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Abstract

The overpopulation of deer in suburban environments is a major problem in the eastern and central United States. In Fairfax County, overpopulation of deer damages the ecology, creates significant property loss through damage to landscapes and collisions with cars, and supports tick populations that carry disease. Fairfax County employs three methods for managing deer populations, including managed hunts, sharpshooting, and bow hunting. A survey of residents in an area experiencing high densities of deer indicates that attitudes and opinions are deeply divided about the presence of deer and their effects. While the majority express positive opinions of the presence of deer, they also express strong concern about landscape damage, collisions, and disease. The overwhelming majority support lethal methods of management.

INTRODUCTION

My husband and I live in a wooded residential area of Fairfax County, Virginia, which is situated near a large tract of forested parkland. When my husband purchased the property 25 years ago, deer sightings in the area were a rare occurrence. When I arrived as a newlywed almost 12 years ago, we would occasionally see deer browsing nearby. At that time, the property had numerous mature azaleas, as well as large stands of 40-year-old rhododendron that reached 12 to 15 feet in height. Ferns and other shade plants flourished under the trees. In the words of my husband who originally purchased the property primarily because of its landscape, it was a “verdant paradise.” Today, we see deer on our property every day, and the impact of over-browsing on our landscape has been severe. The ferns and shade plants have been completely eradicated, and the forest understory is a sea of dead leaves. The majority of our azaleas have been killed, and the few rhododendron that have survived are stripped of foliage up to a height of six feet or more. Over the past decade, an increasing number of deer have been struck and killed
by vehicles on the road directly in front of our house – and in two instances, badly injured deer
dragged themselves into our front yard before Animal Control arrived to shoot them.

Today, our household is divided on the subject of deer. I am an animal lover, and our
experience with the deer has been a source of concern – not only for our landscape, but also for
the wellbeing of the smaller, thinner, hungrier deer. My husband feels differently: he is angry
about the irreparable damage to his “verdant paradise.”

As we have explored the limited options for dealing with our problem – including a recent
bid to install new landscaping encircled by an 8-foot-high perimeter fence – I have often
wondered, “What about our neighbors – or at least, other people who live in this area where there
are too many deer? Do they share our concerns? What do they think and feel about the
problem?” These questions, along with my desire to learn more about the problem itself, are the
focus of the research project described herein.

The first section of this paper provides an overview of my research into the problem of deer
overpopulation, including an overview of the problem of suburban deer in Fairfax County and
the deer management methods being used. I also provide a review of the existing literature on
public attitudes and opinions towards deer. The second section describes the research methods
used for the project, including a brief data summary. The third section summarizes my results,
which are further described in Appendix A. The last section provides a brief summary of my
conclusions.

RESEARCH OVERVIEW

Background

When the first Europeans explored the American continent, they reported a great
abundance of white-tailed “Virginia deer” (*Odocoileus virginianus*) in the forests of the newly
discovered land. These deer were a mainstay of survival for an estimated 2.3 million Native Americans, providing a major source of food and hides (McCabe and McCabe, 1997). Over the next two hundred years, as unregulated commercial hunting thrived and land was cleared for agriculture and human settlements, the deer population of the United States decreased dramatically. By the turn of the 20th century, the national population of white-tailed deer is estimated to have been less than 100,000 deer (McCabe and McCabe, 1997). In some areas of the country, deer sightings were so rare they were reported in the newspaper (Caturano, 2009).

In the early 1900’s, state governments responded to the decline in population by imposing strict hunting limits; in some cases, reintroduction programs were developed. Further, by the mid-1900’s, wolves and mountain lions, which were the deer’s primary natural predators, were eradicated from the eastern United States (Cote, at al., 2004). Deer had evolved to reproduce at a very high rate due to the heavy predation they traditionally experienced in the wild (Caturano, et al., 2009), and wildlife experts found that without natural predation and hunting to control populations, deer populations could increase by 40 to 50 percent each year (V. Monroe, Fairfax County Wildlife Biologist, personal communication, October 28, 2009). This exponential growth rate is due to the fact that female deer generally breed within a year of birth, have twins in most years, and continue to breed for a typical lifespan of 8 to 10 years (Virginia DGIF, 2009). By the beginning of the 21st century, one hundred years after reaching its historical low, the white-tailed deer population had exploded to an estimated 16 and 20 million within the continental United States (Rondeau and Conrad, 2003). According to the Virginia Department of Game and Inland Fisheries (2009), there are approximately 1,000,000 deer in Virginia today, which may be twice as many deer as when Jamestown was settled in the 1600’s.
Unlike in previous centuries, the habitats of deer in the United States are no longer restricted to natural forests or rural lands. As the numbers of deer have increased, and as suburban and exurban development have encroached on natural forests and agricultural land, deer have moved into non-traditional areas in search of food. The optimum habitat for deer is one with extensive borders between forest and open spaces – an “edge” habitat. In edge habitats, leafy plants that thrive in ample sunlight provide an abundant source of food, while the forested areas provide shelter and cover (Humane Society of the United States, 2009). Fairfax County is replete with edge habitats and, as a result of the factors discussed above, has experienced an unprecedented growth in the number of suburban deer.

**Problems With Deer in Fairfax County**

When deer move into suburban environments, citizens tend to enjoy their presence; but over time, citizens also become concerned about the attendant problems (Loker, Decker, Schwager, 1999). These problems are a direct result of deer overpopulation. Like most suburban areas in the eastern and central regions of the United States, the four primary areas of greatest concern to officials and citizens in Fairfax County include impact to the ecology, property loss, deer-vehicle collisions, and disease.

**Impact to the Ecology.** The ecological impact from an overabundance of deer includes effects on both plant and animal life. Deer have a feeding pattern that is described as “browsing,” in which they walk slowly through an area eating small amounts of vegetation from one plant and then another. A mature deer can consume up to 10 pounds of vegetation per day. As deer populations increase, over-browsing begins to occur and a visible “browse line” appears where vegetation up to a height of approximately six feet has been removed.
The effects of over-browsing are being felt in Fairfax County. In some forested areas, experts fear that threatened or endangered plants may have been eradicated; small trees that replenish the forest have been removed, threatening the long-term viability of the forest (V. Monroe, personal communication, October 28, 2009; Monroe, et al., 2009). Small mammals and birds that require adequate forest understory for protection from predators are also affected. According to Cote (2004), “Deer exert cascading effects on animals both by competing directly for resources with other herbivores and by indirectly modifying the composition and physical structure of habitats” (as cited in Fuller 2001, Stewart 2001, Van Wieren 1998). In the Huntley Meadows Park of Fairfax County, over 600 observations by bird enthusiasts between 1987 and 1995 reported a 45% decrease in the number of bird species observed (Ehmann, et al., 1995). In its “Annual Report on the Environment” (2009), Fairfax County reports that, “We have already begun to see a loss of biodiversity that will ultimately lead to a loss of ecosystem stability, with far more widespread and serious effects than the shorter-term effects of overabundant deer (Monroe, et al., 2009).”

**Property Loss.** As the supply of available food is exhausted in natural habitats, deer increasingly move to nearby gardens and yards to forage, which can cause widespread damage to the ornamental plants that comprise residential landscapes. The property loss that occurs as a result of this landscape damage is extensive in some areas of Fairfax County, and is a primary source of complaints about deer from citizens (Fairfax County Supervisor M. Frey, personal communication, November 3, 2009). An indicator of the growth of the problem is seen in the numbers of “Out-of-Season Kill Permits Issued for Deer Damage” in Fairfax County by the Virginia Department of Game and Inland Fisheries. According to its “Annual Report on the Environment” (2009), Fairfax County reports that the number of permits issued annually
increased from 5 in 1989 to 152 in 2007, and the number of deer killed under those permits increased from 25 in 1989 to 245 in 2007 (Monroe, et al., 2009, as cited by Alger, et al., 2009).

**Deer-Vehicle Collisions.** As deer populations increase, collisions between vehicles and deer increase, as well. Nationally, it is estimated that there are 1.5 million deer-vehicle collisions each year (Monroe, et al., 2009). Although most collisions do not result in human injury or death, damage to vehicles is common (Virginia DGIF, 2009; V. Monroe, personal communication, October 29 2009). Nationally, over $1.5 billion in damage occurs due to deer-collisions each year, and Virginia is ranked 7th highest in terms of damage by the Insurance Institute for Highway Safety (Monroe, et al., 2009). It is estimated that nearly 1 in 136 Virginia drivers will have an accident involving deer in the current year, and over 48,000 Virginia drivers are projected to file insurance claims for damage resulting from a deer-vehicle collision (Monroe, 2009). Fairfax County police have estimated that between 18,000 and 22,500 deer-vehicle collisions occurred in the county from 1998 through 2002; of the accidents that required police presence, it is estimated that the average damage per vehicle was about $2,300. (Monroe, et al., 2009)

**Disease.** Tick borne diseases such as Lyme disease are often associated with deer. Deer are not carriers of Lyme disease – in fact, they have a substance in their blood that kills the bacteria that causes the disease. However, deer are considered a Lyme “vector” because they transport ticks on their bodies, which in turn assists in maintaining tick populations (U.S. Centers for Disease Control, 2009; V. Monroe, personal communication, October 28, 2009). Although there are many areas of Fairfax County that have an overabundance of deer and have not reported a higher incidence of tick borne diseases, there are some areas, such as the Country Club Manor neighborhood, which have experienced an unusually high incidence of Lyme
According to its “Annual Report on the Environment” (2009), Fairfax County reports that the number of Lyme disease cases reported in the county increased from 14 in the period from July 1994 to June 1995, to at least 197 in the period from January to December 2008 (Arias, et al., 2009, as cited by Fairfax County Department of Health). In Fairfax neighborhoods where Lyme disease is a problem, citizens tend to be concerned about the overabundance of deer (M. Frey, personal communication, November 3, 2009). Experts say that it is unclear whether reducing the number of deer in an area will affect the incidence of Lyme disease since the disease is actually carried by other species which may also be in abundance (Arias, et al., 2009). However, Fairfax County has utilized sharpshooting in the Country Club Manor area to decrease the number of deer, and a decrease in the incidence of Lyme disease has been observed (M. Frey, personal communication, November 3, 2009).

**Deer Management in Fairfax County**

Deer management programs in Fairfax County are failing to adequately control the negative consequences of overpopulation. Indeed, it is an unfortunate fact that the primary means of controlling deer populations in Fairfax County – and most suburban areas in the United States – is through vehicular collision (V. Monroe, personal communication, October 29, 2009). Local governments wanting to address the problem of controlling deer are often stymied by the emotional and polarized responses of citizens when the subject is considered (Kirkpatrick and Turner, 1997). Opinions often range widely: at one end of the spectrum, some citizens want to protect the deer at all costs; at the other end of the spectrum, some citizens see the deer as pernicious pests that should be killed at all costs. The realities of limited resources and budgets,
along with debate among experts regarding the best methods for controlling populations, combine to make deer management a particularly difficult issue for local officials.

The Fairfax County Board of Supervisors has approved three methods of deer management, including managed hunts, sharpshooting, and bow hunting (V. Monroe, personal communication, October 29, 2009). The county employs one full-time Wildlife Biologist who has responsibility for addressing all wildlife-related issues in the county, including the implementation of the county’s deer management efforts. In Fiscal Year 2009, the county allocated a wildlife management budget of $125,000 (not including the salary and benefits of the Wildlife Biologist, or regular compensation for other county officials in the police and park departments who assist in her duties). Due to recessionary constraints, the budget approved for Fiscal Year 2010 eliminated the previous year’s funding; however, after concern was expressed about the public safety implications of this decision, the Board of Supervisors reinstated $47,000 in funding (M. Frey, personal communication, November 3, 2009; Mark Matthews, Fairfax County budget official, personal communication, November 9, 2009).

**Managed Hunts.** Since December of 1997, managed hunts have been approved for selected parks in Fairfax County. Local hunters must apply to participate, and if accepted, must (i) take a mandatory hunter safety course, and (ii) be certified by the county for being shotgun-qualified. Fairfax County has an excellent safety record with its managed hunts. Moreover, the hunts are extremely cost effective, as permit fees in recent hunts have exceeded program costs. According to its “Annual Report on the Environment” (2009), Fairfax County reports that eleven managed hunts conducted in the fall and winter of 1999 to 2001 involved 355 hunters and harvested 546 deer. In the 2002-2003 season, the county netted a profit of $79.60 for each animal killed (Monroe et al., 2009).
**Sharpshooting.** Members of the Police Department Special Operations Division tactical teams are utilized as sharpshooters in Fairfax County. These highly trained marksmen must engage in training on a regular basis in order to maintain expert proficiency; instead of practicing on a shooting range, deer hunts allow them to shoot live targets in a field setting that more closely approximates true tactical situations. According to its “*Annual Report on the Environment*” (2009), Fairfax County reports that a total of 199 deer were harvested by sharpshooters in 2007-2008. In the most recent estimates, each deer harvested by a sharpshooter costs $29.58 (Monroe et al., 2009). All deer were donated to a charitable organization that provides food for the hungry.

**Bow Hunting.** Except in certain specific cases, including managed hunts conducted by the county, it is illegal for citizens to hunt wildlife in Fairfax County. An exception is made by the county to allow archers who have obtained a permit to hunt deer on private land. Bow hunting is considered to be effective in suburban areas because it is deemed safer than the use of firearms, and it is the only deer management method that can be employed by citizens. According to its “*Annual Report on the Environment*” (2009), Fairfax County reports 1,095 deer were killed by bow hunting in 2008, up from 854 deer during the previous year.

**Nonlethal Methods.** Many advocates for animals, including the Humane Society of the United States, support the use of non-lethal methods for controlling deer. Two methods of immunocontraception (birth control) have been successfully used in controlled settings, and one method has recently been approved by the Environmental Protection Agency. (Dr. Alan Rutberg, personal communication, November 23, 2009). To be effective, tests show that up to 80% of the female deer in a local area must be injected as frequently as every two years. For this reason, this method is considered to be the most expensive means of controlling deer populations.
Literature on Attitudes and Opinions

There have been several studies regarding public opinion and attitudes towards various aspects of the overabundance of deer and the use of deer management methods. Telephone surveys, mail surveys, and door-to-door surveys have been used. Green, Askins and West (1997) report that of 102 citizens contacted by telephone in Chincoteague, Virginia, 95.5% had seen deer in the last year, 69.3% knew about the deer problems in the area, 54.5% had experienced damage to their gardens, and 23.9% reported vehicular damage. The majority of citizens (69.3%) enjoyed seeing the deer, but those who had experienced problems were less likely to report enjoying deer.

Kilpatrick, Labonte, and Barclay (2007) conducted a detailed mail survey to assess the “concerns, perceptions, expectations, and support for deer and deer management strategies” in Greenwich, Connecticut. The experiences of homeowners with deer-related problems affected their preferences for deer population size. Citizens directly affected by deer problems also were found to be more accepting of lethal management strategies (as cited in Siemer et al. 2004).

Kilpatrick and Walter (1997) conducted a systematic door-to-door survey in 1996 of 400 of the 600 homes in Groton Long Point, a wealthy enclave of Groton, Connecticut. The community had been experiencing significant damage to landscape plantings for about five years, and a community vote had been held to approve a controlled hunt to thin the herds. The survey examined “residents’ concerns about deer population size, effects of deer on the community, and preferred deer management options.” A total of 183 surveys were completed. Most respondents believed there were too many deer (75%) and that the population should be reduced (83%). More than half of the respondents (53%) had experienced landscape damage, more than one third (39%) had hit or nearly hit a deer with their vehicle, and about one third (33%) of the
respondents or their immediate family had been exposed to Lyme disease. A majority of the respondents (55%) preferred hunting to reduce the population. Birth control was preferred by 26%, but over half (51%) were not willing to spend money on it.

**SURVEY METHODS**

A self-administered, mail-back, written survey was conducted in a residential area of Fairfax County that is experiencing a high density of deer. A commercial marketing company was employed to generate a random list of 500 names from among 3,939 possible names of residents living in a geographical area bounded by (i) State Route 674 (Lawyers Road), (ii) State Route 602 (West Ox Road), (iii) State Route 672 (Vale Road), and (iv) State Route 674 (Hunters Mill Road). A large tract of forested land, including portions of Difficult Run Stream Valley Park, bisects the selected geographic area.

In order to distinguish the survey from other mail items being received by potential respondents, each envelope was hand addressed and had stamped. Since the mailing list contained a large majority of men, each envelope was addressed to the recipient “and family”, and the cover letter indicated that any adult member of the household could respond. The survey was designed as a 4-page folded booklet, with a cover letter on the front and the survey on the following three pages. The first three questions provide a baseline of respondent attitudes and experiences. The remainder of the survey is designed to (i) educate respondents about the challenges associated with an overabundance of deer, and (ii) elicit attitudes and opinions from respondents once the information had been provided. A data sheet with total numbers of responses in each category is provided herein as Appendix “A”.
SURVEY RESULTS

Out of 500 mailed surveys, 216 recipients (43.4%) completed the survey and returned it by mail. Two envelopes were returned with an undeliverable address. Respondents were almost evenly divided among males and females (Fig.26), and a large majority (89%) indicated they had lived in Fairfax County for more than five years. (Fig.27) Of the 199 respondents who provided their year of birth, almost 80% were middle aged, between 40 and 69 years of age. (Fig.29)

As expected due to the geographic boundaries of the survey, three quarters of respondents frequently see deer on their property, with 42% seeing them on a daily basis, and 30% seeing them twice per week. (Fig.2) Also as expected, attitudes about the presence of deer in Fairfax County show deep polarization, with 46% indicating an attitude of “very positive” or “positive,” and 36% describing their attitude as “negative” or “very negative.” (Fig.1) Similarly, when asked how they react to seeing deer on their property, a slight majority (54%) say they enjoy seeing the deer, but a large number (38%) say they consider them to be a nuisance. (Fig.3) When asked about their attitude regarding the possibility of disease and starvation among deer, a majority (60%) indicated it would be very upsetting if it occurred. Ten percent indicated it would be regrettable, and almost a quarter (24%) said nature should be allowed to take its course. (Fig.12)

A substantial majority of respondents (64%) have experienced “severe” or “moderate” damage to their landscape, and a similar majority (66%) says this issue is important to their opinion of deer in the county. (Figs.5&6) Regarding ecological damage due to over-browsing, three quarters of respondents (76%) were “very concerned” or “somewhat concerned”. A large majority of respondents (76%) expressed concern about contracting a tick-borne disease, yet only 17% of respondents had actually been diagnosed while living in Fairfax County. (Fig.11)
One of the most surprising results of the survey involves the number of respondents or members of their immediate family who have had deer-vehicle encounters. A whopping 42% have collided with deer, with 34% having experienced damage to their vehicle. (Fig.7) Whereas only two respondents indicated that human injury had been involved, one of the two respondents provided a heart-wrenching note stating, “Lost two children.” Fully 88% of respondents indicated they were “very concerned” or “somewhat concerned” about the possibility of colliding with deer while driving in Fairfax County. (Fig.8)

The results of the survey clearly show strong support for lethal methods of deer management among respondents. Managed hunts enjoy the support of a significant majority of respondents (89%); a slightly lower majority supports sharpshooting (66%). (Figs 16&19) About half of respondents (52%) support bow hunting, but unlike other lethal methods, a significant amount of opposition was also expressed (36%). (Fig.22) When asked about non-lethal methods of deer management, only 31% of respondents indicated a strong preference for birth control. The remaining responses were evenly divided from “somewhat prefer” to “strongly do not prefer,” with a full 35% indicating that they did not prefer non-lethal methods.

Finally, whereas a large majority felt that the current budget cuts in the annual funding for wildlife services were too deep, a surprising majority of respondents indicated that $125,000 in annual funding was either “about right” or “too high”, with only 26% saying it was “too low”.

When the frequency of deer sightings is cross-tabulated with attitudes about deer, it is easy to see that respondents who see deer more frequently also have stronger attitudes about them – both stronger negative and positive attitudes. Also, when the support for managed hunts (which enjoys the strongest support of all management methods) is cross-tabulated with attitudes about deer, it is interesting to note that whereas respondents who are opposed to hunting predictably
and overwhelmingly have “very positive” opinions of deer, those who support hunting are fairly evenly divided in their attitudes toward deer. In other words, hunting enjoys support equally among all attitudes toward deer.

Charts depicting responses to all the survey questions, along with graphic illustrations of the two cross-tabulations discussed above, are provided in Appendix “B.”

CONCLUSION

As a response to the author’s experience with severe landscape damage incurred as a result of deer overpopulation in her neighborhood, this paper reports on (1) research conducted on the subject of overpopulated deer in suburban areas, with a particular focus on Fairfax County, Virginia, and (2) results of a survey of attitudes and opinions of Fairfax County residents who experience high densities of deer. The research shows that there are significant problems associated with high populations of deer, including potentially irreparable damage to local ecologies, property loss through landscape damage and deer-vehicle collisions, and the possibility of an increased incidence of tick-borne diseases. Fairfax County has implemented a deer management program that incorporates three methods of controlling deer populations, including managed hunts, sharpshooting, and bow hunting. Results of a survey mailed to a random sampling of Fairfax County residents who live in an area of high deer population indicate that attitudes about the presence and problems of deer are deeply divided. Whereas the majority of respondents have a positive attitude about the presence of deer, the number of negative opinions is also substantial. Most respondents have negative opinions about the damage to their landscape, collisions between deer and cars, and tick-borne diseases. Survey results also indicate that there is strong, broad-based support for lethal methods of deer control among the survey respondents.
References


Figure 1
How would you describe your attitude about the presence of deer in Fairfax County?

- Very Positive: 15%
- Positive: 31%
- Neutral: 18%
- Negative: 25%
- Very Negative: 11%
**Figure 2**

*How often do you see deer on or near your property?*

- **Every Day or Almost Every Day**: 42%
- **A Couple of Times Per Week**: 30%
- **Every Week of So**: 17%
- **Occasionally**: 8%
- **Not Often**: 3%
- **Never**: 0%

**Figure 3**

*If you see deer on or near your property, which of the following statements best describes your reaction?*

- **I enjoy seeing the deer**: 38%
- **I don't react one way or the other**: 54%
- **I think the deer are a nuisance**: 10%
**Figure 4**
*What is your opinion of the impact of "over-browsing" by deer on the ecology of forested areas in Fairfax County?*

- Very Concerned: 32%
- Somewhat Concerned: 44%
- No Opinion: 9%
- Not Very Concerned: 9%
- Not Concerned at All: 4%

**Figure 5**
*During the last three years, have you experienced damage to your landscape by deer?*

- Severe Damage: 29%
- Moderate Damage: 35%
- Low Damage: 25%
- No Damage: 11%
- I Have No Landscape: 1%
Figure 6
Is landscape damage important to your opinion of deer in Fairfax County?

![Bar chart showing the percentage of responses for different levels of importance.]

- Definitely Important: 36%
- Somewhat Important: 30%
- Not Sure: 5%
- Not Very Important: 21%
- Not Important At All: 9%

Figure 7
Have you or anyone in your immediate family ever had a vehicle collision with deer?

![Bar chart showing the percentage of responses for different scenarios.]

- Yes, With Human Injury: 1%
- Yes, With Vehicle Damage: 34%
- Yes, No Vehicle Damage: 7%
- Close Call - Almost Hit a Deer: 19%
- No: 38%
Figure 8
How concerned are you about the possibility of colliding with deer when driving in Fairfax County?

- Very Concerned: 48%
- Somewhat Concerned: 40%
- No Opinion: 1%
- Not Very Concerned: 9%
- Not Concerned At All: 1%
Figure 9
Which of the following statements best reflects your attitude when you see dead deer on the side of the road?

- It makes me sad that so many deer are hit by cars. 41%
- It makes me angry that the deer population is so high. 10%
- It makes me worried for the safety of myself and my loved ones. 38%
- It makes me happy there's one less deer in my garden. 3%
- I don't have strong feelings one way or the other. 10%
Figure 10

Have you or anyone in your immediate family been diagnosed by a physician with a tick-borne disease while living in Fairfax County?

- Yes (17%)
- No (82%)
Figure 11
What is your level of concern about contracting a tick-borne disease in Fairfax County?

- Very Concerned: 29%
- Somewhat Concerned: 47%
- No Opinion: 4%
- Not Very Concerned: 16%
- Not Concerned At All: 4%
Figure 12
Which of the following statements best reflects your attitude regarding the fact that deer in Fairfax County may experience disease and starvation without population control?

- 60%: It would be very upsetting to see the deer in Fairfax County become diseased or starve.
- 24%: It would be regrettable to see diseased and starving deer, but the cost of prevention is probably too high.
- 10%: Disease and starvation are nature's way of controlling animal populations, and nature should be allowed to take its course.

Figure 13
Although feeding deer is discouraged by experts, have you ever provided supplemental food (such as deer corn) to the deer in your neighborhood?

- Yes, Both Summer and Winter: 2%
- Yes, Only in the Winter: 1%
- No, But I've Considered It: 7%
- No: 40%
- No, I Object to Feeding Deer: 49%
**Figure 14**

**MANAGED HUNTS**

*Opponents often say they object to hunting deer, and they do not want hunts to be sanctioned and managed by the county. Do you agree?*

![Bar chart showing responses to the question about managed hunts.]

**Figure 15**

**MANAGED HUNTS**

*Advocates often say that hunters are the best free resource for reducing the number of deer, and managed hunts are a good way to involved local hunters. Do you agree?*

![Bar chart showing responses to the question about managed hunts.]
Figure 16

MANAGED HUNTS

Regardless of the reason, do you support or oppose the use of managed hunts as a deer management method in Fairfax County?
**Figure 17**

**SHARPSHOOTING**

*Opponents* often say sharpshooting is too expensive since it requires the use of costly equipment and often requires overtime pay for the sharpshooters. Do you agree?
Figure 18

SHARPSHOOTING

*Advocates* often say that sharpshooting is the most accurate, effective, and safe method of culling deer in suburban and urban settings. Do you agree?

![Bar chart showing percentage of responses to the question about sharpshooting.](chart.png)
Figure 19

SHARPSHOOTING

Regardless of the reason, do you support or oppose the use of sharpshooting as a deer management method in Fairfax County?
Figure 20

**BOW HUNTING**

*Opponents often say that bow hunting has the highest level of wounding of all hunting methods, and they object to the suffering of deer that are wounded and die slowly. Do you agree?*

![Bar chart](image1)

Figure 21

**BOW HUNTING**

*Advocates often say that bow hunting empowers private citizens to reduce the number of deer on their own property. Do you agree?*

![Bar chart](image2)
**Figure 22**

**BOW HUNTING**

*Regardless of the reason, do you support or oppose the use of bow hunting as a deer management method in Fairfax County?*

![Bar Chart](image-url)
Figure 23

In general, would you prefer that suburban deer populations be controlled with non-lethal methods like birth control?

![Bar chart showing preferences for controlling deer populations.]

- Strongly Prefer: 31%
- Somewhat Prefer: 15%
- No Preference: 16%
- Somewhat Do Not Prefer: 18%
- Strongly Do Not Prefer: 17%
Figure 24

Deer birth control is an expensive means of stabilizing and/or reducing the size of deer herds. How much money would you be willing to spend each year to implement and maintain a program of deer birth control in your neighborhood?
Figure 25
What is your opinion of the level of operational funding for wildlife services in Fairfax County?

$125,000
FY 2009

Too High, 16%
About Right, 38%
Too Low, 26%

$40,000
FY 2010

Too High, 2%
About Right, 11%
Too Low, 66%
Subway Car Proxemics and Seating Choice Analysis

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In this observational experiment, the decisions people made in choosing their seats on subway cars relative to the locations of four archetypal passengers was observed. The archetypal passengers were presented as a White male; a Sikh male; an injured Asian female; and an Asian female with makeup and somewhat revealing clothing. The people observed were coded by age, sex and race. Information was organized respective to where the subjects chose to sit relative to the closest archetype’s positioning and then analyzed for patterns. We offer several conclusion which can be refined with further experimentation.

Introduction

The study questions whether people are likely to chose their seating positions based on their proximity to others, and does so by analyzing subjects’ seating choices on a subway cars. The subway system is conducive to an experiment of this nature as it forces people of varying social backgrounds to passively interact.

This paper presents a brief review of existing literature and background of the subject of proxemics; a detailed description of the experiment, our data gathering and analysis methodology; and our conclusions. Further experiments are likely to provide further insight.

Background and Literature Review

The term “proxemics” was popularized in the mid-twentieth century by researcher Edward T. Hall. Proxemics deals with the study of peoples’ use of personal space while interacting in social settings. Hall’s work led to a landmark publication (Hall 1968) which has
been the topic of extensive discussions among social scientists.

Social scientists M.L. Fried and V.J. De Fazio said “The subway is one of the few places in a large urban center where all races and religions and most social classes are confronted with one another and the same situation” (Vanderbilt, 2009). Researchers have published many studies of experiments conducted on public transportation; however, none that we have located or reviewed focused directly on seating choice behavior.

One relevant study by Maines observed touching behavior on New Your City’s subway to evaluate whether homogeneous behavior patterns could be validated (Maines 1977). A major similarity to the present study is Maines’ coding of race for data evaluation (Maines 1977). Maines’ study differs from this work in that its major questions concern physical touch, while we rely on seating choices that do not include physical contact.

**Description of the Experiment**

This experiment took place on November 21, 2009, which fell on a Saturday, from midday until early evening, and consisted of four trips along the Washington, D.C. Metro subway system. The first trip was on the “Blue Line” from its beginning in Fairfax County, Virginia, to its end in Prince Georges County, Maryland. The Blue Line passes directly through downtown Washington, D.C. The second trip was the reverse of the first, back to the original station on the Blue Line in Fairfax County. The third trip was on the “Orange Line” from another location in Fairfax County, Virginia, into downtown Washington, D.C., and the fourth trip was back along the Orange Line to its origin in Fairfax County, Virginia.

On each trip, one of the four archetypes (Coded A, B, C, and D) occupied one of four
designated seats in the middle of a train car. Each designated seat was surrounded by five other seats, in total offering twenty seats surrounding the four archetypes. The seats were labeled by proximity to the archetypes’ seating position, and are demonstrated in Figure 1:

![Fig. 1](image)

The four Archetypes were coded as follows:

A) White male  
B) Sikh male  
C) Injured/sick Asian female  
D) Asian female with makeup and somewhat revealing clothing

All archetypes appear to be in their early twenties to early thirties in age, and are demonstrated in Figures 2A-2D:
The experiment relied on observing subjects boarding the train car and recording in which of the 20 seats they chose to sit in. Two people coded the data of subjects sitting in each seat by age (U60, U50, U40, U30, U20, U10), sex (M, F), and race (W, B, A, L, O); in which coding the age represented the subject being under a certain age, sex represented male or female, and race represented White, Black, Asian, and Other.

The subject data coding was entered into Microsoft Excel spreadsheets on laptop computers by archetypes A and C, where each was responsible for recording data on seats surrounding two of the four archetypes.
## Data

### Archetype A:

<table>
<thead>
<tr>
<th>A1</th>
<th>A2</th>
<th>A3</th>
<th>A4</th>
<th>A5</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>B</td>
<td>30</td>
<td>F</td>
<td>A</td>
</tr>
<tr>
<td>F</td>
<td>B</td>
<td>20</td>
<td>F</td>
<td>B</td>
</tr>
<tr>
<td>M</td>
<td>W</td>
<td>30</td>
<td>M</td>
<td>O</td>
</tr>
<tr>
<td>M</td>
<td>B</td>
<td>30</td>
<td>F</td>
<td>W</td>
</tr>
<tr>
<td>M</td>
<td>W</td>
<td>30</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total by Seat</th>
</tr>
</thead>
<tbody>
<tr>
<td># by Seat</td>
</tr>
<tr>
<td>Ave by Seat Type</td>
</tr>
<tr>
<td>Variance</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total by Section</th>
</tr>
</thead>
<tbody>
<tr>
<td># by Section</td>
</tr>
<tr>
<td>Ave by Section</td>
</tr>
<tr>
<td>Variance</td>
</tr>
</tbody>
</table>

### Gender by Seat

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Female</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Ratio Male to Female</td>
<td>1</td>
<td>(1)</td>
</tr>
<tr>
<td>Ave Difference</td>
<td>(0.8)</td>
<td>(1.8)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gender by Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Male</td>
</tr>
<tr>
<td>Total Female</td>
</tr>
<tr>
<td>Variance</td>
</tr>
<tr>
<td>Average Variance</td>
</tr>
<tr>
<td>Difference, Men to Women</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Race by Seat &amp; Section</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>White</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Asian</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Hispanic</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Race by Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>White</td>
</tr>
<tr>
<td>Asian</td>
</tr>
<tr>
<td>Other</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age by Seat</th>
</tr>
</thead>
<tbody>
<tr>
<td>#</td>
</tr>
<tr>
<td>Ave</td>
</tr>
<tr>
<td>Var</td>
</tr>
</tbody>
</table>
## Archetype B:

<table>
<thead>
<tr>
<th></th>
<th>B1</th>
<th>B2</th>
<th>B3</th>
<th>B4</th>
<th>B5</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>B 30</td>
<td>F</td>
<td>B 30</td>
<td>F</td>
<td>W 30</td>
</tr>
<tr>
<td>F</td>
<td>W 40</td>
<td>F</td>
<td>W 10</td>
<td>M</td>
<td>B 30</td>
</tr>
<tr>
<td>F</td>
<td>W 50</td>
<td>M</td>
<td>B 20</td>
<td>M</td>
<td>B 30</td>
</tr>
<tr>
<td>F</td>
<td>W 60</td>
<td>F</td>
<td>W 50</td>
<td>F</td>
<td>W 50</td>
</tr>
</tbody>
</table>

**Total by Seat**

| # by Seat | 4 | 4 | 3 | 1 | 6 |
| Ave by Type | 4.8 | 4.3 | 2.3 | 2.8 | 6.3 |
| Variance | 84% | 94% | 133% | 36% | 96% |

**Total by Section**

| # by Section | 18 |
| Ave by Section | 20.3 |
| Variance | 89% |

**Gender by Seat**

| Male | 1 | 1 | 2 | 0 | 4 |
| Female | 3 | 3 | 1 | 1 | 2 |

**Ratio Male to Female**

| (2) | (2) | 1 | (1) | 2 |

**Ave Difference**

| (0.8) | (1.8) | (0.3) | (1.8) | 0.3 |

**Gender by Section**

| Male | 8 |
| Female | 10 |

**Total Male**

**Total Female**

| Variance | 80.0% |
| Average Variance | 72.4% |
| Difference, Men to Women | 7.6% |

**Race by Seat & Section**

| Black | 1 | 1.8 | -0.8 | 2 | 1.5 | 0.5 | 2 | 1.0 | 1.0 | 0 | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 4 | 2.0 | 2.0 |
| White | 2 | 2.0 | 0.0 | 3 | 2.3 | 0.8 | 1 | 1.0 | 0.0 | 1 | 2.8 | -1.8 | 2 | 3.5 | -1.5 |
| Asian | 0 | 0.0 | 0.0 | 0 | 0.5 | -0.5 | 0 | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 0 | 0.0 | 0.0 |
| Hispanic | 0 | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 0 | 0.0 | 0.0 | 0 | 0.3 | -0.3 |
| Other | 0 | 0.5 | -0.5 | 0 | 0.3 | -0.3 | 0 | 0.3 | -0.3 | 0 | 0.0 | 0.0 | 0 | 0.5 | -0.5 |

**Race by Section**

| Black | 9 | 6.25 | 2.75 |
| White | 9 | 11.5 | -2.5 |
| Asian | 0 | 0.5 | -0.5 |
| Other | 0 | 1.75 | -1.75 |

**Age by Seat**

| 45 | 32 | -42% |
| 28 | 27 | 0% |
| 30 | 33 | 9% |
| 50 | 33 | -51% |
| 38 | 34 | -12% |

**Age by Section**

| 38 | 32 | -20% |
**Archetype C:**

<table>
<thead>
<tr>
<th>C1</th>
<th>C2</th>
<th>C3</th>
<th>C4</th>
<th>C5</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>W 30</td>
<td>F</td>
<td>W 10</td>
<td>F</td>
</tr>
<tr>
<td>F</td>
<td>B 20</td>
<td>M W 10</td>
<td>F</td>
<td>M B 30</td>
</tr>
<tr>
<td>F</td>
<td>- 30</td>
<td>F B 20</td>
<td>F</td>
<td>W 30</td>
</tr>
<tr>
<td>M</td>
<td>W 50</td>
<td>M A 30</td>
<td>F</td>
<td>W 20</td>
</tr>
<tr>
<td>M</td>
<td>O 40</td>
<td>F W 60</td>
<td>M</td>
<td>W 30</td>
</tr>
<tr>
<td>F</td>
<td>W 40</td>
<td>F W 40</td>
<td>F</td>
<td>W 60</td>
</tr>
</tbody>
</table>

**Total by Seat**

<table>
<thead>
<tr>
<th># by Seat</th>
<th>Ave by Seat Type</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>4.8</td>
<td>147%</td>
</tr>
<tr>
<td>7</td>
<td>4.3</td>
<td>165%</td>
</tr>
<tr>
<td>2</td>
<td>2.3</td>
<td>89%</td>
</tr>
<tr>
<td>4</td>
<td>2.8</td>
<td>145%</td>
</tr>
<tr>
<td>6</td>
<td>6.3</td>
<td>96%</td>
</tr>
</tbody>
</table>

**Total by Section**

<table>
<thead>
<tr>
<th># by Section</th>
<th>Ave by Section</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>20.3</td>
<td>128%</td>
</tr>
</tbody>
</table>

**Gender by Seat**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Male</th>
<th>Female</th>
<th>Ratio Male to Female</th>
<th>Ave Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>2</td>
<td>5</td>
<td>(3)</td>
<td>(0.8)</td>
</tr>
<tr>
<td>Female</td>
<td>2</td>
<td>1</td>
<td>(3)</td>
<td>(1.8)</td>
</tr>
</tbody>
</table>

**Gender by Section**

<table>
<thead>
<tr>
<th>Total</th>
<th>Male</th>
<th>Female</th>
<th>Difference, Men to Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>7</td>
<td>19</td>
<td>-36.6%</td>
</tr>
<tr>
<td>Female</td>
<td>19</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Race by Seat & Section**

<table>
<thead>
<tr>
<th>Race</th>
<th># by Seat</th>
<th>Ave</th>
<th>Var</th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>3</td>
<td>1.8</td>
<td>1.3</td>
<td>2</td>
<td>1.5</td>
<td>0.5</td>
<td>1</td>
<td>1.0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2.0</td>
<td>-2.0</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>White</td>
<td>2</td>
<td>2.0</td>
<td>0.0</td>
<td>4</td>
<td>2.3</td>
<td>1.8</td>
<td>1.0</td>
<td>1.0</td>
<td>-1.0</td>
<td>4</td>
<td>2.8</td>
<td>1.3</td>
<td>3.5</td>
<td>2.5</td>
<td>0</td>
</tr>
<tr>
<td>Asian</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
<td>1</td>
<td>0.5</td>
<td>0.5</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>Hispanic</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
<td>0.3</td>
<td>-0.3</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>0.5</td>
<td>0.5</td>
<td>0</td>
<td>0.3</td>
<td>-0.3</td>
<td>1</td>
<td>0.3</td>
<td>0.8</td>
<td>0</td>
<td>0</td>
<td>0.5</td>
<td>-0.5</td>
<td>0.25</td>
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</table>

**Race by Section**

<table>
<thead>
<tr>
<th>Race</th>
<th># by Section</th>
<th>Ave</th>
<th>Var</th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>6</td>
<td>6.25</td>
<td>-0.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>16</td>
<td>11.5</td>
<td>4.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td>1</td>
<td>0.5</td>
<td>0.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>1.75</td>
<td>0.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Age by Seat**

<table>
<thead>
<tr>
<th>Age</th>
<th># by Seat</th>
<th>Ave</th>
<th>Var</th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td>33</td>
<td>32</td>
<td>-4%</td>
<td>27</td>
<td>27</td>
<td>1%</td>
<td>35</td>
<td>33</td>
<td>-6%</td>
<td>30</td>
<td>33</td>
<td>9%</td>
<td>45</td>
<td>34</td>
<td>-31%</td>
</tr>
</tbody>
</table>

**Age by Section**

<table>
<thead>
<tr>
<th>Age</th>
<th># by Section</th>
<th>Ave</th>
<th>Var</th>
</tr>
</thead>
<tbody>
<tr>
<td>34</td>
<td>32</td>
<td>32</td>
<td>-7%</td>
</tr>
</tbody>
</table>
**Archetype D:**

<table>
<thead>
<tr>
<th></th>
<th>D1</th>
<th>D2</th>
<th>D3</th>
<th>D4</th>
<th>D5</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>W 10</td>
<td>F W 20</td>
<td>F W 60</td>
<td>F W 20</td>
<td>M O 20</td>
</tr>
<tr>
<td>F</td>
<td>W 20</td>
<td>F W 20</td>
<td>M W 30</td>
<td>M W 10</td>
<td>F W 10</td>
</tr>
<tr>
<td>F</td>
<td>W 20</td>
<td>F B 20</td>
<td>F B 20</td>
<td>M B 20</td>
<td>M W 20</td>
</tr>
<tr>
<td>M</td>
<td>O 30</td>
<td>M B 30</td>
<td>M B 30</td>
<td>M W 30</td>
<td></td>
</tr>
</tbody>
</table>

**Total by Seat**
- # by Seat: 6
- Ave by Seat Type: 4.8 4.3 2.3
- Variance: 105% 47% 133%

**Total by Section**
- # by Section: 18
- Ave by Section: 20.3
- Variance: 89%

**Gender by Seat**
- Male: 3 0 1 1 4
- Female: 2 2 2 1 2
- Ratio Male to Female: 1 (2) (1) - 2
- Ave Difference: (0.8) (1.8) (0.3) (1.8) 0.3

**Gender by Section**
- Total Male: 9
- Total Female: 9
- Variance: 100.0%
- Average Variance: 72.4%
- Difference, Men to Women: 27.6%

**Race by Seat & Section**
- Black: 1 1.8 -0.8 0 1.5 -1.5 1 1.0 0.0 0 0.0 0.0 2 2.0 0.0
- White: 3 2.0 1.0 2 2.3 -0.3 2 1.0 1.0 2 2.8 -0.8 3 3.5 -0.5
- Asian: 0 0.0 0.0 0 0.5 -0.5 0 0.0 0.0 0 0.0 0.0 0 0.0 0.0
- Hispanic: 0 0.0 0.0 0 0.0 0.0 0 0.0 0.0 0 0.0 0.0 0 0.3 -0.3
- Other: 1 0.5 0.5 0 0.3 -0.3 0 0.3 -0.3 0 0.0 0.0 1 0.5 0.5

**Race by Section**
- Black: 4 6.25 -2.25
- White: 12 11.5 0.5
- Asian: 0 0.5 -0.5
- Other: 2 1.75 0.25

**Age by Seat**
- #: 22 32 20 27 37 15 33 34
- Ave: 30% 27% 27% -11% 55% 18 34
- Var: 47%

**Age by Section**
- #: 22
- Ave: 32
- Var: 30%
Data Analysis

The data analysis process expresses averages for subject coding by seats and sections in relation to archetypes. The overall averages for each seat position are then compared by variance to the averages for the corresponding archetypal positions.

This method reveals whether a certain number of specifically coded subjects in a specific seating position for a specific archetype represented a significant trend, or a characteristic fairly common to all similar seat position seats for the other three archetypes.

**Example:** The average of Black males choosing seat position 3 for each archetype (A3, B3, C3, and D3) are calculated, and then compared for variance to average position 3 recordings for archetype B (B3).

This variance revealed that Black males were more likely to sit in closer proximity to Archetype B than any other coded subject group, and that Black males as a group chose to sit closest to Archetype B in comparison to the other three archetypal characters.

There is some concern with the nature of the data collection method, as observers coded individuals by observation rather than a subject’s self-identification. Since it was not possible to have each subject self-identify, reliance on observation was necessary. While these methods of coding may present a small margin of error, however, they are not expected to have a significant impact on the results.
Conclusions

Based on the data obtained from this experiment, we can draw several preliminary conclusions:

- Subjects coded as White females (F/W) were more likely to sit in closer approximation to the injured/sick Asian female archetypal character (Archetype C) than any other coded group. This grouping of subjects chose to sit closest to Archetype C in comparison to the other three archetypal characters.

- Subjects coded as Black males (M/B) were more likely to sit in closer approximation to the Sikh male archetypal character (Archetype B) than any other coded group. This grouping of subjects chose to sit closest to Archetype B in comparison to the other three archetypal characters.

- Subjects coded as White males under 30 (M/W/U30) were more likely to sit in closer proximity to the Asian female with ‘pin-up girl’ style make-up and dress archetypal character (Archetype D) than the any of the other coded group. This grouping of subjects chose to sit closest to Archetype D in comparison to the other three archetypal characters.

- No particular grouping of coded subjects were more or less likely to sit in closer approximation to the White male archetypal character (Archetype A) than any other coded group in their approximation to any of the other archetypal characters.
Also consider the following data, which is expressed in visual graphs:

**Choice by Gender:**

![Graph showing choice by gender](image)

The two obvious trends include a disproportionate number of females sitting by Catherine (Archetype C) and males sitting by Kim (Archetype D).

**Choice by Age:**

![Graph showing choice by age](image)
The oldest group sits by Simran (Archetype B) while the youngest surrounds Kim (Archetype D).

**Choice by Race:**

African Americans are most likely to sit by Simran, while Caucasians (women) are clearly more willing to sit near Catharine.
Works Cited and Reviewed


Sarah Palin and Hillary Clinton: A Linguistic Comparison

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Georgetown University

Abstract

Sarah Palin’s communication style has led some people to question her preparedness for high-level government service. For this reason, we have chosen to compare Sarah Palin’s speech to that of another contemporary politician, Hillary Clinton, using the Flesch-Kincaid grade-level analysis formula. The study analyzed matching pairs of extemporaneous and prepared speeches by Palin and Clinton using mostly transcripts from the public domain and, in one case, a transcript prepared by the author from an audio clip. When the results were averaged, patterns emerged with respect to the difference in grade level between each speaker’s extemporaneous speech and prepared speech, as well as between both politicians’ speech. Although the analysis yielded differences between the two speakers, the author concludes that the Flesch analysis that was performed was of little value in determining the real-life quality of the subjects’ speech. The author suggests that a more thorough analysis of content, grammar, themes, etc., may be necessary for a true understanding of readability.

Regardless of one’s politics, Sarah Palin’s unique speaking style often evokes strong reactions. People who like Palin’s way of speaking praise her sense of realness and her use of plain-talk. “She talks like we do” (as cited in Copeland, 2008, pg. 13), Susan Geary said, often speaking in what Libby Copeland refers to as “mom language” (2008, pg. 17). Copeland also cited Palin’s folksiness as part of her appeal: “She says ‘heck’ and ‘darn’ and ‘gosh’ and ‘shoot’ and ‘oh, gee’” (2008, pg. 20). Her energy and expressiveness also attract people. “As a career classroom teacher, I can see how smart she is...So she doesn’t speak the King’s English—big whoop!...She uses language with the jumps, breaks and rippling momentum of a be-bop saxophonist,” wrote Camille Paglia (2008, pg. 18).

On the other hand, some people are left puzzled by Palin’s speech. “There are a lot of things to ridicule about Sarah Palin’s incomprehensible speaking style,” wrote Bob Cesca (2008, pg. 15). David Stemler seemed to agree, citing the disjointed nature of her speech: “Her farewell
speech was yet another example of her nonsensical rambling and unparalleled disregard for syntax” (2009, pg. 1). Grammar seems to be lacking, as well, according to Maureen Dowd, who accused Palin of “dangl[ing] gerunds, mangl[ing] prepositions, randomly exil[ing] nouns and verbs and also — ‘also’ is her favorite vamping word — us[ing] verbs better left as nouns” (2008, pg. 16). Logic may also be an issue. “With her pompom patois and sing-songy jingoism,” wrote Dowd, “Palin can bridge contradictory ideas that lead nowhere” (2008, pg. 10). These opposing viewpoints demonstrate that Palin’s style is not only unique, but it is also polarizing.

Whether we agree with all, some or none of the above statements regarding Palin’s speech, we do know that her creative communication style has led some people to question her readiness for office. If it is true that high-level government service requires high-level communication skills, and if communication skills are measurable, the author believes that it may be useful to analyze Palin’s speaking abilities and compare her style to that of another contemporary politician. Perhaps then people will be better equipped to judge whether either speaker possesses the skills necessary for whatever position she may seek.

On this basis the author undertook a study of Sarah Palin’s speech in comparison to Hillary Clinton’s speech using the Flesch formula. The author attempted to answer two questions in this regard. First, how do Sarah Palin and Hillary Clinton compare in two categories—extemporaneous and prepared speech? And secondly, which of the two speakers exhibits the greater difference between extemporaneous and prepared speech?

**Literature Review**

The readability of written material has been an issue since the first world war.
During the war, incoming servicemen were being classified according to newly developed mental testing tools. As educators became aware of the great disparity of reading skills among servicemen, they recognized the need to communicate with recruits of all levels. According to Maxwell (1978), educators consequently began to seek “an objective way of quantifying readability” (p. 525).

When the war ended, the quest for readability measures continued. Educators, influenced by Thorndike’s 1921 publication of frequently used words, began to create more simplified textbooks with restricted vocabularies. In 1935, Gray and Leary then questioned several hundred avid readers on readability factors, and, while only “5% of the responses could be measured objectively,” the results of the survey were used in devising readability formulas (Maxwell, 1978, p. 526). By the next decade, Rudolf Flesch, through his extensive writings on the subject, had begun to promote readability and plain-speak, which has since “become the ‘lingua franca’ of the educated” (Maxwell, p. 526).

While their use is now widespread, it is important to recognize the risks involved in misusing simplistic readability formulas like Flesch’s. Analyzed improperly and without an awareness of inherent limitations, the results of these formulas on particular passages can be deceptive. Additionally, the broad acceptance of such formulas may explain beliefs that today’s texts and speeches are generally of lower quality than those of the past (Maxwell, 1978). To minimize the risk of misapplication of and over-reliance on these formulas, it is advisable to test the readability of any given passage using a representative sample of real people.1

After all, real-world comprehension depends in part on factors not measured by simplistic readability assessments. Semantics and syntax, for example, are necessary readability factors for
human audiences. Content, especially the appropriateness of the concepts, is also important for true reading comprehension.

Data and Methods

In order to answer the two research questions presented above, the author devised matching pairs of speeches in each of the two categories, extemporaneous and prepared, designating Palin’s speeches with an SP and Clinton’s speeches with an HC; following the subjects’ initials, the speeches of each matched set are labeled with matching numbers (see Table 1, Appendix A). The first category of speeches, Palin’s and Clinton’s extemporaneous speeches, includes three sets of interviews and two sets of debates. The first set of interviews, SP1A and HC1A, are by Couric. Because of speculation that Couric was unfair to Palin, we included an interview by someone known to be friendly toward Palin; thus, SP1B and HC1B represent a second set of interviews by non-aggressive interviewers. The third and final set of interviews, SP1C and HC1C, are matched based on substance, as each interviewer questioned the respective interviewee on her world views. Finally, SP2 and HC2 are early-campaign debates, and SP3 and HC3 are later-campaign debates.

The second category of speeches, Palin’s and Clinton’s prepared speeches, consists of one set of convention speeches, one set of stump speeches, and two sets of relatively recent speeches. More specifically, SP5 and HC5 are both convention speeches, and SP6 and HC6 are both late-campaign stump speeches. SP7 and HC7, two relatively recent speeches, relate to stepping down from office or from nomination. And finally, in two recent speeches, SP8 and HC8, each speaker addresses her respective near-future career plans (see Table 1).
Most of the data in the two categories was downloaded from various sources in the public domain (see Appendix A). However, in one case, where transcripts were not available, the author transcribed the speech from an audio clip (see Appendix B). Due to the unavailability of a video or an audio clip for HC4, we eliminated the set of press conferences, SP4 and HC4, from the analysis (see Table 1).

### Data Selection

<table>
<thead>
<tr>
<th>Extemporaneous Speech</th>
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<tr>
<td>SP1A and HC1A</td>
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<td>SP1B and HC1B</td>
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<td>SP1C and HC1C</td>
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<td>SP2 and HC2</td>
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<td>SP3 and HC</td>
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<th>Prepared Speeches</th>
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<td>SP4 and HC4</td>
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<td>SP6 and HC6</td>
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<tr>
<td>SP7 and HC7</td>
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<td>SP8 and HC8</td>
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Each of the transcripts noted above was analyzed using the Flesh reading statistics tool in Word for Windows 2003, focusing mainly on the Flesch-Kincaid grade-level assessment. Grade level is determined using the following formula, where grade level = \((0.39 \times \text{ASL}) + (11.8 \times \text{ASW}) - 15.59\). The formula consists of two variables—ASL, average sentence length; and ASW, average number of syllables per word.
Results

Each of Palin’s extemporaneous speeches was first compared, set by set, to Clinton’s speeches in the same category (see Table 2). In the first set of interviews (by Couric), Palin’s speech ranked a grade-level of 7.8 to Clinton’s 4.4, a difference of 3.4 grade levels. In the second set of interviews, the Hewitt and Smalley interviews, Palin scored higher again, with a grade level of 9.5 to Clinton’s 7.5, a difference of 2 grade levels. In the final set of interviews, Clinton finally surpassed Palin, ranking at a grade level of 11.0 to Palin’s 9.5, a difference of 1.5 grade levels. In the first set of debates, Palin outscored Clinton by 3.3 grade levels, ranking at a grade level of 12.7 to Clinton’s 9.4. In the second set of debates, their scores were close, with Palin ranking at a grade level of 9.1 and Clinton at a grade level of 9.2.

Each of Palin’s prepared speeches was then compared, set by set, to Clinton’s speeches in the same category (see Table 2). In the first set of prepared speeches, the convention speeches, Palin scored a grade level of 8.5 to Clinton’s 7.7, a difference of .8 grade levels. Palin scored higher than Clinton again on her stump speech, with a grade level of 9.4 to Clinton’s 7.5, a difference of 1.9. In the third set of speeches, however, Clinton ranked slightly higher than Palin, speaking at a grade level of 9.8 on her concession speech to Palin’s 9.0, a difference of 2.4 grade levels. And finally, in the last set of prepared speeches, Clinton scored higher than Palin again, with a grade-level ranking of 13.3 on her confirmation hearing prepared remarks to Palin’s 10.9 on her farewell speech, a difference of 2.4.

When the results from all of the speeches are averaged, patterns become evident (see Figure 1). We see trends when comparing one speaker’s extemporaneous speech to her own prepared speech, for instance. We find that Palin scored slightly higher on extemporaneous speech than prepared speech, with a difference of .2 grade levels. The pattern reverses with
Clinton, who scored higher on prepared speech than on extemporaneous speech, with a more significant grade-level difference of 1.3. We also see trends when comparing the speech of each speaker to the other in each of the two categories. At a grade level of 9.7, Palin scored 1.4 grade levels higher on her extemporaneous speech than did Clinton, who scored at a grade level of 8.3. On the other hand, Clinton, at a grade level of 9.6, scored .1 grade level higher on her prepared speeches than did Palin, who scored a 9.5.

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<th>Flesch Readability Statistics Results</th>
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<td>Characters Per Word</td>
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<td>Extemporaneous</td>
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<td>SP1B</td>
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Because the analysis yielded unexpected results, the author decided to further test the model using the speech of a great orator and a renowned genius. As such, text of Sarah Palin’s farewell speech, SP8, randomly selected from among the transcripts already collected, was compared to the text of Martin Luther King, Jr.’s highly regarded speech, I Have a Dream.
Surprisingly, Palin ranked at a grade level of 10.9 while Martin Luther King, Jr., ranked at a level of 8.8.

Palin’s speech was then compared to an essay by Albert Einstein. It was believed that of all people, Einstein might rank above Palin. However, when his randomly selected essay, *The World as I See It*, was compared to Palin’s farewell speech, Palin’s grade level of 10.9 once again received the higher ranking. Her score beat Einstein’s grade-level assessment of 10.7 by .2 grade levels.

**Discussion**

What began as an examination of the very different speech styles of Sarah Palin and Hillary Clinton ended with findings that challenge the practical utility of the Flesch-Kincaid grade-level formula. While we did discern measurable differences in the categories under study,
we nevertheless conclude that the scores are perhaps of limited value for our purposes. We offer
the following possible explanations regarding the potential shortcomings of our chosen method.

One challenge we encountered was transcriber subjectivity. For example, the placement of periods in the transcription of oral statements makes a difference in test results. When speakers use the word “and,” it is often unclear to listeners whether the word denotes the beginning of a new clause or the beginning of a new sentence. The distinction matters since average sentence length is one of the two variables of the Flesh-Kincaid grade-level formula. Another example is the use of hyphens in compound words. Where one transcriber uses hyphens, another may break a compound word into two separate words. The average number of syllables per word is the second of the two variables of the Flesh formula and, as such, hyphen placement is also important. Lastly, seemingly inconsequential transcription issues, such as the use of words or numerals to represent numbers, can be meaningful. A double-digit number, when represented numerically, counts as a two-letter word; however, the same number, when spelled out, counts as one, long compound word, thereby affecting average number of syllables per word.

Even when speech is accurately and consistently represented, the speaker’s style also affects the validity of readability measures. For example, long sentences increase grade-level assessment even when the speaker rambles or otherwise speaks nonsensically. Concision, on the other hand, decreases grade-level assessment even when it increases clarity. Thus, the length of a passage may not have the same effect on real-world comprehensibility as it does in the Flesch analysis.

To prove the effects of the speaker’s style on grade-level assessment, we randomly generated rambling dummy text (see Appendix C). Most of the letter groupings in the passage that Flesch counts as words are not actual English words, and the passage is nonsensical.
However, a comparison of the Flesch statistics of the dummy text with a set of randomly selected transcripts already collected for the present study, SP1A and HC1A, shows that at a grade level of 10.6, the dummy text ranked 2.8 grade levels above Palin’s 7.8-grade-level speech and 6.2 grade levels above Clinton’s 4.4-grade-level speech. As substantiated by the evidence, therefore, a grade-level assessment alone provides little basis for evaluating real-world speaking ability.

Real-world speaking ability may have more to do with factors *not* measurable by Flesch. In the real world, for instance, content may be more important than mechanics. That is, a passage may be most comprehensible when answers have some relevance to the questions asked, when complete thoughts outnumber incomplete thoughts, when style is backed up by substance, and when grammar is used in a predictable way. Speaking *style*, including inflection, emotional tone, level of formality, etc., may also affect listeners’ perceptions and ability to comprehend.

In conclusion, we must remember to account for the limits of the Flesch method in any analysis of speech. The blind application of the data in this limited study would lead to a conclusion that Sarah Palin communicates at a higher grade level than Hillary Clinton, Martin Luther King, Jr., and Albert Einstein. But such a conclusion fails to recognize the limitations of the formula. Rather than jump to invalid conclusions, we would do better to view with skepticism the use of the Flesch-Kincaid grade-level formula, especially when judging a speaker’s readiness for office.

**Suggestions for Further Research**

The author recommends performing a more comprehensive linguistics evaluation for content, grammar, themes, and the like. It might be interesting to study the relevance and substance of answers, and word frequency, for example. One could also assess and quantify the
occurrence of incomplete thoughts, run-on sentences and the use or nonuse of the personal pronoun. Perhaps one might further attempt to discern patterns regarding the use of catch phrases, talking points, idioms, and colloquialisms. One might additionally note instances where the subjects use logical fallacies, such as the “straw man” or “slippery slope” fallacies, or play to audience sympathy or sentimentality, such as adopting the role of victim. One could also study the following factors: body language, including facial expressions, winking and other affectations; regionalisms; the placement of stress on particular forms of speech (on prepositions, for example); and vocal tone. While applying highly subjective measures may be difficult and time-consuming, a more thorough analysis will presumably produce more satisfactory results.
Endnotes

1 For a Flesch-Kincaid comparison of the speech of Sarah Palin and Joe Biden, see Orr (2008) and Debate (2008).

2 This text was automatically generated at http://www.adhesiontext.com/.
Appendix A

Links to Transcripts

**SP1A** (Palin’s interview with Katie Couric on 9/25/08):
Transcript, Part 1:

Transcript, Part 2:

Video, Part 1A: http://www.cbsnews.com/video/watch/?id=4476649n&tag=related;wc4481383

Video, Part 1B: http://www.cbsnews.com/video/watch/?id=4476721n&tag=related;wc4481383

Video, Part 2: http://www.cbsnews.com/video/watch/?id=4479049n&tag=related;wc4481383

**SP1B** (Palin’s interview with Hugh Hewitt on 9/30/08):
Transcript: http://hughhewitt.townhall.com/blog/g/0c03d39e-df44-41fc-af7d-f2f9a7f56b68

Audio:

**SP1C** (Palin’s interview with Charles Gibson on 9/11/08):
Transcript: http://abcnews.go.com/Politics/Vote2008/Story?id=5782924&page=1

Audio/Video: Not found.

**SP2** (Palin’s gubernatorial debate on 11/2/06):
Transcript: Created by the author.

Audio: http://www.ktoo.org/gavel/audio.cfm

**SP3** (Palin’s Vice-Presidential debate against Biden on 10/2/08):
Transcript: http://www.cnn.com/2008/POLITICS/10/02/debate.transcript/;


**SP4** (Palin’s 7/7/09 press conference upon resignation as Governor)*:
Transcript: Not found.

Video: http://video.google.com/videoplay?docid=-2831629878468947508

*SP4 and HC4 were omitted from the study due to the unavailability of a transcript for HC4.
**SP5** (Palin’s convention speech of 9/3/08):


**SP6** (Palin’s stump speech of 9/3/08):


**SP7** (Palin’s resignation speech of 7/3/09):
Transcript: http://community.adn.com/adn/node/142176

Video: http://community.adn.com/adn/node/142175

**SP8** (Palin’s farewell speech of 7/27/09):

Video, Part 1: http://www.youtube.com/watch?v=hhAnDsXEPEI

Video, Part 2: http://www.youtube.com/watch?v=3ALswHoIpPo&feature=related

**HC1A** (Clinton’s interview with Katie Couric on 2/10/08):
Transcript: http://www.cbsnews.com/stories/2008/02/08/60minutes/main3809538.shtml

Video: http://www.cbsnews.com/video/watch/?id=3814250n&tag=related;photovideo

**HC1B** (Clinton’s interview with Suzanne Smalley on 3/17/08):
Transcript: http://www.newsweek.com/id/120062

Audio/Video: Not found.

**HC1C** (Clinton’s interview with Michael Tomasky on 10/23/07):

Audio/Video: Not found.

**HC2** (Clinton’s Presidential debate on 4/27/07):
Transcript: http://www.msnbc.msn.com/id/18352397/

Audio/Video: Not found.
**HC3** (Clinton’s debate against Obama on 1/31/08):
Transcript: http://www.cnn.com/2008/POLITICS/01/31/dem.debate.transcript/

Audio/Video: Not found.

**HC4** (Clinton’s press conference upon resignation as Senator)*:
Transcript: Not found.

Audio/Video: Not found.

*SP4 and HC4 were omitted from the study due to the unavailability of a transcript for HC4.

**HC5** (Clinton’s convention speech of 8/26/08):

**HC6** (Clinton’s stump speech of 11/3/08):
Transcript: Created by the author (see Appendix B).

Video: http://www.youtube.com/watch?v=geiz_4ayQpc

**HC7** (Clinton’s concession speech of 6/7/08):

Video: http://www.msnbc.msn.com/id/24993082/

**HC8** (Clinton’s Senate confirmation hearing on 1/13/09):

Audio/Video: Not found.
Appendix B

Transcript for SP2, Sarah Palin’s Gubernatorial Debate; November 2, 2006

Well, our land mass is so huge of course here in Alaska. I would have loved to have been everywhere at any one time. And I think it’s so important for candidates to be able to get out there and meet the people, shake their hands, look them in the eyes and hear from them, so, yeah, I have to say that there were a lot of debates and I wish that we could have paired it down to just to a few less so that we could be out there meeting more people.

Well, Libby’s question is what have we not been able to discuss a whole lot about. We’ve discussed the gasline a lot and education a lot. Some of the uniqueness of Alaska and the need to protect that uniqueness, including our hunting and fishing rights and our access to our wildlife resources and managing our resources for abundance so that all of us would have more access to our wildlife resources. Hunting and fishing is somethin’ we haven’t talked a whole lot about in this campaign. It kind of surprised me.

Well, when, if we’re talking about Governor Murkowski’s entire four years, an action that he took that I don’t agree with and I wish would have been reversed, was his unenthusiastic action there on the longevity bonus—making it not be funded, which I think was a grave mistake in the Murkowski administration, for those who are already enrolled in the program, not to fund longevity.

You know, I wanna talk again about the last four years of Governor Murkowski’s terms there, and I think an action that was taken that was good was the predator-control measures that he engaged in in order to grow more moose and more caribou in our word communities. Interior Alaskans were really begging for some assistance there, and Governor Murkowski did do that one right.

Well, it’s more than just health-care benefits, though, and you would have to, you would have to just do it, Larry, in answer to your question. But no, this is also very important and significant in terms of what the voters said back in 98 here in Alaska when they defined, via the constitutional amendment, what marriage is. And marriage was defined as traditional—one man, one woman would constitute a marriage. And inherent in that constitutional amendment, I believe, was the reference also to benefits. So yeah, you would have to follow the judiciary’s rule there until voters would be given the opportunity to go back to the ballot box and clarify that constitutional amendment if need be.

You know, it, it’s tough to say what I would do today, not having all that information that Governor Murkowski had in front of him when he called that, so it’s tough in a hypothetical to answer that, but what I do know is that, again, inherent in that question that was asked on the ballot box that the majority of Alaskans voted for and approved in a constitutional amendment, I think was referenced to benefits, so I think what this will lead to is clarification of that constitutional amendment.

You’re, you’re asking if in front of me were legislation that I would be asked to sign?
I would. And you know it’s no secret that I’m pro-life, and I don’t hide that and nor am I ashamed of that, but, and I am pro-life, and yes, I’m, a proposal like that, I would stand by it.

Well, I don’t think it would be up to me individually, as an individual, to allow, but in the case of the, the life of the mother being in jeopardy, I think there, that, is the acceptable exception, and I think I’ve gone on record on that.

You, you know, with my respect for the sanctity of life and my belief in the potential of life, I know that this aspect of the abortion issue is very sensitive and, you know, it’s a very private matter also, but personally I would choose life.

Again, I would choose life, and certainly I’m, I’m quite confident here that you’re gonna be asking my opponents those same scenarios.

Again, I would choose life.

You know, I, I don’t think that government should be sanctioning or assisting ending life. I, I think that there are many ways to alleviate pain, of course, at the end of life, and again, this is a, a very personal and private and sensitive issue, and I do respect others’ opinions on this, but personally I believe that no, government should not be sanctioning or assisting taking life.

Well, I’ve been blessed to live in southeast and Skagway, which was a great little town there, and then in Ego River and Anchorage also for a bit, but, you know, I think that it would be in the valley, where it is the most progressive and fastest-growing area of the state. There’s a lot of activity. There’s still a lot of uniqueness that is truly Alaskana out there, where you can snow machine from your front yard. In fact, you can get on a trail from the valley and hit gnome on that snow-machine trail. You can hunt, you can fish—all those good things that so many of us live here in Alaska for.

Well, laugh if you will, but that is my answer, yes, is that the valley is large, you know. It’s a, it’s a, the borough is the size of West Virginia. It’s huge. There are plenty of places in there to choose from.

And I am such a supporter of our military, and in my thankfulness and gratefulness, and recognizing the state’s obligation also to fulfill promises, to those military troops who are putting their life on the line in order to protect our freedoms and to protect our safety, we need to do all that we can. I agree with Tony Knowles’s proposals there. I don’t know if the hundred dollars a month will suffice, so as a, as a bonus I think that there are many more things that we can do to fulfill those promises to the military, not just the mental-health care that you’re mentioning, Libby, that would be needed but overall healthcare, education opportunities, workforce development opportunities that our military should be receiving as they return—all that we can do and, as governor, all that I can do to support our military, they can count on me for that.

Well, another hypothetical because you certainly haven’t seen that on the docket there in our university system, stem-cell research, but here again, with a pro-life position—and it’s
interesting that so many questions I guess do revolve around that, that centeredness that I have, of, of respecting life and the potential of every human life—that no, stem-cell research that would ultimately end in destruction of life, I couldn’t support.
Appendix C

Randomly Generated Dummy Text


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References


Introduction

This paper is a discussion of how social functions and institutions adapt to a major disruptive event. Using the structural functionalist perspective that there exists within a society certain structures which function in support of the social framework of a society (Maryanski 1992), we proposed to review the effects of hurricanes (as a social disruptor) on the crime rate in the affected jurisdictions.

Structural functionalism is rooted in the concept of social institutions and social functions. Institutions exist at all levels of society, interconnected by the social fabric organizing a society. These institutions perform a function within society which is necessary for the successful continuation and operation of society. In the modern context a social institution could be a family network, a network of friends, a church, a police department, or the local medical service providers amongst other various examples.
To approach the concept of social change and disruption in a manageable way, this paper focuses upon hurricanes as a destructive and disruptive natural disaster. Social institutions generally exist for a beneficial purpose. Hurricanes by the very nature of the unpredictability and violence of the storm must have some affect on the institution of a society as these institutions adapt and respond to the event. Hurricanes exist for a singular specific period, and as such allow for the ability to track changes associated with the event over a finite period. The police and other first responders are tasked with responding to natural disasters; however this is not their main function within a society. The police act as agents of law enforcement and social control and when they are tasked with responding to events outside their core social role, crime rate resultanty increase.

Literature Review

The focus within the literature review was to identify whether any prior research had been done focusing on the effects of natural disasters on crime. Our review found little in the way of directly applicable research. As a result we focused upon identifying the role of police in society and the affect police have on crime.

The police as an institution do not eliminate crime however they do act to suppress crime levels (Di Tella 2004). Within the functionalist perspective of our review the police act as agents of social control enforcing and regulating the rules governing a society.

Hurricanes are actively studied and tracked. The US National Hurricane Center acts as the center of research and archival source for all hurricane related storm data in the United States. A wide variety of insurance industry sources track the damage caused by hurricanes but no comprehensive database exists outside the US Government. Pielke 2008, provided a
comprehensive review of all hurricane events over a 105 year period, normalizing damage figures to 2005 in order to make comparisons between storms occurring during different time periods.

**Data and Methods:**

The data sources consisted of two set of information, crime information gathered from the US Department of Justice, Bureau of Justice Statistics and various Hurricane data, derived from information gathered from the US National Hurricane Center (Pielke 2008).

The crime data was organized by the total count of violent and property crime committed within a state broken down by year from 1960 – 2005.

The top 50 most destructive hurricanes by monetary damage value from 1900 – 2005 were identified using the normalized hurricane damage information gathered from Pielke 2008. Hurricanes which occurred prior to 1960 were eliminated from the analysis because comprehensive criminal data was not available for prior to 1960. 37 separate hurricane events were then analyzed and compared to the crime statistics at a state level for each state in which the hurricane made landfall.

Crime levels for a 3 year period, the year prior to the hurricane, the year the hurricane struck, and the year following the hurricane were examined to identify trends in the percent of change year to year in the crime level (Appendix A). Years in which multiple hurricanes struck were then further analyzed to identify trends over the period of 1960 - 2005.
Findings

The analysis of the crime trends identified that on average violent crime increased by 2.18% in the period before a hurricane and continued to increase again the year after the hurricane by 4.62%. Property crime increased on average increases 0.76% and 4.25% respectively for over the same period (Fig. 1).

**Fig. 1 Data Set: Most Damage Producing Storms 1960 - 2005**

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<th>Violent Post</th>
<th>Property Pre</th>
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When the percent change was plotted over the period of 1960 – 2005, the percent change while occurring steadily on average for all hurricane events is trending negatively. Over time the percentage of change in the crime rate has been decreasing (Fig. 2).
While the overall rate of change has been decreasing over time, the percentage change in violent crime has shown an increase dependent on the damage level of the hurricane. As the hurricane damage has increased the rate change in violent crime has increased. Property crime slightly decreases as damage increases (Fig. 3).
Conclusion:

The data supports the functionalist perspective that when an event of sufficient magnitude disrupts the social functions of a society there is a cause and effect relationship between the disruptive event and functions of the society. The police are agents of social function within a society and when an event such as a hurricane disrupts the police’s law enforcement ability there is a corresponding increase in the crime rate. There continues to be arguments made upon exactly how a police force affects crime (Wilson 1978) however, from a purely functionalist perspective the exact how is less important than identifying the exact agent of function.

The data did identify an unexpected negative trend in the percent of crime rate change. Even though some of the most destructive hurricanes occurred during the 1960 – 2005 period the percent of change has continue to decrease over this period. This would suggest that society’s ability to adapt and respond to major disruptive events has increased. Anecdotally this does
seem to fit the idea of continued progress and sophistication in the ability to respond to emergencies. As the number of police/public safety personnel has increased over the years, the ability to more accurately forecast and monitor hurricanes, the mitigating role of technology and the simple ability to have learned from multiple hurricanes/emergencies may be contributing to the authorities ability to respond to the hurricane and not impact their crime suppressing role.

Social institutions are not readily understood or acknowledged, however their existence provides a vital structure that supports society. Institutions provide the foundation of a society and when the institution are impacted by outside forces, that upheaval often leads to the collapse of a society.

References


U.S. Department of Justice, Office of Justice Programs, Bureau of Justice Statistics Crime – State Level, State-by-State and National Trends
http://bjsdata.ojp.usdoj.gov/dataonline/Search/Crime/State/StatebyState.cfm
Appendix A


YR1 = Percent Change Violent Crime Prior Year / Hurricane Year
YR2 = Percent Change Violent Crime Hurricane Year / Post Hurricane Year
YR3 = Percent Change Property Crime Prior Year / Hurricane Year
YR4 = Percent Change Property Crime Hurricane Year / Post Hurricane Year

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<td>124280</td>
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<td>2.78%</td>
<td>166611</td>
<td>171239</td>
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<tr>
<td>2</td>
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<td>-1.93%</td>
<td>93393</td>
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<td>-1.93%</td>
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<td>12</td>
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<td>2005</td>
<td>FL</td>
<td>20.6</td>
<td>123754</td>
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<td>-1.93%</td>
<td>721084</td>
<td>712998</td>
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<td>27</td>
<td>Rita</td>
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<td>TX</td>
<td>10</td>
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<td>959460</td>
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<td>-3.11%</td>
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Health and Travel

Korina Baraceros
Georgetown University

The purpose of this research was to determine if the outbreak of novel influenza A (H1N1) affected the volume of foreign travel to the United States. Natural disasters and illness outbreaks draw a lot of media attention and coverage for a short period of time and tend to trail off. Does the latest H1N1 scare change the coming of foreign nationals to the United States? By researching the amount of encounters recorded at United States ports of entry over the past few years, it is seen that during the time of the H1N1 scare in 2009, there was abnormal behavior in foreign travel to the United States.

Introduction

On average each year for the past three years, over 25 million foreign nationals have entered the United States through land, sea, and air ports of entry (1). This number increases each year. More and more foreign nationals are granted visas each year whether it is for tourism, education, medical, or business related reasons. This year, however, marks the latest in possible threats to the otherwise normal influx of visitors to the United States. In April of 2009, there were several outbreaks of novel influenza A, more popularly known as ‘swine flu’ or H1N1 (3). Was the H1N1 scare sufficient enough to make foreigners rethink visiting the United States during the spring months? If so, what was the difference? Was the most change in activity seen, at airports, seaports, or land border ports? Conversely, these incoming travel patterns, or the departure from, are important statistics to consider when analyzing an outbreak. For example, if the most change occurred at land border ports, could this anomaly, a surge in border crossing, be a contributor to the spread of H1N1 to the United States?

These questions were taken into account when research and analysis was done using immigration statistics from the Department of Homeland Security (DHS) Office of Immigration Statistics (OIS).
Literature Review

The World Health Organization (WHO) first issued a Global Alert and Response (GAR) on April 24, 2009 regarding H1N1 outbreak cases in Mexico and the United States (5). In Mexico, possible H1N1 occurrences had totaled 854 pneumonia related illnesses between March 18 and April 23 (5). Although influenza outbreaks in different areas of Mexico, the United States, and Canada were being genetically linked, the WHO did not advise any travel restrictions or border closures (5). It was however, declared an ‘International Concern’ (5).

On April 29, 2009 DHS Secretary Janet Napolitano announced that the United States would not be closing its southern border, particularly in reference to concerns about closing the border joining Mexico and the United States (9). International travel was discouraged only if travelers were experiencing flu-like symptoms or did not have the need to travel. It appeared that DHS and the WHO, although constantly reporting more H1N1 cases, did not find the need to extensively alarm the public, but more to caution.

As those cases were being reported, Google shows April 2009 being the month of highest search activity related to ‘swine flu’ and ‘gripe’ (6). The news reference index also shows the media reporting the most about H1N1 in April (6). Please reference the following graphs.
Data & Methods

The DHS United States Visitor and Immigrant Status Indicator Technology (US-VISIT) program provides a verification service through the use of biometrics, mainly fingerprints, to officers and state officials to verify visitor and visa applicants’ identities when entering or petitioning to enter the United States (4). It is an encounter based system, counting every occurrence of any individual being recorded by the system. For example, if a foreign national flies into Dulles International Airport and is encountered by US-VISIT he or she is recorded. If the same foreign national leaves the United States and returns at a later date, his or her second encounter is also recorded in US-VISIT (2). This is how the volume of incoming foreign travelers to the United States was calculated. Using travel statistics pulled manually from US-VISIT using Structured Query Language (SQL) code, yearly entry volumes were collected from January 1, 2006 to July 32, 2009. It should be noted that in general foreign travel peaks in certain parts of the year. The following list takes note of these natural trends.

1. March-April: Easter Peak
2. July: Summer Peak
3. November: Thanksgiving Valley
4. December: Christmas Peak

As seen in the next graph, Entry Comparison, there is a clear outlier in April 2009 for incoming foreign nationals.
The following table shows the percentage difference in volume from 2006 to 2009.

<table>
<thead>
<tr>
<th>Year</th>
<th>% difference from previous year</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>N/A</td>
</tr>
<tr>
<td>2007</td>
<td>+9.50</td>
</tr>
<tr>
<td>2008</td>
<td>+13.16</td>
</tr>
<tr>
<td>2009</td>
<td>TBD</td>
</tr>
</tbody>
</table>

**All Entry**

The percentage differences between the yearly volumes alone cannot help or dissuade the hypothesis that there was an anomaly in April of 2009 for two reasons. First, trends show that each year the total amount of incoming foreign nationals to the United States continues to increase (1). Secondly, the total percentage difference between 2009 and 2008 cannot accurately be determined as the data is not yet available. To help focus the data, the yearly entry volumes were divided by modes of entry, land, sea, and air. Because yearly sea entry numbers accounted for less than 1.5% of the yearly total volume, analysis focused primarily on land and air entry. The following graph shows land entry.
Land Entry Comparison

Month

Count

Land 2008
Land 2009
Land 2007
Land 2006
For the most part the behavior of the land entry data is the same over years. Note that the Easter Peak in 2008 happened a month earlier as the Easter season occurred in March that year. In the other sampled years the Easter season occurred in April. The following graph shows air entry.
Generally the air entry data also follows a trend of peaks and valleys, but there is one clear outlier: April 2009. Take into consideration the following tables. The first shows the difference in encounters comparing just the months, while the second compares the Easter seasons.

<table>
<thead>
<tr>
<th>April</th>
<th></th>
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<tbody>
<tr>
<td>Δ  4/2009 &amp; 4/2008</td>
<td>424,190</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Easter Season</th>
<th></th>
</tr>
</thead>
</table>

In each table the data for 2009 is significantly higher than the data for 2008.
Findings

At first glance of total entry data across the years, the expectation is that the land border crossing may have been the contributor to the increased activity in April 2009. However, after separating and reviewing the land border trend, there is no activity that indicates an anomaly. Consequently no surge in land border crossings into the United States means it was not a contributing factor to the spread of the H1N1 virus to the United States is not valid. It was actually air entry encounters from foreign nationals flying into the United States that spiked in April 2009. It is possible that foreign nationals from countries with H1N1 outbreaks were fleeing. This is arguable, though, as the United States has also had a significant number of outbreaks, would people really escape? Another possibility is that foreign nationals from countries with more expensive currency are taking the opportunity to visit the United States. Since April of 2009 was the month of the Easter season, perhaps foreign nationals from countries primarily practicing Catholicism or Christianity are taking their “Easter holiday” in the United States. That could indicate European countries as the Euro is still more expensive than the US dollar, and most European countries practice some form of Christianity, especially Catholicism. Unfortunately researching where the surge of the incoming foreign air traffic is coming from (travelers’ countries of origin) and where they are flying to (in the United States) was not in the scope of this research project. These few theories are a stretch from the original thought of the H1N1 scare having an affect on international travel to the United States, but it may be something to consider in more in-depth research of these statistics.

Another less obvious anomaly to note, keeping in mind that the Easter season in 2008 fell on the month of March, the lag in the Easter peak is accounted for in land entry but not in air entry. All the peaks happened in April.
Conclusion

The results of this research effort turned out to be inconclusive when trying to support the original hypothesis that the H1N1 scare affected foreign travel to the United States. The data did show abnormal travel behavior during the peak of the H1N1 scare, but since further analysis is needed in regards to air entry encounters country of origin, it cannot be concluded that the scare caused the anomaly in the data.

The data that was collected can be broken down and categorized into many different categories. That the way it was presented in this effort was at a very high level. There were more questions that branched off into different new hypotheses compared to the original one. There is so much information contained in a ‘total count’ of something so complex as incoming foreign nationals, as there are so many moving parts. Subsequent efforts to further analyze the data retrieved for this project should be conducted in order to come to a more concrete conclusion.
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4. US-VISIT Traveler Information
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5. Influenza-like illness in the United States and Mexico

6. Swine influenza - update 3

7. Google Trends: swine flu
   (http://www.google.com/trends?q=swine+flu&ctab=0&geo=us&geor=all&date=2009&sort=0)

8. Google Trends: gripe, swine flu
   (http://www.google.com/trends?q=gripe%2C+swine+flu&ctab=0&geo=mx&geor=all&date=2009&sort=0)

9. DHS H1N1 Daily Briefings: Wednesday April 29, 2009 – Full Transcript
   (http://www.dhs.gov/ynews/releases/pr_1241056994692.shtm)
We argue that beauty coupled with unknown attributes equal success in news casting. We theorize that physical factors such as sex, race, and hair color affect news anchors potential in rising to top U.S. markets. As a whole, society places great importance on physical beauty and appearance. Common physical attributes found in news anchors across the country equate to the overall population’s attitude as to what is “attractive” and “beautiful”. We therefore test the following hypothesis: Newscasters who are perceived as attractive, coincided with an unknown attribute will have successful careers. The analysis of data from 30 randomly selected U.S. cities confirms our expectations.

Introduction

Physical beauty is psychologically complex and can be perceived in a multitude of ways. There are clear differences in the perception of whether or not a person is elegant, distinguished, sexy, or even cute. An evening news anchor’s success is based on their markets’ consumer acceptance. As an evening news anchor, a major portion of the presentation is focused on the individual, thus placing great significance on appearance. Humans have innate reactions to selected aspects of appearance; more specifically they are more open and accepting to individuals whom they perceive as attractive. In this article we explore through inductive research whether or not beauty equals success by analyzing the significance of reoccurring physical attributes in local evening newscasters.

Our interest in this topic was sparked by a comment made by Professor Gray, “beautiful people have it easier”. This remark ignited a desire for our group to measure people who were already successful and define common traits among them.
Initial research began by measuring people who are already successful and define common traits among them. This sampling pool was further narrowed to individuals in the public eye because of their accessibility. Given our resources and time constraints, we felt it was more feasible to measure from a large pool where people have published the traits we are looking at. Our concept was that with all abilities being equal, those in the public eye are judged based on their appearance. With this in mind we choose to look more specifically at news anchors based their continued exposure to the public as well as our expectation they would represent their local demographics. Next, we decided to look at network news anchors, rather than cable anchors as they represent nearly 40% of the 18-49 age population, in contrast to cables’ 16% (Nielson, 2008). Lastly, we determined in order to measure attractiveness and decipher its weight in relation to success, a broad spectrum of markets would need to be analyzed.

We began our project with no real data, direction, or actual concept of dealing with the subjectivity of attractiveness; instead we conducted exploratory research and formed our initial premise – beauty or attractiveness has a direct positive affect on success. In addition to lacking a thesis, we lacked clarity as to which correlating factors would be most significant in such a broad research area. To move forward we randomly selected 30 cities from the 100 largest television markets to ensure our data collection would be feasible and collected in a timely manner.

Prior to evaluating our data we conducted research and found several theories in regards to the relationship of attractiveness and success. We felt as part of our literature review it was important to first identify the significance society as a whole places on physical beauty or level of attractiveness. Our first theory was the “Performance Expectation Chart”. This chart maps an attractive individual’s success based on variables such as confidence and expectation.
By applying the “Performance Expectation Chart” to our research, the correlation between attractiveness and success became more apparent. In the chart, \( P \) = an attractive person, \( O \) = unattractive, \( N_a \) and \( N_b \) = their nominal unevaluated characteristic, such as confidence, or for \( O \), lack there of. \( GO^+ \) and \( GO^- \) are the “goal objects”, which equated to higher expectations for the individual with greater confidence, and lower for the individual lacking. \( R^+ \) and \( R^- \) represent the reward levels based on the previous elements in the chart and \( T^+ \) and \( T^- \) equal the overall outcome of attractive individuals. From this chart, we theorized attractive news anchors would perform a level above their less attractive counterparts; we believe this as the initial expectation for an attractive individual will be higher, thus the potential of their overall reward elevated.

Following the “Performance Expectation Chart”, we discovered the “Beauty Match up Hypothesis”. The “Beauty Match up Hypothesis” explains, “beauty is a multidimensional concept where attractiveness is necessary but not sufficient to sell a products image” (Solomon,
According to the Beauty Match up Hypothesis other physical attributes must relate to the product in order for attractiveness to be successful. For our research the product is an effectively received news broadcast. Beauty in our news casters will be assumed in accordance with the Performance Expectation Chart, as all of our subjects are from large news markets therefore success is a given. Our coding research will be searching for additional traits according to the Beauty Match up Hypothesis, which should lead us to an effectively received news product.

\[ BX = P \]

\[ B = \text{Beauty} \]
\[ X = \text{Unknown additional attributes} \]
\[ P = \text{effectively received news Product} \]

Deeper into the literature review we found an article published in the American Economic Association by Mark M. Mobius entitled, “Why Beauty Matters?” Mobius argues individuals who exhibit a certain level of physical attractiveness will have higher levels of confidence, thus considered more capable by employers, leading to more responsibilities and subsequently earned raises. “In this paper, we decompose the beauty premium that arises during the wage negotiation process between employer and worker in an experimental labor market.” (Mobius, pp.1) Mobius argues that within the labor market, beauty is in direct relationship to success. Mobius’s article directly supports the “Performance Expectation Chart” and only strengthens our hypothesis; attractiveness equals success.

To compile our data we began with the 100 largest media markets, from these markets we randomly selected 30 cities. For each of the 30 randomly selected cities, we collected data on
the top 3 evening news anchors from the top 3 networks: ABC, CBS, and NBC. Each anchor was then coded based on physical characteristics. In our content analysis we attempted to systematically analyze the physical attributes commonly found within the industry. Based on our hypothesis, our coding of the common physical characteristics found in news anchors should be associated with a certain degree of attractiveness. Each news anchor was coded based on their ethnicity, gender, hair color, facial hair, glasses, jewelry, as well as their age (50+/50-).

Following our data collection, we coded, analyzed it, and cross-tabbed all conceivable attributes in order to discover more significant relationships.

Prior to cross tabbing, some data showed to be significant. We analyzed 193 news anchors, our dominant numbers were recorded as 47% of the anchor population was male, 53% female, this number are almost an exact inverse of the U.S.’s national population; 72% our data was white (74% U.S. pop); 16% was black (14% U.S. pop); 7% Hispanic (presumed 12-15% U.S. pop), and 4% was Asian (4% U.S. pop). The only ethnic population that was not accurately represented was Latino; this may be due to the rate at which their population is growing. According to the 2000 census, Hispanics accounted for approximately 10% of the population, today it is estimated that they exceed 15%.

After cross tabbing the data a number of attributes proved to be more significant than they initially appeared. Men are more likely to be white; Women are more likely represent minorities; women are more likely to be blonde; men are more likely to be over 50; men are more likely to have gray hair and very few news anchors were found to wear glasses.
In our findings we found it notable there was evidence (more men over 50 than women) of a double standard; by definition, age discrimination. Our data presented markets more accepting of younger women news anchor and older men. In our literature review we learn based on traditional perceptions, the male role has been centered on being the worker as well as
financial provider; the more traditional female role has been outside the workforce. “Bar-Tal and Saxe (1976) suggest that physical attractiveness is used as a more important evaluate cue for women because of the less “objective” criteria available for judging their successful role fulfillment. Thus, women may have a greater orientation toward concern about physical attractiveness than men because of traditional role perceptions and male female role stereotypes (Brown miller 1984).” Based on this theory, older men are more acceptable as are younger women because they offer a variation in traditional perceptions of gender roles.

The unbalance of a minority representation in female news anchors can be correlated with the logic behind age discrimination for older female news anchor. There are more female minorities, as the marker is more accepting of them. We theorize as the minority population ages, more specifically the Latino population, their representation in the larger markets will increase in both male and female news anchor positions.

In this research project we performed an exploratory analysis to examine whether attractive appearance and the perception of attractive appearance in evening news anchors equated to success. We collected, analyzed, and cross-tabbed data in order to find sufficient results to answer our inquiry. We found there to be a direct correlation in the perceived attractiveness and the overall success of an evening news anchor. The University of Chicago Press published an article, “On Beauty”, which clearly states, “beauty or physical attractiveness affects social life in both pervasive and profound ways.” This is the basis for our social research; essentially individuals who are attractive or exhibit particular physical characteristics, which are commonly associated with beauty, will experience higher levels of success within the broadcast news industry.
References


