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<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreword</td>
<td>5</td>
</tr>
<tr>
<td>Effects of Adolescent Fluoxetine Exposure on Female Rat Sexual Behavior</td>
<td>7</td>
</tr>
<tr>
<td>Classification of the ECG Signal Using Artificial Neural Network: A Network Design Analysis</td>
<td>21</td>
</tr>
<tr>
<td>Fictions of Gender: Conceptions of Manliness in Antebellum Pirate Tales</td>
<td>29</td>
</tr>
<tr>
<td>The Effects of Positive Mirror Exposure on Male and Female Body Satisfaction</td>
<td>55</td>
</tr>
<tr>
<td>“Career Opportunities, the Ones That Never Knock:” How the UK’s Punk Movement Emerged from Economic Disaster</td>
<td>75</td>
</tr>
<tr>
<td>Nutrient Levels in Gray Water Irrigation System</td>
<td>81</td>
</tr>
<tr>
<td>About the Authors</td>
<td>83</td>
</tr>
</tbody>
</table>
Foreword

Albert Einstein once famously observed, “If we knew what it was we were doing, it would not be called research, would it?” Call it something as pragmatic as “problem-solving” or as open-ended as “extending the boundaries of knowledge,” research challenges us to ask hard questions, re-frame what we know, and take the risk of marching off the map intellectually.

Undergraduate research at Mercer is mentored, self-directed work that leads students—and their faculty advisers—to new discoveries and understandings. Just as important as the outcomes are the processes of inquiry, discovery, design, and communication.

This journal annually publishes some of the best undergraduate research at Mercer, but it has room only for a very small fraction of the many research projects done this year. At our annual celebration of undergraduate research in April, students in the sciences and business presented 93 posters about their projects. Students from the humanities, sciences, social sciences, and education read 82 scholarly papers. Simultaneously, the annual Engineering Expo focused on the research of faculty, students, and alumni of the School of Engineering.

The papers that follow came through a rigorous selection process. Each went through two rounds of anonymous evaluation by an editorial board of students and faculty members. The articles were chosen for their interesting arguments, their solid and original research, and their authors’ command of their subjects.

Although sponsored by the Honors Program, this journal recognizes the scholarly activities of undergraduates from across the Macon campus. We hope that it will further strengthen the culture of undergraduate research at Mercer in all fields.

We thank University Professor Wallace Daniel and Karol Daniel, whose generous financial support made Spires possible. We also thank faculty mentors, whose careful, painstaking, and patient work shepherded our students through the process of engaging in original research. Finally, we thank all the students who submitted articles for us to consider. We learned from each—and salute your commitment to marching off the map.

Richard Fallis for the Editorial Board
Effects of Adolescent Fluoxetine Exposure on Female Rat Sexual Behavior

Rebecca Gregory

The selective serotonin reuptake inhibitor (SSRI) fluoxetine (Prozac) is the only drug approved for use in children and adolescents as a treatment for major depressive disorder, and it appears to be the most effective drug in young populations (Emslie et al., 2008; TADS, 2004; Usala, Clavenna, Zuddas, & Bonati; 2008). Major depression is estimated to affect 2.5% of children (Birmaher et al., 1996) with a lifetime prevalence of up to 20% by the end of adolescence (Lewinsohn, Rohde & Seeley, 1998). In addition, adolescent girls are twice as likely to experience depression as adolescent boys (Lewinsohn et al., 1998). Although fluoxetine is prescribed to individuals under the age of 18, little is known about the drug's long-term effects in this population, as most research has been conducted on adults (Olivier, Blom, Arentsen & Homberg, 2010; Scharko, 2004). In 1990, 20.7% of depressed patients between the ages of 5 and 18 were prescribed an SSRI, and by 2001, that percentage had nearly doubled to 39.7%. Thus, information about this class of drugs is greatly needed. While other SSRIs have been increasingly used in young populations since 1990, fluoxetine is the most commonly prescribed SSRI overall (Skaer, Sclar, & Robison, 2009).

Children react differently than adults to several antidepressant medications. For example, tricyclic antidepressants (TCA) and some SSRIs that are effective in reducing depression in adults do not work in children (Bylund & Reed, 2007; Kratochvil et al., 2006). Studies that find significant results with drugs other than fluoxetine are rare, and the FDA has not approved any other SSRIs for the treatment of depression in pediatric populations (Kratochvil et al., 2006). TCAs become moderately effective during adolescence and tend to work better as the age of the patient increases (Hazell, O'Connell, Heathcote, & Henry, 2002).

While the exact mechanisms that cause children to react differently from adults to antidepressant medications are not understood. However, the differences can likely be attributed to differences in maturation of neurotransmitter systems, particularly those of serotonin and norepinephrine (Bylund & Reed, 2007). TCAs inhibit norepinephrine and serotonin reuptake (Tatsumi, Groshan, Blakely, & Richelson, 1997), while SSRIs work mainly to inhibit serotonin reuptake. Norepinephrine networks mature much later than serotonin networks, a possible explanation for why TCAs do not work well in younger populations (Murrin, Sanders, & Bylund, 2007).

The human brain continues to develop throughout adolescence, and changes in neurotransmitter systems due to SSRI use may adversely affect development (Murrin et al., 2007). Neurotransmitters such as serotonin play a major role in brain development. Alterations of the levels of these neurotransmitters through the addition of psychoactive drugs, especially before puberty when neuronal rearrangement is high but also after, may cause abnormal
development (i.e., in synapse pruning or formation; Andersen, 2003). Such abnormal development may lead to long-term side effects when fluoxetine is administered to children or adolescents, although these effects have not yet been studied in humans. Animal studies have shown that perinatal exposure to SSRIs can lead to changes in brain circuitry accompanied by anxiety, depression or aggression that continue into adulthood. Neurons that take up extracellular serotonin (transient serotonergic neurons) involved in sensory processing are likely affected by the higher levels of extracellular serotonin caused by SSRIs during early development, although the way serotonin affects development is still unknown (Borue, Chen, & Condron, 2007). It is plausible that treatment with SSRIs during another stage of development may also lead to long-term consequences. A study by Iñíguez, Warren, and Bolaños-Guzmán (2010) found this to be the case when they treated adolescent male rats with fluoxetine. Effects that persisted after drug treatment had stopped included decreased responsiveness to stressful situations and increased sensitivity to reward (sucrose) and anxiety-eliciting situations (elevated plus-maze, novel object approach), as well as sexual side effects (described later). Iñíguez et al. (2010) proposed that the long-term sexual side effects of fluoxetine may be due to changes in receptors that inhibit sexual behavior (i.e. the serotonin receptor, 5-HT1A) or dysregulation of second messenger systems caused by the drug. In addition, Homberg et al. (2011) found that synaptic remodeling in the amygdala, particularly the growth of neurites and spines, increased in adolescents, but decreased in adults, with fluoxetine treatment.

In adults, sexual dysfunction, including reduced libido and failure to achieve orgasm, is a common side effect of SSRI use (Hirschfeld, 2003; Masand & Gupta, 2002; Schweitzer, Maguire, & Ng, 2009). As many as 60% of women taking fluoxetine have reported these effects (Maswood, Sarkar, & Uphouse, 2008). A study by Montejo-González et al. (1997) found that nearly 55% of adult patients being treated with fluoxetine showed sexual side effects. Although sexual dysfunction is fairly common among normal populations, depressed patients taking antidepressant medications report higher levels of dysfunction than untreated depressant patients and non-depressed controls (Angst, 1998).

Studies that report sexual side effects due to SSRI use in adolescents are rare, yet such cases are available (Scharko, 2004). Many studies on this population do not list side effects at all, and few likely ask participants if they are experiencing sexual side effects (Scharko, 2004). Even adults are much less likely to report sexual side effects voluntarily (14%) than do so when asked directly (58%; Montejo-González et al., 1997). Therefore, it is probable that adolescents (if sexually active) will also not report sexual side effects unless prompted. In 2004, Scharko posed the question of whether SSRI use in childhood and adolescence could adversely affect sexual functioning in adulthood, yet very little research has been conducted on the topic since this proposal. The study by Iñíguez et al. (2010) is the only one that has researched long-term sexual side effects after fluoxetine exposure, and they only used male rats. The current study examines these effects in female rats.
Despite high levels of SSRI-induced sexual side effects in females, there have been relatively few attempts to study sexual dysfunction in female animal models (Uphouse, Hensler, Sarkar, & Grossie, 2006). The female rat typically displays a 4- to 5-day estrous cycle consisting of four stages: diestrus 1, diestrus 2, proestrus and estrus. They become sexually receptive on the evening of proestrus through the early morning of estrus. When mounted by a male, a sexually receptive female will display lordosis, a reflexive posture characterized by an arched back, raised head and dorsiflexed tail. Females will also show proceptive behaviors such as darting, hopping and ear wiggling in the presence of a male. Females prefer to copulate at a slower rate than males and can pace the rate of mating behaviors in the wild and under certain laboratory conditions (Jenkins & Becker, 2005). One measure of paced mating, known as return latency (the time a female avoids the male after a mount, intromission or ejaculation), has been used to reflect sexual motivation in female rats, with shorter latency suggesting higher motivation (Xiao & Becker, 1997; Guarraci & Benson, 2005).

Sexual side effects including disrupted estrous cyclicity and decreased sexual receptivity have been found when adult female rats were administered fluoxetine, at least in the short term. (Maswood, Sarkar, & Uphouse, 2008; Matuszczyk, Larsson, & Eriksson, 1998; Uphouse et al. 2006). Interestingly, the side effects of fluoxetine appear to be strain dependent, possibly suggesting a genetic predisposition to sexual side effects in females (Maswood et al., 2008). Results also suggest that estrous cyclicity and lordosis do not necessarily correlate. Likewise, Coolen, Peters and Veening (1997) have shown that different sexual behaviors in male rats (anogenital investigation and copulation) are associated with different patterns of neural activation. However, it remains unclear why the same fluoxetine treatment would cause different sexual side effects in each strain.

One explanation for fluoxetine-induced sexual side-effects involves the role of the serotonin receptor, 5-HT1A, although other serotonin receptor subtypes also play roles in sexual behavior and are influenced by SSRIs. Activation of 5-HT1A receptors is known to inhibit sexual behavior, including lordosis in female rats (Uphouse, 2000). Fluoxetine increases levels of extracellular 5-HT (Perry & Fuller, 1992), leading to increased activation of 5-HT1A receptors. The addition of a 5-HT1A antagonist can counteract the lordosis-inhibiting effect of increased extracellular 5-HT by blocking receptors in fluoxetine-treated rats (Guptarak, Sarkar, Hiegel, & Uphouse, 2010).

Studies have also shown that fluoxetine treatment leads to desensitization in 5-HT1A receptors (Van de Kar et al., 2002), which should increase, rather than decrease lordosis in rats (Guptarak et al., 2010). This may account for the ability of female rats to regain sexual functioning after chronic exposure to fluoxetine (Uphouse et al., 2006). However, the studies would not explain the sexual side effects seen in adulthood when fluoxetine was administered to adolescent male rats (Iñiguez et al., 2010). As suggested by Iñiguez et al. (2010), fluoxetine may increase the density of 5-HT1A receptors or may increase sensitivity of receptors in adolescents but not adults. One study found that fluoxetine did not affect 5-HT1A receptor density in the
Amygdala, dorsal raphe nucleus or medial prefrontal cortex in adolescent rats (Homberg et al., 2011); however, this may not be the case in other areas of the brain.

The ventromedial nucleus (VMN) of the hypothalamus has been shown to be critical for lordosis behavior in female rats (Pfaff & Sakuma, 1979; Yahr & Greene, 1992). In addition, the VMN is one prominent site for showing the lordosis-inhibiting effects of 5-HT1A receptor agonists (Uphouse, 2000). Other areas of the brain, including the medial preoptic area (MPA) and the lateral septal nucleus (LS) are also important for sexual behavior in female mammals (Lu, Yuri, Ito, Yoshimoto, & Kawata, 1998). These areas contain serotonin receptors that may be influenced by fluoxetine treatment (Johnson & Crowley, 1986; Price & Lucki, 2001).

Iñiguez et al. (2010) found that male Sprague-Dawley rats treated with fluoxetine during adolescence displayed increased latency to mount and ejaculate and fewer ejaculations in adulthood compared to untreated rats. The rats in this study were given either 0 or 10 mg/kg of fluoxetine twice daily from PD 35 to PD 49. They were then tested for long-term sexual side effects at PD 80 and PD 90. No study has yet been conducted on effects that persist after the end of treatment in female rats. This study examines whether a similar pattern of exposure to fluoxetine will result in long-term sexual side effects in female rats. However, several aspects of the treatment methods have been modified. In this study, treatment began at PD 30, rather than PD 35, to better represent a period of development equivalent to adolescence in humans (Homberg et al., 2011). Additionally, rats were given daily treatments, as is usual in juvenile rat fluoxetine studies, rather than twice daily administration of the drug (Klompa et al., 2012; La Roche & Morgan, 2007; Norrholm & Ouimet, 2000). Finally, a low dose treatment was also included to mimic the range seen in therapeutic doses for humans (Klompa et al., 2012).

Sexual behavior was analyzed using measures of sexual receptivity (lordosis quotient), proceptivity (darting and hopping), and motivation (percent exits, return latency, and the number of coital stimuli received by the females). It was hypothesized that similar results as those in Iñiguez et al. (2010) would be observed in this study, with the 10 mg/kg group exhibiting the most pronounced effects. This study also measures 5-HT1A receptors in the VMN, LS and MPA. It was expected that rats treated with fluoxetine will have a higher density of receptors which would correlate with sexual side effects, again with a dose-dependent increase in receptors.
Method

Subjects

Female Long-Evans rats were housed singly in clear plastic cages under a 12-hour light/dark cycle with the lights on at 6 am. Animals were provided with rodent chow (Harlan, IN) and water ad libitum. Animals were bred at Mercer University, Macon, GA. Vasectomized males (Harlan, IN) were used as stimulus animals and were housed under similar conditions.

Drug Treatment

Rats were randomly assigned to receive 0, 2.5, or 10 mg/kg of fluoxetine (administered in a volume of 2 mL/kg) dissolved in distilled water by subcutaneous injection twice daily on PD 30 and once daily between PD 31 and PD 41.

Procedure

All procedures described herein were approved by Mercer University’s IACUC. Testing of sexual behavior took place between PD 110-128 (based on the day of proestrus) two to four hours after the start of the dark cycle. Testing was conducted under red light conditions. The rats were sexually naive at the time of testing. Estrous cyclicity was measured daily for two weeks prior to behavioral testing. The stage of the estrous cycle was determined by rinsing the vagina with saline and observing the vaginal smears under a light microscope. Samples with primarily nucleated epithelial cells and some cornified cells but no leukocytes were designated as proestrous smears.

The testing apparatus was a 61 x 25 x 46 cm Plexiglas box with an opaque barrier (20 x 1 x 25 cm) that created two compartments (as described in Xiao & Becker, 1997). Only the female was able to cross the barrier and access both sides to allow for pacing. The female rat was allowed to acclimate for five minutes before a male was placed in one compartment. The male was limited to one side of the apparatus by a tether and harness. Males were trained with the tether and had mating experience prior to testing. Behavior of experimental females was recorded for 45 minutes using a video camera and scored at a later time.

Sexual receptivity was determined using the lordosis quotient (LQ; measured as the number of displays of lordosis by the female divided by the number of mounts by the male multiplied by 100). Darting and hopping, percent exits and return latency were used as measures of sexual motivation. The number of darts and hops were counted and combined. Percent exits were calculated as the number of times the female crossed the barrier after a coital stimulus (mount, intromission, or ejaculation), divided by the total number of that coital stimulus and multiplied by 100. Return latency was recorded as the number of seconds the female stayed on the opposite side of the barrier after a coital stimulus. Additionally, the number of coital stimuli was recorded.
**Immunocytochemistry**

Immunocytochemical procedures in this study are the same as those described in Northcutt, Wang and Lonstein (2007) but using a 5-HT1A primary antiserum.

5-HT1A immunoreactivity was quantified using Image J, a public domain image processing software program provided by NIH. Microscopic images (taken at 20x magnification) were gathered from brain areas on both sides of the brain. The intensity of immunostaining was determined by correcting the images for background intensity and expressed as relative optical density. A single measure of receptor density was calculated by averaging densities of both sides of the brain.

**Statistical Analyses**

All data were analyzed on SPSS. One-way ANOVAs were performed for darting and hopping, lordosis quotient, number of mounts, intromissions and ejaculations, and receptor measures (VMN, LS, and MPA), followed by Tukey post-hoc tests. Mixed 3 X 3 ANOVAs were used for percent exits and return latency (after mounts, intromissions and ejaculations) with treatment as the between factor.

**Results**

Lordosis quotient for mounts did not significantly differ between treatment groups ($F(2, 18) = 1.631, p = .223, \quad ^2 = .153, power = .299$).

A mixed ANOVA revealed a significant difference in percent exits (PE) among the three types of coital stimuli ($F(2, 24) = 9.387, p = .001, \quad ^2 = .439, power = .962$), in which PE for mounts was lower than for intromissions ($p = .026$) and ejaculations ($p = .006$) and PE for intromissions was lower than for ejaculations ($p = .006$). No effect was found for treatment ($F(2, 12) = .879, p = .440, \quad ^2 = .128, power = .167$), nor was an interaction revealed ($F(4, 24) = .479, p = .751, \quad ^2 = .074, power = .143$ see Figure 1).

There was a significant difference in return latency among the three types of coital stimuli ($F(2, 24) = 15.660, p < .001, \quad ^2 = .566, power = .998$) with latency for mounts being shorter than for ejaculations ($p = .002$) and latency for intromissions being shorter than for ejaculations ($p < .001$). Latency for mounts and intromissions did not significantly differ ($p = .114$). No effect was found for treatment ($F(2, 12) = .494, p = .622, \quad ^2 = .076, power = .113$) nor was there an interaction revealed ($F(4, 24) = .680, p = .613, \quad ^2 = .102, power = .189$; see Figure 2).

No significant difference was found in darting and hopping ($F(2, 18) = 1.110, p = .351, \quad ^2 = .110, power = .214$). A one-way ANOVA revealed a significant difference in the total number of coital stimuli (mounts, intromissions and ejaculations combined) among treatment groups ($F(2, 18) = 3.653, p = .047, \quad ^2 = .289, power = .597$). The control group received significantly fewer coital stimuli than the 2.5 mg/kg group ($p = .037$; see Figure 3). There were
no significant differences between the 2.5 mg/kg and 10 mg/kg groups or between the 0 mg/kg and 10 mg/kg groups.

There was no difference in 5-HT1A receptor density for LS ($F(2, 18) = .062, p = .940, \text{power} = .058$), MPA ($F(2, 18) = .893, p = .427, \text{power} = .090$), or VMN ($F(2, 18) = 1.83, p = .188, \text{power} = .332$) based on treatment (see Figure 4).

**Discussion**

Because long term sexual side effects were found in the Iñiguez et al. (2010) study with males, it is surprising that similar results were not found in females. Lack of significant findings may be due to a number of issues with the current study. For example, only 21 subjects were used, and a larger sample size may have resulted in significant results. Low power was observed for the between subjects measures of lordosis quotient, percent exits and return latency, as well as with darting and hopping.

In addition, subjects received only one injection of fluoxetine per day on all but the first day of treatment, while the subjects in Iñiguez et al. (2010) received two treatments of fluoxetine daily. However, once daily fluoxetine treatment is typical in juvenile rat studies (Klompa et al., 2012; La Roche & Morgan, 2007; Norrholm & Ouimet, 2000). A once daily dose of 3-10 mg/kg for rats is comparable to therapeutic doses for humans (Klompa et al., 2012). It is possible that effects were seen in Iñiguez et al. because the treatment was overly aggressive. Because no other studies exist on the topic, it is impossible to compare the effects to those that may exist in males treated only once daily with fluoxetine.

The main effects seen in percent exits and return latency are expected in paced mating (Jenkins & Becker, 2005). All but one animal were sexually receptive based on LQ. The non-receptive animal received 10 mg/kg fluoxetine and failed to display lordosis during mounts and displayed lordosis during only 41% of ectopic intromissions. While it is unclear whether fluoxetine treatment is related to this decreased receptivity, it is interesting to note that another study also found lordosis to be disrupted in only a small number of fluoxetine treated animals while other treated animals remained unaffected (Maswood, Sarkar, & Uphouse, 2008).

The role of animal strain in fluoxetine induced sexual side effects also remains unclear and may have contributed to lack of significant findings in the current study. Iñiguez et al. (2010) used Sprague-Dawley rats while the current study used Long-Evans rats. The effects of fluoxetine on sexual behavior in adulthood vary based on strain (Maswood, Sarkar, & Uphouse, 2008). The effect of the drug does not appear to be robust enough to be revealed across all strains. It may also be true that the effects of adolescent exposure to the drug also manifest differently in each strain.

The only significant effect of fluoxetine treatment was unexpected. The females in the 2.5 mg/kg group received more coital stimulation by the males than did the control females.
While this is contrary to the hypothesis, low doses of fluoxetine may increase future sexual activity. However, given that there were no differences in the number of proceptive behaviors displayed by the three groups, it is unlikely that this difference reflects an effect on sexual motivation. Return latency, one method for measuring sexual motivation, was not significantly different between the groups, further limiting the interpretability of the finding. Additional research using improved methods for sexual motivation (such as the new paradigm described in Cummings & Becker, 2012) may clarify this finding.

A study of the SSRI bupropion found a similar increase in coital stimulation (higher number of ejaculations and shorter post-ejaculatory intervals) in treated females (Lopez, Wurzel, & Ragen, 2007). As in the current study, treated and non-treated animals did not differ in darts and hops, suggesting an increase in sexual attractiveness not related to proceptive behaviors. Lopez et al. (2007) did not use a paced mating paradigm, eliminating the possibility of comparison of motivation. Their study used hormone-primed ovariecotomized females, so the difference seen in coital stimulation was not due to alterations in estradiol or progesterone levels. Lopez et al. (2007) suggest that this effect may be the result of modified pheromone release or subtle behavioral changes. The increase in coital stimuli seen in the low dose fluoxetine treatment group may be due to similar pheromone or behavioral changes, or fluoxetine may increase sexual attractiveness by altering estradiol or progesterone levels.

Adolescent fluoxetine treatment does not appear to affect the density of 5-HT1A receptors in the LS, MPA or VMN, in addition to the brain areas described in Homberg et al. (2011). However, many brain areas have not been analyzed. Additionally, other 5-HT receptors may be affected by fluoxetine treatment. Again, a lack of significant finding may be due to low power of the study. Alternatively, factors other than density may be affected by fluoxetine. For example, receptor sensitivity may be altered or second messenger systems may be disrupted.

The results of the current study do not conclusively describe the role of adolescent fluoxetine exposure on sexual behavior in female rats. As the long-term effects of the drug may potentially affect numerous psychiatric patients, further research on the topic is highly needed. Currently, normal rats are typically used for the study of antidepressant drugs such as fluoxetine. However, normal rats differ in brain chemistry from depressed patients. Fluoxetine may have different effects based on factors such as extracellular serotonin levels before the start of treatment. Any conclusions drawn from studies on normal animals may not carry over to depressed individuals.

Until further research indicates otherwise, fluoxetine treatment during adolescence does not appear to inhibit future sexual behavior in female rats. Contrary to expectations, low doses of the drug may even increase sexual behavior. This is potentially good news for adolescents taking fluoxetine. In terms of long-term sexual side effects, the risk of fluoxetine appears to be low.
References


Figures

**Figure 1.** Percent Exits. The mean percent exits ± SEM for each treatment group after mounts, intromissions and ejaculations, calculated as the number of times the female crossed the barrier after a coital stimulus, divided by the total number of that coital stimulus and multiplied by 100.

**Figure 2.** Return latency. The mean time ± SEM spent away from the male after a mount, intromission or ejaculation, for each fluoxetine treatment group (0, 2.5, or 10 mg/kg).
Figure 3. Coital Stimuli. The mean number of coital stimuli (mounts, intromissions, and ejaculations combined) ± SD for each fluoxetine treatment group (0, 2.5, or 10 mg/kg).

Figure 4. 5-HT1A Receptor Density. Mean optical density ± SEM of 5-HT1A receptors for the ventromedial nucleus (VMN), lateral septum (LS), and medial preoptic area (MPA), for each fluoxetine treatment group (0, 2.5, or 10 mg/kg).
Classification of the ECG Signal using Artificial Neural Network: a Network Design Analysis

Andrew Weems

I. INTRODUCTION

ECG signals are some of the data most commonly and easily taken from the human body. It is also the easiest and least invasive way of looking at and evaluating the performance of the heart. It may be possible to decrease the number of severe cardiac conditions if monitoring systems were in place as detectors for abnormal rhythms. [1] The accuracy of artificial neural networks (ANN) for the classification of specific signals of ECG, such as heart arrhythmias, has been shown to be very accurate (within 99.0% or greater).[1,2-3] When a physician uses ECG signals as a diagnostic tool, the human brain is performing pattern recognition. ANN were designed with the intent to mimic the function of biological neural connections, with pattern recognition being a direction that has been heralded as having enormous potential. [1-4]

The heart beat is generated by the movement of the heart walls. The atria chambers of the heart are the entry points for blood. These chambers prime the heart. The ventricles provide the pulsations of the muscle walls, which in turn produces the flow rate of the blood.

The heart has a negative membrane potential when it is at rest, which will approach zero as ions cross the cell membranes to put the cell in equilibrium. As the membrane potential reaches zero (a state called depolarization), the cell contracts. The entire muscle fiber, and muscle slab, goes through this process at an orderly rate. It initially occurs in the sinoatrial node of the heart, and proceeds down the length of the tissue through the atrium and then to the ventricles. This produces a voltage that occurs between leads that are attached to the chest of the patient. Multiple leads can be used to obtain better electrical views of the heart. This can be done to identify the specific regions that are suffering from certain diseases, such as myocardial infarction. [5-8]

Myocardial infarction (or heart attack) is the interruption of blood flow to portions of the heart, resulting in oxygen deprivation and eventual tissue death. This normally occurs in one of the coronary arteries, which means that the blockage is occurring on the surface of the heart itself. Many heart attacks (approximately a quarter of patients) do not present with specific symptoms of heart attack. [5, 9-11] Myocardial infarctions can result in cardiac failure, but do not necessary imply that the heart muscle has ceased to output blood and an electrical signal.[9, 10] This can result in ECG signals from patients that are suffering from this condition, but without any ECG signal change accompanying the disease.
Cardiomyopathy is the deterioration of the heart muscle, known as heart muscle death. This condition is a long term onset condition, slight changes in the ECG signal over time are possible. [12, 13] This potential change is because any type of deterioration of the heart muscle can be classified by the physician as cardiomyopathy. In most cases, it is a disease term reserved for conditions that lead to heart failure. [14]

Other signals have been classified accurately with ANN, including dysrhythmia, arrhythmias, bundle branch block, and carditis. [1, 2, 6-9, 12-16] These signals are potential signs of future myocardial infarction [17]. The usage of neural networks to detect patterns in cardiac signals of diseased patients has been widely recorded [1, 2, 6-19].

A problem for initial researchers into the classification of ECG signals using ANN is that literature searches present a variety of approaches and geometries to obtain optimal pattern recognition results. Unfiltered ECG signals were used with the MATLAB based ANN in an attempt to address this problem and demonstrate the power of pattern recognition neural networks.

II. METHODS AND MATERIALS

The neural networks used to evaluate the data were assembled using MATLAB’s pattern recognition toolbox.

Preliminary research and testing showed that an optimal design for ECG pattern recognizing neural networks was a one-input, two-hidden, one –output layer. The number of neurons in the hidden layer would be varied in the experimentation. The input layer had an input neuron that input the ECG signals from the leads. Six output layers correspond to each of the conditions being examined. Literature research recommended six neurons in the hidden layer, Figure 1. [9, 12]

The assembled neural network, recommended from literature searches.

The neural network was created using the nftool from the Matlab Neural Network toolbox. The initial geometry was set to two hidden layers. The number of neurons per hidden layer was varied from 5 to 9. Initially, the conditions that are the default settings for Matlab NN were used, which included the Transig function as the neuron’s internal function. The learning algorithm was the Levenberg-Marquadt algorithm, with back-propagation. [6]
The training data was gained from PhysioBank’s ATM, under the file of the PTB diagnostic ECG database. The categories being tested were myocardial infarction, cardiomyopathy, bundle branch block, dysrhythmia, carditis, and healthy signals. Table 1 presents the number of patients in the data set presenting with the various diseases.

Table 1. The number of patients and their conditions used in training the ANN.

<table>
<thead>
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<th>Condition</th>
<th>Number</th>
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<tr>
<td>Cardiomyopathy/Heart failure</td>
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<tr>
<td>Bundle branch block</td>
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<td>Carditis</td>
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</tbody>
</table>

PhysioBank has the capability of taking the recorded patient files and converting them into Matlab compatible files. These files are read directly by the ANN in the training, validation and testing phase of the pattern recognizing network. In addition, the disease symptoms in the ECG signals persisted briefly before being fixed, either naturally or by physician intervention. The majority of the all of the signals are healthy, taken by a 14-lead ECG with a sampling frequency of 1000 Hertz. The number of healthy signals available for training the network was increased by splicing the healthy signals surrounding the disease markers in the ECG wave. The file that was assembled by PhysioBank was put in as a single input in the network. Additionally, the file had a header component that included the physician’s diagnosis of the patient, which was used for initial training of the neural network.

Additional testing of the network was performed on the selected design. This data was taken from multiple sources, in order to check the networks efficiency for the signals in question.

III. RESULTS

The network geometry analysis is presented in Table 2 while the MSE for the testing set of data corresponding to the percentage of data used to train the network is shown in Table 3.
Table 2. The mean squared error (MSE) corresponding to the number of neurons in the hidden layer.

<table>
<thead>
<tr>
<th>number of neurons</th>
<th>MSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>1.02727</td>
</tr>
<tr>
<td>6</td>
<td>0.331757</td>
</tr>
<tr>
<td>7</td>
<td>0.2280329</td>
</tr>
<tr>
<td>8</td>
<td>0.226969</td>
</tr>
<tr>
<td>9</td>
<td>2.05734</td>
</tr>
</tbody>
</table>

Table 3. The percentage of the data set used for training, validating, and testing the network with the corresponding MSE for the testing data.

<table>
<thead>
<tr>
<th>Type of ECG signal</th>
<th>Number of cases</th>
<th>Accuracy (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>healthy</td>
<td>52</td>
<td>99.1</td>
</tr>
<tr>
<td>myocardial</td>
<td>148</td>
<td>86.4</td>
</tr>
<tr>
<td>cardiomyopathy</td>
<td>18</td>
<td>90.1</td>
</tr>
<tr>
<td>dysrhythmia</td>
<td>14</td>
<td>99.2</td>
</tr>
<tr>
<td>bundle branch block</td>
<td>15</td>
<td>98.7</td>
</tr>
<tr>
<td>carditis</td>
<td>14</td>
<td>98.9</td>
</tr>
<tr>
<td>total</td>
<td>261</td>
<td>95.4</td>
</tr>
</tbody>
</table>

The chosen network for the remainder of the experiment was the 8 neuron/hidden layer, with a validation set of 70, 15, 15% for training, validation, and testing percentages. The data was taken from the PhysioBank ATM, but not from the PTB diagnostic ECG compilation. The total accuracy for each individual case is presented in Table 4.
Table 4. The number of cases per disease tested, and the accuracy for sorting each case, determined by the neural network.

<table>
<thead>
<tr>
<th>Validation at 8 neurons</th>
<th>MSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>train</td>
<td>validate</td>
</tr>
<tr>
<td>60</td>
<td>25</td>
</tr>
<tr>
<td>60</td>
<td>20</td>
</tr>
<tr>
<td>80</td>
<td>10</td>
</tr>
<tr>
<td>90</td>
<td>5</td>
</tr>
<tr>
<td>70</td>
<td>15</td>
</tr>
<tr>
<td>75</td>
<td>15</td>
</tr>
</tbody>
</table>

The network misclassified the ECG of myocardial infarction patients with cardiomyopathy. This occurred of 26.4%, according to the confusion matrix. Further tests were performed using additional data obtained from the PhysioBank ATM. The error found with classifying the myocardial infarction and cardiomyopathy signals was approximately 28% of the input signals of the same type. Again, other signals were confused in less than 5% of cases for other ECG signals.

IV. DISCUSSION

One technique that was not used for this experiment was filtering the quality of the data that was presented to the neural network. In addition to not filtering the data, the raw amount of data was not filtered from what would be taken directly from a 14-lead ECG of a patient. Both of these factors added a considerable amount of variation to the data sets that the network was trying to learn.

The geometry of the neural network was found to be ideal for the testing data as a four layer neural network, with 1 input neuron, 8 neurons in the hidden layers, and six output neurons. The network functioned very well with the test data. The overall accuracy of the 8 neuron network was 95.4%. This value was then compared to other training data approximations to ensure that the ideal network would be used in the classification of future data. This data correlated well with other networks recorded in literature. [1, 2, 6-9] The values found with this network were slightly lower than ideal (99+ %).

The issues with classification occurred most frequently for cardiomyopathy and myocardial infarction. This may be due to some similarities between the ECG waves of the two diseases. The T-wave of the cardiomyopathy patients is generally flattened slightly, which can appear as a decreased signal wave. Myocardial infarction is characterized by the decreasing in the signal of T wave. It may also slightly minimize the QRS portion of the wave, another symptom that is similar to patients presenting with cardiomyopathy. In other cases, the waveform of the ECG may not be diseased at all for myocardial infarction patients, even in the
midst of an attack. Abdominal ultrasound is then required to confirm that the output of the heart is not correct, despite the signal to the contrary.

For cardiomyopathy, the onset of heart muscle death is normally a gradual process. Therefore, the diagnosis of an oncoming myocardial infarction as cardiomyopathy could have disastrous results for the patient in the immediate future.

For trained physicians, time is needed to definitively differentiate between the two conditions. In future work, better success could be obtained by lumping both of these conditions into single category. This category could be labeled as an immediate threat to patient condition. By providing a category with this label, additional recommendations could be attached to such an output from the network. An abdominal ultrasound, in conjunction with this NN output, could be used to determine between the two categories, with a potential increase in the accuracy of the neural network. The other misclassifications of the neural network were all much less, and provided a similar ratio of correct diagnoses as physicians. This is for signals that are apparently different in amplitude and frequency (T, QRS waves).

V. CONCLUSIONS

Artificial neural networks are a powerful tool that can be used in lieu of or to augment physician expertise in diagnosing cardiac patients with certain disorders. Signals that have distinct differences in the ECG waveform are simple for the ANN to classify correctly while signals that have similar characteristics, or that do not display distinct characteristics, are more difficult to for the network to sort accurately. Problems with using the artificial neural network in MATLAB currently are confusion with the classification of two signals that present in patients with very different symptoms and require different treatments, but have similar signals. The real world application of this type of ANN could result in a deterioration of patient care, due to the network diagnosing a condition incorrectly. Further work is needed to access what signals can be accurately determined using this type of network and what signals need to be placed into a category that requires a physician’s determination.

ACKNOWLEDGMENT

We would like to acknowledge Dr. Anthony Choi for his invaluable advice and encouragement in the pursuit of this study. Also, Dr. Edward O’Brien for his knowledge of ECG and the electrical activity in the heart. Finally, Roland Adams for his assistance with MATLAB and the initial problems encountered with the study.
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Fictions of Gender: Conceptions of Manliness in Antebellum Pirate Tales

Kim Campbell

Last year was the one hundred and seventy-fifth anniversary of the start of the Civil War; as evidenced by everything from Charleston’s Secession ball in December 2010 to the History Channel’s slew of special programming on the “War Between the States,” one hundred and seventy-five years has done nothing to dampen Americans’ interest in the conflict. In fact, popular culture is not the only arena where Americans show their interest in the Civil War. New monographs come out every year exploring some aspect of the conflict, and one of the most often examined areas is the cause or causes of this enormously violent and devastating war. In particular, scholars and laypeople alike question why well-to-do Southerners would have instigated a conflict when they were so clearly “outmanned, outgunned” and when their cherished institution of slavery was politically untouchable.¹ What then could possibly be said to illuminate this topic any more, when so many scholars have, and continue, to explore this short period of American history?

Young Southern gentlemen are often remembered for their violent tempers and excitement to “whip the Yankees,” but few remember that they were raised in a culture that did value education, even if that education would not meet today’s standards of rigorous curriculums based on textbooks. Primarily taught at home until they were teenagers, Southern gentlemen spent a great deal of time reading; as they went off to Southern colleges, this trend continued, though what they read became much more standardized. The works these young men were drawn to, in particular romantic pirate stories both in short novels and periodicals, reveal a great deal about these young men’s culture.² Furthermore, comparing these stories to romantic pirate tales written for a female audience reveal discrepancies between what traits different groups in Southern culture viewed as ideal manhood. Thus, the distinctly gendered discourse on ideal manhood occurring in romantic pirate tales contained in short novels and serial fiction reveals a much larger cultural conflict in a era where manhood itself was so necessary to Southern society that the Civil War is even connected, and which fundamentally changed the way our society views pirates.

¹ Although these facts are considered incontrovertible in retrospect, we should note that members of the Confederacy did not see themselves poor in either manpower or weaponry for much of the entire war.
² I use the word romantic here in the sense of idealized. Although romantic stories in the United States during the antebellum period are certainly related to the Romantic movement in England (one antebellum reviewer wrote that “In respect to mind, and consequently its productions, America is to be considered but as the larger portion of the island of Great Britain” [Grenville, Mellen, “American Literature,” Ladies Companion, March, 1833, 227]), the American stories lack certain defining characteristics of the British Romantic movement, such as an emphasis the natural, that preclude me from using the capital R romantic.
The Literary Conundrum

Many scholars have questioned the validity of using literature to study history at all. They question how scholars discern fact from fiction when all historians can really do is “readings of readings.” However, despite this primary obstacle to using literature as a legitimate historical source, to ignore literature during any historical study, especially in a study of antebellum America, is to limit fundamentally the potential for insight. Even when historians cannot use literature to discover true “fact,” one scholar has pointed out that “stories and novels, even bad and unskillful ones, possess an element of free fantasy which is sometimes very revealing.” Because fiction makes such frequent use of symbols and images, historians can use stories to uncover the “central concerns” of a culture in a way that journals and correspondence rarely do. When studying an area so well canvassed as antebellum America, historians should take advantage of every source available, especially when that source has not been mined before. Furthermore, the “central concerns” of a culture are especially important to any study of why a group might go to war, no matter what way one approaches finding out what those concerns are.

Literature is a particularly valid source when studying antebellum America because reading was such an important aspect of the culture. As one scholar wrote, “in the early nineteenth century Americans for the first time were beginning to encounter mass reading through the proliferation of books, magazines, pamphlets, and tracts.” Literature was the antebellum American’s television; printers no longer simply published what they thought readers needed. Now, publishers sought to shape “both the content and the form” of literature to suit their consumers’ tastes.

The budding consumerism of the American publishing industry lead to more than 700 American fiction titles being published between 1840 and 1849, the exact period under study. In addition to these titles, nationally circulating periodicals rose to ascendency during this period. Debow’s Review, Graham’s Magazine, Harper’s New Monthly Magazine, and Godey’s Lady Book all circulated nationally in addition to several other publications, and these works were not read by only women. Although exact subscription information is difficult to obtain, “there is

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4 Machor, Reading Fiction in Antebellum America, ix.
7 Ibid.
8 Machor, Reading Fiction in Antebellum America, 3.
10 Machor, Reading Fiction in Antebellum America, 19.
no strong evidence to support the claim that the audience for fiction consisted mostly of women.”12 In fact, some authors, including Reverend J.H. Clinch, whose work will be looked at in detail later, wrote some works specifically for a female audience and some especially for a male audience.13 Authors such as Clinch stand as clear evidence that fiction was no longer universally viewed as a source that “deprave[d] the taste, and too often the morals” of its readers.14 In fact, “The older distrust of novels, which had characterized fiction as lies or simply as a waste of time, gave way in the antebellum era to public recognition – manifested and conducted most volubly in the periodical press – that Americans were devouring increasing amounts of leisure time to fiction reading.”15

However, while antebellum Americans may have no longer viewed fiction as inherently debased, their assumptions about literature maintained that “fiction was inherently instructional,” but whether that instruction was for good or ill was up to the author.16 Thus, authors had to make sure that the purposes of their works were very clear, or they might fail miserably at teaching their audiences anything; and from this priority, antebellum fiction gains its tendency to moralize very openly.17 Similarly, antebellum reviewers “advocated thematic awareness as a means for determining the ethical orientation and value of a novel or tale,” because they felt that fiction could be a very powerful tool for both changing society and maintaining it.18 The fact that a great number of ministers frequently contributed to periodical literature, albeit anonymously,19 only serves to reinforce the notion of fiction’s power to teach.20

Reviewers and readers during antebellum times believed that all fiction could teach, but that historical fiction was particularly good at instructing its readers, which is one reason to look at antebellum pirate stories.21 Historical fiction “promoted [the] means to empower both men and women” to practice the values they saw at work within the stories they were reading.22 Pirate stories, in which the authors are enormously open with what they want their readers to take away, are an excellent way to examine how reading about a cultural ideal might encourage

12 Ibid, 29.
14 Machor, Reading Fiction in Antebellum America, 41.
15 Ibid, 29.
16 Ibid, 40.
17 Ibid, 65.
18 Ibid, 65.
19 Ibid, 205. Not using a byline in periodical literature was very common and should not be interpreted as a sign that these authors were ashamed of their work. In fact, such leading novelists as Sir Walter Scott and James Fenimore Cooper both published anonymously.
20 Douglas, Feminization of American Culture, 278. Sarah Hale the editor of Godsey’s actually began her editorial career under the tutelage of an Episcopalian clergyman – Reverend John L. Blake. Blake authored a great number of sea stories, including pirate tales. I feel that this connection is no Victorian coincidence, but further evidence of how pirate tales were intended to instruct just as much as the articles Hale included in Godsey’s.
21 Machor, Reading Fiction in Antebellum America, 81.
22 Ibid, 82.
certain actions or responses. In addition to these reasons for using pirate tales specifically, pirate tales were also wildly popular. Benjamin Franklin even published a story about Blackbeard the pirate because these stories were such enormous sources of profit.\textsuperscript{23} Despite this popularity, pirate stories remain almost totally ignored in both literary and historical scholarship. One scholar described the situation saying, “The genre of sea writing, which continually increased in popularity with a land-based readership in the first half of the nineteenth century, has been marginalized in critical discourse as low or rough, much as sailors themselves were typed.”\textsuperscript{24} However, ignoring these stories denies scholars a rich opportunity to “reveal something of era values and moral evaluations.”\textsuperscript{25} Romantic pirate stories offer a unique opportunity to examine the mindset and values of Americans, in particular Southerners, just prior to a war where the very definition of manhood was at stake.

**Southern Idiosyncrasies**

One might ask, quite correctly, why romantic pirate stories illuminate the behavior of young Southern gentlemen in particular. To answer this question, one must look at some of the fundamental boundaries and definitions of Southern life and acknowledge them. What class one belonged to was incredibly important in the South during this era. Historian Kathleen Brown wrote that “Class includes the power deriving from material inequities, the systemic maintenance of those inequities by dominant social groups, and the symbols of that power commonly recognized by a society.”\textsuperscript{26} Southerners demonstrated their class through everything from owning slaves to how they dressed, but all of these external manifestations were meant as symbols of the plantation owner’s power. Because ships at sea act as microcosms of society, pirate stories too show the results of both “proper” and “improper” class interactions.

Race is, obviously, a crucial concept to address when one is studying the South. In fact, race and class were absolutely inseparable during the antebellum times in the region. Although an African American might rarely own slaves, he would have never been viewed as a “slave owner,” because “race [was] similarly [to class] constituted by the social meanings attached to physical appearance – itself a highly mediated phenomenon contingent upon culture – and used in the service of economic and imperial goals.”\textsuperscript{27} As will be evidenced later, pirate stories

\textsuperscript{23} Marcus Rediker, *Villain of All Nations* (Boston: Beacon Press, 2004), 173.
\textsuperscript{25} Hume, “The Buccaneer,” 61.
\textsuperscript{26} Kathleen Brown, *Good Wives, Nasty Wenches, and Anxious Patriarchs: Gender, Race, and Power in Colonial Virginia* (Chapel Hill: University of North Carolina Press, 1996), 4. Note that Brown’s definition has only a little to do with socio-economic class as we conceive of class today. Although wealth was certainly important in Southern society, wealth on its own did not determine what class one belonged to.
\textsuperscript{27} Ibid, 4.
belonged to a cultural norm of using race to help define manhood, but the explicit descriptions necessitated by pirate stories being rather “exotic” literature make them particularly revealing on this subject.

Gender too is a concept inherent in discussing ideal manhood. Although gender is often defined as “the historically specific discourses, social roles, and identities defining sexual difference and frequently deployed for the purposes of social and political order,” the role of class and race in defining gender is essential to understanding Southern mindsets, if not American, during the antebellum period. Because these pirate stories center around one man, the pirate captain, they give modern readers a unique look into why those characters are or are not ideal representations of their culture. A hero in one of these stories is “not a personality so much as a set of aesthetic and cultural alternatives sensitized to historical changes but not determined by them”; in other words, these central characters show various ways to react in certain situations using the cultural contexts of the society of which they are a product.

Finally, some context for this period and region are necessary to appreciate why the pirate was such a powerful figure to young Southern gentlemen. “After the exhilaration of the Revolutionary period, a sense of social decline seemed to afflict the South”; Southerners, especially males, seemed rather bored with the idea of living out their days peacefully in the new republic. They did not have to wait long to find an answer to their longing for adventure. Shortly after the Revolutionary period, the frontier began to open up, and during the 1820s and 30s young men coming of age set off into the untamed wilds of Georgia, the Carolinas, and Virginia to make their destinies. These “men embarked on their quest to erect on the still primeval landscape a Civilization to stand for all time.” They built their castles as grand plantation homes and found their medieval peasants in African slaves. However, these men’s sons, lacking the opportunities of their fathers, met an impasse.

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28 Ibid, 4.
29 In using ideal in this context, I mean in the sense that male readers of the work would want to imitate the hero or anti-hero in order to further live up to his society’s expectations.
31 I have chosen to look at young Southern gentlemen in particular for two reasons: first, because one had to be fairly wealthy in the South in order to afford to read extensively during this period, a situation that differs from that in the North during the same period. Second, a gentleman’s education consisted of a great deal of private tutelage and reading in the South until he went off to college. There he would continue his reading, though it might be slightly more directed at that point. Because of these two factors, my study’s conclusions cannot be generalized to the South at large. What motivated middle and lower class Southerners to fight the Civil War is a topic that needs a great deal more research.
33 I consider, as do other historians, the War of 1812 to be a part of the Revolutionary, or founding, era, which preceded the American frontier years.
34 Stephen Berry, *All That Makes A Man: Love and Ambition in the Civil War South* (New York: Oxford University Press, 2003), 27. Borrowing from Stephen Berry’s *All That Makes A Man*, I use the word “Civilization” to refer to both to the literal creation of plantations and the erection of the cultural system of the Old South.
Raised with their fathers’ creation stories as an example, young Southern gentlemen of the 1840s and 50s found themselves being thrust into a newly defined role while being implicitly told to replicate the work of their fathers. “The constrictions of the 1850s were a particular problem for coming-of-age males. More educated than their fathers [coming-of-age in the 1820s and 30s], they were also under more pressure to live up to the version of civilized patriarchy that had become so integral to the South’s sense of self and to its defense against the North.”

Even though the problems facing wealthy, privileged young gentlemen may seem trivial to people today, “in an era of ever-rising expectations and ever-collapsing opportunities, relatively small constrictions tend to take their psychic toll.” After all, “Southerners liked their leading men not to make money but to be somehow affluent, not to work but to be somehow accomplished, [and] not to give orders but to be somehow followed.” Yet, how could these young men ever live up to this ideal, much less live up to the ideal of “affect[ing] Civilization,” when there was nowhere left on the continent to erect their work?

Stephen Berry asked the fundamental question for these young men: “How could Southern men live up to the increasingly romantic ideals of civilizing manhood when the expansive work of winning the empire was giving way to the more mundane work of administrating it?”

Southern colleges, which were “reserved almost exclusively for the sons of the wealthiest planters,” further encouraged the ideals of civilizing manhood. Here, gentlemen not only read the great works of civilizing manhood by Homer but also began to engage seriously with the Southern concept of honor. Southerners on the whole viewed themselves as people “who reacted strongly against the corruption of their society,” and these young men took personal corruption, or rather the charge of personal corruption, very seriously. In fact, “challenging students’ honor was tantamount to challenging their self-concept, and that challenge need not be serious for it to be taken seriously.”

One scholar has looked extensively at the student culture of honor, and some of his findings deserve to be quoted at length:

Student culture was created through a collision of two major forces: the southern code of honor and natural adolescent development. The concept of honor that governed Old South society was, at times, a difficult and confusing code. Southern honor consisted of a set of rules that advanced the appearance of duty, pride, power, and self-esteem; and conformity to these rules was required if an individual were to be considered an honorable member of society. Nor were these

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36 Ibid, 33.
37 Ibid, 18.
38 Ibid, 34.
39 Ibid, 35.
40 Robert F. Pace, Halls of Honor: College Men in the Old South (Baton Rouge: Louisiana State University Press, 2004), 1.
42 Pace, Halls of Honor, 8.
rules confined to a particular class or social group; honor was an intricate part of the entire Southern society.\textsuperscript{43}

Thus, the Southern culture of honor along with the new problems of the 1840s and 50s placed young Southern gentlemen in a unique position at the end of the antebellum era. This unique position is why romantic pirate tales spoke so strongly to this small group of people. As one scholar referred to the attraction, “swashbuckling pirates portrayed in the media had many of the rogue qualities of the Western outlaw; yet, the passage of time had shrouded them in the mist of legend. Pirate stories seemed almost nostalgic reminiscences of a manly and independent lifestyle, offering insight into some of the cultural anxieties of this tumultuous era.”\textsuperscript{44}

\textbf{The Real Pirates of the Caribbean}

As any intelligent observer is aware, the popularly held image of pirates in today’s society—that of the Captain Jack Sparrow-type—is not an accurate representation of Golden Age pirates.\textsuperscript{45} However, few people are aware of just how warped that image is. A few historians, most notably Marcus Rediker, have recently tried to set this image straight in the historical record, but because Disney’s \textit{Pirates of the Caribbean} and other popular references are so prevalent, these images are difficult to discredit. Thus, it becomes necessary for informed readers to gain insight into the way Golden Age pirates actually lived for them to fully appreciate how much romantic pirate stories influenced our perception of buccaneers today.

The first discrepancy between the common picture of pirates and the reality they lived involves the all-powerful nature of the pirate captain. Historians now know that “the stereotyped picture of pirate captains as seagoing dictators who exercised extreme tyranny to maintain discipline” did not exist; in fact, crews could very easily override their captain’s wishes.\textsuperscript{46} If the crew disagreed with the captain’s choice of destination or decision to fight, they simply voted against his wishes. Indeed, the only time the pirate captain had complete control over his crew was during an actual battle. The captain was not even in charge of distributing the spoils, as this job was left up to the quartermaster, who was often a much more shrewd and intelligent man than his captain. Even the fates of the prisoners were outside his hands. Everything on a pirate

\begin{itemize}
  \item \textsuperscript{43} Ibid, 4-5. Emphasis in original. Although Pace feels the concept of Southern honor can be stretched across class in the South, I feel the implications of romantic pirate tales cannot.
  \item \textsuperscript{44} Hume, “The Buccaneer,” 62.
  \item \textsuperscript{46} Hugh F. Rankin, \textit{The Golden Age of Piracy} (Williamsburg: Colonial Williamsburg, 1969), 29, 136. While Marcus Rediker has certainly done more work on the real pirates of the Caribbean than any other historian alive, it should be noted that he used at least one of the romantic pirate stories I use as a source in his revisionist history. Despite this fact, I feel that his observations and conclusions on pirate life are valid, but I have not used any of his material from the chapter on female pirates for this very reason. Rediker, \textit{Villain of All Nations}, 173.
\end{itemize}
ship was put to a vote, and the captain who refused to allow his crew to vote on an important decision often found himself marooned.47

This lack of power on the part of the pirate captain, while it seems strange to people today because of the popular image of pirates, was by no means unintentional on the part of the pirate crews. Men often joined pirate crews as a direct response to the brutalities of life in the navy, particularly in response to British naval service or merchant marine. On a naval vessel, the captain did possess the kind of absolute authority people often associate with pirate captains; the captain could punish whomever he chose whenever he chose, and no one could override his authority, short of mutiny, until the ship returned to port. Deploring a situation that strongly resembled slavery at times, impressed sailors in particular jumped at a chance to set up their own social order. Thus, pirate society was remarkably egalitarian for its time; by voting on all important issues, authority was placed “in the collective hands of the crew,” which meant “the core values of the broader culture of the common sailor were institutionalized aboard the pirate ship,”48 yet romantic pirate tales give absolutely no indication that overriding the authority of the captain is either an everyday occurrence or an acceptable solution to disagreeing with his plans.

The reasons pirates formed these new egalitarian societies on their ships gets at another myth regarding the lives these men, and occasionally women, led. Life at sea today is often associated with cruise lines and family fun and perhaps the occasional thought of American sailors on aircraft carriers. These perceptions carry over into the way society views life at sea during the seventeenth, eighteenth, and nineteenth centuries, but today’s ocean is nothing like the world the Golden Age pirates and their hunters lived in. In addition to the brutalities of naval life discussed above, the hardships of the merchant sailor were little better. “Discipline was as cruel as it was necessary,” and even something as basic as what they ate was harsh.49 One might rightly wonder why there were not more pirate crews given these conditions, as all one had to “do was to find companions of a similar bent” regarding the unfairness of the hardships they faced.50 Truthfully, merchant and naval captains did live much better lives than their crews, and they expected to, given that they typically came from a more refined social background. Who can blame ordinary sailors for wanting to escape this uneven caste system?

Two more commonly cited pirate myths present themselves both in romantic pirate stories and today’s mythology. The image of the crazed, bloodthirsty pirate is almost as prevalent as that of the pirate jumping to rape any woman he comes in contact with, and neither picture presents an accurate portrait of pirates. In fact, “pirates never enjoyed fighting so much as has been suggested, and they never undertook to engage a prize in a battle if it could be avoided. Their object was plunder, not bloodshed.”51 Pirate crews would much rather convince a

merchantman to surrender without a fight, as they already constantly led their lives under the threat of death without taking the added risk of fighting all the time. Between having to occasionally engage merchants, fighting off naval ships that were hunting them, and the all but one hundred percent chance they would be hanged if they were caught, pirates found that “premature death was . . . [their] lot.”52 These men avoided fighting to the point that people today would often consider them cowardly, which is a very different picture than we often get of pirates.

Finally, one must address the myth of pirates’ voracious libidos, which can still be seen in some literature and films from today. The generally accepted fact that pirates incredible sexual potency was a manifestation of their power as men could not possibly be true, if one looks at the world they lived in.53 Except for the occasional incredible story, whose validity is often questioned, there are no accounts of women even being at sea on the kinds of ships pirates either plundered or originally came from. Thus, one must assume for this claim to be true that all of this sexual violence was occurring on shore, but again, the sheer number of women available to pirates in the Caribbean, South America, and the early North American colonies was so limited that the vast majority of pirates would hardly ever come into contact with a woman after they began their tenure on the pirate ship.54 On the few occasions that they did come into contact with women, the “pirate articles” demanded that they “were to be treated well” in order to prevent the “great deal of discord” that was likely to result from a female presence on the ship.55 Here again, despite there being almost no possible way for this myth to be true, it remains resilient in our image of pirates today.

Although the pirate’s job “was most decidedly not a romantic occupation,” we certainly see it as such today, just as antebellum writers did; however, this view was not always the commonly held perception.56 Prior to their image makeover, the general populace viewed these men as the criminals they technically were under the law. Rather than publishing romantic stories about pirates, “colonial newspapers, including James Franklin’s New England Courant, published serious articles about piracy because, for them, pirates were not romantic; they were criminals who terrorized American coastlines and served as a real threat to lives and property.”57 However, by the 1830s, “the [pirate] characters became more brave, successful, cruel, and organized, and their stories filled with more atrocities and adventure.”58 Journalists no longer wrote about pirates, but authors took up the mantle of “historian” and began to write tales where “the pirates became more fearless, romantic, and stereotypical.”59 Some scholars have speculated

52 Rediker, Villain of All Nations, 163.
54 Rediker, Villain of All Nations, 163.
55 Rankin, The Golden Age, 36.
56 Rediker, Villain of All Nations, 163.
57 Hume, “The Buccaneer,” 60.
58 Ibid, 67.
that because ordinary citizens tended to see sailors while they debauched on land, they had a
tendency to romanticize life at sea.\textsuperscript{60} Regardless, “by the mid-nineteenth century their [pirates’] mythography had come of age, with popular books on Blackbeard and Lafitte that described the
‘adventurers’ as both despicable \textit{and} admirable.”\textsuperscript{61} Everything from physical descriptions to
color traits became “sensational, romantic, and even mythical” in these idealized stories, and as a result, pirates “have become, over the years, cultural heroes, perhaps antiheroes, and at the
very least romantic and powerful figures in an American and increasingly global popular
culture.”\textsuperscript{62}

\textbf{Romancing the Pirate}

Although the authors of pirate stories frequently began their works with such statements
as “there are few subjects that interest and excite the curiosity of mankind generally, more than
the desperate exploits, foul doings, and diabolical careers of these monsters in human form,”
these works were wildly popular during a time when the didactic nature of literature was
presupposed.\textsuperscript{63} Some reviewers even claimed that “the novelists who would induce us to take the
murderer and pirate to our hearts, show very plainly where their affections lie.”\textsuperscript{64} However, the
popularity of these tales would not die. The undying appeal of pirate stories was the result, at
least in part, of the fact that the authors of these tales wrote familiar aspects of antebellum life
into their stories of the sea. One sees elements of these characteristics both in pirate stories
written for men and those composed for women.

Class was a concept very familiar to both Northerners and Southerners in the antebellum
period, though not in the same way people today think of the term.\textsuperscript{65} Romantic pirate tales are
filled with both implicit and explicit references to class. The heroes of pirate tales are always of
some sort of noble lineage; in tales where the author is not sympathetic toward the main pirate
captain, one almost always learns that the captain comes from a less than admirable
background.\textsuperscript{66} Stories are littered with references to “noble looking craft[s]” to describe pirate
ships and accounts of the captain’s heritage.\textsuperscript{67} In the story of Captain Mission, the author
declared that he was French and a member of the elite Huguenots who were eventually forced to
flee France after the monarchy returned to power.\textsuperscript{68} Likewise, the story of Captain Roberts

\begin{itemize}
  \item Blum, \textit{View from the Masthead}, 30.
  \item Hume, “The Buccaneer,” 60. Emphasis in original.
  \item Ibid, 70, Rediker, \textit{Villain of All Nations}, 5-6.
  \item Ellms, \textit{Pirates Own Book}, iii.
  \item Machor, \textit{Reading Fiction in Antebellum America}, 3.
  \item See definition of “Class” on page 5.
  \item The exception to the rule “noble birth equals good pirate” is some versions of Captain Kidd’s story that
claim he was descended from royalty.
  \item The \textit{History of Pirates} (Haverhill: Thomas Carey, 1825), 1-43. The fact that Mission is French is a
slight anomaly as most of the pirate stories I could find contained tales of either British or American men;
\end{itemize}
emphasized both his background and his appearance: “This extraordinary man and daring pirate was tall, of dark complexion, about 40 years of age, and born in Pembrokeshire.”69 In order to have readers view these pirate captains as heroic, authors had to forge some connection between the fiction of his characters and the reality of his readers. As Northern readers were members of the middle class at the very least and Southerners reading these stories were almost certainly members of the elite class, having the main characters of these stories share this class identification was a powerful method of connection.

Captain Roberts’s description quoted above draws another explicit connection with Southern readers that also reinforces his upper class status. In the South, “appearance superseded content” to the extent that it was much more important, especially for young gentlemen, for their peers to believe that they had acted honorably rather than to have actually acted honorably in the first place.70 Not surprisingly this emphasis carried over to physical appearance as well as dress, and many pirate stories describe captains who were both handsome and well dressed, as Captain Roberts is. Ellms described him as “being dressed in a rich crimson damask waistcoat and breeches, a red feather in his hat, a gold chain round his neck, with a diamond cross hanging to it, a sword in his hand, and two pair of pistols hanging at the end of a silk sling flung over his shoulders.”71 In his Ramon the Rover of Cuba and Other Tales, Reverend John Lauris Blake described captain Don Ramon as “very tall and muscular, walks his own quarterdeck like an emperor, and holds his crew in most absolute subjection.”72 Besides the explicit references to Ramon being good looking and being a member of an elite class, the fact that he “holds his crew in most absolute subjection” is reminiscent of the way a planter controls his slaves.73 When these positive references to swanky dressing pirate gentlemen are contrasted to descriptions of negatively portrayed pirates, the importance of appearance becomes even more evident. A captain described as “gloomy and dark as an arch-fiend” is only respected by his crew because of his threats of force; furthermore, he dies a gruesome, unnecessary death at the end of the tale.74

While appearance certainly served as a further indication of the pirate captain’s class, Southerners’ attraction to this kind of character as a hero was undoubtedly strengthened by his sharing the value of being handsome and well dressed.

Another characteristic of all positively portrayed pirate captains, regardless of whether the tales they appeared in were intended for male or female enjoyment, is their undeniable charisma. Americans, then and now, like heroes who are charismatic speakers, but the sheer

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69 Ellms, Pirates Own Book, 95.
70 Pace, Halls of Honor, 5.
71 Ellms, Pirates Own Book, 95.
72 John Lauris Blake, Ramon the Rover of Cuba, and Other Tales (New York: Nafis & Cornish, 1843), 114.
73 Ibid, 114.
magnetism around some of these pirates is remarkable. While speechifying to his crew, Don Ramon says, “I determined to do these braggadocios no harm.” Obviously, this statement is ridiculous when one knows that most real pirates came from a background that placed little or no emphasis on education; however, natural charisma in addition to being an accomplished speaker were both traits that were valued in antebellum America, and this was especially true in the South. One scholar even pointed to Aaron Burr as a perfect example of how much charisma was valued: “Burr’s unflappable audacity captured the country’s heart; instead of being convicted for treason, he was coddled and plied with expensive wine for most of his trial.” The fact that charisma seems to have overcome treason outside of a romantic story makes a very strong statement about the value placed on this trait. Pirate heroes were only more attractive as role models to young Southern gentlemen because of this fact.

Race was an issue of paramount concern in antebellum America, much as it still is today. Notions of inherent characteristics of race were so prevalent that authors of pirate stories often unintentionally reveal their prejudices; however, the purpose of this examination is not to judge these authors’ use of racial terms, but to draw attention to the fact that these racial references were instrumental in allowing readers to connect with pirate tales. Captain Mission said that he “abhorred even the name of slavery,” but he treated his crew, particularly those members of his crew who were not of European lineage, in an incredibly paternalistic manner. Mission’s abhorrence of slavery is enormously reminiscent of Southern planters’ claims of being enslaved by Northern industrialists and politicians, with almost that amount of irony.

On the whole, pirate crews, in the stories where they are described at any rate, were multinational; however, the captain was almost always British or American and ruled over his crew with a power historians now know never existed among pirates. Indeed, real pirate crews often were multinational, but this caused very few problems. In romantic pirate tales though, multinational pirate crews were almost always at odds with one another; British hated French, French hated Spanish, and the only things that united European pirates were their hatred of imperial governments and their disgust with their African crewmates.

The authors also presented stereotypical images of Africans common during the period. The common image of the happy-to-serve black man was quite common. “Hallo! – this way, blackey!’ shouted an old tar to the merry Africans, who, by the way, was a kind of reference table for the whole crew,” is only one example of how simplistically Africans were portrayed in these stories. Although slaves did not appear too often in pirate stories, when they did, authors

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75 Taylor, *Cavalier & Yankee*, 86.
76 Blake, *Ramon the Rover of Cuba*, 67.
78 *History of Pirates*, 76-7.
painted them exclusively as loving and concerned servants. Captain Ramble, another creation of Reverend Blake, talks about a planter who described the circumstances that partially lead him to hold his slave Saturday in especially high esteem: “‘The faithful creature,’ he [the planter] continued, ‘took my brother, who was but three years old, in his arms and first letting me from the windows down upon a shed adjoining the house, he followed me and taking my hand, ran along the roof of it, protected from observation by the trees that surround it.”82 One further frequently appearing image of Africans was that of the primitive teacher to the civilized white man. In a number of pirate tales, a slave or black crewmember must show the other pirates how to survive when stranded in tropical parts of the world.83 Whether it is showing the whites the proper way to fish or stopping them from eating some form of poisonous vegetation, the Africans in the story are the only characters close enough to their primitive roots to save their white masters.

One final note on race before turning to the differences between pirate tales geared for men and those for women: the concept of honor, which will be examined shortly, entirely excluded slaves and effectively excluded all people of African descent. Antebellum men, both the authors of these stories and their readers, asked, “if they [slaves] had honor, then how could they be slaves?”84 In twisting the language of the American Revolution, which always advanced a double standard in regards to race, antebellum men created a circular logic that excluded from honorable states both those in literal bondage and those figuratively enslaved by the social system from ever being able to possess honor. In pirate captain Thomas White’s story, he is weak, cowardly, and shameful because he and his crew are constantly captured.85 Likewise, the fact that so many, if not all Africans, were beneath whites made both honor, and by default complete manhood, beyond their reach.86 Literal freedom was very important in all romantic antebellum pirate tales, and this final example is simply representative of that fact. Having turned to piracy in the face of injustices committed against them by their captain, the crew’s lieutenant declares, “that they were no pirates, but men who were resolved to assert that liberty which God and nature had given them, and own no subjection to any.”87 Truly, liberty was a prerequisite to manhood.

As one begins to dive into the concept of honor as presented in pirate tales, it is important to note again the power antebellum readers and reviewers believed fiction possessed. Keeping

82 John Lauris Blake, Evenings in Boston (Boston: Bowles and Dearborn, 1827), 13.
84 Pace, Halls of Honor, 50.
86 Although Kathleen Brown does not specifically use this analysis to refer to men she does write, “Rooted in planters’ assumptions about English and African women’s proper roles in the tobacco economy, early definitions of racial difference and the accompanying discriminatory practices resulted ultimately in a race-specific concept of womanhood.” I am taking this conclusion one step further and applying it to the exclusive nature of Southern honor, based on the idea that bondage or a particular lack of freedom made one dishonorable. [Brown, Good Wives, 108-9.]
87 History of Pirates, 4.
this thought to the forefront, modern readers can begin to see why the subtle distinctions between pirate stories written for women and those written for men are significant. Honor in antebellum times, and perhaps today, is a many faceted concept, but it is incredibly important to the plots of all of these romantic pirate stories, regardless of the intended audience. Although many pirate stories differ on exactly what makes some captains honorable and others dastardly, careful readers will notice certain distinctions between stories published in short novels or periodicals aimed at a male audience and those stories published in periodicals such as *Godey’s Lady’s Book* and the *Ladies Companion*.

One trait that is distinctly honorable in those tales aimed at a masculine audience is patriotism. In practice, privateering was almost no different than simple piracy; however in the minds of readers, ironically, privateers were patriots just as much as George Washington or Patrick Henry.\(^88\) In fact, a technical privateering license was not even required for antebellum authors to write sympathetically about pirates, so long as the pirates in question were antagonizing one of America’s least favorite countries at the time – England. Stories often termed British imperialists as “villains,” and American crews with a few turncoats from mother England often outsmarted dull-witted captains in the Royal Navy.\(^89\) One story even called the pirates a “rank of heroes” while they were fighting against a British force that was far better supplied than they were.\(^90\) One can even argue that Jean Lafitte’s rise to prominence was at least partly the result of the emphasis stories of him placed on his role fighting off the British, as opposed to his other activities. Despite being offered everything from power and influence to a great deal of gold by the British, Lafitte decided to inform the Americans of the impending British attack and their attempt to bribe him.\(^91\) Of course, refusing the bribe was honorable, but the author seems to laud Lafitte even more for the fact that Lafitte cannot find it in himself to accept the bribe as he is French, and sympathetic to the Americans, and the bribe comes from the British.\(^92\)

Even some absolutely notorious pirates were portrayed sympathetically when their activities were cast in the light of privateering as opposed to pure piracy. The notorious Captain Kidd did not start out so terrible; all of his early actions were patriotic plundering, as England was at war.\(^93\) One author described the beginning of his career as follows: “In the beginning of King William’s War, Captain Kidd commanded a privateer in the West-Indies, and by several

\(^{89}\) Ibid, 651.
\(^{90}\) Ibid, 654-5.
\(^{91}\) Ellms, *Pirates Own Book*, 66-7. In contrast to many of the other tales, Jean Lafitte was an actual person, and he did actually help Andrew Jackson during the Battle of New Orleans of the War of 1812. How many of his other exploits are based on fact is debatable, but there is certainly a lot of interest in the matter. For anyone seeking further information on Lafitte, I would recommend going to New Orleans; there is almost a cult following to the pirate/privateer there.
\(^{92}\) Ibid, 67.
\(^{93}\) *History of Pirates*, 56-7.
adventurous actions acquired the reputation of a brave man.”\textsuperscript{94} Even when he came home with “richly laden” vessels, Kidd was not seen as greedy or evil, but simply as a man doing his duty to king and country.\textsuperscript{95} Patriotism, or fighting for a good cause such as warring with America’s enemies, seems to have been more than enough to make pirates decent men in the eyes of antebellum readers; one might even go so far as to say, when looking a Jean Lafitte’s story, that fighting for the right cause can even redeem a truly bad pirate.

Another lesson found exclusively in pirate tales for men was not to be overly bloodthirsty and violent.\textsuperscript{96} As even a short reading of pirate tales will indicate, violence was an important part of these stories. However, good pirate captains, the ones who were the most handsome and of the highest social standing, were always careful to fight only when necessary, but not because they were afraid of being injured or losing their lives as real Golden Age pirates were. No, these men simply were too noble to shed blood or end another’s life unless it was absolutely necessary. Don Ramon exemplifies this trait, as he would frequently say he “was averse to making a disturbance” when none was called for.\textsuperscript{97} In other stories, such as that of Captain John Bowen, the author takes a generally uncomplimentary tone with pirates who, like Bowen, fought simply because they had nothing better to do.\textsuperscript{98} In one of the only examples of a pirate story written for women that contained bloodthirstiness, the pirates in question murder the noble passenger’s only daughter; these pirate subsequently found themselves stranded on an exotic coast where the natives took them captive, prior to their being caught by the British navy and hanged.\textsuperscript{99} Finally, Jean Lafitte returns to demonstrate honor through preventing unnecessary bloodshed: on the attack of an Indiaman, “the English deeming resistance fruitless, surrendered, and Lafitte hastened to put a stop to the slaughter.”\textsuperscript{100} Readers probably found Lafitte’s nonviolence even nobler because he so hated the British.

Similar to the need to avoid unnecessary violence was the necessity of avoiding reckless behavior. Recklessness was, again, seen as a waste of time, money, and perhaps lives, and in the very few stories that sympathize with navies in pursuit of pirates, the pirates are always wild, careless men.\textsuperscript{101} In a story were the dangerous pirate crew is eventually wiped out by the carefully planned and orchestrated attack of the navy lead by Lord Bellamont, the pirate captain

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\textsuperscript{94} Ibid, 52.
\textsuperscript{95} Blake, Ramon the Rover of Cuba, 67.
\textsuperscript{96} Earlier, I discussed how the image of the bloodthirsty pirate, while prevalent in today’s society, has been proven false, but I also said that these stories help to create the image of the pirate as we know him today. The “bloodthirsty” image, it seems, existed prior to the writing of these stories; however, these stories reinforced and perpetuated that image. While the heroic pirate captains are not bloodthirsty, all of the antiheroes are and authors almost always cited how the hero was different from his fellows in this regard.
\textsuperscript{97} Blake, Ramon the Rover of Cuba, 67.
\textsuperscript{98} History of Pirates, 44-52.
\textsuperscript{100} Ellms, Pirates Own Book, 60.
\end{flushright}
“possessed . . . a perfect recklessness of life and a disposition to seek out danger for the fierce pleasure of the excitement in subduing it.”[102] After having to kill the entire pirate crew, Bellamont said, “I knew that they were brave – fearless to desperation, but I did not expect to see them show such fool-hardiness.”[103] Clearly, these tales draw a distinction between necessary violence and pointless fighting.

Some pirates left recklessness so far behind that they actually became quite organized and productive members of society. When Lafitte’s adventures slowed, his “biographer” lauded him for settling down to “the cautious dealings necessary to found and conduct a colony.”[104] While other pirates did not rejoin the “land-lubbers,” some did adopt rigorous organization and discipline, most unlike the real pirate ships historians now describe. For example, “the decks tell tales of holy-stone and sand, and the neatness every where apparent, indicates the reign of discipline.”[105] While these pirate ships may not be even close to being historically accurate, they certainly reveal a lot about what qualities the ideal antebellum gentlemen possessed.

As hinted at earlier, courage played an important role in pirate tales intended for a male audience. If a pirate had “courage” or was described as “courageous,” the author always ultimately saw him as a good man. Authors wrote very sympathetically about Jean Lafitte, saying such things as “the difficulty and danger far from discouraging this intrepid sailor, acted as an additional spur to his brilliant valor.”[106] When our friend, the handsome Captain Roberts, learned that an enemy vessel was approaching, “he slipped his cable, got under sail, ordered his men to arms without any show of timidity, dropping a first-rate oath, that it was a bite, but at the same time resolved, like a gallant rogue, to get clear or die.”[107] This willingness to die is an important characteristic to a number of the pirate heroes; slightly reminiscent of Christ’s death on the cross, which some scholars claim is the basis of “all Western heroic figures,” the ability to not merely face death, but to be truly unafraid to die, is the supreme act of courage in these tales.[108]

While good, brave pirate heroes were unafraid of death, that quality should not be confused with a willingness to allow fate to dictate their ends. By facing death and choosing to die rather than to being captured and enslaved or killed on someone else’s terms, truly evil pirates could redeem themselves, at the very least in the eyes of their authors, by dying bravely. Blackbeard, a name that is still notorious today, was redeemed in at least one recounting of his tale by his clear choice to die rather than allowing himself to be captured and hanged: “though the pirate [Blackbeard] was wounded by the first shot from Maynard, though he had received

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105 Burts, “Privateer,” 650.
107 Ibid, 94.
twenty cuts, and as many shots, he fought with desperate valor.” Another pirate, who was entirely unremarkable except for his exceptional cruelty, took almost the exact same path as Blackbeard. When it became clear to Rahmah-Ben-Jabir that he and his crew were going to be entirely overrun and captured, he blew up himself, his ship, and everything on it, causing the author to say that his death was “truly romantic” despite all of the horrible deeds of his life. While Christ, the archetypal hero, certainly never committed the crimes of Blackbeard or Rahmah-Ben-Jabir, they seemed to receive redemption through death like Christ did, just the same.

Unsurprisingly, greed plays a central role in a number of romantic pirate tales. However, simply looting and plundering did not necessarily earn the author’s condemnation. Antebellum society, or at least the authors of these stories, drew a strong distinction between taking back what is rightfully yours and taking from those who are greedy or stealing for personal gain. Don Ramon plundered a great number of ships, but he only ever turned to piracy in the first place because all his former friends had refused to loan him money after his father had unjustly thrown him out. At that point, Ramon “swore revenge against the whole race of merchants and sailors,” and he got that revenge before long. The very first ship he captured belonged to one of the men who had been “friends” with him his entire life, but who had refused to loan him even the smallest amount of cash after the incident with Ramon’s father. As Ramon was regaining what was rightfully his, Reverend Blake had no quarrels with his stealing from the immoral people around him to regain it.

Many other pirate captains lived happy, peaceful lives if they were not too greedy. Captain Condent, realizing that the greed that drove his piracy was wrong, reformed himself and became a regular sea merchant. However, if pirates who turned away from their piracy returned to their old ways for greedy purposes, they met nasty ends. Captain Tew was leading a calm, relatively happy life after he stopped “pirating,” but when an old mate approached him with a plan for another voyage, Tew became greedy and wound up dying a very painful and slow death due to a gut-shot wound. Remember how Captain Kidd was not always a bad pirate? Greed was the factor that transformed him from a courageous patriot to a foul pirate. Kidd even took a second commission from the King to “begin a new era in [his] life,” but barely a month passed before Kidd returned to his piratical activities and justice found him. In concluding the story of Captain Kidd, the author was very careful to point out that Kidd only had to be hanged

109 Ellms, Pirates Own Book, 344.
110 Ibid, 52-6.
111 Blake, Ramon the Rover of Cuba, 35-7.
112 Ibid, 46.
113 History of Pirates, 117-121.
114 Ibid, 90.
115 “The Bucaneer,” 249, 250.
because the motivations for his plundering changed; before he had been providing a service to his countrymen, by the time of his death, all of his exploits were for his own gain.\textsuperscript{116}

Several other pirate captains’ greed led to their misfortunes. Captain Fly’s piratical career immediately got started off wrong; he was a mutineer, but he convinced the crew to mutiny simply because he wanted more wealth – not because the captain was harsh or cruel.\textsuperscript{117} Captain Avery, who was “a fellow of more cunning than courage, and insinuating himself into the confidence of some of the boldest men in the ship, he represented the immense riches which were to be acquired upon the Spanish coast,” actually got away with a massive treasure of diamonds.\textsuperscript{118} However, Avery himself was swindled out of his entire fortune by a group of merchants who politely told him they would “handle” all of the transactions regarding his diamonds, as they certainly did.\textsuperscript{119} Greed led to the ultimate punishment in “Jack Marlinspike’s Yarn.” The devil lured a group of pirates into sailing right into hell by promising them unimaginable riches.\textsuperscript{120} Greed was never acceptable conduct in a gentleman.

Tellingly, in relation to the mores of the day, rudeness was a trait that was as condemning as greed for antebellum gentlemen. Don Ramon was incredibly polite: “It would have been a cruel thing to frighten the fellow [who showed Ramon the way through the lagoon], after all the polite attentions he had shown us; and I wish to avoid every thing like cruelty.”\textsuperscript{121} In fact, Ramon even explicitly commented on types of piracy that were uncivil. “I [Ramon] must confess that I felt my temper a little ruffled at being mistaken for a highway robber, a land-shark. I have always considered the practice of highway robbery exceedingly immoral, and highly ungenteel [sic].”\textsuperscript{122} Other pirates, such as Captain William Fly who was “ignorant . . . of letters,” were exceedingly rude in polite company, and this fact only added to the opprobrium the authors heaped on that sort of pirate.\textsuperscript{123} On the other hand, some pirates never came into contact with polite company as Ramon and Captain Tew did, who “in point of gallantry, was inferior to none.”\textsuperscript{124} But they too could demonstrate their manners by their interactions with the defeated captains of other ships. Captain Lewis “used him [the opposing captain Smith] very civilly, and gave him as much, or more value than he took from him, and let him go, saying, he would come to Carolina when he had made money on the coast and would rely on his friendship.”\textsuperscript{125} The similarity between the practices of Southern hospitality and Captain Lewis’s statement should

\textsuperscript{116} \textit{History of Pirates}, 60-7.
\textsuperscript{117} Ibid, 130.
\textsuperscript{118} Ellms, \textit{Pirates Own Book}, 13.
\textsuperscript{119} Ibid, 18-20.
\textsuperscript{121} Blake, \textit{Ramon the Rover of Cuba}, 95.
\textsuperscript{122} Ibid, 67.
\textsuperscript{123} \textit{History of Pirates}, 127.
\textsuperscript{124} Ibid, 67.
\textsuperscript{125} Ibid, 152.
not be overlooked; romantic pirates were truly considered “gentlemen of fortune” by both the authors of their tales and their voracious genteel readers.\textsuperscript{126}

While the theme of rudeness tends to appear only in pirate stories written for men, the concept of chivalry manifests itself in pirate tales regardless of their intended audience. Don Ramon “never suffer[ed] a lady to be ill used; and [had] spared more than one vessel on account of the female passengers.”\textsuperscript{127} Perhaps because of these very actions, a young lady said, “there seems to be quite a dash of chivalry about his [Ramon’s] character.”\textsuperscript{128} In a story from the Ladies Companion, the old master’s son returns after many years roaming the seas to protect the old servant Marie from her own, thoroughly drunk, son.\textsuperscript{129} The implication behind this story is that only the upper class gentleman was capable of performing chivalrous actions, while the lower class man was unable to control himself even when the victim of his violence was to be his mother.

These instances of chivalry, or lack thereof, contain the strongest encouragement for the reader either to emulate or avoid the behavior or the character trait. In particular, since Southern men “had appointed themselves the protectors of women” these stories offered particularly good models of appropriate and inappropriate behavior.\textsuperscript{130} While Don Ramon’s behavior toward women was exemplary, the old servant’s son’s actions are clearly condemned. However, relating chivalrously toward women and maintaining honor with other men was not nearly as simple as a quick reading of these stories would seem to indicate. “For these young men, the southern code of honor taught them a dual standard when it came to relations with women. They were to seek out potential mates by courting women from their own social status, following rigid rules of honorable behavior. But the code and society also instructed them that they were to engage in sexual conquest.”\textsuperscript{131} When presented with characters who were open to sexual intercourse, pirate tales took on a distinctly negative tone. Ann Bonny was both sexually aggressive and incredibly masculine in her dress and habits, making her incompatible with the image young gentlemen were taught to desire in a wife.\textsuperscript{132} These images left them wondering, at least subconsciously, how they were supposed to be both sexually accomplished and polite?

In addition to the double standard of sexual conquest, young men had to remain in command of their own fate at all costs, much like Blackbeard and Rahmah-Ben-Jabir did. This situation offered even greater problems during courtship, as “courtship was thus an unusual time in which the balance of power tipped briefly in favor of young women.”\textsuperscript{133}

\textsuperscript{126} Ellms, Pirates Own Book, 86.
\textsuperscript{127} Blake, Ramon the Rover of Cuba, 114.
\textsuperscript{128} Ibid, 115.
\textsuperscript{130} Berry, All That Makes A Man, 112.
\textsuperscript{131} Pace, Halls of Honor, 73.
\textsuperscript{132} History of Pirates, 220-1.
\textsuperscript{133} Brown, Good Wives, 249.
were literally placing their fate, and more importantly, their honor in the hands of the young ladies they were courting when they asked for their hand in marriage. Of course, a young lady’s father could discredit her suitor, but if the offense was serious enough, men could always take the issue to the dueling field. However, when young ladies insulted young gentlemen, they had no established method of recourse. Thus, a young man could not fully establish himself as a gentleman without first placing himself in the power of a woman.¹³⁴

This tension between maintaining control of one’s destiny and placing oneself in the hands of a woman is noticeably absent from pirate stories written for women. The authors writing pirate tales for women never portrayed a pirate sympathetically if he continued his career of piracy at the conclusion of the story. Rather, the pirates either continued in their evil ways and met a nasty end or they were reformed by the power of a good woman’s influence.¹³⁵ The “ideology of the antebellum cult of domesticity” was in full force in these stories.¹³⁶ In the tale of the old master’s son who saved his old servant, the pirate himself had the latent qualities of chivalry and goodness, but it was only after talking to his old female servant, who was a mother, that he decides to turn away from his life piracy and return to a respectable life on shore.¹³⁷ Authors used this plot device very often in such publications as the Ladies Companion, but it did see occasional variation. In one story, the evil pirate son is reformed by his father, though it should be noted that his father exhibits a sentimentality and perception that would not have been out of place in a woman.¹³⁸ The most important observation to take away from these stories written for women is that fate always has a hand in placing good women in the path of those pirates who are destined to be reformed and that it is her power, not any action of his, that transforms the brute into more sensitive man.

**From Pirates to Gents**

While the differences between pirate stories written for women and those written for men are certainly interesting, one might ask what the significance of these differences is. Before turning to that judgment, one should note that on many counts, pirate tales for men and women agree on the characteristics that make up the ideal gentlemen. He is from an excellent background and, naturally, white. He possesses honor as manifested in his courage, manners, lack of greed, and chivalry. However, the stories differ significantly on their view of violence. Pirate tales for males frequently condone violence for reasons as wide-ranging as patriotism to maintaining agency. Women’s stories never condone violence.

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¹³⁴ Many scholars now agree that family, both a wife and children, were incredibly important in establishing a gentleman’s position and honor. For an excellent review of the subject, see Drew Gilpin Faust’s *James Henry Hammond and the Old South: A Design for Mastery.*

¹³⁵ Ellet, “Legacy Ship,” 266.

¹³⁶ Machor, *Reading Fiction in Antebellum America,* 117.


The significance in these differences lies in the fact that both sets of pirate tales were meant to teach. Antebellum writers expected “the informed woman reader . . . to glean practical benefits from novels and stories that did not overtly provide them.”\textsuperscript{139} In other words, authors expected women to go out and reform their violent men after reading one of these stories. Furthermore, women’s stories presented men as pawns of fate, an idea that men often conceived as weak and womanly.\textsuperscript{140} This created problems as “a male in the nineteenth century (like one in the twentieth), self-convicted of feminine qualities, was usually also troubled by anxiety that he might be a failure, non-functional, even non-existent.”\textsuperscript{141} Southern men in particular believed that they had to be self-reliant in order for America to prosper, but self-reliance was clearly not on the agenda of the authors of pirate stories for women.\textsuperscript{142}

Stories written for a male audience presented the pirate as “commanding, firm, courageous, magnanimous, professional, chivalric, restless, hardy, famous, able . . . daring, a good shot, a gentleman, adventurous, and a patriot.”\textsuperscript{143} This image was ideal because the pirate took fate into his own hands, by going down with his ship or committing suicide rather than being hanged. He was a role model because men could not “surrender themselves to the march of events without losing their self-esteem,” and if they did not even esteem themselves, how could they possibly expect to maintain honor in the eyes of their peers?\textsuperscript{144}

Ultimately, action stories like these pirate tales were certainly not the cause of the Civil War. However, these stories openly perpetuated an image of manhood that required honor to be upheld above all else, despite, or perhaps because of, the violence that involved. This image of the ideal gentlemen contrasted sharply with that of the passive, sensitive, reformed man presented in pirate stories for women. However, these young Southern men had much greater problems than simply choosing which image of ideal manhood they wanted to aspire to. For if they did not accept the feminized version of manhood, at least for a period of time, they might never gain a wife, and a wife was essential to maintaining the power and prestige associated with the male image of ideal manhood. Allowing fate or a woman control of his life for even a short period of time, by contrast, could fundamentally compromise that masculine ideal nature to begin with. One can see the problem these young men faced.

While these stories played no causal role in starting the Civil War, they do reveal that cultural expectations were just as important as political concerns, if not more so, in sparking the conflict. If we accept that both of these images of manhood were considered ideal, particularly in the South, then we must acknowledge the concept of a true Southern gentleman was not completely settled. In this uncertainty, the Civil War offered what was perhaps the only

\textsuperscript{139} Machor, \textit{Reading Fiction in Antebellum America}, 81.
\textsuperscript{140} Berry, \textit{All That Makes A Man}, 38-9.
\textsuperscript{141} Douglas, \textit{Feminization of American Culture}, 20.
\textsuperscript{142} Taylor, \textit{Cavalier & Yankee}, 100.
\textsuperscript{143} Hume, “The Buccaneer,” 70.
\textsuperscript{144} Berry, \textit{All That Makes A Man}, 38.
opportunity for young men almost completely to fulfill both images simultaneously. Especially after the North invaded Southern territory, Southern men could claim that fate dictated their fighting when discussing the situation with wives and daughters, and claim agency when talking with other men. Romantic antebellum pirate stories reflect the fact that they are a part of the culture of intransigence and tension that also created the Civil War. In both products, scholars today can see the distinctive tension, created not just by regional strife but also by the discourse on what exactly made the ideal man.

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Secondary Sources


The Effects of Positive Mirror Exposure on Male and Female Body Satisfaction

Sarah Harber

In 1972, a survey by Psychology Today found that 25% of women and 15% of men were dissatisfied with their overall appearance (Pope, Phillips, & Olivardia, 2000). By 1997, 56% of women and 43% percent of men reported dissatisfaction with their bodies (Pope et al., 2000). Because the prevalence of body dissatisfaction and of body image issues has risen drastically over the last fifty years, current research explores the causes of body dissatisfaction as well as measures for preventing and treating body image concerns.

According to Cash (2008), culture, interpersonal experiences, personality, and physical traits all influence a person’s body image attitudes and the importance of body image to an individual. Because changing one person’s attitudes is less complicated than changing an entire culture, internal values and attitudes are the primary targets of both prevention and treatment therapies for body dissatisfaction and overconcern with weight and shape. In body image dissatisfaction studies, social comparison is one of the main contributors to negative ideas about one’s body. Social comparison occurs any time someone compares his or her appearance with someone else’s appearance. Because of the prevalence of ultra-thin females, extremely muscular men, and airbrushed bodies in the media today, realistic body comparisons are difficult. Upward comparison is a type of social comparison where an individual compares himself or herself to a model or actor with looks that a normal individual could never achieve. The lack of realistic comparison models often forces people to engage in upward comparisons that highlight an individual’s deficiencies in body image, weight, and shape (Bergstrom, Neighbors, & Malheim, 2009). These perceived deficiencies lead to dissatisfaction and lower self-esteem, especially among people who rate appearance as important (Bergstrom et al., 2009).

In addition, upward comparisons contribute to the development of negative body image schemas. Schemas are knowledge structures that focus attention and determine methods of information processing. For example, overconcern with weight and shape is a schema that contributes to disordered eating, excessive exercise, body checking, and body avoidance behaviors (Williamson, Muller, Reas, & Thaw, 1999). When an individual accepts the media’s thin-ideal and overvalues appearance in a process labeled “internalization”, the individual focuses on body areas that he or she considers to be negative. The combination of internalization and a focus on an unsatisfactory body area increases an individual’s negative affect as well as the frequency of problematic behaviors associated with that negative body area (Shafran, Lee, Payne, & Fairburn, 2007). Engaging in problematic behaviors increases levels of distress and preoccupation with body areas that reactivate an individual’s negative body image schema (Shafran, Fairburn, Robinson, & Lask, 2004).
Body image dissatisfaction can lead to behaviors that are classified as either body checking or avoidant in nature. Body checking behaviors include “frequent weighing, examining specific body parts in the mirror, using the fit of clothes to judge shape or weight change, . . . [and] seeking reassurance about shape” (Shafran et al., 2004, p.94). Body checking behaviors force attention toward dissatisfying areas of an individual’s body, which are called “hot spots” (Shafran et al., 2007). On the other hand, body avoidance behaviors prevent visual analysis of concern areas and include “refusal to be weighed, covering mirrors in the house, . . . and wearing baggy clothes to disguise one’s shape” (Shafran et al., 2004, p.94). Body checking and avoidance behaviors resulting from body image dissatisfaction and disturbance are a primary characteristic of eating disordered patients, and mirror exposure is a frequent treatment for reducing disturbance in those with disorders such as bulimia nervosa (Shafran et al., 2007).

Mirror exposure (ME) is a common therapy component for both treatment and prevention of body image dissatisfaction; however, a variety of methods and theories are used to counteract body checking and avoidance through ME. Research on these methods lacks consistency in the types of participants, the theory behind observed changes, and the systematic nature of the therapy procedures.

One of the most common ME procedures is based on the theories of desensitization and mindfulness. Delinsky and Wilson (2006) propose that desensitization caused by systematic mirror exposure to one’s body reduces anxiety and decreases later body avoidance in those experiencing body image dissatisfaction. Theoretically, desensitization occurs when participants become used to their image in the mirror and gain the ability to look beyond it. Delinsky and Wilson’s ME procedure is also based on Linehan’s mindfulness training to control dysfunctional beliefs and to increase self-acceptance (Delinsky & Wilson, 2006). To decrease the selective attention toward hot spots, mindfulness encourages participants to experience a more holistic and nonjudgmental view of their body. Delinsky and Wilson’s theory is that mindfulness and systematic ME increase emotional processing of the negative thoughts and feelings of dissatisfaction so that participants feel less dissatisfaction in the future. The mindfulness also endorses a nonjudgmental attitude that works to reduce the emotional impact of body processing. In turn, self-acceptance stops the cycle of body checking, avoidance, negative affect, frustration, and distress (Delinsky & Wilson).

The Delinsky and Wilson procedure occurs in several parts. Each participant gives information on their current mirror use and is informed that the procedure is designed to produce a more holistic view and more nonjudgmental language. Participants describe themselves in a nonjudgmental, systematic manner from head to toe, giving equal attention to all body areas. This procedure is repeated several times and combined with other activities. The course of treatment significantly reduced body checking, avoidance, and weight and shape concern in a population of normal weight women with extreme weight and shape concerns over the course of about six weeks (Delinsky & Wilson, 2006). However, the combination of therapy activities and ME makes it difficult to ascertain what reduced each behavior. The authors also suggest the
mindfulness aspects may not be necessary; systematic exposure alone may treat weight and shape concerns.

In contrast, Stice and Presnell’s (2007) ME therapy uses positive statements without any systematic description. It is based on the theory of cognitive dissonance. According to Baumeister and Bushman (2008), cognitive dissonance occurs when conflicting attitudes or behaviors create “psychological discomfort”. Dissonance often leads people to change their attitudes or behaviors from their previously held ideals. For example, in Festinger and Carlsmith’s study, participants were asked to lie about the entertainment value of a task that they knew to be boring (Baumeister & Bushman, 2008). The less the participants were paid to tell the lie, the more they believed the lie. According to Festinger’s theory of cognitive dissonance, being rewarded for participation or comments decreases a participant’s ability to buy into the comments he or she has made (Baumeister & Bushman, 2008). If the comments conflict with previously held beliefs and lack any external rewards, the participant will be more likely to change their attitudes and behavior. A principle component contributing to this change is that the newer actions must be voluntary and visible to others. Research participants who volunteer for certain counter-attitudinal conditions experience higher levels of dissonance and the resulting behavior and attitude changes (Baumeister & Bushman, 2008). Because participants in this study are being asked to “volunteer” for the treatment conditions without payment, they should experience greater dissonance than they would if they felt they had been forced into a condition. Voluntary efforts will enhance the authenticity of the statements each individual will be asked to write.

Stice and Presnell’s (2007) complete program attempts to change attitudes and thin-ideal internalizations through dissonance-based exercises. Their ME procedure simply asks participants to look in a mirror and write down all their positive intellectual, appearance-related, emotion-oriented, and social qualities. Participants experience dissonance when they write positive statements instead of their normal negative thoughts. Stice and Presnell’s (2007) ME exercise is not systematic; it allows participants to continue avoiding areas of their bodies that cause discomfort. If participants ignore these areas of discomfort, or “hot spots”, they will not experience dissonance in their most negative body image areas. Delinsky and Wilson (2006) correct this gap by having participants systematically describe each body part.

In addition to the difference in the systematic nature of the ME procedures, the procedures advocate different types of corrective statements. Delinsky and Wilson ask participants to use nonjudgmental statements. For participants with initially negative views, nonjudgmental statements can cause dissonance and improve thinking. Possibly because Stice and Presnell’s method is designed to induce cognitive dissonance in normal individuals, they advocate the use of positive statements. For normal participants, there may be a wide range of pre-treatment beliefs. Cognitions that are initially neutral or non-judgmental can only be improved with positive statements. Many self-help programs use positive self-statements to prevent overconcern with weight and shape and development of eating disorders.
Self-affirmation principles and self-help literature on body dissatisfaction attempt to raise positive affect and esteem about the body in the hope of preventing further upward comparison. Self-affirmation is a “process by which people maintain a sense of self-integrity, that is, a perception of themselves as globally moral, adequate, and efficacious when they confront threats to a valued self-image” (Sherman et al., 2009, p.745). Steele’s self-affirmation theory explains that when people experience negative cognitions that lower feelings of self-worth in specific areas, people are motivated to raise their overall self-worth (Sherman et al., 2009). In general, feelings of inadequacy or dissatisfaction in one area motivate people to affirm their self-worth in another, often unrelated area (Bergstrom et al., 2009). For example, a woman who experiences dissatisfaction in regard to her weight may tell herself that she is a loyal friend. Self-affirmation is reflected in Stice and Presnell’s (2007) “The Body Project Workbook” in which participants are encouraged to affirm any positive aspect of themselves. The process allows participants to focus on positive areas instead of targeting “threats” to their self-worth. However, Sherman et al. (2009) note that overall self-esteem may increase more if a person affirms the aspect of self that was “threatened” by cognitions like social comparison and internalization of negative body image ideas. A more systematic method of ME will ensure all body areas are affirmed; therefore, participants will have to bolster the areas they consider threatened. Tesser states that “threats to self-esteem generate negative affect, and bolstering self-esteem generates positive affect” (Tesser, 2000, p.291). Therefore, raising feelings of self-worth in areas that have been threatened should raise overall esteem more than promoting self-worth in an unrelated area. For this reason, a systematic approach is more likely to raise self-esteem and positive affect than an approach like Stice’s, which allows continued avoidance of hot spots.

Self-help programs like Operation Beautiful (Boyle, 2010) and self-affirmation exercises like those used by Stice and Presnell (2007) advocate the use of positive statements about the body as a method of increasing cognitive dissonance and body satisfaction. However, the self-help programs lack experimental evidence supporting the use of positive statements as a method for directly raising positive affect and self-esteem. Thus far, therapies have not consistently addressed all body parts in combination with using positive statements in mirror exercises—despite the claims of self-help and self-affirmation exercises that positive body statements can effect change.

In addition to inconsistencies in ME theories, the populations in experiments differ widely. Unfortunately, the majority of studies assessing these body image therapies do not include male participants. Olivardia (2002) notes that media and cultural changes have influenced male body image in a similar way to female body image; male models from G. I. Joe to Playgirl centerfolds have lost body fat and gained muscle at impossible rates. Overall, the authors note that male body image problems are a significant issue that needs addressing. With women, expressing body image concerns is more socially acceptable and these concerns appear more prevalent; however, the concerns and needs for treatment are just as important to the
mental health of some men. Based on recent research studies, there is no way to determine if current body image therapies are effective for men.

Because current studies show almost everyone appears to have some area of body dissatisfaction, this study incorporated both male and female participants. Participants were assigned to conditions requiring either control, nonjudgmental, or positive body statements designed to effect attitude change. The nonjudgmental and positive exercise conditions attempted to maximize dissonance by asking participants to comment on every body area to ensure participants include their hot spots. The positive element researched by Stice and Presnell (2007) and promoted in self-help affirmation programs like Operation Beautiful was compared with a nonjudgmental statement condition like in the Delinsky and Wilson (2006) procedure.

We hypothesized that the positive statements provide higher levels of dissonance and a larger increase in satisfaction because the new statements are more contrary to the individual’s original ideas than nonjudgmental statements. The control condition measured normal thoughts that occur when looking in the mirror regardless of whether the thoughts are positive, negative, or nonjudgmental. The purpose of this study is to evaluate claims of improvement based on the theoretical benefits of self-affirmation and positive statements when used in a systematic manner. This study examined the effectiveness of a more positive form of ME for the reduction of negative affect, low esteem, and dissatisfaction in both males and females.

Because recent research shows differences in men and women on measures of positive affect, negative affect, and self-esteem, we expected male participants to score lower on negative affect, higher on positive affect, and higher on self-esteem.

In addition to the expected main effects for gender, we expected to have many main effects for condition. Stice, Marti, Spoor, Presnell, and Shaw (2008) have shown that the cognitive dissonance procedures temporarily reduce negative affect. We measured both positive and negative affect before and after the procedure. The control condition should not experience any change in affect except for the changes elicited by looking systematically in a mirror. Because the procedure is designed to promote less negative body-related statements, we expect that both the nonjudgmental and the positive conditions will experience a reduction in negative affect. In addition, if claims made by programs like Operation Beautiful are true, the positive condition should experience a higher increase in positive affect than the control or nonjudgmental conditions, with the control not experiencing any change.

The Appearance subscale of the Body Esteem Scale for Adolescents and Adults (BESAA) should reflect no changes for the control group. The nonjudgmental group would be expected to show increases in body esteem, and we predict the positive condition will show the greatest increase in body esteem. Overall self-esteem might decrease slightly for participants in the control, while it would be expected to increase for the nonjudgmental and the positive conditions. The increase in overall esteem would be expected in both males and females.
The cumulative satisfaction and the initially least satisfactory body area, or “hotspot”, as rated on visual-analog scales of body satisfaction may show slight decreases in satisfaction for participants from the control condition. Participants in the nonjudgmental group should experience some increase in satisfaction, with higher increases expected in the positive condition.

If these predictions hold true, it suggests the use of positive statements in ME may be a more effective way of preventing and treating body image dissatisfaction among both male and female populations.

**Methods**

**Participants**

This study was conducted with 30 female and 31 male undergraduate Introduction to Psychology students who volunteered to participate in a body image exercise. Based on self-reported ethnicity, 64 percent of participants identified as Caucasian, 15 percent as Asian, and 18 percent as African-American. One student identified as Asian and White, and one student identified as Native American. The mean male BMI was 24.7 (SD=4.87), and the female mean was 22.2 (SD=3.41). Participants were 38 percent freshmen, 41 percent sophomores, and 18 percent juniors. Students were told not to participate if they had a history of depression or eating disorders. Students were assigned to conditions based on gender, body mass index, ethnicity, and initial overall body satisfaction. The study did not eliminate participants on the basis of weight. For their participation, students received course credit.

**Materials**

**Body Esteem Scale for Adolescents and Adults (BESAA).** Mendelson, Mendelson, and White (2001) developed the BESAA, which was adapted from Franzoi and Shields’s original Body Esteem Scale. Mendelson’s BESAA, as published in Thompson, Heinberg, Altabe, & Tantleff-Dunn (1999), consists of 23 questions rated on a five-point Likert scale (see Appendix A). The BESAA has three subscales—weight, attribution, and appearance. For females between the ages of 18 and 25, coefficient alphas range from .74 to .95 (Mendelson et al.). For males ages 18 to 25, alphas range from .83 to .91 (Mendelson et al.). Three-month test-retest values were .89 for Appearance. For the purposes of this study, only the Appearance subscale was used.

**Multidimensional Body-Self Relations Questionnaire (MBSRQ).** The MBSRQ, designed by Thomas Cash (1985), is valid for anyone over the age of 15 and is one of the few body image assessments valid for both genders. The questionnaire is a 69-item measure with subscales for Appearance Evaluation, Fitness Evaluation, Health Evaluation, Appearance Orientation, Fitness Orientation, Health Orientation, Overweight Preoccupation, Self-Classified Weight, and Body Areas Satisfaction. Male test-retest reliability varies from .71 to .89 over the course of a month, with the lowest values for the Health Evaluation and Fitness Orientation subscales (Cash, 2000). The one-month test-retest reliability for females ranges from .74 to .94, with the lowest reliability for Body Areas Satisfaction and Self-Classified Weight subscales.
Positive and Negative Affect Schedule (PANAS). In order to assess positive and negative affect, this study used Watson, Clark, and Tellegen’s (1988) PANAS. Positive and negative affect are measured on a five-point Likert scale that asks participants to rate whether or not different adjectives reflect their current mood. Scores range from 10 to 50. Coefficient alphas range from .84 to .90, and Watson et al. have demonstrated correlations between these measures and other psychological distress scales (Kaplan & Saccuzzo, 2009).

Rosenberg Self-Esteem Scale (RES). The Rosenberg Self-Esteem Scale measures overall feelings of self-worth based on 10 statements (Rosenberg, 1989). These statements are rated on a four-point Likert scale. Test-retest correlations are between .85 and .88 over a two-week span.

Visual-analog scales of body dissatisfaction. These scales are designed to reflect a concept similar to Cash’s Body Areas Satisfaction scale. However, this study used a 7.3 centimeter visual analog scale (VAS) in order to be a more sensitive assessment of changes over the course of the study (This length was chosen because of Microsoft Word formatting.). Because we designed these scales, we did not use developed norms. In order to create a list of body areas that was comprehensive, was not too specific, and possessed no overlapping areas, we selected 20 body parts from the Body Cathexis Scale (Thompson, 1990) and Cash’s MBSRQ. Additionally, we measured satisfaction from the shoulders down and overall appearance satisfaction. The overall measure of appearance satisfaction was used to distribute participants among conditions and to assess changes over the course of treatment. For pre and post-treatment comparisons, the body area rated as initially least satisfactory was used (later referred to as the “hotspot” VAS). In order to select the “hotspot” VAS, we looked at the visual analog scales numbered 1-20 and selected the scale with the most initial dissatisfaction.

Body areas for written statements. The twenty body areas used in the visual analog scales provided the basis for each participant’s written statements. These statements covered parts of the body that traditionally elicit body image concerns.

Design

We used a 3 (ME condition: positive, nonjudgmental, control) x 2 (gender) x 2 (time) mixed factorial design with ME type as an independent variable. The dependent variables were positive affect measured by the PANAS, negative affect measured by the PANAS, global self-esteem measured by the Rosenberg Self-Esteem Scale, body esteem as measured by the Body Esteem Scale, and overall body satisfaction. A 3 (condition) x 2 (gender) ANOVA was used to assess body-related satisfaction as measured by a combined visual-analog scale and the “hotspot” visual-analog scale.
Procedure

Participants signed up for individual sessions and were asked to wear form-fitting clothing. A same-sex experimenter conducted participant sessions. Upon arrival, participants were informed of the procedure for the study according to a prearranged script. Participants were asked to sign and turn in a consent form once they understood the procedure. Participants then completed the MBSRQ, the PANAS, the Rosenberg Self-Esteem Scale, the Body Esteem Scale, and a visual-analog scale of current body satisfaction. Based on the participants’ gender, ethnicity, approximate BMI, and rating on the visual-analog scale for overall satisfaction, each participant was assigned to the ME condition that most evenly distributed those traits across conditions. The matching was done based on each participant’s approximate BMI and self-rated level of dissatisfaction according to our combined visual-analog scale.

We asked each participant to “volunteer” to participate in the assigned condition in order to increase his or her level of dissonance. Participants reviewed a typed procedure for their condition and were asked to complete that procedure in a private room. The room contained a table with the written procedures and several mirrors placed so that participants could view all aspects of their bodies. In the room, each participant wrote 20 body related statements that consisted of positive, nonjudgmental, or normal thoughts, depending on their assigned condition. After completion of each statement, nonjudgmental and positive condition participants rated their statement as positive, neutral, or negative before moving on to the next statement in order to ensure they were following directions as closely as possible. Participants in the control conditions rated their statements after completing the whole list so that they would record their normal thoughts—regardless of how negative they were. Participants then retook the PANAS, the Rosenberg Self-Esteem Scale, the Body Esteem Scale, and the visual-analog scale as well as answered demographic questions. Pre- and post-treatment scores were compared to assess changes in esteem, overall dissatisfaction, affect, and the body part with the most initial dissatisfaction.

Results

Overall, the majority of participants were of a normal weight. The mean BMI of male participants was significantly higher $F (1, 54)=4.81, p=.033, \eta^2 = .082$. Despite the higher male BMI, males averaged a rating of 5.06 centimeters (SD=1.27) on a 7.3-centimeter scale of initial overall body satisfaction. The mean initial female satisfaction was 4.67 centimeters (SD=1.46). This difference was not significant $F (1, 55)=1.15, p=.287, \eta^2 = .021$. More importantly, there were no significant differences in BMI or initial satisfaction across conditions. Our participants also appear fairly consistent with the original MBSRQ norms for each subscale (see Table 1). We accidentally used a sum for analysis of the MBSRQ subscales rather than a mean, so Table 1 shows our data converted to the original metric for purposes of comparison with Cash’s established norms.
**Initial Equivalence.** The purpose of this study was to evaluate whether positive or nonjudgmental statements more effectively raised positive affect (PA), body esteem (BESAA), overall esteem (RES), and satisfaction while decreasing negative affect (NA). In order to make sure all groups were equivalent, we performed several 2 (gender) x 3 (condition) between subjects ANOVAs to assess the equality of our groups prior to the mirror exposure procedure. For each analysis, alpha was set at .01 after performing a Bonferroni correction for the five measures of satisfaction, PA, NA, BESAA, and RES. There were no significant gender x condition interactions for BMI, initial body satisfaction, PA, NA, BESAA, RES, or any of the MBSRQ subscales (see Tables 2 and 3 for descriptive statistics). $F$ values for these analyses were all between .008 and 2.95, with $p$ values between .992 and .060. Therefore, our groups were fairly consistent before beginning the experimental procedure.

Before the experimental procedure, NA, preoccupation with being overweight as measured by the MBSRQ, and the Appearance Evaluation subscale of the MBSRQ showed main effects for gender (see Table 4). These effects fit with current research suggesting that women have more body image and weight concerns. There were no significant differences across conditions or interactions by gender in any of the dependent variables prior to the experiment.

**Compliance.** In addition to having no significant initial differences between the conditions, we performed a 2 (gender) x 3 (condition) between subjects ANOVA to assess any differences in compliance with the experimental procedure based on the number of self-rated statements participants wrote that were consistent with their assigned condition. In the control condition, every statement participants made followed the procedures, so the mean was 20 ($SD=0$). In the positive and nonjudgmental conditions, compliance was based on the number of statements that fit within the participant’s assigned condition. The positive compliance mean was 13.47 ($SD=5.42$), and the nonjudgmental compliance mean was 14.10 ($SD=5.78$). Because the nonjudgmental and positive conditions allow participants to write statements that do not fit the desired ratings, there was a significant difference between conditions in the number of statements fitting the manipulated condition with $F(2, 54)=13.488, p=.000, \quad \eta^2=.333$. However, follow-up Tukey HSD post hoc testing revealed no significant difference between the positive and nonjudgmental conditions with a mean difference of -.755, $p=.584$. Therefore, compliance with the procedure was consistent across conditions.

**Changes in Satisfaction.** We also performed 2x3 between subjects ANOVAs designed to assess changes in the “hot spot” VAS, in the cumulative changes in satisfaction, and in overall satisfaction. Theoretically, a maximum change of 7.3 centimeters was possible. However, actual changes were usually less than 3 centimeters. Change in the “hotspot” VAS is based on changes over time in the visual analog scale with the lowest initial rating. Change scores were calculated by subtracting the pre-treatment score from the post-treatment score so that a positive score indicates increased satisfaction. For participants with several equally low initial scores, an average was taken of the change scores. Cumulative change is a sum of the change scores for all
22 visual analog scales including the overall body satisfaction scale. Overall body satisfaction change was based on a single visual analog scale change score.

For the “hotspot” VAS change score, there were no gender main effects or interactions. However, there was a significant difference between conditions on change in the “hotspot” satisfaction with $F(2, 55)=4.70$, $p=.013$, $\eta^2 = 0.146$. The control condition mean was .22 ($SD=.91$), the nonjudgmental condition mean was 1.01 ($SD=1.04$), and the positive condition mean was 1.17 ($SD=1.06$). This indicates that the control condition participants did not become more satisfied with their “hotspots”. However, both the nonjudgmental and positive conditions showed increased satisfaction (see Figure 1). Tukey HSD post hoc testing shows that the positive and nonjudgmental conditions did not differ significantly for increased satisfaction with a mean difference of .161, $p=.611$. However, each was significantly greater than the control. The mean difference between the control and nonjudgmental was .749, $p=.022$, and the mean difference between the control and the positive was .910, $p=.006$.

There were no significant main effects or interactions for gender or condition for cumulative satisfaction or overall body satisfaction. However, the ANOVA for the cumulative change was marginally significant $F(2, 55)=2.45$, $p=.096$, $\eta^2 = .082$. The cumulative change mean for the control condition was -4.97 ($SD=16.82$), which suggests that participants became less satisfied across the 22 visual analog scales. The nonjudgmental cumulative mean was 4.67 ($SD=11.19$), and the positive cumulative mean was 4.88 ($SD=16.50$), which suggests participants in these conditions may have experienced greater increases in satisfaction. Although these differences were only marginally significant, Tukey HSD post hoc testing suggests a trend for increased cumulative changes in the nonjudgmental and positive conditions. The mean difference between the control and nonjudgmental was 9.06, $p=.063$, and the mean difference between the control and positive was 9.17, $p=.057$. There was no difference in the nonjudgmental and positive conditions with a mean difference of .112, $p=.981$.

**Changes in Esteem and Affect.** In order to assess changes in esteem and affect over time, we used 3(condition) x 2(gender) x 2(time-pre/post) mixed model ANOVAs with a Bonferroni correction of $p=.01$. Contrary to our expectations, there were no significant gender x time x condition interactions (see Table 5) nor any significant condition by time interactions for PA, NA, BESAA, or RES (see Table 6). NA had a significant main effect for time with $F(1, 55)=13.048$, $p=.001$, $\eta^2 = .192$, indicating participants became significantly less negative over time regardless of condition (see Table 3). The RES also had a significant increase over time with $F(1, 55)= 16.03$, $p<.001$, $\eta^2 = .226$. There were no significant main effects or interactions for PA or BESAA.

**Discussion**

Based on our analyses of BMI, overall satisfaction, PANAS, RES, BESAA, and the MBSRQ prior to the experimental procedure, we know that none of the conditions were
significantly different from the others, and there were no gender by condition interactions. Therefore, the matching procedure appeared to have been successful. There were significant gender differences in BMI, NA, the MBSRQ Appearance Evaluation subscale, and the MBSRQ Overweight Preoccupation subscale. The gender differences in NA are consistent with Crawford and Henry’s PANAS norms, which suggest females have significantly higher NA. Our data for the MBSRQ subscales follow the trends from Cash’s MBSRQ norms, with men rating higher on Appearance Evaluation and lower on Overweight Preoccupation.

Despite these gender differences, the groups were equivalent across conditions on all of the initial measures, so none of these variables should have been a factor in the changes based on the experimental condition. In addition, the manipulation check shows that participants were equally compliant with the statement-writing procedure across conditions.

The results of the ANOVAs assessing change in satisfaction do not support our hypothesis that positive mirror exposure (ME) would increase satisfaction more than the nonjudgmental ME. However, post hoc analysis of the changes in the “hotspots” and in the cumulative change both support our hypothesis that the use of positive and nonjudgmental statements would increase satisfaction (see Figure 1). Because normal thoughts would consist of a mix of positive and negative thoughts, requesting that people make positive or nonjudgmental statements allows for cognitive dissonance to occur as people write statements contradicting their beliefs. In the control condition, participants were encouraged to write their normal thoughts. None of the statements conflicted with their initial beliefs; therefore, no cognitive dissonance occurred. In all conditions, participants experience desensitization, but only nonjudgmental and positive conditions have the opportunity to experience cognitive dissonance. If desensitization was the most important element of the procedure, all groups should have gained an equal amount of satisfaction. Changes in body “hotspots” suggest that there is a benefit to the elements of cognitive dissonance that cannot come from mere exposure or desensitization. For those in the control condition, there was almost no change in “hotspots”. Additionally, the cumulative changes for those in the control condition indicated the individuals were slightly less satisfied after the procedure. For participants in the positive and nonjudgmental conditions, “hotspot” satisfaction and cumulative satisfaction increased over the course of the ME—perhaps because they experienced the cognitive dissonance and self-affirmation aspects that were not included in the control condition. However, our results do not support claims made by groups such as Operation Beautiful that positive statements raise esteem and positive affect more than nonjudgmental statements.

The analyses that incorporate change over time do not support our hypotheses that participants would experience an increase in PA, BESAA, and RES based on an interaction between time, gender, and condition. Our predictions were that PA, NA, BESAA, and the RES would change depending on the condition of the participants. None of these scales were significantly affected by the condition, which contradicts claims made by self-help literature that suggest positive statements will most effectively raise PA, BESAA, and RES. NA decreased and
RES scores increased only over time—not by condition, suggesting participants benefitted from the procedure regardless of their assigned condition. One factor that may have influenced the change in NA is initial worry over the procedure. It is possible that after completing the procedure, participants realized it was not as bad as they thought it would be. The exposure and desensitization that participants experience in all conditions may also have reduced NA. In addition, these findings may be affected by the fact that all of our participants were from a normal population, fell within the MBSRQ norms, and had never been diagnosed with depression or an eating disorder. The effects of this procedure may be different when using a more appearance-focused population and when assessing changes over a longer time interval.

While a larger sample size may have been necessary to detect changes, the main limitation to this study was time. Increasing the participants’ number of ME sessions would increase any effects of the procedure. In the Delinsky and Wilson (2006) procedure, the ME sessions are repeated multiple times before re-administering the RES. Our biggest changes were in satisfaction with the “hotspot” body area after only one ME session. If we had participants repeat their exposure and statement-writing sessions several times, it might have made a greater impact on feelings of overall satisfaction and esteem. The fact that we achieved some significant results based on the “hotspot” change score suggests that it might be a more sensitive measure of change than using overall satisfaction, PA, NA, BESAA, or RES. In the future, changes in satisfaction on a participant’s “hot spots” might be an effective way of assessing change. Because we had some change among a normal population after a single ME session, this may be a very beneficial procedure for a more clinical population. The next step in testing this procedure would be to use participants who rate high on the Appearance Orientation or Appearance Evaluation subscales of the MBSRQ. It might also be beneficial to analyze data using only the participants who were most compliant with the procedure.

In addition, our “hotspot” change scores were compared based on the participant’s condition placement without regard for whether the statement made about their “hotspot” was negative, positive, or nonjudgmental. In the future, analyses of change in satisfaction with body “hot spots” ought to be based on the type of statement participants made about that particular area. For the sake of privacy, we had participants remain alone in a room and rate their statements as positive, negative, or nonjudgmental. Compliance with instructions was not 100%. In the future, forcing participants to make all of their statements fit the assigned condition could increase the amount of change we saw in participants’ satisfaction levels.

While participants in this study experienced some mixed results, the fact that we experienced change even after excluding people with extreme body image concerns suggests that the ME procedure is effective and that positive and nonjudgmental statements are more beneficial than mere exposure. We would expect a procedure that benefits normal individuals to be more effective for people who are overconcerned with weight and shape. In future experiments, repeated ME sessions using positive and nonjudgmental statements may be an effective form of treatment and prevention for people who are overconcerned with weight and
shape. In addition, change in body “hotspots” may be a more sensitive measure of change for ME procedures.
References


Table 1

*Comparison of participant MBSRQ data with MBSRQ norms*

<table>
<thead>
<tr>
<th>Measure</th>
<th>Male</th>
<th>Female</th>
<th>M Norms</th>
<th>F Norms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$M$</td>
<td>$(SD)$</td>
<td>$(SD)$</td>
</tr>
<tr>
<td>AppEval</td>
<td>3.69</td>
<td>3.22</td>
<td>3.50 (.83)</td>
<td>3.36 (.87)</td>
</tr>
<tr>
<td>AppOrien</td>
<td>3.43</td>
<td>3.52</td>
<td>3.60 (.68)</td>
<td>3.91 (.60)</td>
</tr>
<tr>
<td>FitEval</td>
<td>4.06</td>
<td>3.72</td>
<td>3.70 (.84)</td>
<td>3.43 (.88)</td>
</tr>
<tr>
<td>FitOrien</td>
<td>3.86</td>
<td>3.67</td>
<td>3.39 (.89)</td>
<td>3.21 (.86)</td>
</tr>
<tr>
<td>HealthEval</td>
<td>4.03</td>
<td>3.74</td>
<td>3.96 (.72)</td>
<td>3.86 (.81)</td>
</tr>
<tr>
<td>HealthOrien</td>
<td>3.37</td>
<td>3.42</td>
<td>3.43 (.65)</td>
<td>3.53 (.63)</td>
</tr>
<tr>
<td>OverPreocc</td>
<td>1.84</td>
<td>2.52</td>
<td>2.47 (.92)</td>
<td>3.03 (.96)</td>
</tr>
<tr>
<td>Self-weight</td>
<td>3.06</td>
<td>3.10</td>
<td>2.96 (.62)</td>
<td>3.57 (.73)</td>
</tr>
</tbody>
</table>

M Norms (Male Norms) and F Norms (Female Norms) based on data from MBSRQ Manual (1985) except for self-weight, which is based on the 2000 revision. Because our MBSRQ data were erroneously conducted on sums, these data have been converted to means that reflect answers seen on a five-point Likert scale as in the original MBSRQ scoring.

subscale of the MBSRQ, OverPreocc=Overweight Preoccupation subscale of MBSRQ, Self-Weight=Self-classified weight subscale of MBSRQ

Table 2

_BMI, MBSRQ, and Satisfaction Means and Standard Deviations by gender_

<table>
<thead>
<tr>
<th>Measure</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$ (SD)</td>
<td>$M$ (SD)</td>
<td>$M$ (SD)</td>
</tr>
<tr>
<td>BMI</td>
<td>24.7 (4.87)</td>
<td>22.2 (3.41)</td>
<td>23.5 (4.38)</td>
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<tr>
<td>AppEval</td>
<td>25.8 (4.71)</td>
<td>22.5 (4.25)</td>
<td>24.2 (4.75)</td>
</tr>
<tr>
<td>AppOrien</td>
<td>41.1 (6.91)</td>
<td>42.3 (6.50)</td>
<td>41.7 (6.68)</td>
</tr>
<tr>
<td>FitEval</td>
<td>20.3 (3.26)</td>
<td>18.6 (4.18)</td>
<td>19.5 (3.81)</td>
</tr>
<tr>
<td>FitOrien</td>
<td>46.4 (10.1)</td>
<td>44.0 (9.59)</td>
<td>45.2 (9.84)</td>
</tr>
<tr>
<td>HealthEval</td>
<td>24.2 (4.14)</td>
<td>22.5 (3.44)</td>
<td>23.3 (3.88)</td>
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<tr>
<td>HealthOrien</td>
<td>40.4 (8.85)</td>
<td>41.0 (6.69)</td>
<td>40.7 (7.80)</td>
</tr>
<tr>
<td>OverPreocc</td>
<td>7.35 (2.95)</td>
<td>10.1 (3.42)</td>
<td>8.69 (3.45)</td>
</tr>
<tr>
<td>Self-weight</td>
<td>6.13 (1.54)</td>
<td>6.20 (1.13)</td>
<td>6.16 (1.29)</td>
</tr>
</tbody>
</table>
BMI = Body Mass Index, Initial Sat = Initial overall body satisfaction, MBSRQ subscales based on summed scores

Table 3

Means (SD) before and after experimental procedure

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
</tr>
<tr>
<td>Overall Sat</td>
<td>5.06 (1.27)</td>
<td>5.17 (1.54)</td>
<td>4.67 (1.46)</td>
</tr>
<tr>
<td>PA</td>
<td>30.0 (7.55)</td>
<td>30.3 (8.60)</td>
<td>25.3 (8.46)</td>
</tr>
<tr>
<td>NA</td>
<td>12.4 (2.74)</td>
<td>11.8 (3.10)</td>
<td>15.9 (5.78)</td>
</tr>
<tr>
<td>BESAA</td>
<td>37.1 (7.08)</td>
<td>38.3 (7.13)</td>
<td>34.5 (6.11)</td>
</tr>
<tr>
<td>RES</td>
<td>23.2 (5.32)</td>
<td>24.1 (4.94)</td>
<td>20.3 (5.46)</td>
</tr>
</tbody>
</table>

Overall Sat = overall body satisfaction based on a visual analog scale, PA = Positive Affect as measured by PANAS, NA = Negative Affect measured by PANAS, BESAA = Appearance Evaluation subscale of the Body Esteem Scale for Adults and Adolescents, RES = Rosenberg Esteem Scale
Table 4

*Initial Differences by Gender*

<table>
<thead>
<tr>
<th>Measure</th>
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<th>F</th>
<th>Significance</th>
<th>Partial Eta Squared</th>
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</thead>
<tbody>
<tr>
<td>NA</td>
<td>1, 55</td>
<td>8.745</td>
<td>.005</td>
<td>.137</td>
</tr>
<tr>
<td>AppEval</td>
<td>1, 55</td>
<td>8.657</td>
<td>.005</td>
<td>.136</td>
</tr>
<tr>
<td>WeightPreocc</td>
<td>1, 55</td>
<td>10.192</td>
<td>.002</td>
<td>.156</td>
</tr>
</tbody>
</table>

Table 5

*Interactions for gender x condition x time*

<table>
<thead>
<tr>
<th>Measure</th>
<th>df</th>
<th>F</th>
<th>Significance</th>
<th>Partial Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA</td>
<td>2, 55</td>
<td>2.905</td>
<td>.063</td>
<td>.096</td>
</tr>
<tr>
<td>NA</td>
<td>2, 55</td>
<td>2.002</td>
<td>.552</td>
<td>.021</td>
</tr>
<tr>
<td>BESAA</td>
<td>2, 55</td>
<td>.139</td>
<td>.870</td>
<td>.005</td>
</tr>
<tr>
<td>RES</td>
<td>2, 55</td>
<td>1.087</td>
<td>.344</td>
<td>.038</td>
</tr>
</tbody>
</table>
Table 6

*Interactions for condition x time*

<table>
<thead>
<tr>
<th>Measure</th>
<th>df</th>
<th>F</th>
<th>Significance</th>
<th>Partial Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA</td>
<td>2, 55</td>
<td>1.189</td>
<td>.312</td>
<td>.041</td>
</tr>
<tr>
<td>NA</td>
<td>2, 55</td>
<td>.601</td>
<td>.145</td>
<td>.068</td>
</tr>
<tr>
<td>BESAA</td>
<td>2, 55</td>
<td>.518</td>
<td>.599</td>
<td>.018</td>
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<tr>
<td>RES</td>
<td>2, 55</td>
<td>.680</td>
<td>.511</td>
<td>.024</td>
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*Figure 1.* This graph shows the changes (in centimeters) in satisfaction for the body area initially least satisfactory based on 22 visual analog scales. Lowest change scores were calculated by identifying the least satisfactory areas before the procedure and by calculating their change over time. Participants in the nonjudgmental and positive conditions experienced a significantly greater increase in satisfaction over time.
“Career Opportunities, the Ones That Never Knock:”

How the UK’s Punk Movement Emerged From Economic Disaster

Lee Adcock

This essay aims to demonstrate how Britain’s punk movement in the late 1970s represented the nation’s economic decline at that time. First, the philosophies behind the punk movement will be briefly explained, along with their various manifestations. Next, it will describe the economic crisis in Britain of the 1970s, with an emphasis on its dissimilarities from other recessions. Once the punk movement and the decline of Britain have been defined, connections will be made demonstrating the inevitable link between the two. Isolated incidents will confirm how tighter budgets and the overall lack of employment influenced—or even dictated—the punks’ attitudes. Through close analysis, songs and artwork of the punk movement will also reveal scathing commentary about the deprived era. This essay will quote from critical works from authors such as Jon Savage, Mark Sinker, Nicholas Rombes, and Paul Cobley, and draw quotes about punk and its social contexts from individuals who were involved in the movement. Its ultimate goal is to prove that punk could have only evolved into the violent, reactionary phenomenon for which it is now infamous during the tumultuous time of England’s worst financial crisis.

The punk movement was essentially a youth-driven counterculture in America and Britain, most prominent in the late 70s, against static traditions and ideals. Although best recognizable by its music and fashions, the movement was anchored around what Rogin Sabin calls “identifiable attitudes”: “an emphasis on negationism, a consciousness of class-based politics…and a belief in spontaneity and ‘doing it yourself’” (Sabin 3). What the punks wanted, according to Mark Sinker, was a new social order – one in which taboos ceased and fashions and habits no longer defined the individual (Sinker 124). By this mantra, there was no fixed etiquette or dress code for the punks: they dyed their hair vivid colors, spat and cursed passersby, and played raucous songs far removed from the grandeur of popular rock. The movement had its roots in New York--as far back as the Velvet Underground in 1965, according to Legs McNeil--but blossomed into the infamously “dangerous” cult we know of today when Malcolm McLaren introduced the Sex Pistols to England in 1975 (McNeil, 253).

While punk was gaining ground in Britain, the nation was in a severe financial crisis. Inflation had soared to 26% by 1976 (Willcock); manufacturing companies were vanishing due to a steep decline in exports (Leys 85); unemployment had doubled from 700,000 in 1975 to 1.4 million just two years later (Cobley176). Many countries were grappling with similar problems; however, unlike the others, England had been facing a recession for over a decade (Leys, 87). The Prime Minister during this era, James Callaghan, spoke frequently about the crisis, but
offered his people few words of compassion: “No one group of nations . . . can survive permanently as an island of prosperity if the remainder of the world is in recession.” (Rombes 34). This bleak perspective fuelled British workers’ decade-old frustrations; the vicious string of strikes instigated by Ford factory workers in 1978 is only the most extreme example of the nation’s impatience with low wages (Leys 107).

For many, including punks, the selection of jobs available was small and unappealing. The Clash discusses the menial vocations on the market in their protest song “Career Opportunities” in 1977: office work, bus driving, checking letters for bombs, and “mak[ing] tea at the BBC” (The Clash). Yet, the narrator confesses in the last stanza that he has no choice in the matter, even if he must resign himself to an industrial job, which were some of the most volatile jobs on the market as a result of the rapid decline of British exports. Millions of others would meet the same fate: one discontented graffiti message bluntly illustrated the disillusionment that stemmed from such undesirable positions: “SAME THING DAY AFTER DAY…WORK – TUBE – ARMCHAIR – TUBE – WORK – HOW MUCH MORE CAN YOU TAKE – ONE IN FIVE CRACKS UP” (Savage 111). The statistic may be unverifiable, but the statement captures the general attitude of Britain’s frustrated work force.

With these unsavory options on the market – which were decreasing steadily in number, anyway – several individuals chose instead to deliberately not be employed. Both John Lydon and Joe Strummer, frontmen for the Sex Pistols and the Clash, were squatters in 1975 (Savage 114). They were only a few of the 50,000 squatters reported at that time, all united by “a recognition of the futility and stupidity of work” (112). For them, the search for a job would be too tedious an endeavor, and squatting was a far more lucrative means of living. Others involved in the punk movement were drifters, wandering between the houses of acquaintances. Looking back on a Christmas dinner hosted by a London journalist, Lee Childers remarks: “She was a journalist and she had money. And we were rock performers and we had none” (McNeil 326). Griel Marcus interprets the Sex Pistols’ “Pretty Vacant” as a tribute to this idle lifestyle, rebelliously claiming “the right not to work” instead of protesting against the growing unemployment problem (Marcus 13). Such was the stance of the true punk, and with the British public already unnerved by the severity of the recession, these reactions would appear increasingly sensational.

No force perpetuated more controversy about the punk movement than the wary British media. The recession had encouraged paranoia in the press: with the economic state of the nation so dire, how difficult would it be to convince readers of a moral decline, as well? The tabloids had done so before in the early 70s, ranting about rampant pornography, vandalism, and sexuality as inherent symptoms of the national illness (Savage 109). When punks acted up, the papers released flurries of maledictions against them, condemning the Sex Pistols as “the nation’s most depraved pop group” and warning readers about punks who spat and vomited at audiences (Sinker 174). While these accounts were true, the urgency and distaste that flavored them were the products of recession-crazed journalists; they were to an extent, crafting young
scapegoats for Britain’s decay, diverting the nation from the true cause of decline. Parliament embodied this attitude when it denounced the Sex Pistols as “a threat to the British way of life” (Marcus 10), veiling self-protection in the guise of a public safety announcement.

As much as the press and the government tried to suppress unpleasant realities, punks only pushed harder to expose them. The Sex Pistols’ second single, “God Save the Queen,” released on the same day as Queen Elizabeth II’s Silver Jubilee in 1977, targeted England’s monarch-centered nationalism. From the first couplet, their gripes are clear: “God save the Queen / A fascist regime!” (Sex Pistols). The royal figurehead, Lydon raves, is “the linchpin of an economy based on nothing”, the worthless remains of Britain’s vanishing empire (Marcus 11). The lyric is a rude awakening--“There is no future / in England’s dreaming”—and a jolt to remind listeners of the nation’s inferior power and economy. The Sex Pistols load “God Save the Queen with a prophetic weight that, in spite of its controversial subject matter, struck a chord with the public’s decade-old despair: “No future for you… / No future for me.” Such resonance may explain how the single could jump to #1 on the charts – even when it was banned upon its release date from store fronts across the nation (Garnett 21).

As scandalous and timely as the single’s lyrics were, stores may have shelved “God Save the Queen” as much for its offensive and parabolic sleeve as for its lyrics. The designer, punk publicity extraordinaire Jamie Reid, borrowed from a conventional portrait of the Queen and transformed it into a visual critique of Britain’s empty symbol. By enlarging the picture, Reid exposed the half-tone dots which compose the image, reducing the Queen to a purely abstract figure (Huxley 86). He ripped out the eyes and the mouth from the face, leaving only black strips with the track’s title and the band’s name printed on them in cut-up lettering; this gesture further drains the Queen of any human identity with abrupt, deliberate violence (87). For the finishing blow, he added a safety pin pierced through her lower lip (87), which ultimately associates the botched portrait with the punk movement and all its countercultural creeds. The final product is far more than a desecrated photo of the Queen: the cover art reflects Britain itself, violated by the savage force of the recession. Little wonder, then, that EMI, The Sex Pistols’ label, refused to distribute the single, especially on a day that strained to veil Britain’s actual condition with the luxurious ceremonies for the Silver Jubilee.

Yet, even with the uproar that “God Save the Queen” and its packaging caused, no single visual used by the punks was more unnerving than the swastika. Although the Nazi symbol represents a party conquered by British forces thirty years earlier, England’s postwar confidence from the victory had diminished substantially after the Suez crisis and throughout the lingering recession. As a result, the swastika invoked both open hostility toward the Nazis of the past and guarded anxiety toward a resurgence of new Nazis that the nation may be helpless to resist. Reid often harnessed these negative connotations in his promotional posters to condemn once idolized subjects, as he did for the Dead Kennedys by bordering a Woodstock-esque scene with swastikas of marijuana leaves (Garnett 25). Others, like Siouxsie Sioux, wore the taboo icon on their clothing or on cotton armbands, in order to “deflate national pride . . . over the defeat in Hitler,”
particularly among suburbanites and the older generations who remembered the war (Cobley 182). In effect, Sioux wished to detach the British public from its obstinate patriotism in order to confront the stark realities of the present – just as “God Save the Queen” and its sleeve attempted to dissolve blind devotion to the Queen. As to either method’s success, however, one could never be sure; many punks sporting the swastika and other Nazi emblems were ejected from night clubs or physically harassed (Savage 89).

Even while the memory of this racist group continued to appall the general public, multiculturalism in Britain was becoming a divisive issue. Immigration numbers by 1978 had skyrocketed to 45,000-50,000 people a year (Thatcher). As dire as the unemployment situation was at that time, British natives were bound to grow hostile towards any new competitors in the job market. In September 1977 the National Front, a white supremacist political party, had held a controversial march in Lewisham, a primarily black neighborhood, to protest the crime rate in that area, and were met with multiple anti-racism groups (Bourne). This event rallied supporters from both sides to develop their infrastructures; yet, division truly began in the punk community when Margaret Thatcher delivered a speech to Granada TV on 27 January 1978, and initiated a mass immigration scare:

If we went on as we are then by the end of the century there would be four million people of the new Commonwealth or Pakistan here. Now, that is an awful lot and I think it means that people are really rather afraid that this country might be rather swamped by people with a different culture. (Thatcher)

She was absolutely correct: the National Front’s followers, the Skinheads, could be found at punk band Sham 69’s concerts, causing massive riots and leaving Nazi stickers in their wake (Savage 479). On the other side, however, was Rock Against Racism (RAR), an organization of punk bands that openly condemned any minority marginalizing and included the Clash, X-Ray Spex, and Special AKA, the last of which featured multiracial personnel (482). Special AKA were the forerunners of ska, a genre blending punk, which was dominated by white artists, and reggae, a breezy music style from Jamaica. The fusion of these two styles conveyed the radical possibility of tolerance, which clashed directly with the racist assaults of the Skinheads or Thatcher’s immigration paranoia. Thus, through this symbolic divide of Skinheads and RAR activists, punks mirrored the polarized politics of the nation that had spawned from Britain’s economic inability to support the immigrants and natives.

One song the Clash released at this time illustrates the racial issue in the UK. “(White Man) in Hammersmith Palais”, a narrative about a white man attending a black club, is a sweeping condemnation towards both the punk community and the state. The lyrics voice despair over the futility of preaching unity when “the British Army is waiting out there / and it weighs fifteen thousand tons” (The Clash). Furthermore, Strummer laments that the new wave no longer cares about subverting or challenging society: “They’re all too busy fighting / for a good place under the lighting” (ibid). Yet, worst of all, with Thatcher’s immigration scare affecting millions
of voters, he fears that racism itself is being integrated into the nation’s politics, to the extent that “if Adolf Hitler flew in today / They’d send in a limousine anyway” (ibid). In spite of all these concerns, the Clash sets this song in a fusion of punk and reggae styles, a predecessor of ska which “subverts the song’s lyrical message” and testifies to the possibility of unity between races (Savage, 488).

In conclusion, the UK’s punk subculture was indeed a phenomenon that could have only occurred in its own time and place. Songs from prominent punk bands described the lousy job market and capitalized on the art of squatting, while the press cast punk delinquents as threats to British society. The Sex Pistols’ single, “God Save the Queen,” along with its provocative sleeve, denounced Britain’s static, obsolete government and snapped the nation from its imperial reverie. The use of the swastika and other Nazi symbols in punk fashion attempted to further remove the public from postwar nostalgia, although these attempts were often met with open hostility. Finally, as the issues of mass immigration and racism overtook British politics, punk bands both for and against the National Front voiced their opinions through demonstrations and concerts. All these facets of the punk movement related to the state of decline in Britain, either through direct economic aspects, or attitudes that stemmed from such a condition. Indeed, the punk movement held up a mirror to Britain, diligently reflecting the nation’s bitter present even if many refused to see.

Bibliography


The Sex Pistols. “God Save the Queen”. 1977.


Nutrient Levels in a Residential Gray Water Irrigation System

Nand Patel

Introduction

The level of nutrients in sewage water must be monitored due to the potential impacts of eutrophication and nitrification. The primary source of the nutrients is from the different soaps and cleaners. Low levels of nutrients may suggest a buildup of microbial organisms. Generally, plants use nitrogen based compounds as a source for nutrition. Terrestrial ecosystems rely on microbial nitrogen fixation to convert $N_2$ from nitrites, nitrates, or ammonia (Hornung M., Sutton M.A. and Wilson R.B. 1995).

Phosphorus is a key nutrient as well. Phosphorus often appears naturally as orthophosphate ($PO_4^{3-}$). Phosphorus can often enter surface water through runoffs from soil erosion. When phosphorus enters water systems, eutrophication can cause large amounts of algae, fish kills, and dead zones in waters to occur (S. Carpenter, 2008). In gray water systems, orthophosphate can be derived from trisodium orthophosphate, which is used in soaps.

Materials and Methods

Gray water samples were collected from the test site every week for a period of eight weeks. Samples consisted of shower/bathing water. Tests were done for a system consisting of three tanks. The first tank was the lift tank. This tank collected the water from the bathtubs within the home. The second tank was the treatment tank which provided detention time for solids to settle and some anaerobic degradation of the gray water constituents. The third tank was the dose tank which was used to hold effluent from the treatment tank before the water was emitted into the yard via a sub-surface drip irrigation system. Measurements were done within 24 hours of sample collection from the tanks. Four nutrients were measured: ammonia, nitrite, nitrate, phosphorus (ortho).

Ammonia, nitrites, nitrate, and phosphorous were tested using the TNT 831, 839, 835, and 843 methods, respectively (Hach, Loveland, US). All measurements were read using the DR 2800 (Hach, Loveland, US). The tests were done in duplicate with two vials for each tank. This led to 6 vials per test for all three tanks.
Results

Gray water collected from the lift tank showed significant fluctuations in the readings. These fluctuations could be due to chemicals associated with cleaners, variations in bathing habits, and/or the portion of the bathing flow held in the tank (beginning or end of cycle). The readings in ammonia and phosphorus were higher on certain collections. The higher levels suggested the larger amounts of surfactants from soaps and cleaners.

The levels of nitrate, nitrite, ammonia, and phosphorus tend to fluctuate around 0.141 mg/L ± 0.067281, 0.154 mg/L ± 0.128151, 0.512 mg/L ± 0.07539, and 0.046 mg/L ± 0.133056, respectively. The average concentration for each tank is shown in Table 1.

Table 1. Average Concentrations in the Three Tanks

<table>
<thead>
<tr>
<th>Tank</th>
<th>Nitrate (mg/l)</th>
<th>Phosphorus (mg/l)</th>
<th>Nitrite (mg/l)</th>
<th>Ammonium (mg/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lift</td>
<td>0.02</td>
<td>0.025</td>
<td>0.137</td>
<td>0.279</td>
</tr>
<tr>
<td>Treat</td>
<td>0.093</td>
<td>0.042</td>
<td>0.207</td>
<td>0.342</td>
</tr>
<tr>
<td>Dose</td>
<td>0.311</td>
<td>0.071</td>
<td>0.117</td>
<td>0.915</td>
</tr>
</tbody>
</table>

Conclusion

The overall results for the gray water emitter system are within range of the Environmental Protection Agency (EPA) standards. The overall total nitrogen content of gray water is to be less than 3.0 mg/L (EPA 2009). For this study the total amount of average nitrogen content is 0.807 mg/L. This is the sum of the averages of nitrate levels, ammonia levels, and nitrite levels. The total amount is much less that the required amount set by the EPA. The phosphorus level set by the EPA is less than 1.0 mg/L (EPA 2009). The phosphorus level is much lower than the EPA standard. Independently, the tanks do not violate the EPA regulations.

References


About the Authors

Lee Adcock, from Madison, Georgia, is a senior majoring in English and minoring in Latin. In her research, she seeks to regard contemporary music (and the culture that entails it) as a serious art form that deserves academic attention. An aspiring poet and fiction writer, her Honors project is a collection of poems, Sweets and Flesh. Lee will be taking a year off from school before pursuing an English or Rhetoric and Composition degree in graduate school.

Kimberly Campbell, from Hawkinsvillle, Georgia, is a senior History major with a minor in English. She is a two time winner of the Judge and Mrs. John Sammons Bell Award for Southern History and is this year's Phi Alpha Theta Outstanding History Major. Her research interests include nineteenth century American fiction and the antebellum South. After graduation, she plans on attending the University of South Carolina's Masters Program in Public History.

Rebecca Gregory is a senior Psychology major with minors in Biology and Women’s and Gender Studies. Originally from Orange County, California, her family now resides in Johns Creek, Georgia. She is the recipient of the Metzger Award for Best Empirical Manuscript in Psychology and is a member of several honors societies. She has been accepted to the Psychology PhD program at Indiana University, where she will continue researching sexual behavior as it relates to brain function.

Sarah Harber, from Tucker, Georgia, is a senior majoring in Psychology with minors in Art and Business. She won the Psychology Department’s Metzger Award for Best Empirical Manuscript for her paper on positive mirror exposure. Her research interests include body image issues and developmental disabilities. After graduation, she plans to pursue a Master’s degree in Counseling.

Nand Patel is an Engineering major from Augusta, Georgia. A junior, his research focuses on environmental and biomedical engineering.

Andrew Weems, from Johnson City, Tennessee, is a junior majoring in Biomedical Engineering. A Presidential Scholar, his research interests include nanomaterials and nanoscale science, orthopedic implants, drug delivery methods and systems, and biological instrumentation. He plans to attend graduate school in either chemical or biomedical engineering.