Psi Chi
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About Psi Chi
Psi Chi is the National Honor Society in Psychology, founded in 1929 for the purposes of encouraging, stimulating, and maintaining excellence in scholarship, and advancing the science of psychology. Membership is open to graduate and undergraduate men and women who are making the study of psychology one of their major interests and who meet the minimum qualifications. Psi Chi is a member of the Association of College Honor Societies (ACHS) and is an affiliate of the American Psychological Association (APA) and the American Psychological Society (APS). Psi Chi's sister honor society is Psi Beta, the national honor society in psychology for community and junior colleges.

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 Psi Chi serves two major goals—one immediate and visibly rewarding to the individual member, the other slower and more difficult to accomplish, but offering greater rewards in the long run. The first of these is the Society's obligation to provide academic recognition to its inductees by the mere fact of membership. The second goal is the obligation of each of the Society's local chapters to nurture the spark of that accomplishment by offering a climate congenial to its creative development. For example, the chapters make active attempts to nourish and stimulate professional growth through programs designed to augment and enhance the regular curriculum and to provide practical experience and fellowship through affiliation with the chapter. In addition, the national organization provides programs to help achieve these goals, including national and regional conventions held annually in conjunction with the psychological associations, research award and grant competitions, certificate recognition programs, national and regional chapter awards, and national service projects.

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The twofold purpose of the Psi Chi Journal of Undergraduate Research is to foster and reward the scholarly efforts of undergraduate psychology students as well as to provide them with a valuable learning experience. The articles published in this journal represent primarily the work of the undergraduate student(s). Faculty supervisors, who deserve recognition, are identified by an asterisk next to their name or on a separate byline.

Since the articles in this journal are primarily the work of undergraduate students, the reader should bear in mind that: (1) the research is possibly less complex in design, scope, or sampling than professional publications and (2) the studies are not limited to significant findings. The basis for accepting papers for publication is the agreement among three professional reviewers that the project, hypothesis, and design are well researched and conceived for someone with an undergraduate level of competence and experience.

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2. Manuscripts from graduate students will be accepted only if the work was completed as an undergraduate student.
3. Authors other than the primary author may include non-Psi Chi students as well as the faculty mentor or supervisor. Membership verification information for the primary author must be included.
4. Only original manuscripts (not published or accepted for publication elsewhere) will be accepted.
5. All manuscripts must be prepared according to the Publication Manual of the American Psychological Association (5th ed.).

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Vietnamese Refugees and Their U.S.-Born Vietnamese Counterparts: Biculturalism, Self-Determination, and Perceived Discrimination

Much research has been done on biculturalism, self-determination, and perceived discrimination, but researchers have not examined all 3 constructs in relation to each other. Moreover, researchers have rarely compared Vietnamese refugees and U.S.-born Vietnamese people. We compared Vietnamese refugees to their U.S.-born counterparts, ages 18–25, on biculturalism, self-determination, and perceived discrimination. Two hundred twenty-four Vietnamese Americans residing in Southern California completed the Young Adults of Vietnamese Ancestry Questionnaire. Independent samples t tests showed that the 2 groups of Vietnamese Americans differed significantly on level of biculturalism, but not on self-determination or perceived discrimination. There were no sex or age differences on any of the variables, and biculturalism, self-determination, and perceived discrimination were not significantly correlated. Some results from this study were consistent with past findings, and some were conflicting. Investigators should conduct further research to improve the questionnaire and to expand our knowledge and understanding of Vietnamese Americans.

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Biculturalism

Researchers generally consider biculturalism a type of acculturation, which is a close relative of enculturation. Enculturation is “the process by which youngsters learn and adopt the ways and manners of their culture” (Matsumoto, 2000, p. 174), whereas acculturation refers to the “process of adapting to . . . a different culture from the one in which a person was enculturated” (p. 175).

According to Berry, Trimble, and Olmedo (1986), there are four types of acculturation: (1) assimilation, which is adaptation to the majority culture and distancing from the native culture; (2) integration, which is adaptation to the majority culture while retaining the native culture; (3) separation, which is rejecting the majority culture and reaffirming the native culture; and (4) marginalization, which is rejection of both cultures. Another term for integration is biculturalism. According to Buriel, Calzada, and Vasquez (1982) and Suinn, Rickard-Figueroa, Lew, and Vigil (1987), biculturalism is the ideal type of acculturation. In our view, high biculturalism reflects considerable integration of majority and native cultures, whereas low biculturalism reflects the separated or assimilated categories. Other researchers have defined acculturation solely as biculturalism, so acculturation is one’s success in integrating both cultures (Celano & Tyler, 1991; Duan & Vu, 2000).

Because acculturation, including biculturalism, is such an abstract concept, researchers have approached its measurement in different ways, such as demographic, behavioral, and psychological. The demographic approach measures biculturalism by measuring its predictors. Such predictors include age (Duan & Vu, 2000; Liebkind, 1996; Marino, Stuart, & Minas, 2000; Smither & Rodriguez-Giegling, 1982; Sodowsky, Lai, & Plake, 1991), sex (Liebkind, 1996; Marino et al., 2000), country of birth (Sodowsky et al., 1991), education level (Celano & Tyler, 1991; Marino et al., 2000; Smither & Rodriguez-Giegling, 1982; Sodowsky et al., 1991), family and socioeconomic status (Celano & Tyler, 1991), years of life in the host country (Duan & Vu, 2000; Marino et al., 2000; Matsuoka, 1990; Smither & Rodriguez-Giegling, 1982; Sodowsky et al., 1991), social relations (Berry et al., 1986), occupation (Celano & Tyler, 1991), ethnic density of the community (Duan & Vu, 2000; Marino et al., 2000; Smither & Rodriguez-Giegling, 1982; Sodowsky et al., 1991), preparation for arrival (Do, 1999; Sodowsky et al., 1991; Ying & Akutsu, 1997), and personality (Marino et al., 2000; Smither & Rodriguez-Giegling, 1982).

Whereas the demographic approach to measuring acculturation tries to identify characteristics that would lead to acculturation, the behavioral approach examines manifestations of acculturation. For example, Marino et al. (2000) defined acculturation as “cultural learning.” They studied the adoption of external aspects of the majority culture, including language acquisition, the ability to “fit in,” and social skills adjustment. Furthermore, they asserted that the level of exposure to the majority culture is important in adopting dominant cultural behaviors. Therefore, a person’s background, such as one’s percentage of life in the United States, age of arrival, education level, and income, all influence the level of acculturation, or the extent to which a person has adopted the behaviors of the dominant culture. Similarly, Celano and Tyler (1991) also studied acculturation in terms of customs, habits, language usage, and lifestyle, which are all behavioral manifestations of acculturation.

The third approach to measuring acculturation is from a psychological perspective. Marino et al. (2000) distinguished this perspective from the behavioral approach and made the two independent of each other. In other words, one can adopt the behaviors of the dominant culture (behavioral acculturation), but one does not necessarily have to agree with the values and attitudes behind those behaviors (psychological acculturation). According to Marino et al., these are distinct, yet related dimensions of acculturation, so a scale measuring both aspects provides a more complete picture of acculturation than a scale using only one approach. Other researchers, such as Smither and Rodriguez-Giegling (1982), also emphasized the distinction between measuring psychological and other forms of acculturation. They believed that achievement motivation, sociability, anxiety, assertiveness, and intelligence are psychological factors that contribute to acculturation. We chose to use both the demographic and behavioral approaches, but not the psychological approach.

Self-Determination

Several researchers have defined self-determination as expectations and aspirations (Buriel et al., 1982; Leong & Chou, 1994). Expectations are realistic, anticipated outcomes, while aspirations are more idealistic, desired goals. Other researchers have thought of self-determination in terms of its effect on autonomy and independence (Chirkov & Ryan, 2001, Knee, Neighbors, & Vietor, 2001), intrinsic and extrinsic motivation (Chirkov & Ryan, 2001; Eisenberger & Rhoades, 2001), life satisfaction (Chirkov & Ryan, 2001; Deci & Ryan, 2000), job performance (Deci & Ryan, 2000; Eisenberger & Rhoades, 2001), and academic performance (Schiller & Muller, 2000).
These researchers adhered to the framework of the self-determination theory (SDT), which asserts that across all cultures, individuals must meet “innate psychological needs” to be satisfied with life (Deci & Ryan, 2000). Once met, these psychological needs are related to well-being, mental health, high-quality performance, and positive affective experiences as well as aspirations in life (Deci & Ryan, 2000). Thus, the level of need-fulfillment relates to setting life goals and dictates the level of one’s self-determination, which in turn influences one’s level of satisfaction and performance in life.

**Perceived Discrimination**

Whereas acculturation is the degree to which the minority group member accepts the majority group’s culture, discrimination is an indicator of the degree to which the majority group accepts the minority group member. Perceived discrimination, on the other hand, is the degree to which one feels victim to prejudice, without regard to the actual discrimination received (Sodowsky et al., 1991). We focused on perceived discrimination, independent of actual discrimination.

**Relevance of Dependent Variables to Participants**

Vietnamese refugees and U.S.-born Vietnamese people differ in their experiences, and thus in their philosophies and views of each other. However, all Vietnamese people in the United States must face cultural changes and adapt. The degree to which both groups are able to adapt, or acculturate, and the ways in which they respond to the new culture influence their lives in the United States.

In seeking political and economic asylum in the United States, Vietnamese people develop and foster their sense of self-determination. The journey to the United States is difficult, and Vietnamese refugees have to rebuild their lives, careers, status, and in some cases, families once they arrive in the United States. Moreover, in order to succeed they must learn English, adapt to the new culture, and understand its values, all of which require self-determination. The fact that Vietnamese people are refugees shows they are determined, because all immigrants and refugees need to be in order to survive the migration process and succeed in the new environment (Do, 1999). Therefore, the factor of self-determination plays an important role in the Vietnamese experience in the United States.

Vietnamese Americans, like all minorities, encounter some degree of discrimination because of their physical appearance, background, language abilities, values, and personal guidelines for social interactions. Their perceptions of this discrimination may not relate to the actual degree of discrimination. However, because minorities belong in the out-group with respect to the majority, they must find their way into society, overcoming others’ preconceived ideas of them, fighting stereotypes, and establishing themselves as individuals who are not defined strictly by their ethnic groups. This process of learning and change makes minorities vulnerable to perceiving discrimination.

**Method**

**Participants**

Participants ($N = 224$) were people of Vietnamese ancestry, ages 18 to 25 ($M = 20.70$ years), residing in Southern California. There were 118 females and 105 males (1 participant did not specify sex), of which 81 were U.S.-born, 141 were Vietnam-born, and 2 did not indicate country of birth. We contacted them through Vietnamese organizations (e.g., the Vietnamese Student Association) at several universities and colleges, the Southern California Union of Vietnamese Student Associations, and the Vietnamese Eucharistic Youth Society of Orange County. To eliminate confounding variables of mixed cultures and heritage, all participants were ethnic Vietnamese, of full Vietnamese ancestry. Working-level English was a requirement so that participants would have the language ability to complete the questionnaire. We set the age limit at a maximum of 25 years because mass migration of Vietnamese people began in 1975 after the fall of Saigon, and most U.S.-born Vietnamese people were 25 years old or younger at the time of the data collection. We set the lower age limit at 18 years so that all participants were legally adults. The same age restrictions applied for the Vietnam-born Vietnamese people to ensure comparable groups.

**Materials**

**Questionnaire.** We developed the 40-item Young Adults of Vietnamese Ancestry Questionnaire by evaluating previous literature and psychological measures. Nguyen (2002) detailed the psychometric characteristics of our questionnaire. The questionnaire consists of basic demographics (four items) and the biculturalism, self-determination, and perceived discrimination scales. The biculturalism scale contains three factors: education (three items), family status (four items), and social relations (seven items). The self-determination (six items) and perceived discrimination (seven items) factors are respectively the self-determination and perceived discrimination scales. Nine of the 40 items are filler items. All items are multiple choice except for three, which are fill-ins.
The basic demographics section asks for age, sex, country of birth, and age when the participant came to the United States (if applicable), which we used to calculate the percentage of life in the United States. Consistent with Marino et al. (2000), we believe that the percentage of life in the United States is a more accurate reflection of the influence of American culture on one’s life than years in the United States. The education factor includes the last completed level and/or current level of education. The family status factor contains questions regarding parents’ levels of education and socioeconomic status in Vietnam and in the United States. The social relations portion asks for language competency, preferred ethnic labels, food preference, and issues regarding friends, spouse, and children. The items regarding percentage of life in the United States, education level, family status, and social relations combine to form the overall score for the biculturalism scale. An example item from this scale is “With which culture and its traditions do you most identify? (please check one) (a) Vietnamese; (b) American; (c) I identify equally with both.”

Out of more than 10 possible choices, we chose education, family status, percentage of life, and social relations as predictors for several reasons. There are contradictory findings about the relationships between acculturation and age and between acculturation and sex. Country of birth is the participant variable; therefore, we could not use it to predict acculturation. Education level is one of our four predictors because it has been repeatedly correlated with acculturation. Family background, which includes family status and family values, is also important in calculating acculturation. Life in the United States is one of the greatest predictors of acculturation. We used percentage of life in the United States instead of years in the United States because it takes into account the variation in age of arrival and the subsequent period of life. Social relations is an important concept because it measures the degree of exposure to and preference for each of the two cultures. Occupation is not one of our predictors because the participants are young adults, most of whom are still pursuing an education and are not in the working world. Ethnic density is not an issue in this study because no matter where one lives in Southern California, the community is thickly populated with Vietnamese people. We did not measure preparation for arrival to the United States because the U.S.-born participants did not have to migrate or prepare for the journey. Also, we did not measure personality and individual differences for simplification purposes.

Our definition of self-determination includes the expectation versus aspiration aspect, response to challenges, work orientation and diligence, and peer comparisons regarding capabilities and achievement. The items in the self-determination scale address the many aspects listed above. For example:

Choose one that best describes you: (a) I shy away from challenges; (b) If I fail the first time, I am unlikely to try again; (c) I have a moderate amount of determination; (d) I know my limits, and I like achievable/realistic challenges; (e) I never give up.

The perceived discrimination scale contains items about opportunities for competition, Vietnamese accent when speaking English, sense of belonging in the United States, ethnicity-based discrimination experiences, and instances when hate words were used [e.g., “Have you ever experienced discrimination due to your Vietnamese ancestry? (a) yes; (b) no”].

**Scoring.** The possible score for the biculturalism scale ranges from 5 to 18. For the self-determination scale, the range is from 4 to 19, and from 6 to 21 for the perceived discrimination scale. A high score reflects a high level of the dependent variable. We did not include any incomplete scales (i.e., scales in which there are missing answers) in the analyses.

**Procedure**

We administered packets containing two consent forms (one to sign and return, one for the participants’ records) and the questionnaire to participants. Participation was voluntary, and there was no compensation. We informed participants that their help would broaden psychological knowledge of Vietnamese Americans. Researchers or volunteers distributed the packets at Vietnamese organizations’ meetings or events.

**Results**

We used an alpha level of .05 for all statistical tests. We analyzed each predictor’s relationship to the biculturalism score using the Pearson product–moment coefficient of correlation. We found positive correlations for all four predictors, although the correlations between biculturalism and education and between biculturalism and family status were modest (percentage of life in the U.S.: \( r(167) = .72, \ p < .01 \); education: \( r(167) = .26, \ p < .01 \); family status: \( r(167) = .35, \ p < .01 \); social relations: \( r(167) = .81, \ p < .01 \). Because most participants were undergraduate students, our range for education may be too narrow to exhibit a significant correlation with
biculturalism. We expected positive correlations between each predictor and biculturalism because the predictors contributed to the biculturalism score. Nevertheless, we completed these analyses to examine the ability of percentage of life in the United States, education, family status, and social relations to predict the overall biculturalism score.

The participant variable in this study was country of birth, and it had two values: United States and Vietnam. There were 81 participants born in the United States, 141 participants born in Vietnam, and 2 who did not specify country of birth. For further analysis, we divided the Vietnam-born group into those who arrived at or before the age of 5 and those who arrived after age 5. We chose this age because in the United States and in Vietnam, it is when a child must start formal schooling, a new type of socialization. Of the 141 Vietnam-born participants, 44 (28 females, 16 males) arrived in the U.S. at or before 5 years of age, 92 (42 females, 49 males, 1 did not identify a sex) arrived after the age of 5, and 5 did not report age of arrival. The mean age of arrival was 8.79 years.

From an analysis of variance, we found that biculturalism scores were significantly different for the three groups: Vietnamese people born in the United States, refugees who arrived at or before 5 years of age, and refugees who arrived after 5 years of age, $F(2, 165) = 56.25, p < .01$. Independent samples $t$ tests showed that U.S.-born participants had higher family status, $t(170) = 3.28, p < .01$, and social relations subscores, $t(212) = 3.86, p < .01$, than Vietnam-born participants. The Vietnam-born participants who arrived at or before age 5, as compared to the participants who arrived after age 5, had higher family status subscores that approached significance, $t(110) = 1.84, p = .069$, and significantly higher social relations subscores, $t(111) = 4.60, p < .01$. Although Liebkind (1996) found that males tend to be more bicultural than females, the absence of a relationship between biculturalism and sex, $t(165) = 0.42, ns$, in this study is in agreement with the findings of Sodowsky et al. (1991) and of Marino et al. (2000). We also found no relationship between biculturalism and age, $r(167) = .05, ns$, contrary to Liebkind’s finding that the more bicultural are younger in age. This may be due to our narrow participant age range.

There were no significant differences on self-determination and perceived discrimination scores between those born in the United States and in Vietnam [self-determination: $t(212) = 0.37, ns$; perceived discrimination: $t(218) = 0.04, ns$]; for the two Vietnam-born groups [self-determination: $t(129) = 0.60, ns$; perceived discrimination: $t(133) = 0.70, ns$]; or for the U.S.-born group and the two Vietnam-born groups [self-determination: $F(2, 207) = 0.23, ns$; perceived discrimination: $F(2, 213) = 0.23, ns$]. Table 1 shows the mean biculturalism, self-determination, and

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<th>U.S.-born</th>
<th>Vietnam-born, arrived at or before age 5</th>
<th>Vietnam-born, arrived after age 5</th>
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<td>14.54</td>
<td>12.43</td>
<td>14.16</td>
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<tr>
<td>Self-determination</td>
<td>15.13</td>
<td>15.04</td>
<td>14.91</td>
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<td>Perceived discrimination</td>
<td>10.59</td>
<td>10.57</td>
<td>10.80</td>
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TABLE 1

Mean Biculturalism, Self-Determination, and Perceived Discrimination Scores

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perceived discrimination scores for those born in the United States and in Vietnam, including scores for each of the two Vietnam-born groups. Despite the many proposed relationships among biculturalism, self-determination, and perceived discrimination made by previous researchers, we found no significant relationships between biculturalism and self-determination. \( r(165) = .12, \) ns; between biculturalism and perceived discrimination, \( r(167) = .03, \) ns; or between self-determination and perceived discrimination, \( r(216) = -.07, \) ns.

**Discussion**

Participants completed the Young Adults of Vietnamese Ancestry Questionnaire. Using the data from these questionnaires, tests showed that percentage of life in the United States, education, family status, and social relations can predict the total biculturalism score. We also found that Vietnamese people born in the United States are more bicultural than those born in Vietnam. Furthermore, U.S.-born participants and those who arrived at or before the age of 5 have higher biculturalism scores than those who arrived after 5 years of age. Participants born in the United States and those who arrived at or before age 5 have similar biculturalism levels. When compared on country of birth and age of arrival, participants do not differ significantly on either self-determination or perceived discrimination. Based on these results, we reject the null hypothesis regarding the groups’ difference on biculturalism, but we fail to reject the null hypotheses regarding their differences on self-determination and perceived discrimination. Finally, there are no significant relationships among biculturalism, self-determination, and perceived discrimination.

An issue influencing the difference in biculturalism may be that participants born in the United States had parents who arrived either in the late 1970s or the early 1980s. Refugees during this period, as compared to those who arrived later, were more educated, more urbanized, and more Westernized (Do, 1999). Education, urbanization, and exposure to Western culture are factors contributing to acculturation (Berry et al., 1986).

Because there are no differences among the groups on self-determination, one can draw several conclusions about the sample from this finding. First, these participants may hold similar values with regard to self-determination and expectations because of the cultural similarities of living in Southern California, which is very densely populated with Vietnamese people. Second, we must emphasize that there are differences among those in the sample on self-determination, but not significantly large differences.

For Vietnamese Americans, and ethnic minorities in general, being more bicultural leads to more success in life, and associating oneself with the native culture and taking on its values are desirable (Bankston & Zhou, 1997; Buriel et al., 1982). For some Vietnamese Americans, the high achievement motive/self-determination that is an integral part of the Vietnamese culture has led to high scholastic and career achievement. At the same time, it has produced more pressure on Vietnamese Americans to live up to sometimes unrealistic expectations. An example of this is the *model minority myth*.

Regardless of the lack of differences and relatively low scores on perceived discrimination, Vietnamese Americans overall may still perceive a considerable degree of discrimination. Discrimination may take the form of the model minority myth (Do, 1999). As perpetuated in the mainstream media and in American society, Asians, specifically Vietnamese Americans, are expected to be obedient, compliant, quiet, and high achievers. Although it can be argued that this is a positive stereotype, it is a stereotype nonetheless. First, important cultural values and differences have been turned into a stereotype, leading to the perception that Vietnamese Americans are a homogeneous group. Secondly, it trivializes some people’s accomplishments because they are expected to achieve scholastically, while penalizing those who do not achieve in expected ways or areas. In other words, a good Vietnamese student is good because he/she is Vietnamese, and a poor Vietnamese student is doing poorly because he/she is not determined enough. Moreover, a student performing poorly in academics may experience lowered teacher expectations, which may set the stage for a self-fulfilling prophecy. The stereotype is thus perpetuated.

Although we found no relationships among biculturalism, self-determination, and perceived discrimination, these issues are prevalent in the lives of every Vietnamese American. It may be that the relationships among these factors are not yet present for Vietnamese people living in the United States. Much research about Vietnamese Americans is still needed. The three variables may be related in the future or for other ethnic minorities; further research may be conducted to explore these issues. In order to determine whether it is appropriate to use our questionnaire in such future studies, we will need to establish validity first.

Other investigators have already shown that acculturation levels vary among individuals as well as ethnic groups. Sodowsky et al. (1991) found that Asian Americans perceive more prejudice than Hispanics. Within the broad group of Asian Ameri-
cians, Vietnamese people are less assimilated than both Japanese people and Koreans, and use less English than Japanese people, Koreans, and Asians from the Indian subcontinent. For all groups, first-generation minority members and political refugees perceive more prejudice, are less assimilated, and are less prone to using English. Many Vietnamese people living in the United States are both first-generation and political refugees. Ying and Akutsu (1997) examined the acculturation of Vietnamese, Chinese-Vietnamese, Laotians, Hmong, and Cambodians. They found that the Vietnamese have the youngest age of arrival to the United States, have the greatest English competency, and are most likely to be employed. The Vietnamese and the Chinese-Vietnamese have the highest level of education and are the least traditional culturally. However, it is important to reiterate individual differences in this context. One’s level of acculturation, no matter what ethnicity, can be influenced by psychological and personality factors (Smither & Rodriguez-Giegling, 1982), and opportunity to acculturate (Marino et al., 2000; Smither & Rodriguez-Giegling, 1982).

One limitation of this project is that we used only the demographic and behavioral approaches in measuring biculturalism. In future studies, researchers should use all three approaches—demographic, behavioral, and psychological—to obtain a more accurate depiction of biculturalism (Marino et al., 2000). Another limitation is the narrow age and education ranges of the participants in this sample. In addition, the data may be biased because we collected data through Vietnamese organizations. Thus, the participants may be systematically different from the rest of the Vietnamese American population.

Despite these limitations, the results of this project may assist school counselors and teachers in job training, job placement, and the motivation of students with Vietnamese ancestry and may help employees and employers better understand each other, thus improving the workplace environment. Previous investigators have discussed how biculturalism and perceived discrimination may be applied to work settings. Some of the predictors of biculturalism, such as age of arrival, years in the United States, education level, employment, and English competency can also predict an individual’s ability to resist hardship (Ying & Akutsu, 1997). Less bicultural employees may be more vulnerable to occupational stereotyping, segregation, discrimination, stress, and job dissatisfaction. They may also have less occupational prestige and less occupational mobility than more bicultural employees (Leong & Chou, 1994). Valentine, Silver, and Twigg (1999) found that perceived discrimination, job satisfaction, locus of control, and job complexity are all associated. Lowering employees’ perceived discrimination by participating in fair hiring and fair promotion may result in a higher sense of control, more satisfaction and motivation, and less frustration for the employees. Biculturalism, self-determination, and perceived discrimination are also important aspects of general life satisfaction. Ying and Akutsu (1997) found that acculturation contributes to a sense of coherence, which is linked to confidence, self-esteem, general well-being, physical health, and quality of life. According to Buriel et al. (1982), biculturalism level is correlated with success, and self-determination is correlated with deviant behavior. McKelvey and Webb (1997) found a relationship among self-determination, discrimination, and depression. Perceived discrimination and depression are linked in Noh, Beiser, Kaspar, Hou, and Rummens’s 1999 study, and perceived discrimination is also related to a sense of coherence (Ying, Lee, & Tsai, 2000). In short, the results of this project adds to our knowledge of Vietnamese Americans in terms of how they are adapting to their environment and their experiences living in the United States.

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Phonological and Semantic Ambiguity Resolution During Text Integration

Text integration errors can occur when a reader initially selects the contextually inappropriate meaning of an ambiguous word. When the reader attempts to integrate that meaning into the context, the sentence will not make sense. We investigated how readers recover from text integration errors in an oral reading study involving 2 types of ambiguous words: heterophones and homophones. Heterophones have 2 possible pronunciations and 2 meanings (e.g., sewer), whereas homophones have 1 pronunciation and 2 meanings (e.g., calf). We hypothesized that the multiple phonological codes of heterophones will cause additional difficulty initially and in recovery from text integration errors compared to homophones. Presumably, the working-memory code involved in reading is sound based (Daneman & Carpenter, 1983), so readers may reread to recover the alternative meaning and pronunciation of a heterophone but not of a homophone with a single pronunciation. We found that skilled readers made more errors initially on heterophones than homophones and used different strategies to recover from text integration errors caused by heterophone and homophone ambiguity.

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Reading is a complex process that involves understanding the semantics (meaning) and phonology (sounds) of words, but also involves integrating the meanings of individual words to extract the overall meaning of phrases and sentences. Text integration is the process of integrating the meaning of phrases and sentences to achieve comprehension (Haberlandt, 1994). Ambiguous words, words having more than one meaning, contribute to reading’s complexity (Duffy, Morris, & Rayner, 1988). Ambiguous words appear in many languages and can cause semantic misinterpretations by readers. Over the past few years, psycholinguists have done extensive research on ambiguity as it affects the text integration process.

There are several types of ambiguous words that could affect the text integration process. For example, a word can have multiple semantic interpretations (e.g., calf) or multiple meanings and pronunciations (e.g., sewer). The complexity of ambiguous words causes them to be processed differently than nonambiguous words (Duffy et al., 1988; Folk & Morris, 1995; Grainger & Ferrand, 1994; Morris & Folk, 2000), but little research has examined whether different types of ambiguous words are processed differently in reading.

Lexical-Semantic Ambiguity
Psycholinguists have investigated how readers activate the different meanings of semantically ambiguous words (e.g., Duffy et al., 1988, Folk & Morris, 1995; Miyake, Just, & Carpenter 1994; Morris & Folk, 2000; Swinney, 1979; Wiley & Rayner, 2000). By relying heavily on the cross-modal priming paradigm, researchers have examined how homophones, words with more than one possible meaning, but a single spelling, and pronunciation (e.g., calf), are processed. In this paradigm, participants listen to a sentence that contains a homophone that is immediately followed by a word that appears on a computer screen that is related to one of the homophone meanings (Swinney, 1979). The findings of Swinney (1979) and many others revealed that when the target word immediately followed the homophone, participants made faster lexical decisions about the target word if...
it was semantically related to either homophone meaning than if the target word was not semantically related to either homophone meaning (e.g., Kintsch & Mross, 1985; Onifer & Swinney, 1981; Seidenberg, Tanenhaus, Leiman, & Bienkowski, 1982; Swinney, 1979). This finding indicates that both meanings of ambiguous words are initially active.

Recent evidence from eye-tracking studies has suggested that both context and meaning dominance influence readers’ processing of ambiguous words. In a series of studies, investigators examined the role of context in ambiguity resolution (Binder & Morris, 1995; Binder & Rayner, 1998; Dopkins, Morris, & Rayner, 1992; Duffy et al., 1988; Rayner & Duffy, 1988; Rayner & Frazier, 1989; Sereno, Pacht, & Rayner, 1992). As readers silently read sentences containing homophones, an eye tracker recorded readers’ eye movements and fixation times. Researchers used either biased homophones, having one dominant or more frequent interpretation, or balanced homophones, having two equally likely meanings. When context prior to the ambiguous word was neutral, not providing any clues to the contextually appropriate meaning, findings revealed longer fixation times on balanced homophones than on biased homophones and control words. When the homophone is balanced, both meanings are equally available so they are in competition with each other for selection, slowing initial processing (Binder & Morris, 1995). With biased homophones, there is no competition initially among meanings because one meaning takes precedence over the other. The reader initially selects the dominant meaning of the homophone with little competition from the less likely meaning. In addition researchers found that when readers reach the disambiguating region of the sentence, the region revealing the appropriate meaning of the homophone, participants spent more time in that region when the homophone was biased and the sentence supported the subordinate meaning (Rayner, Pacht, & Duffy, 1994). Readers must spend time recovering the contextually appropriate meaning after initially selecting the contextually inappropriate dominant meaning.

In contrast, when prior context supported the less likely meaning of a biased homophone, readers fixated longer on the biased homophones than on the controls or balanced homophones (Duffy et al., 1988; Rayner et al., 1994). Presumably, the context boosts the activation of the subordinate meaning to compete with the dominant meaning. In summary, these findings suggest that meaning dominance and context influence the processing of biased and balanced homophones.

Phonologically Ambiguous Words

Heterophones, which are semantically and phonologically ambiguous, are processed differently than homophones, and some researchers have attributed this to working-memory processes (Daneman & Carpenter, 1983; Folk & Morris, 1995; Morris & Folk, 2000). Working memory contributes to the acquisition and processing of language, temporarily processing and storing information. Baddeley and Hitch (1974) suggested that working memory influences a range of complex cognitive activities and is important in both language processing and comprehension. The processing code for working memory during reading is believed to be sound based. Thus, some researchers have predicted that recovering from text integration errors for heterophones would be more difficult than for homophones (Daneman & Carpenter, 1983). For heterophones, readers have to retrieve the alternative pronunciation to access the alternative meaning, but they have the sound code associated with both meanings of a homophone in working memory.

Daneman and Carpenter (1983) completed an experiment using garden path messages to observe how heterophones and homophones are processed. Garden path messages are passages that prime the reader to expect that one meaning of an ambiguous word is intended and that subsequently indicate that the alternative meaning is contextually correct. This research illustrated the importance of phonology in working memory. Daneman and Carpenter presented two passages to participants and encouraged them to read each one aloud. One passage contained a heterophone or its unambiguous control word, and the other passage contained a homophone or its control word. After reading each passage, the experimenter asked the reader a comprehension question to reveal if he or she correctly or incorrectly interpreted the heterophone or homophone. Daneman and Carpenter defined text integration errors as a result of selecting the contextually incorrect meaning of an ambiguous word. Readers had longer reading times and more text integration errors for text containing heterophones compared to homophones. These results indicate that readers had more difficulty recovering from heterophone misinterpretations than homophone misinterpretations. Presumably, the reader has more difficulty initially reading and recovering from errors caused by heterophones (multiple pronunciations) than homophones (single pronunciations) because the working-memory code is sound based. The multiple pronunciations of heterophones cause confusion in working memory.
To recover from incorrect interpretations of heterophones, the reader must retrieve all the phonological codes of the word and then reinterpret the word (Folk & Morris 1995; Morris & Folk, 2000). This explanation of how readers recover is based on current models of reading that suggest that readers hold the sound codes of words read in working memory (Baddeley & Hitch, 1974; Gathercole & Baddeley, 1993). Working memory contributes to the acquisition and processing of language, temporarily processing and storing information. Baddeley and Hitch (1974) suggested that working memory influences a range of complex cognitive activities and is important in both language processing and comprehension. The processing code for working memory is believed to be sound based. If current reading models are accurate, the reader would not be able to convert from one meaning to the other without accessing the additional pronunciation.

Folk and Morris (1995) also observed processing differences among readers when reading sentences containing heterophones and homophones. They recorded participants’ eye movements during silent reading. Folk and Morris examined the target word region and the disambiguating region of each sentence to observe processing time. The target region consisted only of the target word (i.e., ambiguous heterophones and homophones or their unambiguous controls), and the disambiguating region consisted of any words or phrases in the sentence that biased toward one interpretation of the ambiguous word. The context prior to the ambiguous word was neutral, and the disambiguating region followed the ambiguous word. Folk and Morris found that participants reread heterophones more often than unambiguous control words, but not homophones. This finding is consistent with Daneman and Carpenter’s (1983) findings, suggesting that readers have more difficulty recovering from text integration errors involving heterophones than homophones.

Why do readers have more difficulty reading sentences containing heterophones than homophones? While reading, readers place the word’s phonological codes in working memory, allowing for the word to be integrated with subsequent text so they can obtain the overall meaning of the text (Gathercole & Baddeley, 1993). If a reader selects the dominant meaning of a heterophone, phonological working memory maintains the sound code. As readers continue to read, reaching the disambiguating region, they realize that the dominant meaning is semantically inappropriate. More effort is needed for heterophone text integration error recovery than homophone text integration error recovery because heterophones have two phonological codes and homophones have one phonological code. Thus, readers will need to expend more effort for recovery. Heterophone text integration recovery requires accessing all possible phonological codes for the word to gain the correct meaning (Folk & Morris, 1995). Homophone text integration recovery gives readers the capability to convert from an incorrect meaning to a correct meaning using the same phonological code (Folk & Morris, 1995). The findings from the studies of Daneman and Carpenter (1983) and Folk and Morris (1995) led us to the current experiment in which we (a) observed how skilled readers resolve phonological and semantic ambiguity and (b) examined how homophone (multiple meanings and one pronunciation) and heterophone (multiple meanings and multiple pronunciations) ambiguity affect text integration.

Current Study

Based on findings of previous research, we hypothesized that differences in heterophone and homophone text integration is a result of the reader’s working-memory code (Daneman & Carpenter, 1983; Folk & Morris, 1995). “The water treatment manager forgot to visit the sewer on 125th Street to pick up his tuxedo.” When reading this sentence, if readers initially interpret sewer (heterophone) as a drainage tunnel, they may encounter an integration error. After reading “his tuxedo,” the disambiguation region of the text, the readers realize they have selected a meaning that is not semantically appropriate with the remaining text; this realization begins the recovery process. The recovery process we observed was rereading. We hypothesized that the ease of recovery from a text integration error will significantly depend on the ambiguity type—heterophone or homophone—because of the phonological ambiguity of heterophones.

The present experiment investigated the influence of ambiguity type on initial word errors and the rate of rereading. We examined how readers recover from integration errors involving the misinterpretation of ambiguous words. Readers were presented with sentences that contained ambiguous homophones or heterophones. Initial context was consistent with the dominant interpretation of an ambiguous word, with the subsequent context consistent with the less likely subordinate meaning. We expected more processing difficulties with text containing heterophones (e.g., sewer) than homophones (e.g., calf) when examining the initial word errors and rereading rate because phonological codes impact the text integration process (Daneman & Carpenter, 1983; Folk & Morris, 1995; Morris & Folk, 2000).
Method

Participants
Fifty-eight Kent State University undergraduates from the Psychology Department participant pool served as participants. Participants received course credit in exchange for participating in the experiment. Experiment eligibility required that all participants be native English speakers with no reported reading disabilities. Student ages ranged from 18 to 31, with the majority of students in the 18- to 21-year-old range. Both men and women participated, with the majority of participants being women.

Materials
We used five heterophones (e.g., sewer: tailor/gutter), five homophones (e.g., calf: leg/cow) and 10 control words in our oral reading experiment (see Appendix). We matched unambiguous control words with the ambiguous words in length and frequency. Mean length is the average number of letters per word, and mean frequency refers to how frequently a word is used in print. We used the Francis and Kucera (1982) written word frequency norms to determine word frequency. The mean length for heterophones was 4.6 letters, and mean frequency was 41.6 occurrences per million words according to the Francis and Kucera norms (mean length for their unambiguous control words was 4.6 letters, and mean frequency was 37.2). The mean length for homophones was 4.6 letters, and the mean frequency was 131.8. The mean length for the control words was 4.6 letters, and the mean frequency was 122.6. We used local population norms to determine the meaning bias of ambiguous words. We used only biased ambiguous words, words with one meaning more frequent than the other.

We embedded all ambiguous and control words in sentences in which the text before the ambiguous word was in agreement with the dominant meaning of the word and in which the subsequent text, called the disambiguating region, was consistent with the less likely subordinate meaning. Our materials consisted of 20 experimental sentences: 5 sentences containing heterophones, 5 sentences containing homophones, and 10 control sentences. In addition, we included 60 filler sentences, sentences that did not contain ambiguous words or control words. We used filler sentences to ensure that readers did not notice the purpose of the experiment. Example sentences are contained in Table 1.

Apparatus
We used a Sony auto-reverse cassette recorder, Sony tiepin lapel microphone, and Sony high-fidelity normal-bias audiocassettes to record oral reading responses. Each sentence was on a single sheet of paper and was presented one at a time. We bound sentences in a three-ring binder.

Design and Procedure
The experimenter informed participants that they were participating in an oral reading experiment, tested each participant individually, and encouraged participants to read as they normally do for sentence

| TABLE 1 |
| Example Sentences |

| Homophone example | Ambiguous word | As the accountant observed the bill on the duck he noticed that it had very unique features. |
|                   | Control word   | As the accountant observed the hair on the lion he noticed that it had very unique features. |

| Heterophone example | Ambiguous word | The water treatment manager forgot to visit the sewer on 125th Street to pick up his tuxedo. |
|                    | Control word   | The water treatment manager forgot to visit the tailor on 125th Street to pick up his tuxedo. |

Note. The target word is indicated by italics, and the disambiguating region is underlined.
comprehension. The booklet with the experimental sentences contained "yes" or "no" comprehension questions that followed some of the filler sentences and required an oral response. Participants read eight practice sentences so that they were familiar with the procedure before reading the experimental materials. After reading each sentence aloud, the participants turned the page and then read the remainder of the sentences. All participants performed the experiment at their own pace.

We presented the sentences in a pseudo-randomized order. We used four presentation orders for the sentences and assigned participants to conditions by using a Latin square design. We used comprehension questions as a check to make sure that participants read the text for comprehension, and the experimenter recorded the participants’ responses to the comprehension questions manually, in addition to the audio recording. To be included in the study, a participant had to answer 85% of the comprehension questions correctly. Six participants did not meet this comprehension criterion, and we excluded their data from the analyses.

Results

We collected two dependent measures: initial word errors and rereading. We defined initial word errors as any reading errors occurring when the reader first encountered the ambiguous words or control words. We included long pauses (i.e., an extended period of silence after reading the target word before proceeding onto the next word), hesitations (i.e., an extended period of silence before reading the target word), stumbling on the word, and mispronunciations as initial word errors. We used the following criterion for scoring initial word errors: If the reader initially said the subordinate meaning of the ambiguous word, we coded the response as incorrect. This criterion for scoring is somewhat controversial because the subordinate meaning was the contextually appropriate meaning, but the reader was not aware that the subordinate meaning was correct until after initially encountering the ambiguous word. The second dependent measure was rereading (i.e., any rereading of an ambiguous or control word after initially encountering the word). Two raters scored all of the initial word errors and rereading. Reliability between the raters was .80.

We excluded one homophone and its control word from the analyses. Many participants mispronounced the homophone coach initially as couch, and several participants said that the sentences with coach contained a spelling error. Thus, we excluded coach and its control word from the analyses because coach was not an ambiguous word to many of our participants. The participants were unfamiliar with the “traveling compartment” meaning of coach.

For initial word errors we performed a 2 (type of ambiguity: heterophone or homophone) × 2 (word type: ambiguous or control) within-participants analysis of variance (ANOVA; see Table 2 for means). In this analysis, the main effect of ambiguity was significant, \( F(1, 51) = 250.00, MSE = .03, p < .001 \). The main effect of word type was also significant, \( F(1, 51) = 311.30, MSE = .02, p < .001 \), because readers made more initial errors on the ambiguous words than on the controls. The interaction was also significant, \( F(1, 51) = 238.62, MSE = .03 p < .001 \), as readers made more errors on the heterophones versus controls than on the homophones versus controls. We discovered that the processing of heterophones was different than their controls in a planned comparison, \( F(1, 51) = 346.30, MSE = .04, p < .01 \), as we found more initial errors on heterophones than on their controls. Among the processing of homophones and their controls there was no significant difference, \( F(1, 51) = 2.88, MSE = .01, p = .10 \). The multiple phonological codes of heterophones caused the differences in difficulty between initial word errors for heterophones and homophones because both heterophone pronunciations are initially active and competing for selection.

We performed a second ANOVA for the rereading data (see Table 2 for means). The main effect of ambiguity was not significant, \( F(1, 51) = 2.26, MSE = .02, p > .13 \). The main effect of word type was significant, \( F(1, 51) = 8.55, MSE = .04, p < .01 \), because readers reread the ambiguous words more than the control words. The interaction was not significant,
Ambiguity Resolution During Text Integration

The present results provide evidence that heterophones and homophones are processed differently, consistent with previous studies (Daneman & Carpenter, 1983; Folk & Morris, 1995; Morris & Folk, 2000). The processing differences among heterophones and homophones are evident in the documentation of more errors initially on heterophones versus their controls than on homophones versus their controls. This finding suggests that readers initially have both phonological codes for heterophones available. When reading heterophones, the phonological codes compete with each other for selection, causing initial pronunciation errors.

Any time the reader read the target or control word and then proceeded past the target of control word to other words and then returned back to the target of control word, we coded this as rereading. In our initial analysis of the data, the rereading of the heterophones and homophones are both significantly elevated relative to their unambiguous controls. How heterophones and homophones are both significantly elevated relative to their unambiguous controls. However, rereading of homophones did not differ from that of their control words, $F(1, 51) = 3.12, MSE = .03, p > .08$.

Discussion

The results of our experiment will assist in helping to better understand “normal” reading errors and reading deficiencies and provide a more extensive illustration of the error recovery process. Understanding of the recovery process of text integration errors will help refine current models of reading and provide descriptive information about the recovery process. Future experiments could involve embedding ambiguous words and control words into longer garden path messages than we used. The embedding of ambiguous or control words in longer messages will provide the reader with additional context, biasing the reader’s selection of one meaning over another, unlike our current materials that just offer a short phrase to bias the reader to one meaning. If we can bias the reading to one meaning more strongly, we would possibly gather a better observation of initial errors and recovery methods.

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APPENDIX

Ambiguous Words and Their Unambiguous Control Words Included in the Study

<table>
<thead>
<tr>
<th>Heterophones</th>
<th>Heterophone Controls</th>
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<td>Wound</td>
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<td>Shower</td>
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<td>Tear</td>
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<table>
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<tr>
<th>Homophones</th>
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<td>Coach</td>
<td>Cabin</td>
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<td>Bill</td>
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THERE IS OVERWHELMING EVIDENCE THAT THE way in which an individual organizes his or her world is based on and heavily influenced by stereotypes. According to Bem (1981), stereotypes are generalized attitudes, beliefs, and opinions that people hold about members of a group. Stereotypes serve many cognitive functions; for instance, they limit the amount of information requiring encoding, thereby preserving mental resources (e.g., Macrae, Milne, & Bodenhausen, 1994). More specifically, researchers have found a clear processing advantage when individuals use stereotypes of gender, age, and race to categorize others (e.g., McCann, Ostrom, Tyner, & Mitchell, 1985).

Research in this area suggests that gender stereotypes dominate over race and age stereotypes as a basis for categorization (Fiske, Haslam, & Fiske, 1991). Moreover, cross-cultural research reveals a high level of agreement across many countries in relation to characteristics associated with men and women (Schwartz, 1990; Williams & Best, 1982). In general, males are described as more active, strong, cortical, and adult-like, whereas females are described as more passive, weak, nurturing, and adaptive (Williams & Best, 1982). In addition, many Western studies suggest that the most common stereotype of women is the “submissive” housewife or “sexy” secretary, whereas the typical man lies somewhere between a businessman and macho man. Interestingly, researchers note that male stereotypes are less clear-cut (see Fiske, 1998, for a review).

Over the past several years, a vast amount of research has examined the cognitive processes underlying gender stereotype differentiation. One focus of this research has been to examine the organization and representation of gender stereotype information in memory. In addition, many cognitive researchers have focused on differences in memory accuracy for gender stereotype information. A meta-analytic review of these studies suggests that judgments are faster and memory is more accurate for material that is consistent with gender stereotypes (Fyock & Stangor, 1994). For example, Banaji and Hardin (1996) showed adult participants prime

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In their study, Lenton et al. (2001) presented participants with five 15-word lists. Four of the word lists contained direct relations, similar to those used by Roediger and McDermott (1995). The remaining word list contained 15 roles that were either stereotypically related to men (e.g., president, doctor) or women (e.g., secretary, nurse). Participants studied each word for approximately 1 s. Following a 3-min interpolated task, researchers gave participants a recognition task that contained words that were not presented, but were close associates to the studied list. Results corroborate the standard false memory effect reported by Deese (1959) and Roediger and McDermott (1995) for the direct associations. More importantly, they also found that participants were more likely to falsely remember a nonpresented word that was stereotypically consistent with the studied list as compared to a nonpresented word that was stereotypically inconsistent. Lenton et al.’s study was the first to demonstrate that indirect stereotype associations can produce false memories using the DRM procedure.

Although most studies of false memory have relied on use of the DRM paradigm to investigate false recollections, a few studies have reported a false memory effect using other paradigms (e.g., Miller & Gazzaniga, 1998; Seamon, Luo, Schlegel, Greene, & Goldenberg, 2000). For example, Miller and Gazzaniga (1998) reported a reliable false memory effect using a picture paradigm. Advantages of using pictures of scenes over word lists are that pictures are more natural and may be more generalizable to practical situations (Miller & Gazzaniga, 1998). In their study, Miller and Gazzaniga presented participants with color illustrations that depicted strong thematic stereotypical scenes (e.g., a beach scene). Participants viewed 12 pictures, and each picture had two identifiable (studied) objects (e.g., a beach ball, a beach umbrella) and was missing two thematically related (nonpresented) objects (e.g., a beach blanket in the sand, a lifeguard’s life preserver). Miller and Gazzaniga found that participants reported seeing the nonpresented objects almost as often as the studied objects, thereby producing a false memory effect for pictures that is similar to that found with word lists.

A second aim of the present study was to examine the false memory effect for gender stereotype information using scenes of men and women portraying stereotypically consistent and inconsistent household roles. Participants viewed groups of thematically related pictures of either a man or a woman performing a common household task. Following an interpolated task, researchers gave participants a recognition
test. Similar to predictions made by Lenton et al. (2001), we predicted a false memory effect for those pictures that were not presented in the study list but were meaningfully related to the pictures that were presented. More importantly, we also predicted a greater false memory effect if (a) the person performing the chore was a woman as opposed to a man and (b) if the chore was consistent with the gender stereotype (e.g., woman dusting; man hammering) as opposed to inconsistent with the gender stereotype (e.g., woman hammering; man dusting).

Method

Participants
Sixty undergraduate students (30 male, 30 female) from Berry College in Rome, Georgia, participated in the study. Most participants received extra credit in a psychology course; however, some participants volunteered and did not receive compensation.

Materials
Normative data. Twenty-one surveys were gathered from a separate pool of undergraduate students enrolled in an introductory psychology course. We developed the survey to assess prevalent stereotypes concerning whether common household chores were typically associated as being performed by “mostly male,” “mostly female,” or “neutral” persons. We selected eight of the chore categories most frequently rated by participants as stereotypically performed by a man and eight of the chores most frequently rated as stereotypically performed by a woman to use as the studied pictures and critical lure stimuli (see Appendix). We used the remaining eight chore categories to form the nonstudied pictures for the recognition test.

Picture stimuli. One hundred ninety-two digital pictures were taken. Of these pictures, 96 were of a man performing 24 different household chores and 96 were of a woman performing the identical household chores as the man. Each chore category was associated with a sequence of four pictures showing a chore being completed in various stages. For example, a sample sequence included the man carrying a ladder, leaning the ladder against a house, climbing the ladder, and finally, cleaning a gutter. The same picture sequences were created for the pictures depicting a woman (see Figure 1 for a comparison).

In addition, for the pictures depicting a man, 16 chore categories (i.e., 8 rated “mostly male” and 8 rated “mostly female” in the normative study) were selected. Of the four pictures associated with each category, three pictures were used to form the studied list (total of 48 items) and one picture (total = 16) was used to form the nonpresented critical lure. The nonpresented critical lure was thematically related to the studied list items, but appeared only on the subsequent recognition test. Finally, of the remaining 32 pictures, 16 were randomly selected to form the nonstudied pictures on the recognition test. The same process was repeated for the pictures depicting a woman, thereby creating two identical lists that differed only by the gender of the individual performing the chores.

The recognition test was comprised of 48 pictures. Of those 48 pictures, 16 were “old” (seen previously), 16 were “lures” (not seen previously, but from the studied categories), and 16 were “new” (not seen previously and from new categories).

Apparatus
We took the pictures using an Olympus 450 digital camera and edited them using Adobe Photoshop software. We used an Alto PC-compatible computer equipped with a MaxTech computer monitor to present the pictures. Participants sat approximately 50 cm from the computer screen. The second author created the program by using Micro Experimental Laboratories (MEL) Version 2 software (Schneider, 1995). Each picture measured 640 x 480 pixels and filled the entire computer screen.

Procedure
Study phase. We tested each participant individually. Each session lasted approximately 15 min. The experimenter read the instructions that were displayed on the computer screen while each participant followed along. If there were no questions, we instructed participants to press the Y key on the computer keyboard to begin. Next, a white fixation cross on a black background appeared in the center of the screen for 500 ms. Immediately following, each picture was presented for 1 s. We presented participants with either 48 pictures of a man or 48 pictures of a woman performing 16 different household chores. We randomly ordered the chores; however, we grouped together each set of three slides within each chore category.

Recognition phase. When participants finished viewing all of the pictures in the study phase, we instructed them to make a list of exemplars from an animal category for 3 min. This task served as a distracter and prevented participants from thinking about the pictures presented during the study phase. Following the distracter task, we gave the participants a picture recognition test. The recognition test was comprised of 16 old, 16 lure, and 16 new pictures presented randomly. Again, the experimenter read
FALSE MEMORY FOR PICTURES □ de Mayo and Diliberto

FIGURE 1
Sample pictures used in the study phase of the experiment.

Note. Pictures (a) and (b) are of a man and woman, respectively, performing a stereotypically female-related chore (i.e., dusting). Pictures (c) and (d) are of a man and woman, respectively, performing a stereotypically male-related chore (i.e., carrying a ladder). In the actual experiment, pictures were presented in color.

the instructions aloud as the participant followed along. For each picture that we presented, we instructed participants to press the Y key if that exact picture was presented during the study phase, and the N key if the picture was not presented during the study phase. We carefully instructed each participant to press the Y key only if he/she specifically remembered the picture from the study phase. We gave participants 5 s to respond before the computer advanced to the next picture. After completing the recognition test, we fully debriefed participants and thanked them for their participation.

Results

We evaluated all analyses using an alpha level of .05 unless otherwise indicated. We performed a $2 \times 2 \times 2 \times 2$ mixed-factor analysis of variance (ANOVA) on the data with chore stereotype (male, female) and item type (lure, new) as within-subject variables and with participant sex (male, female) and picture sex (male, female) as between-subject variables. The dependent variable was the mean proportion of false recognitions to pictures not presented during the study phase.
Surprisingly, there was no main effect of either participant sex or picture sex. In addition, the two-way interactions between participant sex and item type, participant sex and chore stereotype, picture sex and item type, and picture sex and chore stereotype were not statistically significant ($F s < 1$). Finally, the three-way interactions between participant sex, picture sex, and item type, and between participant sex, picture sex, and chore stereotype were not statistically significant ($F s < 1$); therefore, in order to examine the false memory effect, we performed a separate $2 \times 2$ repeated measures ANOVA on chore stereotype and item type.

We found a statistically significant main effect of chore stereotype, $F(1, 59) = 51.721, p = .000$, indicating that the proportion of false recognitions was greater to pictures of an individual performing a chore that was rated stereotypically female ($M = .245, SEM = .016$) than to pictures of an individual performing a chore that was rated stereotypically male ($M = .139, SEM = .012$). In addition, a statistically significant main effect of item type was found, $F(1, 59) = 113.727, p = .000$, indicating that the proportion of false recognitions was greater to lure pictures ($M = .298, SEM = .018$) than to new pictures ($M = .105, SEM = .011$). More importantly, we found a statistically significant interaction between chore stereotype and item type, $F(1, 59) = 9.420, p = .003$.

To follow up on the Chore Stereotype x Item Type interaction, separate planned $t$ test comparisons were performed on the lure and new items for chores rated stereotypically female and for chores rated stereotypically male. We found that the proportion of errors to lure pictures ($M = .373, SEM = .027$) was greater than the proportion of errors to new pictures ($M = .125, SEM = .017$) for chores rated stereotypically female, $t(59) = –6.333, p = .000, \eta^2 = .405$. Similarly, the proportion of errors to lure pictures ($M = .223, SEM = .021$) was greater than the proportion of errors to new pictures ($M = .088, SEM = .013$) for chores rated stereotypically male, $t(59) = –8.451, p = .000, \eta^2 = .548$. In summary, a false memory effect occurred for pictures rated stereotypically female and for pictures rated stereotypically male. Interestingly, the size of the effect, as computed by taking the difference score (i.e., lure–new), was greater for pictures rated stereotypically female than for pictures rated stereotypically male, $t(59) = 3.069, p = .003$. Furthermore, the three-way interaction between picture sex, chore stereotype, and item type was not statistically significant.

In order to examine the proportion of errors to old items (i.e., saying “no” to an item that appeared on the studied list), we conducted a one-way repeated measures ANOVA. We found that the proportion of errors to old items was greater for pictures rated stereotypically female ($M = .177, SEM = .016$) than to pictures rated stereotypically male ($M = .081, SEM = .014$), $t(59) = 5.424, p = .000$.

**Discussion**

The purpose of the present experiment was to examine false memory for gender stereotype information using pictures of men and women performing traditional and nontraditional household chores. We found a reliable false memory effect for the nonpresented lure pictures. Moreover, the false memory effect was greater for pictures that depicted a stereotypical female chore than for pictures that depicted a stereotypical male chore.

Researchers have shown that the use of a picture paradigm produces false memory effects equal to those produced by a word paradigm (Miller & Gazzaniga, 1998). The use of pictures in the study of false memory is also significant for the present experiment because using pictures has certain advantages over using words when testing for false memory. One such advantage is that the picture paradigm represents testing conditions that are more naturalistic than the use of words. Asking participants to recall visual information has closer ties to incidents in real life in which individuals’ visual reports may be critical, as in the case of eyewitness testimony (Miller & Gazzaniga, 1998). One downfall of using the picture paradigm, however, is that it doesn’t take into consideration the events surrounding the pictures, as would be the case in real life.

More interesting was the finding that the magnitude of the false memory effect was nearly twice as great for pictures that depicted a person performing a female-related chore (e.g., dusting, ironing) as opposed to a male-related chore (e.g., taking out the trash, hammering). One possible explanation for difference in the magnitude of the false memory effect may relate to the use of subtypes when stereotyping different groups of people. Sex is one of the most dominant subtypes in the process of categorization, and in many instances can even take precedence over race (e.g., Fiske et al., 1991). Furthermore, subtypes found for Western women include that of a housewife or a sexy woman; however, the subtypes for men are much less well defined (see Fiske, 1998, for a review). Male subtypes seem to be less driven by sex and more so by competence in a particular area (Fiske, 1998). Studies have also shown that both men and women seem to view women as a more homogeneous group than men (Lorenzi-Cioldi, Eagly, & Stewart, 1995). Given the fact that women are more...
readily subtyped according to their sex and that one of the largest subtypes used to categorize women is that of the housewife, it is only reasonable to assume that false memory would occur for the female-related chores. It seems as though stereotypes, and especially those for women, served to categorize all female-related chores as performed by a woman regardless of what the picture actually depicted.

In addition to this explanation, research has also shown that when people are under time pressure to encode and to make recognition judgments, as the participants were in the current study, they tend to process stereotype-consistent information faster because it is easier to assimilate into existing schemata (Fiske, 1998). Thus, it is possible that participants encoded less perceptual detail on the stereotypically female pictures and relied on the dominant stereotype or subtype to “fill in the gaps,” thereby resulting in more errors on those items.

Another possible explanation for the greater incidence of errors on the stereotypically female pictures is the finding by Stewart, Vassar, Sanchez, and David (2000) that both men and women who hold more traditional views of women tend to individuate men more than women. However, for men and women who were shown to be more progressive in their views of women by their scores on the Attitudes Toward Women Scale (AWS; Spence & Helmreich, 1972; Spence, Helmreich, & Stapp, 1973), the opposite was found to be true. The participants in these studies tended to individuate women more than men in what Stewart et al. (2000) viewed as an attempt to help improve the lower status of women in society. It is possible that the participants in the present study hold more traditional views concerning women and thus had better recall for the male-related chores than the female-related chores. Future studies should examine the role of attitudes toward women when investigating stereotypes based on sex as this seems to be a key aspect in memory recall.

Of particular interest is that we found no effect of participant sex. This finding was contrary to what the researchers hypothesized; however, other studies on gender stereotypes have also failed to find an effect of sex. Banaji and Hardin (1996) reported evidence for automatic stereotypic associations that was independent of participant sex. Another study by Swim and Sanna (1996) found a similar effect regardless of participant sex. Also, contrary to our predictions, we found no effect of the picture sex (e.g., sex of the person performing the chore). One possible explanation for the failure to find this effect may be that participants ignored the sex of the individual portrayed in the photo because it was the same through-out, and instead focused on the details of the chores themselves. Given the complexity of design and of creating and editing the materials, we manipulated picture sex between subjects. A future study may want to use a within-subject comparison, which may be more sensitive to the picture sex variable.

In addition to the explanations of false memory based on stereotype generalizations, it is possible that the false memory may be related to differences characteristic of the chores or pictures themselves. For example, it is possible that it is a more common occurrence to see a person dusting than carrying a ladder. If this assumption is true, then it is equally likely that the less common occurrence is more salient and likely to capture more attention, thus producing greater memory. Also noteworthy is the fact that many of the chores reported by participants in the normative study for women were indoors, whereas for men the chores tended to be outdoors, which may also contribute to differences in saliency (see Appendix).

In conclusion, one limitation of the current study is that there was a noticeable age difference of the individuals depicted in the pictures; however, we do not believe that age had a significant influence on our results. Age was confounded with picture sex, and no effect was found. A second limitation of the current study is that only two models (one male and one female) were used. Also, the lure pictures represented the same individual at a different stage of the chore performed in the studied list. Future studies may want to replicate and extend this finding with different models (e.g., professions, age, or race) and use stereotypically related, but different, pictures as lures in order to make a more direct comparison with the word association studies.

References
## APPENDIX

### Critical Stimuli Used in the Experiment

<table>
<thead>
<tr>
<th>Male list</th>
<th>Female list</th>
</tr>
</thead>
<tbody>
<tr>
<td>grilling</td>
<td>ironing clothes</td>
</tr>
<tr>
<td>sawing a tree</td>
<td>watering house plants</td>
</tr>
<tr>
<td>mowing the lawn</td>
<td>vacuuming</td>
</tr>
<tr>
<td>trimming the hedges</td>
<td>dusting</td>
</tr>
<tr>
<td>taking out the trash</td>
<td>sweeping the floor</td>
</tr>
<tr>
<td>checking the oil in a car</td>
<td>cleaning the toilet</td>
</tr>
<tr>
<td>hammering</td>
<td>folding laundry</td>
</tr>
<tr>
<td>climbing a ladder</td>
<td>setting the table</td>
</tr>
</tbody>
</table>
Wonder Women: The Portrayal of Women in Television Soap Operas

This study used content analysis to explore the depiction of women in soap operas aired during the fall of 2000. The marital status, employment, and age of female characters were compared to male characters, as well as to the general population. The portrayal of single motherhood was also examined for work–life conflict, family support, and socioeconomic status. Findings supported the hypotheses that women in soap operas would be young, single, upper-class professionals. Very few characters were single mothers, and those characters who were experienced little work–life conflict. Although the depiction of women did not differ significantly from that of men, it did vary from the general population. This skewed portrayal could lead women to feel misrepresented or to become dissatisfied with their lives.

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HOW ARE NIKKI NEWMAN, ERICA KANE, Christine Williams, and Brooke Logan all interrelated? These women are the reigning divas of daytime television (TV). What do they all have in common? They are young, beautiful, and successful—often against all odds. Many have endured painful divorces, single parenthood, and abuse, yet still manage to remain on top in their lives. These characters seem to have it all.

This superhuman portrayal of women, however, can become problematic for the audience. TV is becoming increasingly important in society, with more than 90% of households owning a TV and the majority having more than one (Davis, 1990). TV is watched an average of 20 hours per week and is cited as the third most time-consuming activity, after work and sleep (Signorielli & Bacue, 1999). With its increasing popularity, the key role TV assumes is that of socialization agent—TV teaches us values, behaviors, and even sex roles (Davis, 1990). Cultivation theory, developed in 1980 by Gerbner, Gross, Morgan, and Signorielli, attempts to explain the relation between TV content and the viewer’s conception of reality (as cited in Morgan, 1982). This theory hypothesizes that the more time people spend watching TV, the more likely they are to possess worldviews that match the views presented on TV. These findings have been replicated in numerous studies (e.g., Rubin, 1985; Signorielli, 1989). In the 1980s, Gerbner et al. (1980) expanded cultivation theory to include the notion of mainstreaming, or reducing individual differences among heavy viewers and creating a homogenized outlook (as cited in Morgan, 1982). TV provides a broad, unified view of the world, and the more viewers watch, the more likely they are to adopt this view, thus reducing individual differences among viewers.

Morgan (1982) compared the results of a sex role stereotype questionnaire administered to male and female students three times over the course of three years. Morgan found that the more TV girls watched, the more sexist they tended to be. This same finding did not hold true for boys. Therefore, he concluded that outliers, viewers not well represented by those writing and controlling media sources (specifically...
adolescent girls. All three major networks broadcast
egories is the soap opera because network TV targets
inaccurate portrayal of women. According to cultivation theory, women may become
dissatisfied with their lives and themselves due to TV's
evolution over time. The analyses have been overwhelm-
ingly disappointing—TV still portrays the sexes unequally. Women are portrayed as younger than men, although this statistic is not true in the popula-
at large (Beck, 1978; Davis, 1990; Gerbner &
Signorielli, 1982). Furthermore, as women age, they
become less central to the plot, and therefore less
important (Signorielli & Bacue, 1999). The majority
of women are single (unmarried), although over
half are shown involved in a romantic relationship
(Signorielli, 1989, 1991). This statistic is in sharp
contrast with the population living in the United
States, where only 18% of women are single, 62% are
married, 8% are divorced, and 12% are widowed
(Signorielli, 1989). TV depicted women as single
mothers, enjoying life on their own, with a healthy
baby, a good job, an affluent lifestyle, and an active
social life. In reality, 45% of single mothers live in
poverty, most teen mothers live with their parents,
health problems are likely and very often serious, and
few single mothers hold jobs earning more than min-
imum wage (National Commission on Working
perhaps the largest difference between TV and
reality lies in the depiction of careers. Although
two thirds of real American mothers work outside of
the home, on TV only one third of mothers did (National
Partnership for Women and Families, 1998). Also,
most TV women who were in the work force held
professional jobs, a figure three times larger than that
of the 1975 U.S. census (Greenberg, Neuendorf,
Buerkel-Rothfuss, & Henderson, 1982). TV portrayed
jobs that were largely traditional male occupations
(40 of 68), as opposed to traditionally female or
gender-neutral occupations (Signorielli & Bacue,
1999). Taken together, these findings represent a
skewed portrayal of women, which poses a problem
for the viewer trying to make sense of reality. Accord-
ing to cultivation theory, women may become
dissatisfied with their lives and themselves due to TV's
inaccurate portrayal of women.

One of the most troublesome TV program cat-
egories is the soap opera because network TV targets
adolescent girls. All three major networks broadcast
soap operas until 4:00 p.m., Monday through Friday,
52 weeks a year. Soap operas now comprise 10.5 hours
of programming per day (Cantor, 1979; Lowry, Love,
& Kirby, 1981). Stedman (1971) suggests the soap
opera is meant to give an “illusion of reality.” Yet this
“reality” is seriously skewed in many arenas: sex roles,
sexual activity, single motherhood, and careers
(Larson, 1996; Signorielli, 1989, 1991). Despite
numerous studies of general TV content analysis,
there are relatively few studies focusing solely on the
soap opera. According to Greenberg et al. (1982),
the number of empirical studies on soaps numbered
less than a half dozen by the late 1970s; even less
research on the medium has been undertaken since
then. Cantor (1979) gives several reasons for the
genre’s neglect, including a lack of interest from
critics and the largely female audience. Because of
cultivation theory and mainstreaming, soap opera
research is becoming more vital as the viewing audi-
ence grows dramatically. Lack of past research in the
area necessitates a need for this study, as does the
rise in teen violence, sexuality, pregnancy, and sui-
cide, which may all be linked to a faulty perception
of reality shaped through the viewing of TV shows.

The goal of this study was to explore the portrayal
of women in 21st-century soap operas in light of its
importance according to cultivation theory and
mainstreaming. Four major hypotheses were tested.
The first hypothesis was the majority of women por-
trayed on soap operas would be single. The second
hypothesis explored the role of work in women’s lives.
Specifically, the working woman would be employed
in a professional role, most likely in a prestigious com-
pany, and would enjoy a generous salary, unlike the
average working woman. Hypothesis 3 was that the
single mother would be depicted enjoying domestic
bliss. She would experience very little work–life
conflict, would have a strong support system, would
enjoy a middle- to upper-class lifestyle, and would have
few or no child-care problems. The final hypothesis
stated the majority of female characters would be
young (18–30), as compared to their male counter-
parts, who would be considerably older (40–65),
unlike real-life age divisions.

Method

Procedure

Data were collected on daytime TV from two
major TV networks, ABC and CBS, from September
27 to October 13, 2000; this study omitted NBC due
to extensive coverage of the 2000 Olympics, which
preempted regularly scheduled programming. The
Young and the Restless, The Bold and the Beautiful, All
My Children, and Port Charles were taped from 12:30
p.m. until 2:00 p.m., Eastern Daylight Time, on Mondays and Fridays.

This study used content analysis to examine the depiction of women in soap operas. The variables assessed in the analysis included marital status (single, dating, married, divorced, widowed), working status (employed, unemployed, professional, nonprofessional, company prestige, salary), motherhood/domestic bliss, work-life conflict, men in life, family support, socioeconomic status, problems with child care), and age (18–30, 31–50, 51+). Two trained monitors independently recorded, coded, and analyzed each character’s demographics and frequency of behaviors using a checklist. Several categories were operationally defined. The classification of jobs as professional versus nonprofessional was based on observable characteristics, such as an office environment. Work–life conflict was determined by objective criteria (e.g., such as missing work due to the illness of a child). Raters coded family support in each episode based on observable conflicts within the family. Problems with child care were also determined based on observable behavior, such as being late to a meeting because of a tardy babysitter. Interrater reliability was calculated using the percentage of perfect agreement and averaged 97% overall.

Results

The sample consisted of 95 characters (54.7% were women, 45.3% were men). The binomial test of the ratio of men to women did not differ significantly from that of the general population. The majority of female characters were single (69.2%), as were the majority of men characters (62.8%); this result supports the first hypothesis that the majority of women characters would be single. A chi-square test comparing these frequencies to real-world statistics on marriage yielded a significant difference, \( \chi^2(1, N = 63) = 21.89, p < .0001 \). Only 21.4% of women and 29.3% of men were married; 38.9% of characters were divorced. A chi-square test revealed that this percentage was significantly higher than that of the general population, \( \chi^2(1, N = 95) = 148.94, p < .0001 \). Only 9.5% had been widowed, which was not significantly different than the general population.

Careers were classified as professional, nonprofessional, or unemployed because of the ease of objectively scoring in this manner. A chi-square test found a significantly high proportion of women employed in professional roles on soap operas, \( \chi^2(1, N = 33) = 42.74, p < .0001 \). Sex was independent of employment, with the majority of both male and female characters working in professional positions (75% and 53.1%, respectively). However, there was a difference in unemployment rates between the sexes, with 18.4% of women being unemployed, whereas only 5.0% of the men did not work. A chi-square test comparing the general population female unemployment rate (4.6%) with the soap opera rate yielded a significant difference, \( \chi^2(1, N = 77) = 19.47, p < .0001 \). The rate for men was not significantly different than in real life. The findings supported part two of our second hypothesis, that the working TV woman would be employed in a professional role in a prestigious company, enjoying a good salary; 76.5% of the women held prestigious positions at their places of employment and 90.7% garnered a good salary. Although not statistically significant, it should be noted that a smaller percentage of TV men than TV women enjoyed a good salary (89.7%), whereas a higher percentage of men’s careers on TV were prestigious (82.4%).

A small percentage of women were single mothers (12.6%), which does not differ significantly from that of the general population. However, the depiction of their lifestyle was vastly different from real-life single mothers. Work–life conflict was experienced by only 8.3% of women on TV. A majority of the mothers had men in their lives (75%), whereas 83.3% had the support of their family. Most notably, 100% of the women had no child-care conflicts, and 100% were classified as upper or middle class.

Age was divided into three categories: young (18–30), middle-aged (31–50), and older (51+). Findings showed most men and women were 31–50 (61.4% and 45.1%, respectively). Twenty-four percent of men and 39.2% of women were 18–30. The smallest group was 51+, consisting of 13.6% of men and 13.7% of women. A chi-square test comparing age of soap opera characters to the ages of the general population was significant for women, \( \chi^2(2, N = 50) = 8.22, p < .01 \), but not for men.

Discussion

Women and men were present in equal numbers in the soap operas viewed, although the depiction of women was not always equal to the portrayal of the male characters, nor was it necessarily reflective of real life. The majority of characters on the soap operas were single, supporting the first hypothesis and coinciding with the findings of previous research (Signorielli, 1989, 1991). Very few soap opera characters were married, in sharp contrast to reality, in which almost 50% of the population is married. Divorce is also more prevalent on soap operas than in the real world; many characters have been divorced multiple times. Marital status on soap operas is misrepresentative, leading the
characters open to perpetual romance without any responsibilities.

Work also differs dramatically in the soap opera world. Verifying research conducted by Greenberg et al. (1982) and supporting Hypothesis 2, the majority of the characters were professionals. Unemployment rates were higher for women than for men and did not reflect the actual current unemployment rate in the U.S., with soap opera characters being much more likely to be unemployed. Few characters, regardless of employment, faced any financial issues; all characters seemed to enjoy economic success. Most characters held prestigious positions, with almost all men and the majority of women working for a highly respected company. Perhaps reflecting employment in the real world, men were slightly more likely to work in a prestigious setting than women. Obviously, this portrayal of employment does not reflect reality; soap opera characters were significantly more likely to have a professional career in a prestigious company with an ample salary than the average American employee.

Rate of single motherhood on soap operas did not differ significantly from that of the general population; however, the lifestyle of the soap opera mothers did, supporting research conducted by Larson (1996). Almost none of the single mothers on the soap operas experienced work–life conflict or child-care conflict. Real-life single mothers often juggle a career with domestic responsibilities and struggle to find a babysitter during office hours. Most single mothers on the soap operas had a man in their life; many women had several. One single mother-to-be was even shown in her wedding gown, 9 months pregnant and about to be wed. Dating life as a single mother in the real world is often difficult, if not nonexistent. Many single mothers do not have time or suitors (Larson, 1996). The majority of the soap opera women had the support of their family. No scenes were shown in which the parents quit speaking to the single mother, and there were no arguments when Grandma was asked to baby-sit. Finally, all of the single mothers were upper to middle class. Not one mother or mother-to-be experienced economic hardship. This portrayal is not reflective of reality, in which many single mothers must move in with family members or rely on welfare to make ends meet. Soap opera portrayals of single motherhood are potentially dangerous to a young and impressionable viewing audience. Raising a child alone is made to look easy, even fun. This depiction is contrary to many real-life experiences and is a disservice to viewers, according to cultivation theory (Larson, 1996; Morgan, 1982).

The findings partially supported the fourth hypothesis. The majority of female characters were not young, but neither were the majority of male characters. This finding differs from previous research (Beck, 1978; Davis, 1990; Gerbner & Signorielli, 1982), which found that women are portrayed as younger than men. Most soap opera stars were middle-aged, whereas very few stars were older. However, the age of men on the soap operas was reflective of the age of men in the general population; the age of women on soap operas was not. More women were 18–30 on the soaps than in the population, and less were 51+ than in the general population. Although the majority of women were middle-aged, there were a considerably larger number of young women on soap operas than in real life.

Some of the findings were encouraging; the fact that an equal number of men and women were portrayed is a step in the right direction. Also, the research showed sex to be independent of marital status, type of employment, and age, which also varied from past research. However, TV still depicts women in a false light. Many more soap opera characters are young, single, and professional than in the general population. This false portrayal makes the women of daytime TV seem more beautiful, accessible, and economically independent than the average woman, which could contribute to lowering viewers’ self-esteem or distorting their worldviews, according to cultivation theory. TV also glorifies single motherhood; real-world conflicts between life roles, family members, and career were not shown. Because increased numbers of teenage girls are tuning in, and TV presents soap operas to viewers in a real-life format, this portrayal could be particularly dangerous, giving girls an unrealistic picture of single motherhood.

This study has methodological strengths and limitations. A major strength is the subject of the research. Although soap operas are a major source of programming, researchers have conducted very few studies on daytime TV. Less than a half dozen studies were undertaken by the end of the 1970s, and research in the area tapered off in the 1980s, yet soap operas are historically the most enduring programs. Their persistence in American culture makes the soap opera an important topic for study. However, due to the limited previous research, this study had to create original hypotheses, thereby eliminating any possibility of a longitudinal content analysis comparison.

Another limitation of the study was the fact that it was not feasible to analyze a whole season. Soap operas are aired Monday through Friday, year-round. Although different networks were taped on different
days, this study did not attempt to tape every soap opera every day. Two major networks, ABC and CBS, were included, with NBC being omitted as the result of the timing of the study, which coincided with the 2000 Summer Olympics.

Analysis of the taped soap operas also yielded both strengths and limitations. Multiple raters coded the shows, thereby counteracting any rater bias that could potentially confound the data. However, due to the nature of the hypotheses (e.g., age of character), some guessing was utilized. Objective information about this variable was rarely if ever available, introducing some subjectivity into this particular hypothesis.

More research on soap operas needs to be conducted. Future investigation should continue to focus on content. One important variation could be a longitudinal study of soap operas from the 1950s to the present. Variables of particular interest would be the changing roles of women, sexual attitudes and morals, alcohol and drug abuse, and character demographics. Another important area for future research is the effect of soap operas on the viewer. Future research designs should assess the impact of daytime TV on both attitudes and behavior. Topics to consider might include changes in beliefs about gender roles; alteration of opinions about controversial topics such as racism, sexual activity, and crime; changes in sex role behavior; and modification of certain activities, including, but not limited to, sexual activity, drinking and eating behavior, and physical abuse.

In conclusion, continuation of research on the content and effects of daytime TV is an important area of study. Variables studied in the past need to be reinvestigated, more factors should be considered, content changes should be studied and analyzed, and researchers should concentrate on the application of these findings. The portrayal of women on TV is important, insofar as it helps to shape women’s identities and ideas about themselves. Because daytime TV is aimed at women, the depiction of female characters on these shows becomes even more critical. If women do not see themselves reflected in the characters, they may become dissatisfied with their lives or feel like failures because they are struggling with mundane issues, whereas the women on TV are CEOs of prestigious companies. Women have come a long way on TV, but the next step needs to be adequate and realistic representation of all women, not just a chosen sector. Women on soap operas need to age, marry, struggle with economic hardship, be lonely occasionally, argue with their family about a babysitter—in short, live.

References


The Relationship Between Math Exposure and Math Anxiety

Math anxiety has largely been associated with girls and women and seems to result in their avoidance of mathematics. Therapeutic treatments to reduce math anxiety often include desensitization to math in addition to cognitive therapy. In this study, differences in math anxiety in relation to sex, level of math exposure, math ability, and career goal were examined in 135 college students. Significance was observed in the relationship between level of math exposure and math anxiety (p = .009). However, the direction of this relationship was surprising; greater exposure to math was associated with greater math anxiety. Limitations of the study are discussed with suggestions for future research.

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Georgian Court College

Math anxiety has received much attention in psychological literature (Adams & Holcomb, 1986; Chipman, Krantz, & Silver, 1992; Hembree, 1990; Tobias, 1995). Like test anxiety, math anxiety can be defined as an increase in state anxiety when confronted with a math task or evaluation apprehension regarding math (Hembree, 1990), and is generally associated with math avoidance.

Research on math anxiety illustrates consistent gender-differentiated patterns. From adolescence on, women are more likely to admit math anxiety than are men (Hembree, 1990; Leder, 1990; Spencer, Steele, & Quinn, 1999; Zettle & Houghton, 1998). Many adolescent and older females approach math learning with fear and trepidation, which may result in avoidance behavior (Hembree, 1990). In high school, fewer young women take upper level math courses such as advanced algebra or calculus than do young men (Leder, 1990). The avoidance trend continues in college, where math attitudes seemingly predict interest in scientific careers (Chipman et al., 1992), and where degrees in fields like physics and computer science requiring advanced math skills are less often awarded to women than to men (Hill, 1997). Postgraduate statistics are even more alarming: In 1993 women held only 20% of the doctoral degrees in science and engineering (Burrelli, Arena, Shettle, & Fort, 1996). When women do attempt higher math, they may bring to classes preimposed self-doubts that can manifest themselves in poor performance compared to men with the same ability (Hembree, 1990).

The math anxiety experienced by many women may stem from a variety of factors, including gender differences in attributions for math success. These seem to appear at an early age and peak in late adolescence. The meta-analysis by Hyde, Fennema, Ryan, Frost, and Hopp (1990) of mathematics attitudes across three age groups illustrated that compared to male students, female students were less likely to attribute their mathematical successes to internal, stable influences such as ability. Concurrently, they found that female students were more likely than male students to attribute their successes to unstable factors such as effort, or external ones such as luck or task ease (Hyde et al., 1990).

The reduced competence and greater anxiety relative to mathematics that is felt by many women may reflect early social learning. Hyde et al. (1990) found that across all age groups and particularly during the high school years, gender differences in attitudes
about math were significantly related to parent and teacher attitudes about math. Adolescent boys' reports of the attitudes of parents and teachers regarding their math performance were more favorable than those reported by girls. Given the social nature of education and the importance of support from these sources in relation to adolescents' social self-efficacy (McFarlane, Bellissimo, & Norman, 1995) girls may feel that less is expected of them in math classrooms.

Stereotypical thinking that places gender labels on mathematical ability may be the largest stumbling block facing girls and women on the road to mathematical achievement and may contribute to their math anxiety. Hyde et al. (1990) found evidence of this in their meta-analysis and demonstrated that an overwhelming majority of students considered math to be a male domain. More surprising was the source of this thinking. Considerably more men stereotyped math as a male domain than did women. The prevalence of this opinion may subtly discourage girls and women from achieving in mathematics (Hyde et al., 1990).

The stigma associated with gender and math may inhibit both confidence and performance. A reduction in performance in the face of stereotype threat was the focus of a study by Spencer et al. (1999), who illustrated that in college women, the risk of being judged negatively on math performance as a function of gender can affect the quality of that performance. On a test of mathematical ability in which no gender differences were claimed, women's performances were equivalent to their equally prepared male counterparts. However, on a similar test in which men's superior performance was made salient, women's performances were substantially worse than those of the men (Spencer et al., 1999). Many women not only feel less competent than men with respect to math, stereotypical thinking on the part of others seems to affirm this and may promote math-avoidance behavior. An inability to avoid math during the formative years of education may result in feelings of math anxiety. If math is a dragon against which girls and women feel threatened, then its presence may stimulate feelings of anxiety.

Efforts to curb math anxiety have achieved mixed results. Hembree (1990) reviewed four common treatment approaches to reducing math anxiety; classroom interventions, behavioral modifications, cognitive therapy, and cognitive-behavioral therapy. Cognitive-behavioral therapy resulted in moderate decreases in math anxiety; however, systematic desensitization combined with anxiety management and conditioned inhibition emerged as the most successful treatment method to reduce math anxiety. This treatment method resulted in a significant decrease in math anxiety, which correlated with a significant increase in math test scores (Hembree, 1990).

Repeated exposure to situations that provoke math anxiety may actually reduce anxiety. This premise is supported by a meta-analytical examination of math anxiety by college course and major (Hembree, 1990). Consistent with an exposure-reduction hypothesis, men and women students with declared majors in studies requiring the greatest amount of math (i.e., math/science and physical sciences) reported the lowest levels of math anxiety. In contrast, students majoring in courses intended for careers that require only basic math knowledge (i.e., elementary education) had the greatest level of math anxiety (Hembree, 1990). While these results lend support to an exposure-reduction hypothesis and support the behavioral treatments for math anxiety, they bring additional concerns into focus: First, is the relationship between degree program and math anxiety reciprocal? That is, does math anxiety predict the choice of a degree program, or does the degree program predict levels of math anxiety? Secondly, what roles do gender-differentiated patterns in course enrollments (i.e., more women in elementary education programs and more men in advanced math and science programs) play in these analyses? Finally, was the reduced math anxiety observed in college majors with high levels of math exposure due to the exposure itself or due to ability? Further analyses taking into account exposure level as well as ability in math may reveal information about the source of math anxiety in women.

Does math anxiety or math ability influence career choices? Chipman et al. (1992) examined the effects of math anxiety and math ability on the career interests of female college freshmen. They hypothesized that both math anxiety and math ability would predict career interests. Math anxiety was assessed via questionnaire. Career interests were assessed via career goal indices that measured whether students were inclined to work with things rather than people (indicative of a preference for science-based careers), whether financial concerns motivated interests, and whether students were inclined to careers that provided creative outlet. The participants also indicated career preference by responding to a Likert-type scale that explored the likelihood of entering 15 different careers. Analysis demonstrated a significant negative association between math anxiety and interest in science careers. The greater the math anxiety, the less open the participants were to careers in science. However, contrary to expectations, ability in math did not correspond with career choice. Students with more math ability did not have more interest in
scientific careers. Furthermore, the relationship between math anxiety and math ability was not reciprocal. Interestingly, some women with high math ability remained anxious about math, and some low in math ability felt confident in math (Chipman et al., 1992).

Studies have shown that math anxiety directly affects math performance (Hembree, 1990) and career choice in women (Chipman et al., 1992). However, its effect on performance in math does not seem to indirectly affect career choice (Chipman et al., 1992). The lack of a relationship between ability and interest in scientific careers is surprising. One might expect students to gravitate to areas in which they feel competent. Chipman et al. (1992) felt that the results may reflect the difficulties of establishing a preference for scientific careers based on a desire to work with things rather than people. They acknowledged that the indices used in their study to assess career interests may have resulted in obtuse career categories. Indeed, having a preference for working with things rather than people could be interpreted in many ways. For instance, both a painter and an engineer can work with things, yet these two careers reflect diametric relationships to science. An examination of career goals that relies on self-report versus forced choice may render different results.

The purpose of this study was to test several hypotheses regarding women and math anxiety. First, sex differences were expected in levels of math anxiety. Specifically, it was hypothesized that women would report greater levels of anxiety compared to those reported by men. Secondly, no reliable association was expected between math anxiety and ability in math as measured by mathematics grade point average (GPA). Additionally, as found by Chipman et al. (1992), there should be a significant relationship between career choice and math anxiety, such that those with high levels of math anxiety would seek careers low in math intensity. Finally, support was sought for the exposure-reduction hypothesis. I expected that level of math exposure would predict math anxiety, and that in a sample of college students, those with greater exposure to math in their courses of study (high-math condition) would have lower scores on a measure of math anxiety than the students with less exposure to math (low-math condition).

Method

Participants

Participants were 135 college students ranging from freshmen to graduate levels whose participation was voluntary. Of these, 114 participants were recruited from a small women’s college and 21 responded via e-mail to an Internet posting of the survey. Women comprised 88.9% of the sample, and 36% were college seniors. Almost half of the participants (48.9%) reported taking at least two college math courses. The majority of the participants (81.5%) were liberal arts majors.

Materials

The survey of math anxiety was identical to the one used in Chipman et al. (1992). This measure contains five items that rate agreement on a 5-point Likert-type scale. High scores indicate greater levels of math anxiety. Scale reliability was established, α = .94. Additional data collected were: college major and minor, year in college (i.e., freshman, sophomore, etc.), number of undergraduate math courses completed, math GPA, career objective, and sex of respondent.

Procedure

Participants were recruited in person at various locations on campus or via electronic media. The survey questionnaire was electronically posted in two locations: on the campus intranet and on the World Wide Web (http://www.cybercomm.net/~marianne/math.html). In an effort to attract male students to the study, notice of the study and the URL of the online questionnaire were posted on two websites that contained a variety of hyperlinks to online psychology experiments as well as an electronic forum for student discussions of psychology-related issues. Group assignment was based on number of math courses (exposure level). Participants reporting one or zero math courses were assigned to the low-exposure group, those reporting two to three courses were assigned to the moderate-exposure group, and those with at least four completed math courses were assigned to the high-exposure group. Five levels of career math intensity were determined by the increasing level of math knowledge or its use required in various careers. For example, the career aspiration of elementary teacher was ranked low in math intensity, whereas computer programming was ranked high. Math ability was assessed via participants’ reports of their math GPA calculated on a 4-point scale.

Results

Overall, reports of math anxiety for the participants in this sample were in the neutral range as reported by Chipman et al. (1992) and did not differ between men and women. The mean level of math anxiety was 3.12 (SD = .45; see Table 1 for mean item responses and overall math anxiety by exposure group). The mean level of math exposure was in the
moderate range of two to three classes ($M = 3.03, \ SD = 2.49$), and the mean math ability was a GPA of 3.00 ($SD = .89$). The prediction of sex differences in math anxiety was not supported. The mean level of math anxiety for men was 3.20 ($SD = .51$) and for women the mean level of anxiety was 3.11 ($SD = .43$). Subsequent analyses included their combined scores. The expectation of no relationship between math anxiety and math ability was not supported; ability and math anxiety were significantly correlated, $r(127) = .30$, $p < .01$. The hypothesis that level of math anxiety would be associated with career goal math intensity was not supported. The hypothesis of a relationship between math exposure and level of math anxiety was supported, $r(127) = .28$, $p < .01$. However, this relationship was not in the anticipated direction. Contrary to expectations, high levels of math exposure corresponded to greater levels of math anxiety. An analysis of variance (ANOVA) revealed a significant difference in math anxiety depending on level of math exposure, $F(2, 128) = 4.94$, $p = .009$. A Fisher LSD showed no significant differences in math anxiety between low ($M = 3.02, \ SD = .45$) and moderate ($M = 3.15, \ SD = .42$) math exposure, but the anxiety associated with low math exposure differed significantly from the anxiety associated with high ($M = 3.4, \ SD = .34$) math exposure.

### Discussion

The hypothesis that there would be sex differences in math anxiety was not supported. Given the overwhelming representation of women in this study, and their propensity toward greater math anxiety (Hembree, 1990; Leder, 1990; Spencer et al., 1999; Zettle & Houghton, 1998), this result seems rather surprising, and may reflect some characteristic of the population. For example, the majority of the participants attended a women’s college, and it is possible that this experience led to reduced levels of anxiety. Perhaps learning situations in single-sex institutions lead to reduction in anxiety levels in women.

The relationship between math ability and math anxiety was also surprising. The null hypothesis of no relationship between math anxiety and math ability was not supported. Participants with greater ability in math also reported greater anxiety. However, the small size of this correlation necessarily limits its predictability of math anxiety in the general population. Additionally, since ability was measured by self-report rather than official records, the estimates given may reflect bias on the part of participants.

The hypothesis that level of math anxiety would associate with career goal math intensity was not supported. Similar to Chipman et al. (1992), a negative association was expected between math anxiety and high math-intensive career interests. It was expected that those students high in math anxiety would have less interest in careers that require greater math knowledge or use of math. The unexpected findings in this regard may result from problems with the categorization of math intensity in careers. Perhaps the lines drawn between different careers did not accurately reflect math intensity. Additionally, the failure of math anxiety level to predict career interest may reflect habituation to a certain amount of math anxiety by participants. For some, the dragon may have

### TABLE 1

<table>
<thead>
<tr>
<th>Mean Item Responses and Overall Math Anxiety by Exposure Group</th>
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<tbody>
<tr>
<td>Low exposure (0–1 classes)</td>
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<tr>
<td>-----------------------------</td>
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<tr>
<td><strong>I dread math class.</strong></td>
</tr>
<tr>
<td><strong>I feel tense when working on math problems.</strong></td>
</tr>
<tr>
<td><strong>Math is easier for me than for most people.</strong></td>
</tr>
<tr>
<td><strong>I just cannot understand math.</strong></td>
</tr>
<tr>
<td><strong>If I ever need to learn math for a new job, it will be easy for me.</strong></td>
</tr>
<tr>
<td><strong>Mean overall math anxiety</strong></td>
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lost its threat. Still, others may expect that career aspirations requiring knowledge and skill in higher mathematics will be accompanied by greater anxiety. For them, math anxiety may be a motivating factor.

The direction of the relationship between math exposure and math anxiety was the most surprising finding of this study. Contrary to expectations, greater exposure to math was associated with greater math anxiety. However, this result should be regarded with caution. A possible explanation for this concerns the measure of math exposure. Although participants were instructed to count only college-level math classes in their estimations, they may have unwittingly included math classes that were remedial in nature, or math classes that had been repeated. This would have the effect of inflating levels of math exposure. Future research of the relationship between math exposure and math anxiety should measure the level of math experience achieved (e.g., Pajares & Kranzler, 1995) rather than a count of math classes completed. A second interpretation involves expectations surrounding the challenge of higher learning. As one progresses in level of education, the course work necessarily increases in difficulty. Greater math anxiety at higher levels of exposure may reflect an acceptance of a certain level of math anxiety, and suggests a healthy learning attitude toward this challenge. Additionally, characteristics of the sample may have influenced the results of this study. All the participants were volunteers and therefore did not constitute a random sampling of college students. More importantly, the participants in this study included a preponderance of liberal arts majors. Math courses may be threatening to liberal arts majors, but their infrequency in liberal arts programs may put a damper on the anxiety associated with them. In contrast, the threat associated with math classes may be magnified for those students whose lines of study require greater math exposure.

The exposure-reduction hypothesis had no predictability for the sample in this study. Alone, increased exposure to math is not associated with reduced levels of math anxiety. Perhaps the limitations of exposure toward the reduction of math anxiety include such factors as the innate ability of the student as well as the quality of the learning experience and resultant performance. It seems that math exposure’s value toward the reduction of math anxiety may be realized only in association with additional factors.

A few words remain to be said on the wisdom of measuring math anxiety in college students while a semester is in progress. No attempt was made to control for state or trait math anxiety. It is conceivable that those students actively involved in a math learning situation may possess greater math anxiety than students not currently taking math courses. By separating state math anxiety from trait math anxiety, a clearer picture may emerge of math anxiety’s effects on career and goal choices. This might be accomplished by examining math anxiety at a time when its threat is not immediate, that is, when students are not actively involved in learning, but also when the past experience with mathematics may be relevant, such as during registration periods and the course selection process. Indeed, it is during this process that math anxiety exerts its most debilitating influence on educational decisions.

This study of math anxiety produced unexpected findings. Some of these may be related to errors of operation. However, they illustrate the complexity that surrounds math anxiety. A phenomenon observed during data collection merits mention. Whether they verbally indicated high or low math anxiety, most participants were eager to make their views about math anxiety known. Additionally, a large number of participants requested the results of this study to be sent to them upon its completion, illustrating a prevailing concern about math anxiety. Research that probes the causes and effects of this phenomenon has widespread potential application.

References


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Psi Chi annually sponsors national undergraduate and graduate research award competitions, as well as research awards for members submitting the best research for the regional and national paper/poster sessions. In addition, Psi Chi also sponsors grant programs to fund student and faculty research. Psi Chi’s award and grant programs now provide up to $225,000 to members annually. Descriptions of the award/grant competitions follow. Further information and submission forms may be obtained from the Psi Chi website (www.psichi.org).

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