

## **Even in Modern Media, the Picture is Still the Same: A Content Analysis of Clipart Images**

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*Both psychological theory and empirical research have consistently indicated that human beings use media images to form cognitive schemas, and that these schemas can then have an effect on perceptions of ability and performance. Gender and ethnic biases are well documented in common media, such as television and picture books. This study examined images of human beings in two popular computer clipart packages, Microsoft Office 97 and Print Shop Ensemble III, to investigate whether this new medium would embody modern, egalitarian goals for gender and racial equality or would depict more traditional and differentiated views. As hypothesized, computer clipart was similar to other media, depicting Caucasian males more frequently and in more active/nonnurturant and desirable roles than any other group. Findings suggest that individuals using these programs to make business and educational materials more interesting and engaging may inadvertently activate maladaptive cognitive schemas.*

Since cave dwellers began drawing pictures on walls, human beings have been interested in self-representation and have inferred meaning from the pictures that they create and view. Research has investigated the content and implications of images of people in specific print and televised media, and has

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consistently found gender biases and stereotypical messages. Recently, computer technology has increased the use of visual images in everyday media such as office bulletins, school flyers, memos, school presentations, and personal letters. The nature of these computer images, the messages they send, and the implications of such messages are unclear. In this study, we expanded upon previous research on common media images in our culture by examining the nature of human representations in popular computer programs.

Goffman's early analysis of print advertisements found gender-based discrepancies, with females depicted as shy, passive, and gentle, whereas males were depicted as dominant, and powerful (Goffman, 1976). Since that time, many researchers have investigated gender stereotypes by conducting content analyses of "common images" presented by popular media (e.g., cartoons, children's books, magazines, music videos, and television). Although individual studies each investigate a specific media domain, these content analyses yield similar findings, showing disparities between depictions of male and female characters. For example, research on books for preschool and early elementary-age children has found differences in both visual images and text descriptions based on characters' gender. Males generally appear in illustrations more often than females and are more likely to be cast in central roles and to be cited in the titles than females (McDonald, 1989; Tepper & Cassidy, 1999). Females tend to be portrayed in passive or nurturing roles or both (e.g., mother, nurse, or secretary), whereas males are portrayed in active/nonnurturant, productive or aggressive roles or both (e.g., baseball player, construction worker, or scientist; Crabb & Bielawski, 1994; McDonald, 1989; Tepper & Cassidy, 1999).

Research on diverse forms of television programming has found similar results. In televised music videos, men appear twice as often as women, and engage in significantly more aggressive and dominant behavior. Women in these videos are significantly more likely to be depicted as the passive object of sexual advances than men (Sommers-Flanagan, Sommers-Flanagan, & Davis, 1993). Televised commercials depict women as sexual targets and men as active and dominant, significantly more than the opposite (e.g., by showing women in an undressed state or revealing clothing, see Browne, 1998; Coltrane & Adams, 1997; Willemsen, 1998; Zebrowitz McArthur & Resko, 1975). Even in children's cartoons, gender stereotypes are demonstrated (e.g., Chu & McIntyre, 1995; Dines, 1995). Thompson and Zerbino's review of 20 years of cartoons demonstrates that changing gender roles and increasing societal awareness of gender biases have not influenced the disparities in the frequency and nature of representations of males and females (Thompson & Zerbino, 1995). The modern disparities in cartoons, television commercials, and music videos parallel Goffman's longstanding finding that print advertisements show women, but not men, in predominantly

domestic and dependent roles (e.g., Goffman, 1976; Whipple and Courtney, 1985).

In fact, these inequities pervade educational and professional environments as well as entertainment media. Hogben and Waterman (1997) examined textbooks for introductory psychology and found that women and ethnic minorities were underrepresented in both text and illustrations in these books. Chappell (1996) examined educational software designed to teach mathematics in elementary school classrooms through the use of engaging stories and activities, and found that the majority of the characters depicted in the stories were male. Further, the proportion of female characters decreased as the intended grade level of the game player increased. Ogletree, Merritt, and Roberts (1994) found that even postage stamps were much more likely to depict men than women, and that men were more likely to be depicted in more active roles, less likely to be depicted in nurturing roles, and engaged in more diverse activities, while women were generally portrayed in a limited number of traditional, nurturing activities.

Postage stamps and television are certainly pervasive, and many children are exposed to educational software in school or home settings or both. However, individuals in modern society may be exposed to computerized images as frequently as to television, in both computer-based applications and printed material. Clipart graphics (the images contained in word processing programs, inserted into desktop published documents and visible on virtually every website) are currently used in most business and educational settings. For example, clipart has been incorporated into educational materials from kindergarten through college (Abramson, French, Huss, & Mundis, 1999; Chappell, 1996) and in psychological surveys for adults (Francis & Irwin, 1988; Marschalek, 1988). Use with younger children (preschool and early primary grades) is also quite widespread. Clipart has been used with children to foster creative learning (Clements, 1995; Sisson, Mayfield, & Entz, 1985), to facilitate story telling (Riding & Tite, 1985), for play therapy (Kokish, 1994), and for diagnosing dyslexia (Karnes, 1982). Despite the ubiquitous presence of clipart in educational settings, no previous research has analyzed the content of these images.

Historical and recent research documenting pervasive and systematic depictions of females and males in stereotypical roles have led theorists to explore how these images may affect an individual's concept of one's social role and related rules for behavior which may limit the aspirations of some individuals, especially those who are depicted in a restricted range of activities and contexts. Goffman's discussion of individual consciousness suggests that our perception of reality is constructed through exposure to commercial symbolism (e.g., books, advertisements, cartoons, and television; Goffman, 1959). As a result, Goffman (1959) and others (e.g., Gordon &

Chafetz, 1990) suggest that, in modern society, media depictions of men and women are one of the fundamental sources of our gender identity. The “cognitive miser” theory refines this view, proposing that humans rely on common images to create stereotypes, and then use those stereotypes as a decision-making aide in order to conserve mental resources (Macrae, Milne, & Bodenhausen, 1994; Sherman & Frost, 2000).

Consistent with these ideas, current psychological literature supports the view that stereotypes about gender, age, and ethnicity are associated with individuals’ self-schemas and expectations for others. For example, females who have high sex-role affiliation are likely to have lower self-efficacy, suggesting that they applied the stereotypical view of women as passive to their personal self-concept (Clark & Zehr, 1993). Similarly, gender stereotypes influence individuals’ interpretation of their own achievement, so that females may evaluate their performance more negatively when engaging in male-typical activities such as math (Bornholt, Goodnow, & Cooney, 1994). Spence and Hall (1996) found that children who endorsed gender stereotypes also preferred gender-congruent activities and preferred to interact with adults in gender-congruent professions. Jacobs (1991) found that parents’ gender stereotypes influenced children’s course selection and academic performance, and Van Vianen and Willemsen (1992) found that gender stereotypes influenced employers’ hiring decisions. In particular, conceptions of women as sexual objects and maternal figures can lead to lack of respect in professional settings (Chafetz, Lorence, & Larosa, 1993).

Beyond activity selection, stereotypes have been shown to affect performance. Studies using priming paradigms to cognitively activate negative stereotypes about females (e.g., statements such as “females are not very good at math”) have demonstrated that such primes often undermine task performance (Stangor, Carr, & Kiang, 1998) and decrease cognitive performance (Aronson, Quinn, & Spencer, 1998; Spencer, Steele, & Quinn, 1999) in females on related activities. Negative stereotypes about aging (e.g., older people are slower) have also been shown to decrease cognitive performance in older adults, and positive stereotypes about aging (e.g., older people are wiser) have been shown to increase cognitive performance in the same manner (Levy, 1996). Steele’s research has repeatedly shown that asking African Americans to report their ethnicity before taking an exam will reduce subsequent performance on the exam, presumably by heightening awareness of ethnicity-related stereotypes (Steele, 1997, 1998; Steele & Aronson, 1995).

Based on the idea that pervasive media images influence our collective and individual consciousness, and considering the current ubiquitous use of computer clipart images, we sought to examine whether modern media sources such as clipart were as systematically biased as other common

media images. In this research, we examined the gender, race, and age-relevant information in two top-selling computer software packages that include extensive clipart collections: The most popular word processing program (Microsoft Word) and the most popular program for making cards and signs (Broderbund Print Shop). It was possible that, because clipart is an entirely new medium, it would be relatively free from the gender biases common to other visual representations. However, we hypothesized that our analysis would find traditional gender disparities in clipart, so that males would be depicted more often and in more diverse and active/nonnurturant roles. In addition, we expected that we would find disproportionate prominence given to depictions of Caucasians in preference to other racial groups. Because Office is primarily marketed to business environments and Print Shop to families and schools, we expected that the preferential depiction of Caucasian males would be more pronounced in Office and that greater diversity would be evident in Print Shop.

## METHOD

### Sample

Based on industry data (PC Data, <http://reston.intelectmt.com/>), two top-selling computer packages that utilize clipart were selected for analysis: Microsoft Office (Office 1997) and Broderbund's Print Shop (Print Shop 1997). Microsoft Office is the most widely used software package available in the United States, and contains the word processing program Microsoft Word (<http://reston.intelectmt.com/>). There are several versions of this package containing slightly different applications, but all versions share the same software collection. Only the basic clipart included in all Office packages was included in this analysis.

At the time of this study, Print Shop was the most popular program for making signs, cards, and other graphic-based presentations. Like Office, there are several versions of Print Shop with slightly different features. Print Shop Deluxe Ensemble III was selected for analysis because it contained the largest collection of clipart, and therefore was most likely to demonstrate image diversity. Several different versions of Print Shop continue to be marketed, and together they were among the top 10 best-selling software packages in 1999 (<http://reston.intelectmt.com/>).

Every image containing a humanoid figure (any figure of a human, whether cartoon or silhouette) contained in these two software packages was coded. The resulting sample included 2,713 pieces of clipart, containing 3,929 individual characters (757 characters from Microsoft Office and 3,329 from Print Shop).

## Procedure

All clipart was coded by trained students (one graduate student, and three undergraduates<sup>2</sup>) at California State University, Fullerton. In addition to completion of research methods courses, the coders were trained in content analysis procedures. Group observations and discussions of sample clipart from other sources were used to ensure shared evaluation criteria, and a standardized coding form was used. Each coder coded a subsection of either Microsoft Office or Broderbund Print Shop, and each piece of clipart was coded only once. Intercoder reliability was assessed by checking one person's ratings against another person's ratings for the same clipart image (i.e., using Kappa for categorical data, and Pearson  $r$  for interval data). Intercoder reliability on a sample of 100 pieces of clipart was assessed immediately after training, and a follow-up assessment was made for each coder pair on a sample of 50 pieces of clipart approximately halfway through data collection. The resulting intercoder reliability between the two coder pairs was high. Kappa statistics for categorical scales ranged from .50 to .85, with a mean of .70. Bivariate correlations also found strong intercoder reliability for variables measured on interval scales (mean  $r = .70$ ).

All variables were assessed separately for each represented individual, so that clipart depicting more individuals carried more weight in the analyses. The only exception to this procedure was made for images with more than eight figures, which were coded as groups.<sup>3</sup> The coders coded Microsoft Office clipart via a computer screen, and Print Shop clipart from a book that accompanied the software package.

### *Physical Characteristics*

Several categories of appearance of the depicted individuals were coded: Age, clothing type, gender, and picture chrome. Clipart color schemes were categorized as silhouettes, black and white or colored. In nonsilhouette images, individual characters' skin tone was rated on a 1 (*lightest/Caucasian*) to 12 (*darkest/African American*) scale.<sup>4</sup> The scale used for monochromatic

<sup>2</sup>Because the characteristics of the perceiver influence perceptions of content (e.g., Dambrot & Reep, 1993), this study included both male (1) and female (3) coders from two different ethnic backgrounds (Caucasian and Hispanic).

<sup>3</sup>Most clipart pictures contained fewer than eight individuals in a picture; however, when more than eight individuals were depicted the pictures were likely to be very small and non-discernible. Therefore, the picture was coded as a group, and only the variables discernible were coded.

<sup>4</sup>To examine which skin color range was depicted most frequently, the 12-point scales were broken down into four equal categories.

images ranged from white to black, whereas the scale used for colored images ranged from pale pink/tan to dark brown. Silhouettes represented black and white images without color gradation or facial detail, and so were not coded for skin color. The age of depicted individuals was coded on a 5-point ordinal scale from 1 (*baby*) to 5 (*elderly*). Gender, if discernible, was coded as male or female. Clothing worn was coded as revealing (e.g., bathing suits, skirts, short dresses, shorts,) or nonrevealing (e.g., long skirts, slacks). If the type of clothing worn was not discernible (e.g., a blanket was covering the legs), the clipart piece was coded as not discernible.

### *Activity*

Each individual's activity was classified as passive (not requiring any response or producing any discernible product, e.g., sitting or reading), active/nonnurturant (a nonnurturant but dynamic activity such as walking or working), or active/nurturant (care-giving activities such as feeding, holding a baby, or housekeeping).

In addition, each activity was coded for gender typicality. Regardless of the gender represented in the picture, coders indicated on a 5-point Likert-type scale from 1 (*highly unusual*) to 5 (*highly typical*) whether the activity/behavior would be normative for a female, an example of a highly typical "female" activity is "setting the table." Likewise, all pictures were also scored for characteristically male behavior. An example of a highly typical "male" activity is "sawing a piece of wood." As a result, it was possible for an activity to receive high scores on both gender typicality dimensions, indicating that both genders normatively engage in the activity (i.e., the activity/behavior is gender-neutral). An example of a gender-neutral behavior is "watching television."

## **RESULTS**

Three data analytic techniques were used to examine these data. Chi-square ( $\chi^2$ ) analyses were used to assess patterns in categorical variables, while one-way and two-way multivariate and univariate analysis of variance (ANOVAs or MANOVAs) and independent-groups *t* tests were used to examine group differences in continuous variables. Effect size phi ( $\phi$ ) is reported for the  $\chi^2$  analyses,<sup>5</sup> and *r* is reported for the between-groups and mixed-model tests. Following a report of the clipart population

<sup>5</sup>Phi ( $\phi$ ) is only interpretable in the  $2 \times 2$  case (when the  $\chi^2_{df} = 1$ ); therefore effect sizes were only calculated in these cases.

characteristics, the results are reported alphabetically by topic, first describing similar trends within each of the two clipart packages followed by analyses of differences between the two packages.

### Clipart Population Characteristics

The vast majority of the clipart in both Microsoft Office and Print Shop depicted human beings of clearly discernible gender, skin color and age.<sup>6</sup> In both packages, males, 65% in Microsoft Office,  $\chi^2(1, N = 455) = 42.5, p < .001; \phi = .31$ ; 63% in Print Shop,  $\chi^2(1, N = 3,031) = 197.1, p < .001; \phi = .26$ , adults, 82% in Microsoft Office,  $\chi^2(1, N = 497) = 207.3, p < .001; \phi = .65$ ; 65% in Print Shop,  $\chi^2(1, N = 3,268) = 312.1, p < .001; \phi = .31$ , and individuals with lighter complexions, 73% in Microsoft Office,  $\chi^2(1, N = 518) = 107.5, p < .001; \phi = .46$ ; 71% in Print Shop,  $\chi^2(1, N = 2,775) = 480.7, p < .001; \phi = .42$ , were significantly more common than depictions of females, other ages, and darker skin tones.

There were no differences between Microsoft Office and Print Shop in representation rates for males or females, although Office contained more neutral or ambiguous figures, 8% in Print Shop versus 14% in Office;  $\chi^2(1, N = 346) = 15.9, p < .001; \phi = .21$ . Print Shop contained many more images of human beings ( $N = 3,309$ ) than did Microsoft Office ( $N = 756$ ). In both packages, the vast majority of the clipart represented normal people engaged in everyday activities (i.e., human beings rather than supernatural humanoids such as vampires; 92% of Office images and 93% of Print Shop images,  $\chi^2(1, N = 3,617) = 1.7, ns$ ).

### Activities and Behavior

#### *Activity Type*

In both packages, active/nurturant activities were very uncommon. In the Microsoft Office sample, passive (52%) and active/nonnurturant (45%) behaviors were shown with similar frequency, and both were much more common than representations of active/nurturant activities, 3%,  $\chi^2(2, N = 527) = 224.0, p < .001$ . In Print Shop, passive activities were shown most frequently (54%), followed by active/nonnurturant behaviors (43%), and active/nurturant behaviors were least common, 4%,  $\chi^2(3, N = 3,313) = 2908.2, p < .001$ .

<sup>6</sup> Approximately 12% of the clipart was excluded from analysis because it portrayed silhouettes of indeterminate characteristics and activity.

**Table I.** Association Between Gender and Type of Activity

	% Males	% Females	$\chi^2$
Microsoft Office			
Active/nonnurturant	53	35	$\chi^2(1, 440) = 13.0, p < .001, \phi = .17$
Passive	46	64	
Print Shop			
Active/nonnurturant	49	37	$\chi^2(1, 2911) = 38.5, p < .001, \phi = .15$
Passive	51	63	

However, there was a significant relationship between gender and the nature of the depicted activity. Males were more likely to be shown in active/nonnurturant settings, engaged in active/nonnurturant behavior, or both, than females, and females were much more likely to be engaged in passive activity or behavior than males (see Table I). In Print Shop, there was a strong trend toward significant gender differences in active/nurturant activities, such that the majority (58%) of the images showing active/nurturant activities depicted females,  $\chi^2(1, N = 112) = 3.6, p = .06; \phi = .18$ .

#### *Gender Typicality*

Across gender, individuals in Office were significantly more likely to be engaged in typically male behavior ( $M = 4.35$ ) than in Print Shop ( $M = 3.67$ );  $t(685.65) = 11.25, p < .001; r = .39$ . There was no overall difference in ratings of typically female behaviors between Office ( $M = 3.39$ ) and Print Shop ( $M = 3.36$ );  $t(645.49) = .43, ns$ . There was no significant interaction between clipart package and gender of character for typically female behavior,  $F(1, 3481) = .67, ns$ , or for typically male behavior,  $F(1, 3480) = 1.90, ns$ .

#### *Activity Type and Gender Typicality*

In both Microsoft Office and Print Shop, there was a main effect of activity type on gender typicality. One-way MANOVAs using the Wilk's test revealed a significant difference between the three activity types (passive, active/nonnurturant, active/nurturant) on gender typicality,  $F_{\text{OFFICE}}(4, 1048) = 19.20, p < .01$ ;  $F_{\text{PRINTSHOP}}(4, 6586) = 45.49, p < .001$ . Looking specifically at the differences between each of the activity types on typically male and typically female activity separately, Tukey's post hoc analyses showed that for Microsoft Office, active/nonnurturant activities ( $M = 4.50$ ) and passive activities ( $M = 4.27$ ) were seen as more typically male than active/nurturant activities ( $M = 3.40, p < .001$ ). In addition, active/nurturant ( $M = 3.87$ ) and passive activities ( $M = 3.88$ ) were seen

as significantly more typically female than active/nonnurturant activities ( $M = 2.79$ ;  $p < .05$ ). In Print Shop, post hoc analyses indicated that active/nonnurturant activities ( $M = 3.92$ ) were seen as more typically male than passive activities ( $M = 3.50$ ;  $p < .001$ ). Passive ( $M = 3.40$ ), active/nonnurturant ( $M = 3.22$ ), and active/nurturant ( $M = 4.32$ ) were all significantly different from one another ( $p < .001$ ), with active/nurturant and passive activities seen as more typically female than active/nonnurturant activities.

### *Character Gender and Gender Typicality*

A Character Gender  $\times$  Gender Typicality mixed-model ANOVA was conducted separately for Microsoft Office and Print Shop, revealing a significant main effect of gender typicality,  $F_{\text{OFFICE}}(1, 453) = 38.55$ ,  $p < .001$ ;  $r = .30$ ;  $F_{\text{PRINTSHOP}}(1, 3027) = 5.29$ ,  $p < .02$ ;  $r = .04$ , indicating that illustrations of either gender were more likely to depict typically male behavior. In addition, a significant interaction between gender of character and gender typicality was also found,  $F_{\text{OFFICE}}(1, 453) = 97.24$ ,  $p < .001$ ;  $r = .42$ ;  $F_{\text{PRINTSHOP}}(1, 3027) = 888.18$ ,  $p < .001$ ;  $r = .48$ , showing that females were more likely to be depicted in typically female activities than in male activities, while males were more likely to be depicted in typically male activities than in female activities. A contrast between gender typical and gender atypical behavior revealed that males and females were significantly more likely to engage in gender typical behavior (males rated as acting masculine) relative to gender atypical behavior (females acting masculine),  $F_{\text{OFFICE}}(1, 453) = 42.67$ ,  $p < .001$ ;  $r = .29$ ;  $F_{\text{PRINTSHOP}}(1, 3027) = 896.29$ ,  $p < .001$ ;  $r = .48$ ; see Table II for means and standard deviations. The only difference between the packages was that across gender, individuals depicted in Office were significantly more likely to be engaged in typically male behavior ( $M = 4.35$ ) than in Print Shop ( $M = 3.67$ );  $t(685.65) = 11.25$ ,  $p < .001$ ;  $r = .39$ .

### **Age**

Similar to our finding that males were depicted more often than females, there were more images of middle-aged adults than younger adults and elders. However, there was a significant interaction between gender and age, so that on average in both packages, men were more likely to be depicted as middle-aged. In Office, males were more likely to be represented as middle-aged (87%) than females (81%), and females were significantly more likely to be represented as teenagers (14%) than males, 8%;  $\chi^2(8, N = 497) = 21.2$ ,  $p < .001$ . In Print Shop, males (9%) and females (9%) were equally likely to

**Table II.** Means and Standard Deviations for Gender by Sex-Typed Behavior for Both Print Shop and Microsoft Office

	<i>M</i>	<i>SD</i>	<i>n</i>
Print Shop			
Typically female			
Females	3.97	1.07	1,128
Males	2.97	1.31	1,901
Typically male			
Females	3.98	1.02	1,901
Males	3.65	1.24	3,029
Microsoft Office			
Typically female			
Females	4.06	1.30	158
Males	2.96	1.58	297
Typically male			
Females	3.66	1.67	158
Males	4.71	.84	297

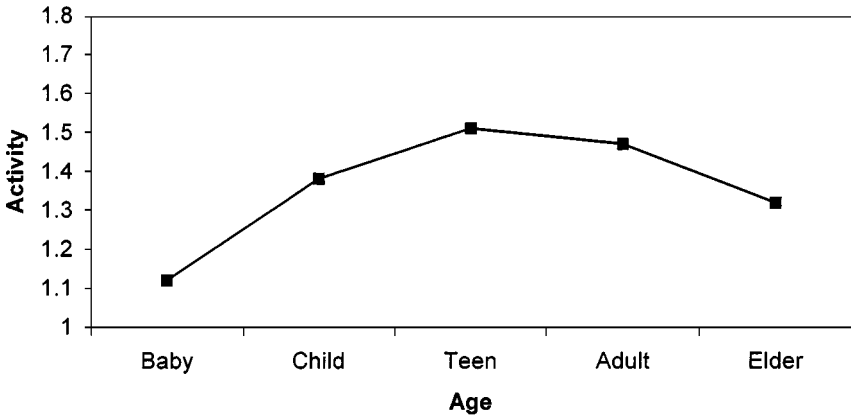
be shown as teenagers. However, males were more likely to be represented as middle-aged (69%) or elderly (5%) than females, 65% middle-aged, 1% elderly;  $\chi^2(6, N = 3,021) = 45.1, p < .001$ . In both packages, gender analysis of infants and children was not conducted because it was often difficult to determine the gender of these individuals.

An independent-samples *t* test revealed that the average individual depicted in Microsoft Office was older ( $M = 3.79$ ) than the average individual pictured in Print Shop ( $M = 3.47$ );  $t(987.62) = 10.96, p < .001; r = .33$ . Office and Print Shop contained similar percentages of teenagers (12 and 9%, respectively) and similar percentages of elders (1 and 3%, respectively). However, Office contained a higher percentage of adults (82%) than Print Shop (65%), and Print Shop contained almost five times more babies and children (22%) than Office (5%). The observed frequencies of ages across the two packages were significantly different than expected by chance,  $\chi^2(6, N = 3,772) = 94.05, p < .001$ .

In Microsoft Office, age was not significantly associated with type of activity,  $F(1, 477) = .97, ns$ . However, in Print Shop a significant quadratic trend was found between age and activity, indicating that elders and children were more likely to be engaged in passive behavior and that teenagers and middle-aged adults were more likely to be engaged in active/nonnurturant behavior,  $F(1, 3140) = 42.71, p < .001; r = .12$ ; see Fig. 1 for a depiction of this pattern.

### Clothing

In both packages, males were generally shown with their legs covered/less revealing clothing (Office = 88%, Print Shop = 79%). In contrast,



**Fig. 1.** The quadratic relationship between age and role (passive & active/nonnurturant) for Print Shop.

females were much more likely to be shown with their legs uncovered/more revealing clothing, Office = 82%, ( $\chi^2(1, 204) = 95.2, p < .001; \phi = -.68$ ; Print Shop = 75%,  $\chi^2(1, N = 1,897) = 475.33, p < .001; \phi = -.50$ . There was no difference between the two packages regarding clothing worn;  $\chi^2(1, N = 2,251) = .254, ns$ .

### Skin Color

Print Shop contained many more black and white images (35%) than Office (8%), and Office (82%) had more color images than Print Shop (57%),  $\chi^2(2, N = 1,194) = 198.5, p < .001$ . A two-way ANOVA looking at clipart package and chrome on skin shading indicated that there was no main effect of clipart package on skin shading,  $M_{\text{OFFICE}} = 3.34, M_{\text{PRINT SHOP}} = 3.12; F(1, 3293) = 2.48, ns$ . There was a main effect of chrome on skin shading, indicating that across packages, color pictures showed individuals of significantly darker complexion ( $M = 3.77$ ) than the black and white pictures,  $M = 1.72; F(1, 3293) = 38.27, p < .001, r = .10$ . This discrepancy was larger in Print Shop than in Microsoft Office;  $F(1, 3293) = 14.15, p < .001, r = .06$  (see Table III for means and standard deviations).

The finding that lighter skin tones were depicted significantly more often than darker skin tones was robust, but was reflected differently within different color schemes in the two software packages. In Microsoft Office, lighter-skinned images comprised approximately three quarters of both monochromatic, 76%,  $\chi^2(1, N = 45) = 11.8, p < .001; \phi = .51$ ; and colored pictures, 73%,  $\chi^2(1, N = 473) = 95.92, p < .001; \phi = .45$ . Although pale skin tones

**Table III.** Means and Standard Deviations for Chrome by Clipart Package on Skin Tone

	<i>M</i>	<i>SD</i>	<i>n</i>
Print Shop			
Black & White	1.66	2.33	942
Color	3.87	2.74	1,836
Microsoft Office			
Black & White	2.84	3.46	45
Color	3.38	3.42	474

predominated in Print Shop, the disparity was greater in black and white drawings, 93% of monochromatic images contained individuals with pale skin,  $\chi^2(1, N = 942) = 686.2, p < .001; \phi = .85$ ; than in colored pictures, 60% of colored images contained individuals with pale skin,  $\chi^2(1, N = 1,833) = 67.2, p < .001; \phi = .19$ .

In Microsoft Office, there was a marginally significant trend depicting females ( $M = 3.25$ ) as more darkly colored than males,  $M = 2.93$ ;  $t(261.01) = 1.90, p = .06; r = -.13$ . This trend was reversed in Print Shop where males ( $M = 3.36$ ) were about equally as likely to be depicted as more dark skinned than females,  $M = 2.57$ ;  $t(2,157.45) = -7.94, p = .00; r = .12$ . In both packages, skin color was significantly related to behavior. In both Microsoft Office and Print Shop, individuals engaging in active/nonnurturant behaviors ( $M_{\text{OFFICE}} = 3.62$ ;  $M_{\text{PRINT SHOP}} = 3.33$ ) were rated as having significantly darker skin tone than passive individuals ( $M_{\text{OFFICE}} = 2.73$ ;  $M_{\text{PRINT SHOP}} = 3.02$ );  $t_{\text{OFFICE}}(354.44) = -2.74, p < .01; r = .14$ ;  $t_{\text{PRINT SHOP}}(2, 690) = -2.76, p < .01; r = .05$ . However, the effect was much larger among images in Microsoft Office than in Print Shop.

## DISCUSSION

In this study, we examined the demographic characteristics and activities of individuals depicted in computer clipart. A content analysis of two top-selling clipart packages, Microsoft Office and Print Shop, was conducted in order to examine potential gender frequency asymmetries and stereotyping. Because computer media are relatively new, it was thought that perhaps these images would be free from the pervasive stereotypes and biases found in children's books, on postage stamps, on television, and in textbooks. In addition, both of these packages advertise the breadth and scope of their clipart as a desirable feature of the software, implying that many different types of people might be represented in many different ways.

However, as hypothesized, there were significant representational biases in the clipart contained in both Microsoft Office and Print Shop. In

both packages, images of middle-aged males with light complexions were far more common than any other type. As predicted, males were depicted in more diverse and active/nonnurturant roles than females.

This is perhaps not surprising for Office, which was originally designed for a business audience and may therefore reflect normative perceptions of American business environments. However, underrepresentation of women and minorities in clipart, and implicit support for gender typical roles, are problematic even if they do reflect the reality of a business environment. As Van Vianen and Willemsen (1992) demonstrated, gender stereotypes influenced employers' perceptions of their employees. Clipart, like other visual representations, could prime and reinforce these stereotypes. In addition, Print Shop is designed for family and educational use and shows the same bias toward over representing Caucasian male adults.

When females were depicted, both software packages portrayed them in a significantly different manner than males. Females were more likely to be depicted as teenagers in Office, and less likely to be shown as middle-aged or elderly in both Office and Print Shop. Females were also shown given more revealing wardrobes (such as bathing suits, short dresses, short shorts, and short skirts), which means that females were more likely to be drawn with their legs bare. This offers some support for many past findings suggesting that representations of women are more sexualized than those of men (e.g., Browne, 1998; Coltrane & Adams, 1997; Sommers-Flanagan et al., 1993; Willemsen, 1998).

Illustrations depicted males in predominantly active/nonnurturant behaviors, in which they were physically mobile or producing some product (production was a part of assigning a code of "active/nonnurturant"). Females were more likely to be portrayed in passive positions, such as sitting or reclining, or depicted in static poses or delegated to the role of "audience" (i.e., passively accompanying or observing a male). Females were also more likely to be shown in active/nurturant activities such as feeding a baby, or cleaning the kitchen. Again, this parallels research on other media demonstrating that males are accorded more prominent and powerful activities in photographs and illustrations (e.g., Crabb & Bielawski, 1994; Hogben & Waterman, 1997; McDonald, 1989; Tepper & Cassidy, 1999).

Given the popular sense that gender roles in American society are becoming less well-defined, it was possible that activities might differ in activity level while still remaining gender neutral. For example, reading is a passive activity that is equally appropriate for males and females. Therefore, the finding that more women are depicted in proportionately more passive roles cannot be used as the sole indication of bias.

However, it was not the case that most passive activities, or most depictions of women's behavior, were judged to be equally appropriate for

males and females. Instead, women were much more likely to be shown in typically female activities, whereas males were more likely to be illustrated in typically male activities. Similarly, females were significantly more likely to be shown in active/nurturant roles. When cross-gender activity was depicted, images of female characters engaged in male behavior were more common than male characters engaged in female behavior. This pattern was particularly pronounced in *Print Shop*, which demonstrated lower rates of males engaged in typically female behavior than did *Office*. This pattern encourages the perception that traditionally male activities are desirable for all, whereas traditionally female activities are less desirable (as shown by their less-frequent depiction) and gender-specific.

When genders are portrayed as different and unequal, the depictions create and reinforce cognitive rubrics that narrow the range of roles women may play in society. Depicting women as primarily passive individuals, sexualized, or shown in nurturing roles may encourage men to dismiss women in business settings (Chafetz et al., 1993). Recalling the research on stereotype threat, it is easy to think that when businesses and educational institutions use such stereotypical images, they could be affecting the performance of women and minorities (Aronson et al., 1998; Chappell, 1996; Steele, 1997, 1998; Steele & Aronson, 1995). The effect of clipart may be particularly pronounced for children, because research has shown that children retain more gender typical information than gender atypical information (Welch-Ross & Schmidt, 1996).

Human cognition is dependent on mental heuristics to conserve and maximize cognitive resources. Human beings will always use available environmental information to derive and apply social stereotypes (Macrae et al., 1994; Sherman & Frost, 2000). The current findings demonstrate that, although it is a new medium, computer clipart is not free from historical societal views of gender. Consequently, use of clipart is likely to encourage traditional gender schemas in viewers. Understanding this provides a useful counterbalance to prominent movements to increase use of technological images in education from preschool through college, as a method of increasing student engagement (cf. Yelland, 1999; SyllabusWeb <http://www.syllabus.com/>).

Future research is needed to examine the specific influence of clipart images on children and adults in various settings, and how those influences might compare to the impact of other media. Additional studies should also explore the diversity of computer images available from other sources. Microsoft's website provides a much larger selection of clipart, which is increasingly available to Office users as Internet transmission speeds improve (e.g., Clip Gallery Live, <http://cgl.microsoft.com/clipgallerylive/default.asp>). Analysis of human images in this collection may or may not find the same biases as the clipart included with the Office software, or with clipart available

from other sources. Further research may want to look at how computer images have changed since their dawning in the late 1980s, that is maybe it is the case that computer generated pictures have come a long way in the short time they have been around. In fact, Microsoft has come out with a newer version of Microsoft Office (Office, 2000) since this research began, and may reflect more diversity in their depictions of humans

Human beings' love of self-representation has existed since cave dwellers and will not end with the advent of new technologies. However, the changing form of images and the multiplicity of their sources allow us greater control over the images that we utilize, particularly in educational and motivational settings. It is incumbent on us to make sure we understand the impact of our images and to use these self-representations responsibly.

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