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Applied Developmental Psychology 24 (2003) 627–644

Applied Developmental Psychology

Gender differences in preadolescent children's online interactions: Symbolic modes of self-presentation and self-expression☆

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Abstract

Preadolescent children who did not know one another interacted in a multiuser domain (MUD), an online site designed to facilitate identity exploration and peer interaction. Each child participated in two separate sessions, one with a same-sex and one with an opposite-sex peer. Children created characters that reflected real-life properties of themselves, such as gender and interests in popular culture. Boys in same-sex pairs interacted with one another through action, rapid changes, and playful exchanges. Girls in same-sex pairs interacted primarily through written dialogue. In mixed pairs, boys wrote more and engaged in less playful exchanges, and girls wrote fewer and increased their actions. The results suggest that boys and girls have their own unique play styles with same-sex peers, but will moderate those patterns during late childhood to communicate with peers of the opposite sex.

Keywords: Media; Internet; Adolescent; Peer interaction

1. Introduction

The self includes representations of the physical and psychological characteristics of who we are, as well as an ideal self of who we want to become (Harter, 1998). Physical

☆ This research was supported by the National Science Foundation (Grant #0126014) and by Georgetown University.

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0193-3973/$ – see front matter
doi:10.1016/j.appdev.2003.09.001

characteristics of the self revolve around the body in which we live, a body that is constrained by attributes such as age, sex or gender, and physical appearance (Harre, 1983). Psychological characteristics of the self include the activities we do, the social skills we possess, and the roles that we play (Harter, 1998). How we present the self, characterized by its physical and psychological features, is the topic of a large literature on self-presentation (Harre, 1983; Harter, 1998). In most considerations of the self, it is necessary to consider the match between the actual, or underlying self, and the presented self, sometimes called the persona (Hall & Nordby, 1973).

Biological sex is one aspect that is often important in people's self-constructions (Ruble & Martin, 1998). In the sex-typing literature, distinctions are drawn between biological sex and gender, the latter being socially constructed (Huston, 1983). Gendered behaviors are a key marker of self-expression for many children and adults alike, providing one anchor of identity. Our gender often influences the way that we interact with others, and has been called an interpersonal aspect of identity (Baumeister, 1997). Gender-related behavior becomes especially salient as children approach adolescence where they move from a world dominated by same-sex interactions to one that increasingly includes opposite-sex peers.

Online multiuser domains (MUDs), where players can assume fantasy roles and engage in role playing activities, offer an easy context for exploring the self (Turkle, 1995, 1997). In anonymous online interactions, we are free to present ourselves in many ways, less constrained by the expectations of the real world (Calvert, 2002). Investigating such online explorations may offer a window on how children represent themselves to others by examining their symbolic modes of self-presentation and self-expression.

In this exploratory study, sex differences in the interactions of 11- and 12-year-old boys and girls were examined. We created an online MUD that was designed to foster social interaction and role-playing activities. In our data collection and analyses, we focused on three features that can serve as gender-related identifiers in online MUD interactions: (1) users' pretend names; (2) the kinds of pretend characters they create; and (3) the kinds of interpersonal roles and activities they undertake in relation to one another. We considered the interactions of unacquainted children in same- and opposite-sex pairs to maximize participants' flexibility in constructing a gendered character as well as in how easy it was for them to act in ways that were consistent or different from traditional gender roles.

1.1. Social interactions in MUDs

MUDs are online forums in which participants interact with one another (Turkle, 1995). These spaces were originally only a text medium but now allow interactions in an online, three-dimensional world. Players can play games and engage in somewhat constrained role play activities ranging from slaying dragons to pretending to be Barbie, or they can create environments and explore the MUD in more flexible, and open-ended ways (Turkle, 1995). Thousands of people, many of whom are adolescents, spend time online in these role playing activities (Turkle, 1995).

In MUDs, players create personas, or public masks—called avatars—in which they construct names, genders, and self-descriptions (Curtis, 1997). Some players use this medium

to try out new roles to practice skills, such as learning to be more assertive; some alter core aspects of their identity such as their sex to learn what it is like to be a member of the opposite sex; some vary other dimensions to pretend to be people that are different from them (Turkle, 1995). These symbolic experiences can contribute to identity construction by allowing players to suspend reality and experience interactions as someone else, particularly when they interact with strangers. Players may assume their roles and practice activities in a safe space where accidents can be repaired simply by creating a new online character (Calvert, 2002). Each of the features we investigated—names, characters, and online interactions—can provide rich information about self-presentation.

1.1.1. What's in a name?

People's names provide a major identifier of who they are and affect how they are treated. Researchers have shown that name popularity affects social interactions: children with frequent and popular names like Tom and Mary are better liked than children with rare, unpopular names like Herman and Hilda (Asher, Oden, & Gottman, 1977). Popular names minimize social discomfort, making it easier for children to move through the world.

As the adolescent years approach, children become more aware of fitting in, of not wanting to stand out and be too different from their peers. One's name at this point may take on more valence. Hence, when given a choice, the kinds of names that children might select may be ones that are frequent in the peer group and that reflect popular culture. Nicknames also serve a social function in the worlds of children. For instance, nicknames can serve to separate "us" from "them," as children without nicknames tend to be socially isolated from their peers (Harre, 1980).

1.1.2. Who shall I be?

Creating a virtual body offers a window into participants' salient personal dimensions. Gender is one of the most salient in self-presentations and in the social construction of the self (Ruble & Martin, 1998). But would children choose to be their own gender online, or would they explore other gender identities if they had a choice? Some research indicates that adolescents as well as adults often engage in gender-bending when online, trying out the virtual identity of the other biological sex (Turkle, 1995).

Another marker of identity in online avatar construction is the costume chosen, which signifies a particular role or stance that one assumes in relation to others. The chosen character or role influences how others treat a person online as well as how that person acts in relation to other characters (Turkle, 1995). An athlete, for instance, has a particular role to fill just as a wizard does. Roles may be selected online to reflect the popular culture, or may be selected to experience interactions in different roles.

1.1.3. How do I interact with others?

Online interactions allow children to experiment with and develop interpersonal aspects of identity (Baumeister, 1997). These kinds of experiences allow them to experiment with the consequences of different kinds of interactions.

The interaction preferences of boys and girls are quite different in late childhood, reflecting their experiences in a gender-segregated peer group (Maccoby, 1998). Boys tend to prefer more active interactions in visual media—such as action-adventure television programs and video games where content moves fast and changes rapidly, features that are considered to be perceptually salient (Huston, Wright, Rice, Kerkman, & St. Peters, 1990; Roberts, Foehr, Rideout, & Brodie, 1999). By contrast, girls tend to prefer nonsalient features such as written words and dialogue (Calvert & Kotler, 2003; Huston et al., 1990; Kafai, 1996; Roberts et al., 1999).

Boys also engage in more play than girls do, including role play (Subrahmanyam & Greenfield, 1998; Strommen, E., 2003, June 13, personal communication), and boys appear to learn best from playful activities where they are able to enact content. For example, young boys understand important television content better after exposure to structured role play rehearsals whereas young girls learn better from verbal summaries of that content (Friedrich & Stein, 1975). Such findings suggest that there may be sex differences in learning styles. Specifically, boys seem more likely to engage in enactive representations, in which they do things with their bodies, as well as iconic representations, in which they visualize content; by contrast, girls seem more likely to engage in verbal, symbolic styles of interaction and representation.

During preadolescence, children show greater interest in interacting with a broad range of people, and new motivations to understand and communicate with others emerge. For example, romantic interests develop and boys and girls begin to navigate the intricacies of interactions with the opposite sex. How do boys and girls make a transition from same- to opposite-sex interactions? Online interactions, we believe, can shed light into how preadolescents learn to interact with opposite-sex peers.

1.2. The present study

The present study provides descriptive information about preadolescent interactions with same- and opposite-sex peers in an online MUD. We were particularly interested in the following questions: (1) how would children present themselves to one another online, and would those presentations vary with same- and opposite-sex peers? (2) What would children do with one another online? Would the kinds of preferences children show with traditional media, such as boys' interest in perceptually salient features like action and girls' interest in features like dialogue, also appear in online interactions? and (3) Would play patterns be similar to those observed in real life, or would they be different online?

2. Method

2.1. Participants

Participants were 84 fifth and sixth grade children (42 boys; 42 girls) from four schools located in Tampa, FL; Merion Station, PA, a suburb of Philadelphia; and two schools in

Washington, DC. Two schools were private; two were public. Mean age was 11 years, 2 months for 5th graders (range 10 years, 5 months to 12 years, 4 months), and 12 years, 2 months for 6th graders (range 11 years, 4 months to 13 years, 1 months). Participants were predominantly Caucasian (66%). Other identifiable ethnic groups included African American (10%), Latino (9%), and 15% from a variety of other groups.

Within grades, participants were randomly paired with two unknown students from one of the other schools, one of the same sex, the other of the opposite sex. Due to equipment problems, 2 boys and 8 girls only went online one time, yielding a total of 79 sessions. Of these, 40 children were in boy pairs, 34 children were in girl pairs, and 84 children were in mixed boy/girl pairs.

2.2. MUD web site

We created a multiuser domain at Georgetown University (GU) where children could come online and interact with another child. The MUD, which was programmed in Macromedia Flash, was comprised of six scenes: a stage, beach, cityscape, outer space, castle, and park.

As children entered the MUD, they initially selected a name or "handle." Next they constructed a character "avatar" in a costume area. To construct the avatar, they decided if they wanted to be a boy or a girl. Then they selected one of five costumes: a kid in jeans and a t-shirt, a soccer player, a punk kid in a leather jacket, a firefighter, or a wizard. The firefighter was included in our MUD because of the heroic status of this occupation following September 11, 2001, potentially making them attractive to children as role models. The wizard was included because both *Harry Potter and the Sorcerer's Stone* and *The Lord of the Rings: The Fellowship of the Ring* had emerged as very popular box office successes, and these films featured wizards as key characters. Our data were collected the spring following these events.

Once the character was completed, each child was transported to the stage scene by default. The computer screen was divided into three basic areas as illustrated in Fig. 1: a top area where the avatars could act in various scenes, a text line, and a bottom control panel where additional instructions were given by the child to control the avatar. In the top screen, occupying 2/3 of the total screen area, players could move their avatars by clicking on them and dragging them within that scene. It was in this screen area where children interacted through their characters.

Just below was a box in which children could write words that would then appear as dialogue in a cartoon bubble over their avatar's head for about 5 s on average. The dialogue also appeared in a continuous fashion in the bottom control panel on the far right and one could read and maneuver through the dialogue by scrolling.

In the bottom of the screen, the space was divided into a grid with sections that specified the scene, displayed the avatar's emotions, displayed the dialogue, and noted the time. At the bottom left corner of the screen were small icons of the available scenes (beach, park, city, stage, castle, space). Clicking on an icon would transport an avatar to those areas of the MUD. To the immediate right of the scene options was an emotional display menu with six face icons that children could click on to change the facial expressions (happy, silly, sad,

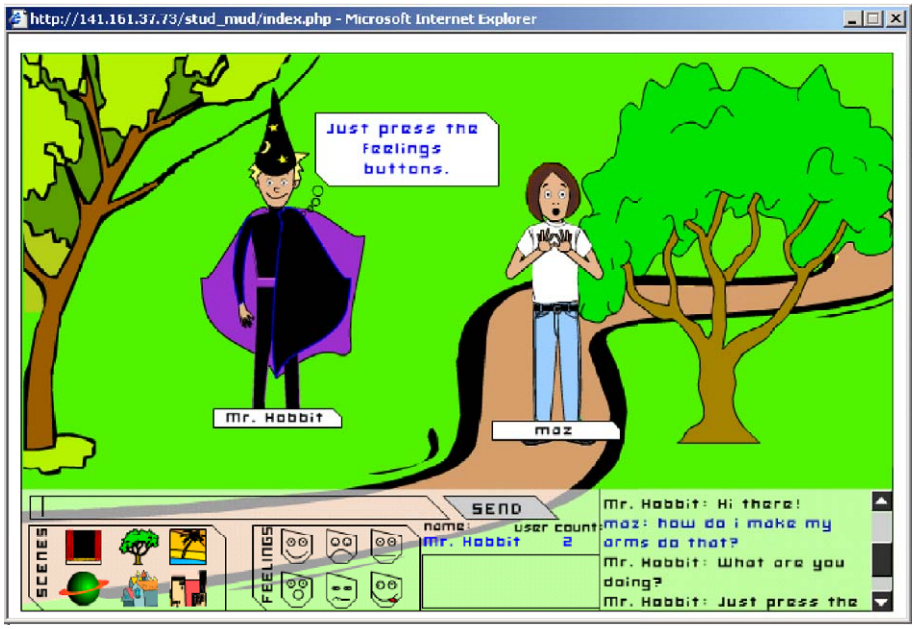

Fig. 1. Screen shot of MUD.

surprised, angry, and bored) and associated body postures of the avatar on the main screen. The default facial expression was a happy face with arms at the side.

An experimenter working from the GU laboratory controlled the administration of the MUD. The experimenter admitted children to the web site and then monitored their activities. She could also communicate to children via text bubbles, although she did not have an avatar. If children acted inappropriately, she could warn them in text, and if they continued to misbehave, she could expel them.

Due to firewalls at some schools, we had to create a "chunnel" for the web site that allowed children to tunnel around the firewall into our site. This created slight time delays in posting information for those who were, versus were not, behind a firewall.

2.3. Procedure

The experimenter coordinated who was to come online with the teachers in each of the four schools. Children came online in two separate sessions: once with a same-sex child and once with an opposite-sex child. All sessions were recorded with Camtasia, a computer program that provides a videotape-like copy of the session by recording all video and screen activities.

Children initially waited for one another at the stage scene. Once both were there, they could act however they wanted, except for behaving abusively or using profanity. Over the course of a session that was approximately 10 min in length (6% of the sessions were truncated due to equipment problems), children interacted with one another through move-

ment, scene changes, written dialogue, emotion changes, and play. Because each child could control their avatar independently of the other interaction partner, players could also be in scenes alone. Once the session was completed, another pair of children came online.

2.4. Dependent measures

Coders used the Camtasia files to score children's activities during each of their two sessions. The frequency or duration of activities was the focus of scoring activities. Interobserver reliability was calculated for 20% of the sessions for each avatar. When frequencies were scored, interobserver reliability was calculated as 2 times the number of agreements divided by the total number of scores for Scorer 1 and Scorer 2. When durations were scored, interobserver reliability was calculated as a Pearson correlation of overlapping time between the onset and offset of time spent performing each instance of an activity. Specific information for each dependent variable follows.

2.4.1. Self-presentation: avatar construction

In our MUD, students created identities for each session that were scored and analyzed in three ways: (1) screen name, (2) avatar gender, and (3) avatar costume/role. The chosen screen names were classified into one of six categories that were defined after the data were collected on the basis of the names used in the MUD. These categories were: real (Julia, Ryan, Bob), fantasy/myth (Frotto, Lord of the Rings, princess), pop culture that was predominantly musical in nature (Brittany, Destiny, Shania), sports (swish, skings26—for the Sacramento Kings, blitz), concepts and objects (shadow, sun), playful (dude, booboo, cooladri), and nonsense (hpoein, humbo, hund). Interobserver reliability was 85.7%. Avatar gender was determined by children's choice of being a boy or a girl character. Costumes/Roles were determined by children's selections from a menu of five preset choices: regular kid, punk kid, soccer player, firefighter, or wizard costumes.

2.4.2. Movement

Character movement was measured as the number of seconds elapsed from the start of movement (character began to move) to its end (character stopped moving). Interobserver reliability for movement duration was $r = .99$.

2.4.3. Dialogue

Character dialogue was scored by a computer program that automatically summed the total number of words spoken by each character. Interobserver reliability was calculated with a real person who scored a subset of those protocols, yielding reliability of 99.8%.

After the data were collected, we noted that participants used abbreviated expressions to stand for an entire sentence (such as "*lylas*" for "love you like a sister") or used individual letters that sounded like and represented specific words (such as "*ur*" for "you are"). We analyzed this coded language in the following way: expressions in which a single "word" like "*lylas*—love you like a sister" were scored as one instance of coded language; individual letters sounded like and represented specific words, such as "*ur*—you are," were coded as

two instances of coded language. Interobserver reliability for coded language for two independent scorers was 91.4%.

2.4.4. Emotional expressions

Specific emotional expressions were scored as "on" whenever a participant chose it for an avatar and "off" whenever a different emotional expression was chosen. Measures included the frequency with which each emotion was selected and the duration (in seconds) each emotion was displayed. Interobserver reliability was 96.9% for emotional expression frequency and $r = .98$ for duration.

2.4.5. Scene changes

A scene was scored as "on" whenever a player selected it and "off" whenever the player selected a different scene. Measures included the frequency of scene changes and the duration (in seconds) in each specific scene. We also coded whether participant pairs were in the same or different scenes during their sessions. Interobserver reliability for scene change frequency was 98.4% and was $r = .95$ for specific scene duration.

2.4.6. Role play

Role play was defined as the suspension of reality to engage in a role-based, imaginary interaction that had a thematic strand. Coding an episode as role play was based on meeting one of two criteria. The first was some verbal indication by a player that the characters were involved in pretense. That text could be related to (1) a scene (e.g., character says "I am going swimming" and then scene is changed from the city to the beach); or (2) an onscreen identity (athlete avatar pretends to play basketball calling out "She shoots! She scores!").

The second was that the role play involved actions that complimented the dialogue (e.g., the character pretends to drown while swimming and calls out "Help!" or moves to the basket and pretends to shoot an imaginary ball while pretending to play basketball). Role play was scored when both actions and language were involved, or when only language was involved in assuming (e.g., "I'm Orlando") or acting in a role (e.g., "Are we in Safari Park?").

Role play was observed in 27% of the sessions. Since role play was not observed for all sessions, interobserver reliability was calculated on 20% of the sessions when role play was present. Interobserver reliability for the duration of time in seconds spent in role play for sessions where it was present was $r = .94$.

2.4.7. Game play

Game play episodes involved thematic strands that reflected an online game, created by children, and included (1) peek-a-boo, a movement game in which a character hid behind another character, occasionally popping up; (2) hide-and-seek, a scene change game in which one character hid in a different scene and the other character tried to find him or her; (3) copy cat, an emotion game in which a character copied the emotional displays and associated movements of another character; and (4) I'm taller than you, a movement game where children placed their avatars higher on the screen than their session partner.

Both characters had to participate in the game for game play to be scored. Scoring began when a character became involved in the game, through either verbal or motion cues. These cues also ended the game. We scored the end of game play (and role play) conservatively. If another action or verbal exchange occurred that was not related to the game, then we returned to the last point of play to mark its end. Composite game play frequency and duration scores were created by summing independent subcomponents of game play.

Game play occurred in 27% of the sessions. Interobserver reliability, computed for 20% of the sessions when game play was present, was $r = .97$ for number of seconds spent in role play.

3. Results

3.1. Avatar construction

3.1.1. Avatar name

The names children selected for their avatars were classified into one of six categories: real (42%), nicknames (25%), pop culture (8%), fantasy/mythical (9%), concepts and objects (7%), sports (6%), and nonsense (3%). As seen in Table 1, boys and girls picked different kinds of names when they picked a nonreal name, $\chi^2(6) = 26.98$, $p < .001$. Among those children who did not choose a real name or nickname, boys chose fantasy and mythical names, sports names, concept names, and nonsense names whereas most girls (and no boys) chose musical pop culture names. Similar numbers of boys and girls selected real names or nicknames.

3.1.2. Avatar gender

Children overwhelmingly selected a gender for their character that was consistent with their own gender, $\chi^2(1) = 149.19$, $p < .001$. Only two boys (one 5th grader and one 6th grader) gender swapped by creating a girl avatar. Both occurred in the second session. One of those boys immediately identified himself as a boy when he entered the session, even though his character was a girl.

3.1.3. Avatar costume

The most selected costume/role for avatars was athlete (39%), followed by punk kid (24%), normal kid (17%), wizard (21%), and firefighter (12%). As seen in Table 2, there were

Table 1
Avatar names created by preadolescent boys and girls (%)

	Types of avatar names						
	Real	Nickname	Pop culture	Myth/fantasy	Concept/object	Sport	Nonsense
Boy ($n = 82$)	41	21	0	16	9	9	5
Girl ($n = 76$)	42	29	17	3	5	3	1
Total ($N = 158$)	42	25	8	9	7	6	3

Table 2
Sex differences in the avatar roles selected (%)

	Character/roles				
	Normal	Punk	Firefighter	Athlete	Wizard
Boys (n = 82)	20	34	11	21	15
Girls (n = 76)	13	12	4	59	12
Total (N = 158)	16	23	8	39	13

sex differences in these choices, $\chi^2(4) = 26.26$, $p < .001$. Girls were more likely to select athletes for their avatars, and boys were more likely to choose punk characters. The least selected choices were those of firefighter and wizard, roles that are less linked to children's own daily lives.

3.2. Overview: analyses of online interactions

Scores were computed individually for each child for each dependent variable. Individual scores were then analyzed by the type of participant pair (boy, girl, or mixed).

Analyses examined how children interacted with one another, focusing on what they did (movement, scene changes, emotional expression changes, role play, and game play), and said (number of words communicated, use of coded language). Time spent moving, the number of emotions displayed, the number of scenes visited, the number of words communicated, the number of coded word phrases used, time spent in role play activities, and time spent in game play activities were analyzed, in turn, by a 3 (gender pair: boy, girl, or mixed pair) × 2 (grade: 5th vs. 6th) ANCOVA using session order and the length of individual sessions as covariates.[2] The unadjusted means are presented in Table 3. Adjusted means (M) and standard errors (SE) are reported for significant effects within the text for the analyses.

3.2.1. Avatar movement

The two-factor ANCOVA computed on the duration of time in seconds that children moved their avatars around the screen yielded a main effect of gender pair, $F(2,150) = 11.41$, $p < .001$. As expected, LSD post hoc follow-ups revealed that children in boy pairs (M = 22.71, SE = 2.62) moved significantly more than children in mixed sex pairs (M = 11.79, SE = 1.84), who, in turn, moved significantly more than children in girl pairs (M = 4.64, SE = 2.92).

3.2.2. Scenes visited

Children spent most of their time together within the same scene (M = 91.42%, SD = 13.50). Children in mixed-sex pairs (M = 95.57%, SD = 7.67) were more likely to stay within

[2] Because scores on these dependent variables were not independent of one another for each of the paired subjects, analyses were conducted correcting standard errors for nonindependence using algorithms available in STATA 7. As these analyses did not differ from the noncorrected ANCOVAs, the original ANCOVA results are presented.

Table 3
Uncorrected mean scores for MUD activities for children in same- and mixed-sex pairs

	Boys—same (n = 40)	Mixed (n = 84)	Girls—same (n = 34)	Total (N = 158)
Duration spent moving (s)	22.63	11.93	4.4	13.02
Number scenes visited	15.05	5.47	6.46	8.51
Duration in specific scenes (s):				
Beach	123.93	130.73	194.15	144.38
Park	81.18	108.28	151.97	111.19
Stage	52.85	113.25	79.06	87.32
City	154.30	73.39	54.26	92.13
Castle	52.05	45.55	55.74	49.94
Space	104.45	140.95	66.53	112.04
Number of emotions expressed	13.58	8.69	8.53	9.89
Duration expressing specific emotions:				
Happy	388.58	498.14	511.38	473.20
Sad	21.30	4.69	7.00	9.39
Angry	20.50	7.12	4.85	10.02
Silly	76.50	59.52	44.74	60.69
Surprised	35.75	16.39	22.74	19.53
Bored	28.15	18.87	11.00	22.66
Number of words written	55.68	73.88	93.41	73.47
Number of coded words/phrases used	1.88	2.65	3.68	2.68
Time in role play (s)	32.95	10.69	1.65	14.38
Time in game play (s)	32.05	9.26	2.41	13.56

the same scene than were children in boy pairs (M = 88.28%, SD = 11.04) or children in girl pairs (M = 87.31%, SD = 21.24), $F(2,68) = 3.01$, $p < .06$.

The 2 factor ANCOVA computed on the number (frequency) of scenes visited yielded a main effect of gender pair, $F(2,130) = 12.90$, $p < .001$. As expected, LSD post hoc follow-ups disclosed that children in boy pairs (M = 15.54, SE = 1.58) changed scenes more often than children in mixed sex pairs (M = 5.52, SE = 1.40) or children in girl pairs (M = 6.40, SE = 1.71).

Descriptive statistics showed that children spent the most time overall at the beach (M = 23.90%, SE = 2.65), followed by the park (M = 19.38%, SE = 2.59), space (M = 18.07%, SE = 2.20), the city (M = 15.69%, SE = 2.14), the stage, which was the default option (M = 14.35%, SE = 2.23), and the castle (M = 8.61%, SE = 1.43), respectively.

3.2.3. Emotions expressed

The 2 factor ANCOVA computed on the frequency of emotions expressed yielded a main effect for gender pair, $F(2,150) = 4.42$, $p = .01$, which was qualified by a gender pair by grade interaction, $F(2,150) = 4.99$, $p < .01$. LSD post hoc follow-ups revealed that children in boy pairs (M = 13.69, SE = 1.51) changed emotions more frequently than did children in mixed-sex pairs (M = 8.85, SE = 1.06) or children in girl pairs (M = 7.89, SE = 1.69). As seen in Fig. 2, the Gender Pair × Grade interaction revealed that gender pair differences occurred for 6th,

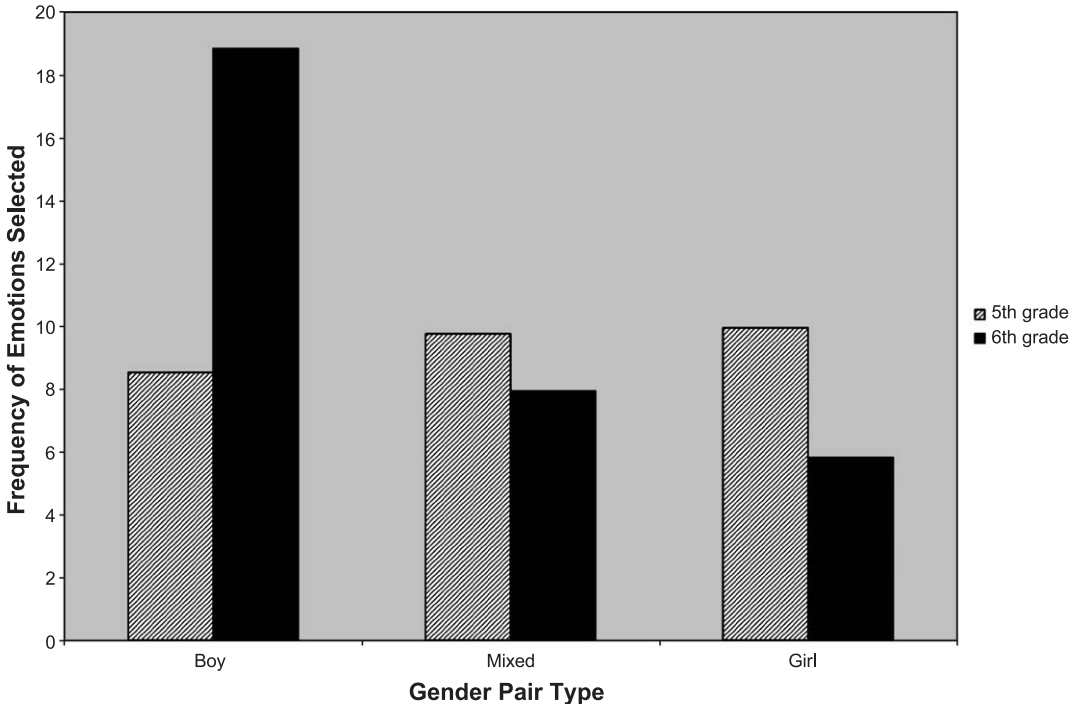

Fig. 2. Number of emotions selected as a function of pair type and grade.

but not 5th graders; specifically, 6th grade children in boy pairs changed scenes much more often than children in mixed-sex pairs or children in girl pairs.

Descriptive statistics revealed that children spent the most percentage of time using happy expressions ($M = 79.58\%$, $SE = 2.03$), which was the default choice, followed by silly ($M = 10.23\%$, $SE = 1.36$), surprised ($M = 4.00\%$, $SE = 0.85$), bored ($M = 3.74\%$, $SE = 0.99$), angry ($M = 1.70\%$, $SE = 0.41$), and sad expressions ($M = 1.63\%$, $SE = 0.33$), respectively.

3.2.4. Frequency of online role play and game play activities

Role play occurred in 27% of the sessions, as did game play. There were significant differences in the number of sessions that children in boy pairs, girl pairs, and mixed pairs participated in role play, $\chi^2(2) = 15.36$, $p < .001$ and in game play, $\chi^2(2) = 14.24$, $p = .001$. Play occurred more for boy pair than mixed pairs or girl pairs (45% of children in boy pairs showed role play; 17% of children in mixed pairs; 12% of children in girl pairs), as did game play (45% of children in boy pairs; 26% in mixed pairs, 6% in girl pairs).

3.2.5. Amount of time involved in online role play activities

The two-factor ANCOVA computed on the duration of time in seconds that each child was involved in role play yielded a main effect of gender pair, $F(2,150) = 4.59$, $p = .01$; grade, $F(1,150) = 5.72$, $p < .02$; and a Gender Pair $\times$ Grade interaction, $F(2,150) = 3.32$, $p < .05$. As expected, children in boy pairs ($M = 33.01$, $SE = 7.46$) spent significantly more time

engaged in role play than children in mixed-sex pairs (M = 10.51, SE = 5.24) or in girl pairs (M = 1.97, SE = 8.31), and 6th graders engaged in more role play than 5th graders (M = 25.46, SE = 5.84 vs. M = 4.87, SE = 5.96). As seen in Fig. 3, the Gender Pair × Grade interaction revealed that the gender pair differences in role play were more pronounced for 6th than for 5th graders, particularly for children in boy pairs.

3.2.6. Amount of time involved in online game play activities

The 2 factor ANCOVA computed on the duration of time in seconds that each child was involved in game play yielded a main effect of gender pair, $F(2,150) = 15.38$, $p < .001$. The session order covariate was also significant, $F(1,150) = 4.31$, $p < .05$. As expected, children in boy pairs (M = 33.47, SE = 4.18) spent significantly more time engaged in game play than children in same-sex pairs (M = 7.52, SE = 2.94) or children in girl pairs (M = 4.73, SE = 4.66).

3.2.7. Words communicated

The two-factor ANCOVA computed on the total number of words communicated yielded a main effect of gender pair, $F(2,150) = 14.07$, $p < .001$. The covariate of session length was also significant, $F(1,150) = 4.08$, $p < .05$. As expected, LSD post hoc follow-ups revealed that children in girl pairs (M = 95.04, SE = 5.32) wrote more than children in same-sex pairs (M = 72.35, SE = 3.36), who in turn, wrote more than children in boy pairs (M = 57.47, SE = 5.32).

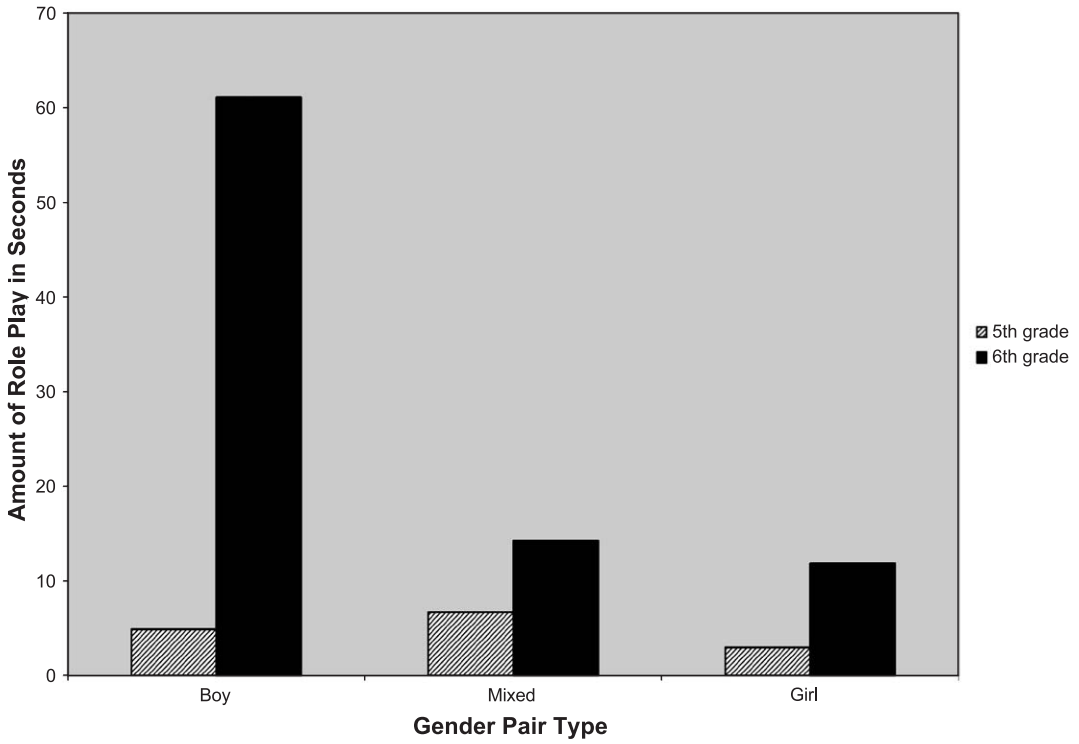

Fig. 3. Amount of role play as a function of pair type and grade.

3.2.8. Coded language

The two-factor ANCOVA computed on coded language scores yielded a main effect of grade, $F(1,150) = 10.93$, $p = .001$. Sixth graders used more coded language than fifth graders ($M = 4.08$, $SE = 0.51$ vs. $M = 1.60$, $SE = 0.52$, respectively). The kinds of coded language that children used included *lol* (laughing out loud), *2* (to or too), *18er* (later), *nvm* (never mind), *g2g* (got to go), *ur* (you are), and *lylas* (love you like a sister). We also observed a child explaining the definition of *lol* to another child, suggesting that they explicitly teach each other the meaning of coded language.

4. Discussion

The purpose of this study was to examine how children represent themselves to other children in online interactions, focusing on others that they do not know. We looked at self-representations in three ways: (1) the names or handles that children created for themselves, (2) the avatars they constructed, and (3) the ways that children interacted with one another online through their avatars. Gender-related behaviors were of particular interest so we studied preadolescents, a time when opposite gender interactions become increasingly important (Maccoby, 1998).

The names that children selected for their avatars were generally realistic, based in their real-life identifies. When children did pick names from other genres, there were gender differences with boys preferring mythological and fantasy handles, such as *Frotto* and *Lord of the Rings*, which are related to popular movie culture, and girls preferring names drawn from popular culture, especially pop music, such as *Brittany* and *Destiny*. These name selections are similar to children's media choices where boys prefer visually based media whereas girls prefer music-based media (Roberts et al., 1999); the findings suggest that media can influence children's identity construction.

Although children had a considerable amount of flexibility in constructing their "avatars" since other children did not know their true identity, we found that they stayed very close to real life in terms of gender. Almost all children created an avatar of their own biological sex during both of their online interaction sessions, a finding that contrasts with earlier findings reported for older adolescents and adults who are more likely to engage in gender-bending (Turkle, 1997). The salience of gender for preadolescents, when children are just beginning to demonstrate interest in opposite sex peers, may be one reason for staying close to familiar roles. That is, when one is just beginning to think seriously about what it means to be a boy or girl in relation to other people, it may feel safer to be yourself than to experiment.

We also found that children were less likely to select firefighter and wizard costumes; it seems that children choose to stay close to real life in their roles as well as in their name and avatar gender selections. The costumes that children selected for their avatars were somewhat similar for boys and girls with two notable exceptions: boys chose more punk characters wearing leather jackets while girls chose athlete characters in soccer uniforms. The hip persona of the punk character may give boys a sense of being an outlaw from the system,

make them appear to be cool, or reflect a counterculture or rogue identity. The selection of the athlete persona by girls contrasts with traditional gender roles, but is in keeping with more recent roles that are available to girls since the introduction of Title IX, which ensures that girls have equal access to athletic pursuits in their schools. One problem though is that we had only five preset role selections and did not provide a stereotypically female role choice, making it impossible for girls to assume a traditional role.

Our next level of analysis focused on how children interacted with one another within the MUD setting. Children in same-sex pairs interacted with one another in much the same way that they do in other domains of experience. Children in boy pairs moved around, changed scenes and emotions frequently, and played—both role play and made-up games—more than children in girl pairs. They were also more likely to use perceptually salient features (rapid scene changes, action) in their own interactions. Children in girl pairs interacted through written words more than children in boy pairs, a finding that is consistent with girls' greater proclivities for writing online descriptions of educational television programs (Calvert & Kotler, 2003). Taken together, the findings suggest that enactive, visual, and verbal representational forms are not just selectively observed, but also selectively internalized and utilized as forms of self-expression.

These kinds of patterns suggest that transfer of learning may occur across media platforms (Bransford, Brown, & Cocking, 1999). That is, preferences for visual or verbal media may reoccur across observational and interactive media. Such learning may be facilitated, in part, by a cohesive set of emerging sets of beliefs and styles of interaction that preadolescent children carry from one setting to another.

The play patterns of children interacting in same-sex boy and girl pairs also reflected previously documented findings in the literature. In our study, boys were more playful, both in the role-playing activities that they assumed, as well as in the propensity for making up games, such as hide-and-seek, peek-a-boo, copy cat, and I'm taller than you, that took advantage of their online setting. Similar patterns of exploratory and role play are reported favoring boys over girls in other media studies (Strommen, E., 2003, June 13, personal communication; Subrahmanyam & Greenfield, 1998), suggesting that boys take a more playful stance in their media interactions.

Role play may also provide an enactive, iconic, and symbolic way to rehearse information. In the early television literature, for instance, boys acted in more prosocial ways after a role playing rehearsal procedure while girls benefited most from a verbal summary of program content (Friedrich & Stein, 1975). These same preferences for role play by boys and for verbal language by girls were found in our study, suggesting that the ways that children best represent content may vary by gender.

Of particular interest to our work was how boys and girls represented themselves to one another when they were in opposite-sex pairs. We were able to observe this pattern, in part, because children typically chose to represent themselves as their true biological sex. When children were in mixed-sex pairs, boys role played less, moved less, changed scenes and emotional expressions less, and talked more than when they were in same-sex pairs, and girls talked less and moved more than when they were in same-sex pairs. The findings suggest that boys tone down their perceptually salient style of interaction, while girls, still

communicating through language, move their avatars around more when with boys. That neither style of interaction dominated was interesting, suggesting that in this context, both boys and girls acted in ways that the opposite-sex child typically did, presumably to facilitate interaction with one another. This interpretation of the findings is strengthened by the tendency of children in mixed-sex pairs to stay within the same scene more so than when children were in same-sex pairs, thereby increasing opportunities for boy/girl social interaction.

Age differences in interaction styles demonstrated stronger effects for the 6th than for the 5th graders for role play, scene changes, and the use of language codes. Specifically, 6th grade boys role played more than 5th grade boys, suggesting that this style of playful interaction takes on increased meaning as a way to try out roles as adolescence draws near. Sixth grade boys also changed scenes more frequently than did other age groups and gender pairs.

In dialogue interactions, we found age differences in displays of coded language, with 6th graders knowing these codes more so than 5th graders. The data also suggest that girls are playful with words, their preferred communication style. Coded language, such as g2g (got to go), provided short-cuts in self-expression, making it possible for children to write more quickly, approximating the speed of a real conversation (Greenfield & Subrahmanyam, 2003). In the present study, children were also teaching each other coded language during the preadolescent years, enabling a new style of linguistic self-expression at relatively young ages.

As a setting for studying the ways that children interact with one another, our MUD offered unique opportunities for understanding the social interactions and the styles of those interactions for preadolescent boys and girls. Boys seemed more mouse-oriented in their interaction styles, clicking on menus and dragging their avatar around the screen. By contrast, girls seemed more keyboard-oriented, typing messages to one another. Because it took more time to write than to click on menus or drag a character around, girls only dominated in the overall number of words used. Even when given the chance to experiment with children who did not know them, the overwhelming preference was to make avatars, act, and use language (except for coded language) in ways that often paralleled their real lives. These kinds of interactions will only become more commonplace as digital technologies increasingly permeate the daily lives of our youth.

The MUD offered some technical and logistical challenges. The firewalls that are increasingly common in schools made it difficult, at times, for children to get online and to allow them to communicate as quickly as those who did not have firewalls. Coordinating schools and children across time and place were also a logistical challenge at times. Nonetheless, the MUD offered children access to other children that they did not know, making the world a much smaller place.

In conclusion, the present study demonstrates considerable levels of gender stereotyped modes of online interaction during the preadolescent years, with boys selecting a style dominated by perceptually salient, fast moving qualities, and girls selecting a slower, language based style of online communication. Even so, boys and girls show sensitivity to one another's styles, choosing to alter their own way of communicating when interacting with

the other gender. Online interactions provide a forum for self-expression and self-exploration, making it an important venue for future examinations of how children develop their identities and communicate with one another in the information age.

Acknowledgements

We gratefully acknowledge the financial support of NSF and Georgetown University, who made this research possible. We also acknowledge the early contribution of our initial NSF Program Officer, Rodney R. Cocking. We thank the children, schools, teachers, and parents who participated in this research. We also thank Edward Gonzales, Jr., Robert Ramsay, Katherine Murray, Elizabeth Vandewater, June Lee, Bonnie Strong, and Katherine Jacobs for their assistance.

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