Do Girls Prefer Games Designed by Girls?

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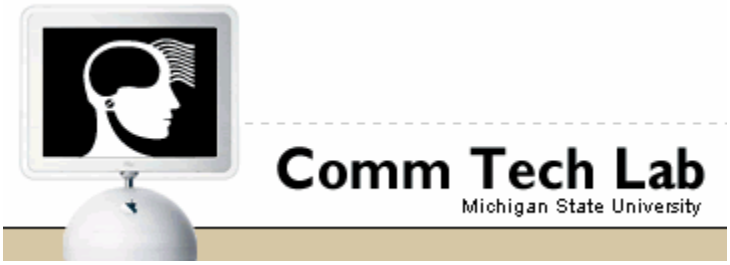
ABSTRACT

Eight same sex, same grade teams (four 5th and four 8th grade) were guided through a two week space learning and game design brainstorm camp to envision a game concept that would "make kids just like you" become interested in space exploration. The 8 child-envisioned game ideas were adapted into short (roughly 3 minute) promos for hypothetical space learning games. The promos were shown to 145 middle school children without revealing the gender of the design teams. Girl games were perceived as better for learning. Rank order results showed same gender preferences. Females like girl games better and males like boy games better. However general liking measures are weaker, showing that males really like boy games, and females react negatively to violent themes. Females rated girl games closer to gender neutral than boy games, although all were overwhelmingly perceived of as for boy or for everyone rather than for girls.



INTRODUCTION

An argument often made is computer culture (and by extension, computer software) "could be positively transformed through the integration of girls' and women's insights" (AAUW, 2000, page x). Our research seeks to test this assumption. If the assumption is true, then the gender of a software designer in a setting where she can express her true perspectives and preferences would be expected to have a measurable impact on her design process and/or her design outcome. Will games envisioned by all-girl teams appeal more to girls, and games envisioned by all-boy teams appeal more to boys?

We think so. But we also think the proposition should be tested. If we document that gender of the designer does influence the software design outcome, this compelling result could help motivate the computer industry to integrate girls and women onto their teams. It would also advance our understanding of the impact of gender on design. The often proposed solution of involving more women and girls in game design assumes that game designers create games which are appealing to themselves. The expectation that girl-designed games will appeal more to girls than boy-designed games presumes that by growing up girl, or growing up boy, a designer embodies some kind of implicit understanding of what appeals not just to themselves, but to their gender and this will naturally be reflected in the designs they create.

Considerable research has been conducted on girls and games, including amount of game play by gender, genre and play style preferences, spatial orientation gender differences, and a variety of recommendations of what girl-friendly games should be like. These studies often conclude with a call to involve more women in game design. But the presumption that doing so will result in games which appeal to girls has not been tested.

Why Creating Games That Appeal To Girls Matters

There are certainly business reasons for the computer industry to develop software that appeals to girls. Beyond this, there are critical social reasons for doing so. Increasingly computer environments will provide the rich educational terrain for a generation of virtual learners. Intervention at this stage in the development of computer-mediated educational software can shape our educational future and to fail to do so may allow the computer culture to develop and settle as a male based design industry for predominately male users.

Technology holds great promise for advancing education. However, there exists a troubling computer game culture gender gap. In contemporary culture, the computer is no longer an isolated machine: It is a centerpiece of science, the arts, media, industry, commerce, and civic life (AAUW, 2000). As AAUW Commission on Technology, Gender, and Teacher Education co-chair Sherry Turkle writes, the computer culture has become linked to a characteristically masculine worldview, such that women too often feel they need to choose between the cultural associations of "femininity" and those of "computers" (AAUW, 2000, p. 7). Most computer games often have subject matter of interest to boys, or feature styles of interaction known to be comfortable for boys

(AAUW, 2000). Statistics on girls' participation in the culture of computing are of increasing concern, from the point of view of education, economics, and culture. We need a more inclusive computer culture that embraces multiple interests and backgrounds and that reflects the current ubiquity of technology in all aspects of life. As the AAUW report describes, girls assert a "we can, but I don't want to" attitude about participating in computer activities.

It is well established that commercial game play is more popular among males than females (Bryce & Rutter, 2003; Colwell, Grady, & Rhaki, 1995; Funk & Buchman, 1996a, 1996b; Griffiths & Hunt, 1995; International Hobo, 2004; Roberts, Foehr, Rideout, & Brodie, 1999). The disparity is particularly true for console and handheld games, the dominant revenue source for the game industry. Girls prefer playing games on the computer than on video game consoles (Gorriz & Medina, 2000; Klawe, et al., 2002; Thomas & Walkerdine, 2000). Video games have larger male gamer populations (60%) than female (21%), while the gender difference for computer games is much smaller (29% to 24%) (Roberts et al., 1999). Laurel (2001) comments that computer gaming is a culture dominated by young males. Falstein (1997) points out that the industry is male dominated, from production to distribution channels. Ray adds that the software publishing industry has not encouraged women to see computers as an entertainment medium (2003).

Some academics suggest that it is not "socially rewarding for females" to identify themselves as gamers because gaming is considered a male dominated area (Griffiths, 1997, p. 235). Funk and Buchman (1996b) found that it is more socially acceptable for boys to play a lot of games than for girls. Other researchers proposed that females tend to have psychological barriers when gaming in public, while private domains provide more comfort for such activities. (Bryce & Rutter, 2003).

Researchers focusing on game content have indicated that most titles on the market are designed by males to please males (Chaika, & Groppe, 1996; Gorriz & Medina, 2000; Klawe Inkpen, Phillips, Upitis, & Rubin, 2002; Miller,). In one experimental study where educators with programming experience were instructed to design software to teach 7th-grade girls, 7th-grade boys, and 7th-grade students in general, the software designed for girls resembled "learning tools" whereas those for boys and for general students were highly similar – they were game-oriented, emphasizing eye-hand coordination and competition (Huff & Cooper, 1987). The result reveals perhaps unconscious programmer assumptions that the software meant for students as a whole was designed only with boys in mind, and that boys play games but girls use learning software.

Gender Differences in Genre Preferences

Across age groups, males generally like Shooters, Fighters, Sports, Racing/Speed games Fantasy/Role Playing, Action-Adventure, Strategy, and Simulations more than females like those genres. Females favor traditional games such as Classic Board Games, Arcade, Card/Dice, Quiz/Trivia, Puzzle, and Kids games (Roberts et al., 1999; Sherry,

Lucas, Rechtsteiner, Brooks, & Wilson, 2001). However, Sherry et al.'s survey study reveals that Racing games are embraced by both genders, which is an anomaly among the literature. The researchers attribute the interest in Racing games to the experience of learning to drive during high school.

Girls perform better on verbal tasks (Berk 2003) and pattern-matching, which may explain why quiz-trivia or puzzle games such as Tetris are favored by females (Laurel, 2003; Sherry, Holmstrom, Binns, Greenberg, & Lachlan, n.d.) Developmentally, Miller et al. suggest that older girls tend to prefer educational games while younger girls seek more entertainment-oriented content (1996).

Exercising Reflexes

In terms of game genre preference, it has been found that girls prefer solving puzzles more than exercising their eye-hand reflexes (Gorriz & Medina, 2000), which is boys' favorite. Kafai's research indicated adolescent girls prefer games that do not require quick-paced interactions (1996). Likewise, college males reportedly favor games that require fast reactions (Sherry et al., 2001) while females prefer games they can play quietly such as puzzle solving and trivia games.

Action Content

Across age groups, it is believed that boys are more likely than girls to play action content games, while girls prefer puzzle, quiz-trivia or classic board games (Roberts, et al., 1999; Sherry et al., n.d.). With regards to females who play action games, Buchman and Funk (1996) found that girls play fewer fighting games as they grow older, as gender roles become more firmly entrenched Funk & Buchman, 1996b).

According to one survey, not only did three fourths of children agree that in general boys prefer fighting games, but the sampled boys tended to consider violent games inappropriate for girls to play (Funk & Buchman, 1996b). Some researchers suggest content such as fighting, competition, or sports is a turn-off to girls (Bryce & Rutter, 2003; Greenfield, 1994; Kafai, 1996; Provenzo, 1991). Among girls who like violent content, Buchman and Funk indicated that they usually prefer fantasy or cartoon violence while boys prefer realistic, human violence (1996, p.31). In general, girls do not especially enjoy "shooting bad guys and monsters" (Klawe, et al., 2002, p.211). In Kafai's study involving children designing games, boy designers tended to provide violent feedback to the players when they gave incorrect answers, whereas girls provided non-violent feedback (Kafai, 1998).

Role playing games: social interaction, story, characters, adventures

Researchers have found that the elements girls enjoy in games include role playing (Brunner, Bennet & Honey, 1998), social interaction (Gorriz & Medina, 2000; Klawe et al., 2002; Thomas & Walkerdine, 2000), narrative (Gorriz & Medina, 2000; Laurel, 2001), and adventure (Falstein, 1997; Gorriz & Medina, 2000). Girls like to

construct narratives and hence, need complex characters to develop narration (Laurel, 1998). Littleton et al. (1998) reported that girls in their study identified with the characters in the gender-neutral version of game. Role Playing Games with a single player is a genre with an extensive female audience, with a complex story line and adventures. Some predict that Massive Multi-Player Online Role Play Games may encourage female gaming in domestic settings because they provide social interaction and anonymity, perhaps reducing gender stereotyping from other players (Bryce and Rutter, 2003).

Creation and Destruction Activities or Themes

Gorriz and Medina suggest girls prefer creating content than destroying (2000). Examples of this play style include The Sims and Tycoon series of games. However, this concept may not be universal. The themes of the games also have an important effect on their popularity among genders. For example, the goals of Sim City and The Sims are identical: to build the given subjects into prosperity. Fast reflex reactions are not needed, nor do they involve combat or competition with other players. Both games are all about creating, not destroying. Yet Sim City was not as successful as The Sims in attracting female players. A likely reason is that the themes of the games that matter: in Sim City the player is a mayor building and running a city, while in the home-oriented The Sims one maintains a home and the characters' relationships with each other.

What do Girls Say they Really Want?

A growing body of research details differences in what girls and boys say they want from computer games and their attitudes toward computers. Girls and other nontraditional users of computer science –who are not enamored of technology for technology's sake-may be far more interested in using technology if they encounter it in the context of a discipline that interests them (AAUW 2000). Brunner, Bennett, and Honey (2000) point out "we have never actually investigated the design features that make games more attractive to girls -- we are merely applying the characteristics we have found to make good electronics learning environments for girls to the domain of electronic games." AAUW reports that girls object to the violence in today's computer games. Laurel's (2001) research on girls and computer games concluded "girls didn't mind violence so much as they disliked the lack of good stories and characters." Laurel (2001) also reports girls are much more likely to blame themselves rather than the machine when something went wrong Girls perform less well than boys at tasks involving mental rotation under time pressure – they tend to prefer more body-centric navigational methods than boys, relying more on landmarks for cues. If these things are true then the featureless mazes and left to right scrolling of traditional videogames have privileged male players. Games have traditionally advantaged "victory over justice; competition over collaboration; speed over flexibility; transcendence over empathy; control over communication; force over facilitation (Brunner, Bennett, & Honey, 2000).

Boys' status hierarchies tend to be based on explicit factors such as strength, speed, and skill at some tasks. Competition among boys tends to be fairly explicit. By contrast a girl's social status among her peers is more likely to be influenced by her

network of affiliations than by any explicit measure. Covert tools such as exclusion and secrets are prominent means of social competition. Laurel notes this finding upset feminist critics. She describes a tension between designing games for political correctness and designing for the reality of girls' lives. Should software for girls reflect their concerns over popularity and social competition, or should software deal only with politically correct issues about which society wants girls to be concerned?

Brunner, Bennett, and Honey (2000) asked adult computer and multimedia professionals to invent a science fiction story about a perfect instrument in the future and what it would be like. Women fantasized about small, flexible objects that facilitate sharing ideas, staying in touch and that can be used anywhere to fulfill a number of quite different functions -- something that can be a camera one minute, for instance, and a flute the next. In contrast men's fantasies were about mind-melds and bionic implants that allow their owners to create whole cities with the blink of an eye, or to have instant access to the greatest minds in history. They summarized how men and women thought about technology. For women, technology was a medium that brought to mind the terms– a tool, communication, creation, expressive, flexibility, effectiveness, sharing, integrating, explore, empowered. For men technology was described with the terms– a product, a weapon, control, power, instrumental, speed, efficiency, autonomy, consuming, exploit, and transcendence.

Brunner, Bennett, and Honey (2000) propose alternative scenarios for play to appeal to girls:

> Technologically sophisticated software to allow interactivity with humans and objects beyond what is easily accomplished with today's technology;
> Winning and losing where it matters what you win and what you lose;
> Success and sacrifice addressing what are the issues and what sacrifices one has to make;
> Complex stories that raise questions about consequences and social perspectives of femininity;
> Persuasion versus conquest
> Humor (girls are very interested in humor)
> Adventure related to rescue and romance;
> Puzzles and obstacles where the goal is to outwit rather than vanquish;
> Writing and communication across a variety of media;
> Designing living spaces;
> Mysteries with complex plots and intelligent action.

In "Rethinking Girls' Games" (AAUW, 2000) the AAUW Tech-Savvy Commissioners conducted focus group interviews with middle school and high school girls, talking about what their ideal game would be like. The commission suggests many design approaches "to make play in the digital universe as appealing to girls as it is now to boys" (AAUW , 2000). Girl-friendly design approaches include:

> Games to create rather than to destroy;
> Games involving simulation and identity play;

Opportunities to work through real life problems;
The chance to swap identities;
The chance to face struggles one has not encountered yet in life but will someday;
Computers used as tools not toys;
Computers as tools, not an extension of self;
Instrumental possibilities of computers;
Computers as artistic tools;
Games that use "real power," not the "false power" girls complain that boys like;
Computers that can be used to get things done;
Technology used in ways to promote human interaction
Technology used in ways to build human relationships;
Meaningful activities, not merely playing with machines;

Content Analysis of Girl- and Boy-Designed Games

Kafai (1999) analyzed 32 video games created by fourth graders, half intended to teach third graders about fractions and half intended to teach third graders about the solar system. The games were developed as part of normal classroom activities covering a six month period. The math and science game projects were conducted two years apart, by the same teacher and same researcher, but of course with different fourth grade child designers.

The games were compared along the following dimensions:

- Game genre
- Game worlds and places created
- Game characters and supporting cast of actors developed by the students
- Interaction modes and feedback provided to the player
- Narrative development as part of the game structure

Boy game genres frequently included a moral dimension of good versus evil, while most girl games did not. Girl games were much more likely than boy games to be overtly teaching, often set in the classroom.

Kafai found that the math games were more likely to use fantasy locations than the solar system games (which used real planets). Boy math games used more fantasy locations while girl math games used more realistic, familiar locations.

Math games included more and more diverse nonplayer characters. In the space games all nonplayer characters except one were fantasy aliens. Boys included more nonplayer characters than girls did in the math games, but this difference did not appear for the solar system games.

In the solar system games, no child designer of either gender included violent feedback for wrong answers (losing ones life or suffering physical or emotional harm such as insulting the player's intelligence) However in the math games boys far more than girls included violent feedback.

METHODS

Forty-two boys and girls (5th and 8th graders) came together for two weeks to work in same gender, same grade 5-6 person teams (with a teacher facilitator) to learn about space exploration by playing digital games, watching video clips, and participating in diverse technology-mediated space learning activities. Camp began with a representative from NASA telling the group that NASA needs their help to recruit the next generation of space scientists. In their small same-sex, same grade teams the children participated in six guided brainstorms to invent a space related educational game which would motivate "kids just like you" to want to become space scientists.

The same sex, same grade teams generated 8 game concepts which were adapted into short (roughly 3 minute) promos for hypothetical space learning games. The PI worked with researcher-observer notes and child team white board notes and drawings from all six brainstorms, the final presentation videos and child team's final PowerPoints, as well as tabulated team voting on which examples they liked and disliked in each brainstorm. In consultation with a game designer and space scientist, she developed scripts for promos for each game and worked with an artist and sound design team to produce the promos. One professional female artist did the art for half of the games (evenly divided by gender and age) and a male professional artist did art for the other half of the games. The sound team was of mixed gender. Both the space scientist and the game design consultant were males, and the producer/PI was (is) female. Game promos were shown to a small subset of participants from the summer camp one year later. At an informal gathering they were asked whether the promo was true to the groups' game ideas. The response for 7 of the 8 promos was "yes."

In Spring 2004 data was collected from 145 6^{th}, 7^{th} and 8^{th} graders across three different schools. Forty-six percent of the respondents were female; 25% were 6^{th} graders; 66% 7^{th} graders; and 9% 8^{th} graders. Students were shown the 8 child-envisioned space learning game promos, one at a time, and answered questions about each promo followed by some general questions. Immediately after seeing each promo, respondents were asked five questions about that promo:

Would you like to play "(game name)"? (1=definitely to 5=definitely not)
Would it be fun to play "(game name)"? (1=very fun to 5 = not fun at all)
How would you rate "(game name)"? (from 1=very cool to 5=not at all cool)
Would playing "(game name)" be a good way to learn about space? (1=very good, 5-not good at all)

The first three questions were highly correlated (.70 or higher) within each promo. They were summed to construct a single measure of the appeal of each game promo. Cronbach's alpha reliability of the scales was .90 or higher for each of the 8 promos.

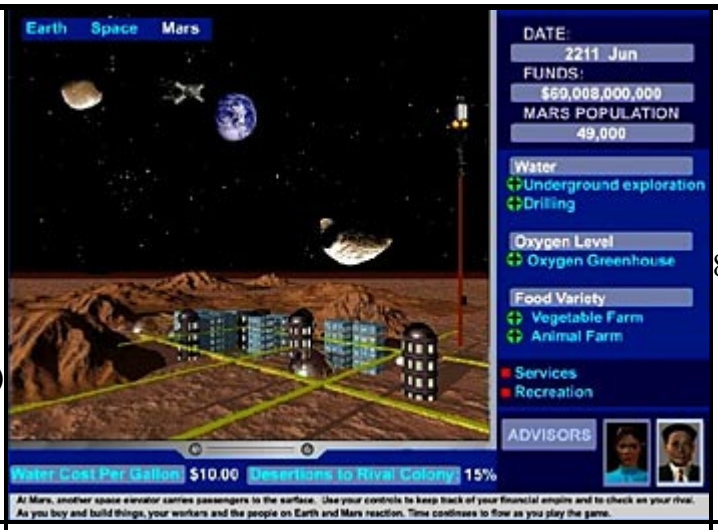
After seeing all 8 promos, respondents were asked to rank order them from most appealing to least appealing. The rank order question equalizes potential gender difference of how appealing games are in general, since all respondents had to rate the games from 1 to 8. This is a different measure than appeal, because with appeal kids and rate all the games as high or low as they wish, whereas ranking orders the promos from best to worst, forcing respondents to make a direct comparison.

For each game promo respondents were asked whether they thought the game would be best for: MORE FOR BOYS, FOR BOTH GIRLS AND BOYS, or MORE FOR GIRLS.

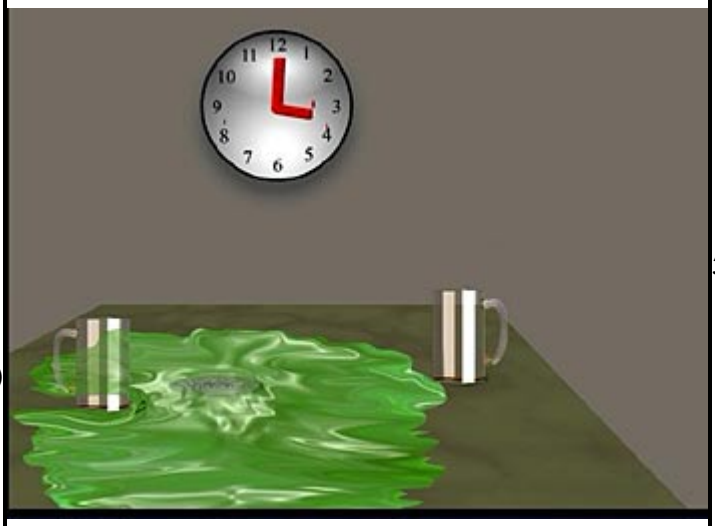
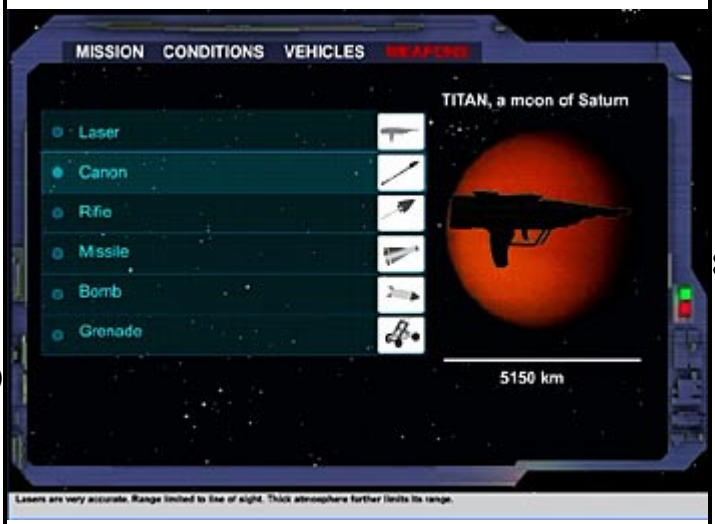
RESULTS

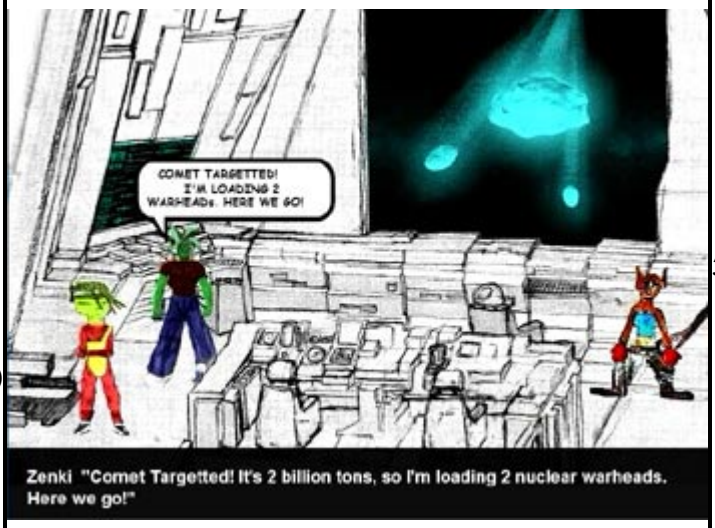
Below are screenshots from the QuickTime trailers inspired by game brainstorming of our 8 child design teams at Space Pioneer Learning Adventures camp. The games are listed in order from the highest ranked (in our spring survey of 145 6th, 7th and 8th graders) to the lowest ranked. The left most column lists the order, followed by average ranking (on a scale from 1 to 8 where 1 is the best). In parenthesis is how that promo compares to the others in terms of average liking (different than ranking) followed by the average liking on a scale from 1 to 5 where 5 is like very much and 1 is don't like at all.

Column 3 shows the age and gender of the child team whose game concept is reflected in the promo (5 for 5th grade, 8 for 8th grade, G for girls, B for boys).

1 2.94 (3) (3.81)		8B	**Mission to Mars: The Race to Save Humanity** A direct modification of the existing game, Moon Tycoon. The object is to transport 50,000,000 humans from the overpopulated Earth to a colony on Mars, while getting rich. There are three views -- Earth, Space, and Mars.
2 3.33 (2) (3.61)		8G	**Virtual Reality Mars Resort** You are the new president of a half-built Mars resort. The game begins when you land on Mars. The resort manager runs out of bolts and the first Sam challenge is to find enough chromium and iron on Mars to finish the resort. You earn a magic pet rabbit for achieving your quest, and go on to many other quests.

3 3.98 (4) (3.92)		8G	**Desdemona IX** You are captain of the starship Desdemona IX. Earth has been devastated by World War III, and your mission is to find new planets and moons for humanity to live on. You leave a small team to colonize Mars and head onward towards Jupiter. You respond to a distress call from the sentient species of mutant turtles on Io, rescuing a mother's eggs. The grateful turtle offers to lead you to a far away Earthlike planet. Your crew is in conflict over whether to leave the solar system.
4 4.55 (6) (5.03)		5G	**The Great Probe Rescue** Humanity has sent probes to every planet in the solar system, but all 9 probes are missing, along with the first ship of astronauts who went looking for the probes. A transmissions from near Jupiter looks like aliens may be involved in stealing the probes. You fly to the moon for training, then head to Venus. You encounter aliens who intercepted the probe. You offer them a gift and they give you a treasure map. Entering the poisonous hot thick atmosphere, you have only a few minutes to use radar and visuals to find the probe before the systems fail from the pressure..

5 4.69 (7) (5.79)		5B	**Never Safe in Space** A team of scientists living on a research outpost on Jupiter's moon, Europa. have been drilling through 5 miles of ice to look for life under the planet wide ocean. The core sample is brought into the lab. Scientists spill beer on it and it begins to grow. The last thing NASA received was a distress call. You choose to send a new science expedition to continue the search for life. Near Jupiter your engine fails and you abandon ship in lifepods to investigate what happened to the science team.
6 5.00 (1) (2.80)		8B	**The Universal Challenge** A direct modification of Halo II, battles with aliens for control of the solar system have been underway for tens of thousands of years on every major moon and planet in the solar system. You fight to save humanity, responding to military beacons to receive assignments. First you go to Miranda, but you choose a shuttle like vehicle which cannot fly under zero atmosphere conditions. Next assignment, on Saturn's Moon, Triton, you investigate more and make better choices of weapon and vehicle. For each assignment you must fight under the actual conditions

			(gravity, atmosphere, surface, heat, etc.) of that world.
7 5.50 (5) (4.51)		5B	**Virus Fighters: The Defeat of Juppa** Humans and aliens coexist happily but the aliens didn't tell us they had an evil leader named Juppa. Juppa is imprisoned on a cold, dark, transneptunian object out beyond Pluto but before he was caught he unleashed a terrible virus. Your mission is to stop Juppa and his evil minions and save the solar system from the virus. Your first challenge is to blow up an asteroid carrying the virus and headed towards Earth, using exactly the right number of nuclear warheads to blow up each comet fragment. On the second fragment you calculate incorrectly and your ship blows up, leaving you 8 more lives to try to win the game.
8 5.70 (8) (6.24)		5G	**Dr. Evil Stinky and the Poison Cake** Peace has at last been achieved on Earth, and people are celebrating with a planet wide party. A cake big enough to feed the world is being airdropped. You are sitting in a space ship about to launch when everyone on earth passes out from the poison cake. You are accidentally launched half an hour early.

			A pirate message from Dr. Evil Stinky says you are Earth's only hope to find a cure. You begin by going to Mars and trading your Brittany Speers album for a plant that is part of the antidote.

The girls in this study were far less game-oriented than the boys. Girls reported spending significantly fewer hours per week playing computer and video games than boys did. For boys the average game play hours per week was 11.6 compared to 3.2 hours for girls ($t(138)=4.35$, $p<.001$). 37.5% of girls and only 6.6% of boys do not play computer or video games at all in a typical week. On the other extreme, slightly more than one third of boys (35.5%) played games for 10 or more hours per week, compared to only 6.2% of girls.

APPEAL OF THE PROMOS

Despite males' more extensive game play hours, no significant gender difference was found in the overall average appeal of the 8 promos ($t(133)=0.82$, $p=.416$). The average appeal of the promos for females was 3.16 and for males it was 3.03.

There were no significant gender differences for the promo rankings for any of the four girl-envisioned games, either individually or averaged across the four girl games ($t(136)=.61$, $p=.546$). The girl games were not differently appealing to females and males.

The combined appeal of all four boy-envisioned games was significantly lower for females than for males $t(136)=2.25$, $p=.026$. On a scale where 1 is highest appeal and 5 lowest, females liked girl games an average of 3.11 and they liked boy games an average of 3.21. Males liked girl games an average of 3.22 and they liked boy games an average of 2.84. In other words, boys particularly liked boy games.

Looking at the individual game appeal ratings, two games with violent themes ("Universal Challenge" and "The Defeat of Juppa") appealed significantly less to females than to males ($t(140)=5.78$, $p<.001$ and $t(143)=2.05$, $p=.042$). Both were envisioned by all boy teams. Considering the order of most appealing to least appealing promos, three of the four games which appealed most to females were envisioned by girl teams. Three of the four games which appealed most to males were envisioned by boy teams.

The 8th grade games were more popular among both female and male respondents (an average of 2.85) than the fifth grade games (averaging 3.32). This is in part due to all respondents being at least one grade older than the 5th grade design teams. The average appreciation of the games drops significantly from sixth to seventh to eighth grade ($F(2,134)=10.66$, $p<.001$). Sixth grade respondents' average appreciation was 2.45. Seventh grade was 3.27. And eighth grade was 3.65.

RANK ORDERING THE PROMOS BY PREFERENCE

Considering rank order of the promos rather than general liking, the top-ranked game among females was the boy game, Race to Save Humanity, a direct derivative of the commercial simulation game, Moon Tycoon. The lowest-ranked game for females was the girl game Dr. Evil Stinky and the Poison Cake, a fifth grade game. Ignoring the top and bottom ranked games, choices two through four for the females were girl games.

All four boy games had significantly different average rankings among males and females. The two battle-oriented boy games (the Defeat of Juppa and the Universal Challenge) were ranked significantly higher among male respondents ($t(135)=3.03$, $p<.003$ and $t(136)=5.31$, $p<.001$). The two non-battle oriented boy games (Race to Save Humanity and Never Safe in Space) were ranked significantly higher among female respondents ($t(133)=3.51$, $p=.001$ and $t(135)=2.53$, $p=.012$).. Although Laurel (2003) and other research suggest girls do not mind violence in a game so long as it is justified, females in this study do not seem to like fighting in a war even if, as in the case of these games, the battle is for the noble cause of saving humanity. Curiously, females ranked the nonviolent boy games higher than males did.

Average ranking of the girl games was significantly higher among female respondents (4.42) than among male respondents (4.72, $t(133)=2.53$, $p=.013$). Average ranking of the boy games was significantly lower among the female respondents (4.56) than among the male respondents (4.25, $t(132)=2.63$, $p=.010$).

GENDER and LEARNING FROM THE GAMES

Estimates of how good the four girl games were for learning were summed and averaged. That same computation was conducted for the four boy-designed games. Based on a paired t-test, the four girl-designed games were rated significantly better for learning than the four boy-designed games (2.97 compared to 3.28 where 1 was very good for learning and 5 was not good at all) ($t(134)=2.21$, $p=.029$).

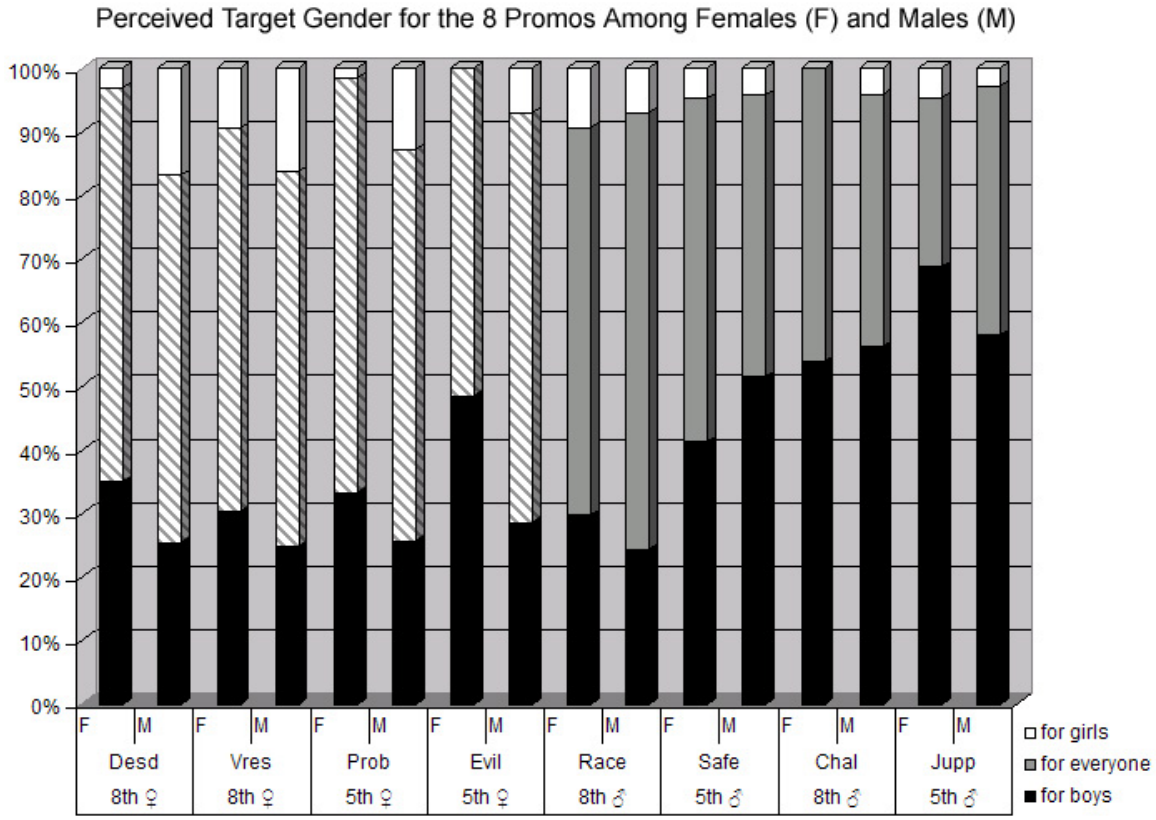
The more enthusiastic female reaction that girl games would be good for learning approached but did not achieve significances Female assessment of the learning value the girl games was higher but not significantly so than their assessment of the boy games for learning (2.83 compared to 3.23, $t(137)=1.67$, $p=.097$). It is somewhat surprising, given how alienated girls feel by games in general, that they on average anticipated the games shown in the promos would be in the direction of being considered better for learning about space than the boys did.

	Female	Male	(df)T	p
Girl envisioned games good for learning about space	2.83	3.13	(137)1.67	.097
Boy envisioned games good for learning about space	3.23	3.35	(136).67	.504

GENDER APPROPRIATENESS

The assessments of gender appropriateness of the eight promos dramatically illustrate how strongly females felt none of the games were made for girls, and how much males assumed any game is made for them.

In the table below each promo has two columns: the first is responses by females and the second responses by males. Within a column, white means respondents thought the game was more for girls. Black means more for boys. Cross hatched and grey each represent 'for everyone", but the cross hatched are the girl designed games and the grey are the boy designed games.



Many more respondents of both genders thought every game promo was more appropriate for boys than the percent who thought they were appropriate for girls. On average 42.5% of female respondents thought each promo was primarily for boys, compared to 36.8% of male respondents believing each promo was primarily for boys. On average only 4.3% of female respondents thought the promos were primarily for girls, compared to 8.9% of male respondents. For two of the promos, not even one female respondent felt it was primarily for girls. The highest percent of female respondents believing any promo was primarily for girls was only 10%.

Males were more likely to think the girl games were for girls than females were. At the level of individual game promo analysis, two of the 8 promos are anomalies – the 5th grade girl Evil Stinky and the Poison Cake was perceived as a boy game by females, and the 8th grade boy Race to Save Humanity was perceived as a girl game or gender neutral by both genders. But when ratings of the four girl designed games are combined,

being designed by girls **did** help reduce the extent to which females felt excluded, but even then only to the point of seeming gender neutral rather than seeming made for girls. The average gender appropriateness for girl games was 1.79 on a scale from 1=for boys to 3=for girls. Average gender appropriateness for boy games was 1.58 this difference is highly significant ($t(121)=7.78$, $p<.001$).

	Gender Appropriateness of Girl Games	Gender Appropriateness of Boy Games
Females	1.68	1.52
Males	1.87	1.60
(df)T	(124) 2.98	(125)1.16
p	.004	.247

Chi square analysis was run for the 8 promos crossing respondent's gender with whether the game was more for boys, for everyone, or for girls. Three of the four girl games had significant chi squares. Specifically, for those three girl games, males were more likely to rate them as being for girls, while female respondents were more likely than male respondents to rate them as being more for boys. In other words, males seemed to be more sensitive to perceiving some kind of gender difference in the girl games than females were. None of the chi squares for the four boy designed games were significantly different across genders.

DISCUSSION

A separate analysis is underway to compare the content of the girl and boy games. The purpose of the current study is to compare reactions of male and female middle school students to the promos, without disclosing the gender of the design teams. What impacts can be observed when girls design games?

Eight promos lasting nearly 30 minutes comprise a small stimulus from which to draw far reaching conclusions about the impact of gender on game design. All manner of factors may have influenced the creation of the promos, from the brainstorming by the child teams at camp through the scripting and production process. Attempts were made throughout the process to retain the influence of the same sex child teams. Girls came to camp in the mornings, boys in the afternoons. Teacher-facilitators and researcher observers were the same gender as the child teams they worked with. One male and one female artist each created half of the art for both girl and boy promos. The respondents viewing the promos had no idea which gender created with promo. This is by no means a definitive study, but it does provide an unusual first look at possible impacts of the gender of game designers.

Considering general appeal. females liked girl and boy games about the same amount. Males liked boy games significantly better than girl games. Males and females were particularly polarized by the two boy games with violent themes. Universal Mission, an 8th grade boy promo, focuses entirely on Halo-like combat. Defeat of Juppa, a 5th grade boy game, did not include any overt battles, yet the language repeatedly talked about defeating Juppa and his evil minions.

Rank order results forced respondents to make choices. Under that circumstance, three of the top four female games of choice were girl games and three of the top four male games of choice were boy games. On average females ranked girl games higher than males did. And males ranked boy games higher than females did.

The four girl games were considered significantly better for learning than the four boy games. Why is this so? What it is about the girl games that was better for learning? A content analysis is underway to attempt to address this.

Electronic Arts Vice President Steve Seabolt commented (2004) "girls feel locked out of the clubhouse." These data dramatically support that observation. Even though half of the games were envisioned by all girl teams, half were drawn by a female artist, and all were produced by a female producers, at least four fifths of male respondents considered every single promo to be gender appropriate for boys (combining good for boys or good for everyone). Conversely, the female respondents had significantly lower perceptions that any of the games was gender appropriate for girls. Games are such a boy medium, both boys and girls feel any game is made for boys.

Males seemed to be more sensitive to subtle cues about game designer gender. Males were more likely to say the girl games were "more for girls" than females were. Males spend more time playing games. Both 8th grade boy games ideas were "borrowed" from a successful commercial game, while all of the girl games and the fifth grade boy games were original concepts. Frequent game play may impact design decisions, on the design side, and may result in frequent players noticing promos that diverge from expected formulas. Frequent (male) players may have detected something "alien" about the girl games.

The sample size for the current study is small. A larger study including fifth, sixth, seventh, and eighth grade is underway. Including fifth grade is expected to result in more positive evaluations of the 5th grade games. The larger sample size can confirm and perhaps expand these initial findings.

The current study found measurable differences in reactions to game promos based on gender of the design teams and gender of respondents. That girl games are perceived as better for learning is interesting and offers a hint of promise to games for learning. Rank order results reveal same gender preferences. Females like girl games better and males like boy games better. However the general liking measures are weaker. General liking results show that males really like boy games, and females react negatively to violent themes. Females found girl games to be somewhat more gender neutral than boy games, although all games are boy games to these female respondents.

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