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The Rise of Manipulatives in Video Games

By Chris Pruett

My wife is a native of Japan, and we travel back to that country to spend time with her family at least once a year. Every time I visit Japan I make it a point to visit local arcades to see what types of video games are currently popular. Though they have all but vanished from the United States, game arcades have managed to survive in Japan by appealing to a wide audience: most include "print club" photo booths (aimed at teens) on the first floor and gambling simulations (aimed at an older crowd) on the upper levels, with traditional action-oriented games wedged in-between. The level of commitment required roughly correlates with the floor: the street-level floors are reserved for casual gamers while the upper floors are dimly lit and smoky bar-like affairs, with most of the customers fixated intensely upon large screens depicting virtual horse races. "Normal" games, the kind that we are used to in the West, are somewhere in the middle.
The middle floors of these Japanese arcades are fun because many of the games are played using elaborate devices. Namco's *Taiko No Tetsujin* ("Taiko Drum Master"), for example, is played by pounding plastic drumsticks into giant taiko drums that protrude from the game's cabinet. Another Namco game, *Rapid RiverDX* [1], simulates white-water rafting by forcing players to sit in a miniature raft and manipulate a long paddle. Every time I visit a Japanese arcade I am surprised to find some new game with a unique control method.

But last year I began to notice a new phenomenon in Japanese arcades. Off in the corner of the middle floors, where the lights begin to dim and the atmosphere from the floors above begins to bleed in, I found a number of people playing video games with playing cards. I am not talking about virtual poker or games where cards appear on the screen, but rather games where the player has physical cards in a deck that he uses to interact with the game machine. These games are a fairly recent development in the Japanese arcade world, and from what I could see they appear to be quite popular. Players control the game using special cards, which are placed on a flat surface in front of the screen [2]. The machine can tell which cards are in play and where they rest on the playing field, and by manipulating the cards the player engages in a strategy game against the computer or other players. In another version aimed at younger kids, poker chip-like plastic discs were used instead of playing cards.

In some ways, the idea of a video game driven by playing cards is so obvious that it is amazing that such systems have appeared only recently. Japan's affinity with card games stretches back hundreds of years; Nintendo, the company that is the father of the modern game industry, originated in 1889 as a company that produced a card game called *hanafuda*. Fitting, then, that Nintendo is also the force behind popular game-related card games today. In 1996, Nintendo repurposed its incredibly popular *Pokémon* video game brand as a collectable card game. Modeled after an American game called *Magic: The Gathering*, Nintendo's *Pokémon* card game requires players to assemble a collection of cards from which a powerful deck can be carefully built. Like
baseball cards, Pokémon cards are sold in small packs, and the content of each pack is random. Some cards are rarer than others, making them more valuable among players and collectors. Once a player has created a deck, he can challenge another player to a game. Play involves placing cards that represent monsters and resources from one's hand out on the play field, and using those cards to try to defeat the opponent [3].

It is not hard to see why the Pokémon card game is popular, especially among kids. The game taps into collection and management mechanics common to all kinds of collectable cards, and the random nature of each pack makes card collecting itself a form of Skinner box. The game took off in Japan and remains popular there today; subsequent releases in the US and other countries were met with similar success. The idea that a card game made by a video game company might be tied back into a videogame itself seems obvious. Indeed, Nintendo did attempt to sell a peripheral for its GameBoy Advance system that could read magnetic strips from cards, but the idea never really took off. Now, a few years later, other companies have filled this gap in the market by producing arcade games that play like card games but render the imaginary context of the game in realistic 3D graphics.

What I find most interesting about this trend is that playing cards are the most recent example of arcades games in Japan surviving because they provide physical manipulatives. When my wife was studying for her Masters in education, her teachers regularly touted the use of manipulatives as a way to give students, particularly elementary and middle school students, a concrete understanding of abstract concepts. The idea is that by rendering abstract ideas into physical objects that can be manipulated and observed, a teacher can communicate the details of the idea more effectively than through lecture alone. A typical example of this approach appears in Elizabeth G. Cohen's *Designing Groupwork*:

"Key concepts, such as linear coordinates, are embedded into the activities. The child encounters linear coordinates repeatedly in different forms and at different stations. For example, at one station, students locate their homes on a map, using the
coordinates. At another station they work with longitude and latitude on a globe. After repeated experience with these abstract ideas in different media, the child acquires a fundamental grasp of the idea that they will transfer so that he or she will recognize it in new settings, including in an achievement test." [4]

There's something about being able to hold an object in your hand that makes the properties of that object obvious, and I think that the appeal of arcade games is that they can actually provide a physical object for the player to interact with that is less abstract than a joystick. If the goal of manipulatives in education is to teach concepts through physical interaction, perhaps video games that use manipulatives work on the same principle. Games actively strive to teach the player the rules by which the game world is governed, but they also have another goal: to make the experience of using the game intrinsically enjoyable. As linear coordinates may be too abstract a concept for some children, the traditional game controller itself may be a similar barrier for casual gamers. In his book *What Video Games Have to Teach Us About Learning and Literacy* [5], James Paul Gee argues that while video games are not usually attempting to impart knowledge to their players that is useful in the real world, they are nevertheless extremely effective teachers. His thesis is that the mechanics used in video games to communicate abstract ideas to the player are entirely applicable to "important knowledge," the stuff that is taught in school. If he's right, it makes sense that the reverse would also be true: that manipulatives, having been found to be an effective tool in the education world, would also have applications in the video game industry.
Namco's *Taiko no Tetsujin* is played by hitting the giant drums.

Of course, interesting input devices in arcade games are nothing new; many arcade games have featured steering wheels, guns, and other types of unique controllers for years. Music games in particular have been big arcade hits ever since Konami's *Dance Dance Revolution* and *Beat Mania* provided ways for casual gamers to act out fantasies of being dance masters and killer DJs. The incredible international success of *Dance Dance Revolution*, which is played by standing on top of a special platform and hitting arrows on the ground with your feet, paved the way for a series of music-oriented arcade games like *Guitar Freaks* and the aforementioned *Taiko No Tetsujin*.

A few years later, these games became available on home consoles as well. In fact, in the last five years or so, a number of games using non-standard control devices have shipped for home use. Almost all of these are music games, and some of the most notable titles include Nintendo's
*Donkey Konga* (which uses a pair of conga drums as its controller) and Harmonix's *Guitar Hero*, which has enjoyed intense popularity in America. Harmonix's latest game, *Rock Band*, features full-size guitar, drum, and microphone controllers, and allows players and their friends to "play" popular music [6]. Though the controller phenomenon has been restricted almost exclusively to music games, Sony's *Eye of Judgement* for the PlayStation 3 is a version of the card-based video game trend designed for the home [7]. And though it features a controller that is not specifically designed to emulate a real-world object, I think that Nintendo's Wii console is one of the most dramatic recent examples of manipulatives in video games; its motion-based control system has proven popular with a wide audience of both casual and hard-core gamers.

The rise of manipulatives in video games is keeping arcades alive in Japan and attracting new players here in the States. As manipulatives diversify--be it through card-based video games or home systems like the Nintendo Wii--I think that we will continue to see games designed to engage the player through different forms of physical interaction. The attractiveness of this method of play, combined with the prospect of lucrative peripheral and trading card sales makes this particular trend too powerful for the game industry to ignore. For my part, I'm looking forward to the new types of games that this trend will inevitably spawn; visiting Japan just would not feel right if the country ever lost its crazy arcade games.

[1] Information about Rapid River DX:  
For full effect, check out video of people playing this game:  
http://youtube.com/watch?v=MEnuOWLAIIE

[2] Photo credit and a bit of information about one of these games can be found here:  
Here's a picture of a sports-related card-video game:
http://www.cynicaltravel.com/blog/images/GAMES5.jpg

[3] Wikipedia has an extensive article on the Pokémon card game:


[6] Another factor worth noting is that controllers and other peripherals can be very lucrative for the game industry. Rock Band retails for $170.00, almost three times the cost of a regular video game.