Suit The System To The Player: A Methodology for Physical Creativity

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ABSTRACT
The PS Move, Kinect, and Wii tout their technological capabilities as evidence that they can best support intuitive, creative movements. However, games for these systems tend to use their technology to hold the player to higher standards of conformity. This style of game design can result in the player being made to 'fit' the game, rather than the other way around. It is worthwhile to explore alternatives for exertion games, as they can encourage exploration of long-dormant physical creativity in adults and potentially create coliberative experiences around the transgression of social norms. This paper synthesizes a methodology including generative outputs, multiple and simultaneous forms of exertion, minimized player tracking, irreverent metaphors, and play with social norms in order to promote. *Scream 'Em Up* tests this methodology and provides direction for future research.

Keywords
game design, physical creativity, embodied play, coliberation

INTRODUCTION
A major trend in console design is the development of increasingly sophisticated technology for tracking physical movement. The PS Move, Kinect, Wii, and other platforms largely eschew traditional controllers, instead asking the players to move their bodies or use their voices to interact with the system. Such systems tout their technological power as a shorthand for supporting more intuitive, more natural movement. The Kinect's marketing is emblematic of this: advertisements state, “you are the controller. […] If you have to kick, then kick, if you have to jump, then jump. You already know how to play.” Formerly limited to the arcade, exertion games—that is, games that have interfaces “which focus on intense physical effort from the participant” (Sheridan 2010)--are increasingly available for public consumption at home.

The majority of these exertion games share a potentially problematic design value: namely, the use of their console's tracking power to create systems that define a narrow range of acceptable physical input, rather than support a wide range of creative movements. Such games tend to track the players' movements more closely and hold their movements to a higher standard of conformity. This style of game design results in games where technology is used to make the players 'fit' the game, rather than the other way around.

Although this kind of game design obviously has mass appeal, its inherent limitations are

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an impetus to explore alternatives for physical gaming, to provide unique opportunities for creative expression and engagement. For example, exertion games can give people a safe space to tap into their physical creativity, which is the "creative process" as embodied in physical activity—or, alternatively, "the ability to innovate through exertion" (Sheridan 2010). Society only sanctions physical creativity for adults of a certain skill level (e.g. professional dancers, professional athletes). The 'magic circle' of physical games can provide the perfect safe space for adults to tap into that inherent creativity. When physical games require strict adherence to a certain kind of movement, however, the player loses out on this space, and physical creativity is replaced with physical mimicry. Furthermore, is that exertion games can be used to create coliberative experiences: that is, moments where the play community feels a "shared transcendence" that helps them "free each other from whatever constraints [they] usually impose on [each other]" (DeKoven 1978). Exertion games, especially those played in public, can act as spaces to collaboratively transgress and free each other from social norms regarding etiquette, public space, and the body.

By designing exertion games that minimize player tracking while generatively responding to player inputs, play with social norms, create festive contexts, and incorporate multiple forms of exertion, exertion games can better support physical creativity, self-expression, and performativity, potentially leading to a coliberative experience. *Scream 'Em Up*, the game developed in tandem with this paper, tests this methodology and provides reflections, questions, and thoughts for future research.

A HISTORY OF EXERTION GAMES

Although exertion consoles existed long before the Wii, Kinect, and PS Move, the kinds of games originally developed for those systems are strikingly similar to the those now available.

The earliest dance-related game was *Dance Aerobics*, made by Bandai in 1987. The game required the player to step in certain areas of a gamepad in time with their virtual aerobics instructor. *Dance Aerobics* bears close similarity to the wildly popular *Dance Dance Revolution* series (Konami 1998). Dancing games have perhaps undergone the largest technological revolution, culminating in games like *Dance Central* (Harmonix 2010), which has a sprawling library of acceptable moves, and uses the Kinect's skeleton tracking to closely judge player movements. Singing games largely began with *Karaoke Revolution* (Harmonix 2003), a game in which players try to accurately sing along to covers of pop hits. *Karaoke Revolution* and *Donkey Konga* (Namco 2003) set the stage for the *Rock Band* (Harmonix 2007) and *Guitar Hero* (Harmonix 2005) franchises, which use additional controllers that approximate real instruments to let the user play out a fantasy of being a rock star. (While *Rock Band* and *Guitar Hero* are not as exertive as games like *Dance Dance Revolution*, they still require more exertion than operating the average game controller.) Finally, the Sega Activator (an octagonal system placed on the floor that could detect when beams were interrupted by limbs) led the way for the kinds of sports games currently popular on on the Wii.

While console technology may have evolved, the assumptions underlying exertion games have largely stayed the same: exertion games still, for the most part, "focus on competitive play" and emphasize conflict and win/lose conditions to the detriment of "open play—that is, "the often shared, anarchic, and spontaneous play found in improvisation and live performance" (Id.). Technological advances in tracking fidelity have largely just been used to judge the player more harshly, requiring them to strictly adhere to highly-specified sets of movements in order to win. This paradigm has a serious

impact on how well a game can support physical creativity.

PHYSICAL CREATIVITY AND ITS BENEFITS

Encouraging a player's innate physical creativity can have significant benefits both for that player as well as for the immediate community around them. Physical creativity, “the ability to innovate through exertion” (Sheridan 2010), requires enough “looseness” and “wiggle room” to allow for “expressiveness and play-in-the-usual-sense” (Williams et al. 2010). Thus, for a game to support physical creativity, it must move past requiring physical mimicry, instead encouraging “remaking over reproduction” (Sheridan 2010). Once players can move “beyond memorizing a procedure” or “mimicking movement,” they can begin to “elaborat[e] on, extend[], or reconfigur[e] patterns of movement” (Id,). Supporting physical creativity means letting players use “exertive movements of the body as self-expression, improvisation, and imaginative play” (Id.), as well as a source of the simple “pleasure of moving one's body” (Simon 2009). The potential benefits of this behavior should not be discounted. Stuckey and Nobel, speaking about arts therapy and public health, note that “engagement with artistic activities, either as an observer of the creative efforts of others or as an initiator of one's own creative efforts, can enhance one's moods, emotions, and other psychological states,” potentially contributing toward the reduction of “stress and depression.” While the physical activity they studied was not game-based (rather, movement therapy and dance), it seems likely that the “movement of mind and body in a creative way” within the larger, playful context of a game could lead to the same benefits in reducing tension and anxiety (Stuckey et al. 2010).

Further, exertion games that support physical creativity in public may, by breaking social norms surrounding acceptable public behavior, create opportunities for coliberation. Throughout history, humans have created “time periods in which it was understood that the normal order of things was suspended,” in order to “channel[] the human need to break the rules periodically” (Bertozzi 2007). However, many traditional “moments of rebellion against civilizing order” (e.g. Halloween and Carnival) have become greatly tamed and commercialized, causing them to “[lose] their potency and transgressive charge” (Id.). Games are special because they can support the “breaking of social norms” and “create and celebrate taboo behavior” (Bernard 2009). The magic circle allows “players to be 'bad' in many ways that are severely punished in the real world,” giving them the feeling of “agency and power which may be in stark contrast to the feelings they experience outside of game worlds.” While most studies of transgressive behavior in games focus on sex, murder, racial violence, etc., there are plenty of highly-pervasive and restrictive social norms that structure, regulate, and restrict body movement and physical creativity every day. Physical behaviors that do not fit into these norms tend to be seen, at best, as childish and immature, and at worst, as symptoms of mental illness. Physical creativity is thus a type of creativity that many do not get to express in general--much less in public, with other people. Games that support public displays of physical creativity can create a unique 'magic circle' in which players can safely, and without repercussions, break these taboos with each other. At their apex, these games can create what Bernie DeKoven calls "coliberative experiences," in which players "manage to free each other from whatever constraints [they] usually impose on each other," causing the player to leave the game world "more fun[…], more alert, [and] more alive" (DeKoven 1978). Exertion games thus pose a unique opportunity for game designers to create experiences where players can tap into their own dormant physical creativity, as well as share that creativity with other players and spectators in a positive, coliberative way.

A METHODOLOGY FOR ENCOURAGING PHYSICAL CREATIVITY

Having examining games by independent developers, physical installations, and performances that result in exceptional opportunities for physical creativity, five general strategies for physical creativity come into focus: inattentive systems, festive contexts, responsive systems design, multiple simultaneous physical inputs, and opportunities for playful transgression.

Inattentive systems

'Inattentive systems' refers to a type of system that only tracks or judges a few points of player input. Wilson refers to as low process intensity, describing it as a kind of system that "monitor[s] only a fraction of the action [it] instruct[s]," with the goal of "foreground[ing] social context" (Wilson 2011). Bogost takes issue with Wilson's terminology, saying that games that "respond very selectively to player input" and leave room for behavior that may "exceed the system's capacity for understanding" are truly *high* process intensive. To Bogost, the "small, open systems that invite[] unexpected player negotiation" and "expand their available creativity" are not only "*compatible* with procedurality – [they] also *rel[y]* on it" (Bogost 2012). To avoid the terminology argument, for the purposes of this paper, this kind of design will be referred to as inattentive systems design, as the core idea is the "conspicuous absence of technological systemization" used to foreground social context (Wilson 2011).

B.U.T.T.O.N. (Wilson 2010) is an excellent example of an inattentive system that results in tremendous physical creativity. *B.U.T.T.O.N.* is a "highly physical party game for 2 to 8 players," in which "multiple players race to their controllers through physical space" to complete a random win condition (Id.). At the beginning of each round, the game tells the players to put their controllers down. It then orders them to take a number of steps back, then gives the players some sort of command or task (e.g. 'lie on the floor' or 'act like a monkey'). Finally, the game displays a random win/lose condition for that round (e.g. 'first player whose button is pushed 15 times wins'), "tacitly encouraging players to rush toward the controllers" and try to complete the win condition, or cause others to lose (Id.). What is remarkable about B.U.T.T.O.N. is that the system tracks almost none of the players' behavior. It doesn't try to "monitor whether you took exactly six steps back, or if you did indeed spin around five times." All it judges is whether the win condition has been achieved—not how it has been achieved. In the end, B.U.T.T.O.N. "amounts to little more than a randomized billboard, taking a rudimentary button-press detector and dressing it up with a sequence of timed texts" (Id.). Because the system only responds to a "small fraction of player acts," players can—within collaboratively-defined limits—spontaneously create new and unexpected strategies (e.g. "a well-timed shove or gutsy dive") (Wilson 2011). Indeed, physical creativity is encouraged by the fact that such a game "consists of little else *besides* the players' embellishments" (Id.). Having a system that only cares about specific points of player interaction can provide a solid foundation for encouraging physical creativity.

Festive atmospheres

'Festive atmospheres' describes a type of game in which winning is much less important than having the "excuse[] to laugh and horse around with friends" (Wilson 2011). By encouraging ridiculous actions, or setting the game within a ridiculous context, these kinds of games can promote a certain attitude toward the game that reinforces exaggerated, silly, and performative physical activity.

Wario Ware: Smooth Moves (Nintendo 2006) is an example of a game that uses festive atmospheres to promote physical creativity and embellishment. *Smooth Moves* is a

collection of different levels that contain a string of mini-games. As time goes on, the difficulty of the mini-games increases. While there are other games that incorporate fast-paced mini-games (e.g. *Minute to Win It*), what makes *Smooth Moves* special is the game's irreverent and playful skin. In a given round, the game might ask the player to squat like a weightlifter, pretend to be an elephant, or insert a grandmother's dentures. Players soon realize that *Smooth Moves* does not require these movements to be particularly accurate—it can't tell whether a player is making elephant noises or got down on all fours, just whether the Wiimote is pointing at the screen—but this rarely results in players moving less. Rather, players continue behaving in silly and dramatic ways for each other—indeed, the idea of playing *Smooth Moves* in a purely competitive fashion seems strange. Much like B.U.T.T.O.N., the "messy scramble, so out-of-place in the familiar setting of controller-based console gaming, is unmistakably ridiculous," causing laughter to move from being a "'side effect' of the game" to being "central to the social-bodily process" (Wilson 2011). By designing festive contexts for their games, designers can avoid the issue of trying to design large, silly movements for players to follow, as the festive context will lead them to decide, on their own, to take part in this silliness together.

Responsive systems

'Responsive systems' is the idea that players will be more likely to vary their physical activity if the system responds to a wide variety of physical activity. While inattentive systems design is concerned with what the game *scores*, responsive systems design is concerned with what the game *reacts to*. It refers to a more generative, procedural system that can take varied player input and respond with a similarly wide range of new and interesting outputs. This give-and-take can incentivize the player to explore the system by continually changing their movements.

There are relatively few games that emphasize this, but several installations and 'interactive environments' can provide guidance. *Happy Action Theater* (Double Fine Productions 2012) is a Kinect-based "augmented reality playground" with multiple interactive environments. Drew Skillman, in an interview with Ars Technica, notes that these environments are "as responsive as possible," and have "no imposed restrictions or apparent purpose other than to see what happens" when you interact with them in different ways. In the lava environment, players can splash the lava around, kick rocks into the lava, interact with small flames that pop up from the pool, or immerse themselves in the pool to gain the ability to shoot fireballs. Because *Happy Action Theater* doesn't "actually require the player to perform any specific actions," and instead focuses on making the world "as responsive as possible," as Skillman says, it encourages physical creativity by naturally piquing players' curiosity about how they can shape and interact with the virtual world.

The installation form of *Messa Di Voce* is another example of a highly generative system that naturally results in physical creativity. *Messa Di Voce* explores the concept of phonesthesia: "phonetic symbolism" (Levin et al. 2004) and the visualization of sound. As described on the project's website, "Clouds," one segment of Messa Di Voce, uses respiration as an input, and from this data generates an "animated cloud whose visual texture evolves with the timbre of the sound it portrays," with "bright frequencies in the breaking sounds […] mapped to higher spatial frequencies in the clouds, [and] duller sounds produc[ing] smoother clouds." The piece creates a "perceptually and aesthetically plausible, interactive fictional universe in which speech is somehow visible." (Levin et al. 2004) The designers describe this system as "*commensurately expressive*" with the voice. By providing players with generative systems that provide a rich variety of outputs to the

players' inputs, these pieces naturally encourage curiosity and creative, spontaneous, improvisational interaction.

Multiple simultaneous physical inputs

'Multiple simultaneous physical inputs' is the idea that—if balanced carefully—multiple physical inputs may increase player physical creativity. For example, rather than solely utilizing physical creativity in the kinesthetic sense, games could simultaneously respond to kinesthetic inputs as well as vocal inputs. Such a strategy could lead to more expressive behavior at a given time, and a higher likelihood that each form of creativity would support and reinforce the other. There is evidence that "increased involvement of the body can afford the player a stronger affective experience," as it "enables the affective aspects of human-human interaction" and "unleashes the regulator properties of emotion" (Bianchi-Berthouze 2007). Additionally, multiple physical inputs play nicely into the idea of the festive context; when there are more physical inputs but less emphasis on their precision, there is a higher likelihood that the player will end up behaving in some ridiculous or absurd way, leading them to focus less on winning and more on enjoying the opportunity to be silly and perform for others.

Balancing the inputs is the critical issue, however, and there are relatively few games that provide guidance for this kind of design. As Sean Baron describes in his article on Gamasutra, the theory of flow states that if the “skill is too low and the task [is] too hard, people become anxious,” causing them to direct their attention away from embellishing on the task and toward simply completing it. When games require a high level of skill in a certain physical area (e.g. dancing), designers generally have to exclude other physical activities from judgment, as tracking both would likely cause the game to be exponentially harder. However, this implies that designers could increase the number of physical inputs so long as they lowered the difficulty of successfully triggering those inputs. One example of this kind of play—led by players, rather than developers—is playing *Rock Band* as a 'singer-songwriter,' i.e. playing the guitar while also singing into the microphone. Because most of the songs are familiar to players (and learning a melody is relatively easy), the level of skill required stays manageable, and players have a more affective experience. While multiple simultaneous physical inputs are difficult to balance, they can be a useful tool for encouraging physical creativity and creative expression.

Playful (and collaborative) transgression

'Playful transgression' refers to the use of games to create contexts in which players can transgress the social norms—especially the more subtle ones—that permeate everyday activity. Games have the special ability to “allow players to engage in a very limited form of social deviance with few or no consequences” (Bertozzi 2007). This activity serves an “important form in culture” by creating “moments of release from prevailing norms,” and giving players an “outlet for behavior […] that is not available in analog culture without significant consequences” (Id.).

Of course, many mainstream games support virtual transgression—the *Grand Theft Auto* series being perhaps the best well-known—but the “kinds of social deviance that [these] games make available to players” (Id.) generally deal with taboos of the highest degree (sex, violence, etc.), and less with banal, but perhaps more pervasive, everyday social norms. As discussed previously, even minor public displays of physical creativity—unless done in certain contexts by certain kinds of people—tend to be seen as inappropriate, rude, or strange. Subverting these “cultural and social norms,” which affect everyday experience, “can indeed become its own source of pleasure” (Wilson 2011). By creating a context in which players can rebel against these norms together, games can help players

“free each other from whatever constraints [they] usually impose on each other,” causing the players to leave the game “more fun[...], more alert, [and] more alive” (DeKoven 1978).

PewPewPewPewPewPewPewPewPew (Incredible Ape 2011) is an example of a game that utilizes voice control as a means for creating playful, public transgression. *PewPewPewPewPewPewPewPewPew* (hereafter referred to as *PPPPPPPPP*) is a 'shoot-em-up' game for two players, where each player uses their voice to control one aspect of the player avatar. The player who controls position uses the pitch of their voice to change the height of the ship, while the player who controls shooting triggers the bullets by shouting “Pew!” into their microphone. Without the transgressive activity of making strange vocalizations in front of other people, the game would be effectively identical to others in the shoot-em-up genre. However, using childish noisemaking as a mechanic, an act that would be otherwise unacceptable in public, makes the game especially compelling. In addition, because *PPPPPPPPP* is a multiplayer game, two people are always transgressing these norms together. This helps mitigate the “mutual vulnerability” of the behavior, generally leading to a “laughter-filled acknowledgment of vulnerability that nurtures a feeling of togetherness” (Wilson 2011). By giving the players the opportunity to express their creativity in socially transgressive ways, these games can create coliberative experiences, as well as “nurture a sense of camaraderie through a chaotic kind of play” (Wilson 2011).

EXPLORING THE METHODOLOGY: SCREAM 'EM UP

Scream 'Em Up, the game created for this paper, puts the above methodology into practice, with the goal being to create a game that supports and encourages physical creativity. *Scream 'Em Up* is a multiplayer arcade-style space shooter, in which the position of the ships are controlled by lateral movement, and the shooting of bullets is triggered (and shaped) by loud player vocalizations. Though the design has changed over multiple iterations, the rationale behind these core choices has stayed the same. The game is designed to be generative enough to drive player curiosity and exploration, while being inattentive enough to leave room for player embellishment, exploration, and creativity. The combination of physical inputs (movement and voice) are meant to be mapped relatively intuitively (e.g. louder shouting leads to bigger bullets) and easy to trigger, in order to give players a more affective experience. Finally, the ridiculousness and social inappropriateness of the behavior (effectively, running around and screaming) is designed to allow players to transgress together and to create a festive context in which players value fun, expressiveness, performativity, and coliberation over strictly winning.

Technological description

The game requires a Kinect, a Mac computer with *Scream ‘Em Up*, and two iPhones (one for each player) running ScreamPhone. ScreamPhone is the software that takes in and analyzes the vocal data of the player. It is able to determine the volume of the player’s voice, as well as run an FFT (Fast Fourier Transform) analysis to determine the frequency with the maximum amplitude. This data is sent via OSC messages to *Scream ‘Em Up*. *Scream ‘Em Up* is the actual game, and contains all the level/enemy/player information and methods. To determine player location, it uses the Kinect's skeleton tracking to find approximately where the players are in lateral space (judging from one point on the hip), and passes that data to the player’s “ship,” which moves accordingly. To determine if bullets should be firing (and what their attributes are), it analyzes the OSC messages from ScreamPhone. The size and color of bullets is based on the volume and prevalent frequency of the individual player’s voice. The shape of the bullets is based on the

difference between the prevalent frequencies of each player. If players are at the same frequency, the shape will be more circular, and if they are at opposite ends of the spectrum, the shapes become more pointed.

Both of these programs were written in openFrameworks. Their code can be found at http://github.com/friej715.

Playtest #1

The first playtest of the game took place at Parsons' Spring Fair. The game at that point had entirely randomized enemies; no win/lose conditions; no frequency analysis; and only tracked volume and lateral movement. At that point, the major questions were:

Will people play with the game at all, or will they be too shy?

What types of people are willing to play with it?

How long will they play with it? Will they get bored or tired quickly?

What kind of experiences will they report?

Will lateral movement be big and wild?

Will players vary the way that they yell?

Will people play at all? What types of people?

I had originally anticipated that few people would be willing to play, and that those willing to play would largely be young males, since society tends to tolerate (and even encourage) men, not women, to be loud and to take up space. However, a wide variety of people were almost immediately willing to play, once the mechanics had been explained to them. Players ranged from teenage girls to grandparents, with little convincing needed on my part.

How long will they play with it?

Players generally played Scream 'Em Up for a little under a minute, which I largely attributed to the fact that there was no level design and no way to win or lose. However, it did highlight the importance of creating thresholds for activity, both vocal and physical, that were low enough that the player didn't get too physically tired or uncomfortable before the game was over.

What kind of experiences will they report?

The general reaction was that the game was "fun," with many people saying that they thought it was "interesting." Considering the total lack of level design or artistic direction, the latter largely seemed like a sign that people were receiving sufficient generative responses from the system, leading to curiosity and continued play. Another not-infrequent response was that the game was "therapeutic," which supported the idea that unrestrained vocal and physical behavior was something that many people wanted the opportunity to experience in their lives.

Also interesting was the fact that players rarely played by themselves. Players would, on their own, bring their friends over, and once their turn was over, would automatically hand the iPhone running ScreamPhone to them, saying, "Here, you try." This implied that the transgressive experience was improved by having not only an audience to perform for, but also having other players transgressing at the same time or shortly thereafter--supporting the decision to make the game two-player.

Will lateral movements be big and wild?

Lateral movement was a mixed bag at this point. Some players would actually run from side to side, but the majority of them tended to stay in the center and lean to either side to move their ship. This signaled two things. The first was that levels would have to be carefully designed to require players to cover distance in order to kill enemies (at that time, the random distribution of enemies made staying in the center the best bet). The second was that the difficulty and complexity of the system would have to be balanced with a lot of care, as the lessened physical movement could have easily been a response to overly difficult enemy distribution or overly difficult triggering of the vocal mechanism.

Will players vary the way that they yell?

Very few players actually varied their pitch and volume while playing the game. For the most part, players would hold a loud "ahhhh" at a steady frequency to shoot. Though this still allowed for the transgression of taboos, it indicated a lack of desire or interest to be vocally creative. This drove home the fact that, in order to encourage such creativity, the system would have to be more responsive to different types of vocalization. This observation greatly influenced the later playtests of *Scream 'Em Up*.

Playtest #2

The second major playtest of Scream 'Em Up took place at Come Out And Play NYC. Scream 'Em Up, along with a few other games, was set up in a relatively small alleyway. At this point, the game had a more developed visual style (Space Invaders with a large dose of glitchiness and visual distortion), non-random level design, and a high score board. In addition to tracking volume and lateral movement, it now had the capability to shape bullet styles based on frequency. It also supported 2-player activity. Though the game couldn't technically be won or lost, there was a boss enemy at the end who would float down from the top of the screen, and it was implied that beating him (before he went offscreen) was equivalent to winning. At this point, the major questions were:

> Will people stay away from each other, or use the game as an excuse to physically interact with each other?
>
> Will people vary the way that they yell if they see additional visual information/effects?
>
> Will people vary the way that they yell based on the yelling of the person they're playing with?
>
> Will player performativity have any noticeable impact on spectator behavior? Will spectator behavior feed back into player performativity?

Will people stay away from each other?

Overall movement was somewhat limited by the size of the alleyway and the close presence of other games in the area. However, the players actively sought out opportunities to run into and grapple with each other, in order to help them shoot enemies and prevent the other player from doing so, despite the fact that the game was not made explicitly competitive. This implies that the playful but violent nature of the screaming and yelling caused people to translate that violence into their physical play, or use it as an opportunity to horse around. This kind of play indicates the presence of the festive atmosphere previously discussed.

Will people vary the way they act if they see additional visuals?

This playtest was successful in that the players began to vary the way that they were

vocalizing, going from loud to soft volumes and high to low frequencies. The playtest was also successful in that players generally understood the synaesthetic qualities attached to the sounds (e.g. lower frequencies had fills on the blue end of the color spectrum, while higher frequencies had fill on the yellow end of the spectrum). The generative nature of the system performed its intended effect of leading the player to make many kinds of vocalizations.

Will people vary the way they yell based on the yells of others?

My initial assumption was that players would tend to do the opposite frequency or type of sound as the person they were playing with, as that kind of dissonance seemed well-suited to the hectic and chaotic nature of the game. However, while people would make different noises on occasion, players generally tended to end up matching frequencies, upping the ante mostly with volume. The fun, rather than coming from dissonance, appeared to be coming from the ability of players to be loud and inappropriate in the same way at the same time. This could be the product of the length of time that people played--perhaps with longer rounds, they would become more comfortable with the interface and explore it in their own way--but it may indicate that the real enjoyable experience and sense of togetherness comes from sharing almost exactly the same kind of transgression, or the sheer fun of mimicking each other.

Will the players fuel the crowd? Will the crowd fuel the players?

Perhaps the most satisfying aspect of this playtest was observing the effect of the players on the spectators, and vice-versa. Once players started running around and screaming, spectators flocked to the area. Each game tended to have a similar rhythm, where the crowd would start shouting along with the player, eventually reaching a crescendo when the players reached the boss. At those moments, the spectators and the players seemed to be screaming as a unit, with everyone trying to make the crowd as loud as possible. Once the boss was either killed or went offscreen and the game ended, the spectators would cheer the players. The game always ended with laughter and high-fives between players and spectators, which seemed like a promising indication of a festive context and perhaps some moments of coliberation.

POSTMORTEM

While *Scream 'Em Up* is still in development, its current success (and the applicability of the methodology as a whole) can be judged by the degree to which it encourages physical creativity and coliberative experiences so far.

Scream 'Em Up was most successful in its use of playful transgression, responsive systems design, and festive contexts. The immediacy with which players (of all ages and genders) picked up the phone and started screaming, even when the game was one-player, indicates a near-universal desire to use one's voice in wild and uninhibited ways not usually tolerated by society. Descriptions of the game as “therapeutic” further indicate that people appreciate having the space to transgress these everyday norms around the body. The responsivity of the system also greatly contributed to vocal creativity. Iterations with less generative output led to less creative vocalizations, while the final iteration led to a variety of sounds. While players didn't tend to move laterally in the way I had anticipated (i.e. strafing, staying away from their partners), the use of voice almost certainly informed the way people moved, with people tending to modulate their voice in more extreme ways as they shoved and wrestled with each other with growing intensity. *Scream 'Em Up* thus succeeded in its use of playful transgression, responsive systems design, and use of multiple inputs to encourage physical creativity and social playfulness,

and very well may have created togetherness ‘coliberation’ (difficult metrics to measure or observe directly).

Where *Scream ‘Em Up* was less successful was in the area of multiple physical inputs. While the players' lateral movement was wild and ridiculous, it was not quite as varied as their vocal modulation. This may indicate that the players were too focused on trying to shoot the enemies at the expense of the performativity of their lateral movement. While having multiple physical inputs seemed to benefit the vocal part of the game, it seemed to stress the physical part of the game, meaning that the game could benefit from better balancing and level design. Another explanation is that the system was attentive to the wrong criteria. The choice of the hip joint for the ship position may have been too limiting, as it required a specific type of lateral movement to trigger. The system could have been benefited by, for example, using an *average* of the joint positions. Although this requires more input, it does not require any given body part to be in a specific place at a given time. Such a strategy could allow players to move their ship with a much wider variety of movements (moving the whole body, leaning the body, or throwing limbs out to the side). *Scream 'Em Up* could thus benefit from a reexamination of its implementation of multiple physical inputs, as well as exactly what the system is paying attention to in terms of physical movement.

CONCLUSION

Most current exertion games use their console's tracking power to more strictly judge players' movements against a narrow set of accepted behaviors, using the technology to make the players 'fit' the game, rather than the other way around. While this kind of game has commercial appeal, its mandated conformity can result in the loss of precious space for adults to explore their physical creativity. By analyzing games and installations in which physical creativity is especially encouraged, certain game design techniques to enhance creativity and engagement become clear: namely, the use of inattentive systems, festive contexts, responsive systems design, multiple simultaneous physical inputs, and opportunities for playful transgression. By incorporating these strategies into their games, designers can create exertion games that support physical creativity, self-expression, and performativity in a coliberative setting.

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