A Proceduralist View on Diversity in Games

Gillian Smith

Abstract

The way in which information is represented to the machine, as well as how procedures use it, reveals biases during game development that influence the way in which players experience a game. Additionally, in order to critique the role of gender, race, and sexuality in games that are partially procedurally generated, it is necessary to examine the role the software takes as a designer. Looking at diversity and inclusion through a proceduralist lens allows us to more deeply analyze current games, as well as prompt new questions and avenues for technical and design research.

Introduction

The analysis and critique of gender, race, and sexuality in games has typically focused on narrative elements and visuals. Some scholars have pointed out an imbalance in the representation of women, and a scarcity of people of color in games (Williams, Martins, Consalvo, & Ivory, 2009). When characters from under-represented groups are present, they are cast in stereotypical roles–including some which encourage objectification by an assumed straight, white male audience. Thus far, analysis of player identity in games has understandably focused from perspective of the player, interrogating how people make meaning through play. This essay considers how the feminist analysis of identity politics can be adapted into a proceduralist understanding of representation that embraces the analysis of game mechanics and software design decisions in addition to images.

Author Biography

Gillian Smith is an Assistant Professor jointly appointed in Art+Design and Computer Science at Northeastern University. Her primary research interests are in procedural content generation for games, computational crafting, and issues surrounding feminism and social justice especially as they intersect with technology and game design. Her work attempts to answer questions such as how generative methods can be used to augment human design, how computational modeling of creative processes can help us better understand human creativity, and how AI systems embed politics and represent diversity in their design. She received her PhD in Computer Science from UC Santa Cruz in 2012, where she worked in the Center for Games and Playable Media.

Games have the potential to express the diversity of identity politics on the level of code. Critical games scholar, Ian Bogost's (2010) notion of procedural rhetoric states that games are capable of conveying political messages through their systems. These messages are often conveyed deliberately; players understand them by playing the game and learning from its underlying system. Treanor and Mateas (2013) define a proceduralist perspective as one in which "the meaning of the [game] is ultimately produced through the dialectical interplay between the mechanism and ways that players ascribe meaning to it." Although both analog and digital games have authored rules and procedures, the programming languages of digital games heavily influence their design. Even games that focus heavily on aesthetics and ambiance to the exclusion of strong rule systems–such as so-called "walking simulators" (Cook & Smith, 2015)–have rules that govern player movement and environmental physics. Player behavior is informed by interaction with, limitations from, and the subversion of these rules.

A game's "playability" relies upon players being able to interact with a system of rules (Sullivan, Mateas, & Wardrip-Fruin, 2009). Just as physics puzzlers or platformers require an underlying formal model for how physical objects interact, so too do story-based games need an underlying formal model for character behavior (McCoy, Treanor, Samuel, Mateas, & Wardrip-Fruin, 2011). "Social physics" engines, whether implemented as complex artificial intelligence (AI) systems or as simple flags and Boolean variables, make commitments about characters' potential identities and the space of potential social interactions supported in the game.

There is also a rising interest in procedural content generation for games. Since computational systems are frequently responsible for authoring content and even entire games, any analysis of that content should include analysis of the system that created it. We hang analysis of human-created content on theories related to human society; for computer-created content, this analysis should include additional information about how the software was constructed.

A feminist and proceduralist approach to game analysis lets us examine more than just the ways that diversity is *shown* to the player by designers, artists, and writers, it also helps us see how players can *perform* and *play* with identity. The biases of both algorithms and narratives play out over the course of a game. This essay argues for taking a proceduralist view on analysis of diversity and inclusiveness in games, and shows how future work in game design can support the development of socially responsible procedural content generation systems.

Language for Describing Software Design

Software consists of two layers: the *knowledge representation* layer and the *algorithmic* layer. As I consider playable identity and procedural design in the following sections, I will consider them in the context of both software layers.

The *knowledge representation* layer consists of the data provided to a system–whether directly by a human designer, or indirectly through gathering from other sources–that is then used by different game algorithms. Examples might include the layout of a game level, the different options available during character creation, or the individual story components that are authored by humans and combined by a story generator. Knowledge representation dictates the level at which a system can meaningfully respond to a player choice: computers are unaware of data which has not been coded and are incapable of responding to it.

In the *algorithmic* layer the system must reason and make decisions about which actions to take. Examples here include the ways that level elements react with each other, how an NPC responds to a particular player action, and the ways that a story is assembled from constituent parts. An algorithm is the formalization of a process, be it a creative design process (in the case of procedural generation), or the thought process of another character.

Playable Identity

Playable identity is the intersection of player performance and algorithmic performativity within an avatar. An ethical approach to playable identity does not aim to have a realistic simulation of contemporary identity politics; rather, this approach questions the degree to which algorithmic systems support players in their choices regarding identity politics. While gender/sexuality and color-blind system design is a tempting and occasionally appropriate solution to this problem, sometimes neutral algorithmic responses betray an underlying bias.

Feminist scholar Judith Butler's (1999) notion of performativity and considering a player's conscious performance help us to better understand the hidden biases of algorithms. Performance relates to the conscious decisions made by the player. Players perform their character's identity in games–they make choices in character creation and use props made available by the game. In games where players are free to use natural language, especially multiplayer online games, players have the freedom to express themselves outside of the the game's structure. In role-playing games specifically, non-player characters also perform a heavily scripted identity.

Performance and performativity occur within a space defined by physical rules and social norms. Performativity does not need to be (and often is not) consciously engaged by the performer. For instance, a player's avatar might perform femininity (through its body and choice in clothes) while the player conscientiously performs masculinity (through their avatar's speech patterns). Adherence to social norms is a performance, though typically not a conscious one. The game world provides additional context, constraints, and affordances informed by the game's nature as a software artifact. Through their software design decisions, the developers of game environments shape the space in which the player performs, and therefore influence the range of performance and performativity that can emerge in that

space.

Fable (Big Blue Box Studios, 2004) is an excellent example of how performance and performativity intersect. A player performing femininity by wearing a skirt can receive comments from bystanders that she is wearing nice "trousers." This intersection is symptomatic of the algorithms gendered assumptions.

Software is a formal representation of how physical rules and social norms are enacted in the game world–some of these rules and norms may intersect with reality (e.g. sexuality, gender, and race), while others may be added or augmented to fit with the game's fiction (e.g. species). In building a formal model of real world phenomena, some features will be prioritized while others will be ignored. Thus, examining the model itself–in terms of both its representation of knowledge and processes that use that knowledge–is crucial for understanding the context within which players are performing an identity.

At the *knowledge representation* layer, we can examine how identity is encoded within the game. This often becomes clear during the character creation process, where players make choices about the appearance and personality traits of their characters. Sometimes, important aspects of identity are left out of this process; for example, in her analysis of queer identity in The Sims, feminist game scholar Mia Consalvo (2003) considers how queerness is explicitly "coded in" or "coded out". Other choices, like hairstyle, may be more explicit. The *Mass Effect* (BioWare, 2007) series, like many other roleplaying games, allows players to choose whether they are male or female, thus conflating sex and gender identity in the process and perpetuating a binary view of gender. It also allows players to choose a skin color, presumably to be used as a signifier for race.

At the *algorithmic* layer, we can see how the choices that players make about their identity influence character behavior in the game. Often, systems enact a "neutral" stance on the player's chosen identity by having the algorithm ignore choices that players have made regarding their identity when processing decisions–characters often respond in the same way to players regardless of skin color, and in role-playing games with same-sex romance options, a player commits to their character's sexuality only when deciding with whom to pursue a relationship. Another common choice is to tag dialog options based on gender or race, and select the appropriate dialog options at runtime. For instance, *Dragon Age: Origins* (Bioware, 2009) occasionally adds dialogue options for female characters before the standard dialog tree is displayed.

Developers must consider more nuanced models of playable identity. When defining a computational model for a character, a developer is making commitments to what it means to be a person, which traits should be prioritized and which should be ignored. Instead of using Boolean variables for gender (marking whether the player is male or not), other representations can be explored: floating point numbers could allow players to express their identity on

sliding scales of masculinity or femininity, and a vector representation can permit players to express how important particular aspects of their identity are to them. Similarly, race and sexuality can also be formalized in these ways. Artificial intelligence and game researchers Chong-U Lim and Fox Harrell (2015) have also been investigating how to build a more nuanced model of player identity. They argue for systems which account for socio-cultural aspects such as family status, class, and elements of personal history.

Procedural Design

Given the rising interest in procedural content generation (PCG) in games, we are now encountering situations where computational systems take on partial responsibility for game authorship. Designers are drawn to PCG for many reasons, such as the (often false) promise of relieving authorial burden, an ability to sustain player interest through new and surprising content, and attempts to personalize content to a particular player's interests and experience level. The way in which these PCG systems are constructed reflect their designer's view of the content being created (Phillips, Smith, Cook, & Short, 2016). In short, procedural design must be considered central to the emerging ethics of playable identity.

Systems that generate procedural content must create a formal and complete definition of their computational or "generative space"–considering all potential pieces of content in that category (Smith & Whitehead, 2010). This system must have a specification that describes the nature of what it is creating (*knowledge representation*) as well as what is considered an appropriate method for designing it (*algorithm*). It is not always obvious from a single playthrough of a game with generated content what the character of generative space is, since most PCG systems can create thousands, even millions, of different configurations of content. Therefore, critiques of generated content are often unnecessarily shallow. Despite this interpretive limitation, the politics of procedural content can be understood by understanding the affordances of its schematic. A procedural content generator, unlike a human artist, relies on a readable blueprint for its understanding of the world and its creative process.

There are different kinds of knowledge representation and algorithms used in PCG, in both industry and academic research (Smith, 2014). The layers of knowledge representation are defined in terms of granularity. Some generators use large pieces of content that are human-authored and independently recognizable, while others on the opposite end of the spectrum may use smaller components. For example, an avatar generator might randomly select from existing character portraits that are created by human artists, or may have different modular body parts that can be assembled at runtime. A name generator might pick first and last names from a standard list, or might attempt to construct new, unique names from phonemes. Analysis at the knowledge representation layer can reveal underlying biases and assumptions made by the authors of the system in a way that looking at a single piece of finished content alone cannot. Clearly, our hypothetical avatar generator will never create a person who sits in a wheelchair if there is no wheelchair option in the source material.

More sophisticated methods for creating content include learning from other data sources. *QuestBrowser* is a generative tool for quest designers to create innovative quest structures. A designer can enter a prompting word or short phrase describing the start and end states of the quest, and the system will give brainstorming prompts in the form of chains of concepts that link the start and end states together (Sullivan et al., 2009). ConceptNet itself is built in part upon crowdsourcing, where members of the general public can "teach" the system about the relationship between concepts (for example, a *teacher* is associated with *children*, or a *dog* is *man's best friend*) (Speer & Havasi, 2013). This necessarily biases the system towards concepts that members of the public have chosen to enter. At the time of this writing, the concept of "woman" is described in the ConceptNet 5 database as: 1) being used for having sex, 2) being a female person, 3) being a slut.[1] Use of crowdsourced information in a generative system opens up that system to the biases of the crowd.

At the algorithmic layer, the simplest possible form of content generation is to randomly select elements from the knowledge base and combine them. This makes the statement that all potential combinations of elements are considered appropriate and equal to each other. Continuing the avatar generation example, if there is only one wheelchair component while there are several different options for legs that are standing up, then combinatorics tells us there will be very few characters created who are in wheelchairs.

A more complex form of content generation is to repeatedly generate and test content until it meets a human-authored "optimum" value, known as search-based PCG (Togelius, Yannakakis, Stnaley, & Browne, 2011). These systems are sensitive to the knowledge representation that's used, in that it influences the kinds of content that can be created with it. But they are equally sensitive to the optimization function, and require a human designer to explicitly define not only what content can be made out of but also what it means for content to be considered "good" or "optimal".

Generating content carries with it the risk that, no matter the care paid by the designer, the system will create inappropriate or offensive content. Microsoft's *Tay* twitter chatbot is a recent example of this. The system "learned" how to interact with other people on twitter via conversations, and quickly began responding with racist commentary that it had observed from other twitter users (Bright, 2016). To combat this problem, a common technique used is to "blacklist" certain combinations of content or words. For example, generative artist and prolific twitter bot creator Darius Kazemi maintains a blacklist of offensive words to be avoided in twitter bots, and deliberately created it to be more restrictive than permissive to fully prevent accidental offensive statements (Jeong, 2016). It is interesting to note that instead of needing to understand why what it might say is inappropriate, it simply follows a set of prescribed rules to avoid giving offense, echoing rhetoric used by humans around the idea of "political correctness".

Conclusion

Humans who author procedural systems of playable identity are creating systems that lack empathy. These systems can only interact on the basis of what they have been "told" to understand, whether they have been hard-coded with responses, learned from interacting with others, looked at large corpuses of information for design ideas, or been imbued with a social understanding through painstaking hand-authoring of social theories. A socially responsible and aware approach to game design thus requires consideration of social issues at every stage of creating the software. Providing cultural context to a computational system is often done unintentionally, through the inclusion or exclusion of certain features in knowledge representation, or the decision for a process to be "blind" to aspects of identity such as gender, race, or sexuality. AI authors in particular often rely on "smoke and mirrors" to create the illusion of intelligence; this illusion falls apart when subjected to scenarios that the designer of the system did not originally envision (Wardrip-Fruin, 2009).

Thus, there are many avenues for future research and design in order to support game designers in making sure their game systems embody diversity and inclusiveness in the way they wish. Technical research directions include investigating methods for giving AI more cultural context automatically and judging the value of what they have "learned", how to create tools that allow designers to author complex social scenarios and appropriate responses for a variety of player identities, and how to visualize and define the expressive range of a content generator using metrics that can uncover unintentional biases in the generative system.

Examining the procedures underlying games gives us an additional lens through which we can view the game's treatment of issues around diversity and inclusiveness. These procedures are authored by human designers and developers, and reflect their implicit and explicit biases as well as larger cultural norms. This essay has argued for the importance of examining games as software artifacts, looking at both the taxonomies and formal models used in knowledge representation strategies, as well as the algorithms themselves.

Acknowledgments

The ideas presented here build from discussions and previous writing with Amanda Phillips, Michael Cook, and Tanya Short. Thanks also to Aaron Trammell for valuable feedback on previous drafts that were crucial for shaping this essay.

Endnotes

1. These definitions sit alongside the somewhat more progressive descriptions of a woman as being equal to men, and capable of thinking.

References

Big Blue Box Studios. (2004). *Fable*. Xbox: Microsoft Game Studios.

BioWare. (2007). *Mass Effect*. Xbox 360: Microsoft Game Studios.

BioWare. (2009). *Dragon Age: Origins*. Xbox 360: Electronic Arts.

Bogost, I. (2010). *Persuasive games: The expressive power of videogames*. Cambridge, MA: The MIT Press.

Bright, P. (2016, March 26). Tay, the neo-Nazi millennial chatbot, gets autopsied. *Ars Technica*. Retrieved from http://arstechnica.com/information-technology/2016/03/tay-the-neo-nazi-millennial-chatbot-gets-autopsied/

Butler, J. (1999). *Gender trouble: Feminism and the subversion of identity*. New York: Routledge.

Consalvo, M. (2003). Hot dates and fairy-tale romances: Studying sexuality in video games. In M. J. P. Wolf & B. Perron (Eds.), *The Video Game Theory Reader* (pp. 171–194). New York: Routledge.

Cook, M., & Smith, G. (2015). Formalizing non-formalism: Breaking the rules of automated game design. In *Proceedings of the Foundations of Digital Games Conference*.

Jeong, S. (2016, March 25). How To Make A Bot That Isn't Racist. Retrieved April 21, 2015, from http://motherboard.vice.com/read/how-to-make-a-not-racist-bot

Lim, C. U., & Harrell, D. F. (2015). Understanding players' identities and behavioral archetypes from avatar customization data. In *Proceedings of the 2015 IEEE Conference on Computational Intelligence and Games* (pp. 238–245). Tainan, Taiwan.

McCoy, J., Treanor, M., Samuel, B., Mateas, M., & Wardrip-Fruin, N. (2011). Prom week: Social physics as gameplay. In *Proceedings of the 6th International Conference on the Foundations of Digital Games* (pp. 319–321). Bordeaux, France: ACM.

Phillips, A., Smith, G., Cook, M., & Short, T. (2016). Feminism and procedural content generation: toward a collaborative politics of computational creativity. *Digital Creativity, 27*(1), 82-97.

Smith, G. (2014). Understanding procedural content generation: A design-centric analysis of the role of PCG in games. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 917–926). Toronto, Canada: ACM.

Smith, G., & Whitehead, J. (2010). Analyzing the expressive range of a level generator. In *Proceedings of the Workshop on Procedural Content Generation in Games, co-located with FDG 2010*. Monterey, CA.

Speer, R., & Havasi, C. (2013). ConceptNet 5: A large semantic network for relational knowledge. In I. Gurevych & J. Kim (Eds.), *The People's Web Meets NLP* (pp. 161–176). New York: Springer.

Sullivan, A., Mateas, M., & Wardrip–Fruin, N. (2009). QuestBrowser: Making quests playable with computer-assisted design. In *Proceedings of the 8th Digital Art and Culture Conference*. Irvine, CA.

Togelius, J., Yannakakis, G. N., Stanley, K. O., & Browne, C. (2011). Search-based procedural content generation: A Taxonomy and Survey. *IEEE Transactions on Computational Intelligence and AI in Games, 3*(3), 172–186.

Treanor, M., & Mateas, M. (2013). An account of proceduralist meaning. In *Proceedings of the 6th International Conference of the Digital Research Association*. Atlanta, Georgia.

Wardrip-Fruin, N. (2009). *Expressive processing: Digital fictions, computer games, and software studies*. Cambridge, MA: The MIT Press.

Williams, D., Martins, N., Consalvo, M., & Ivory, J. D. (2009). The virtual census: representations of gender, race and age in video games. *New Media & Society, 11*(5), 815–834.