Three Perspectives on Behavior Change for Serious Games

Joshua G. Tanenbaum
Simon Fraser University
Surrey BC, Canada
joshuat@sfu.ca

Alissa N. Antle
Simon Fraser University
Surrey BC, Canada
aantle@sfu.ca

John Robinson
University of British Columbia
Vancouver, BC, Canada
john.robinson@ubc.ca

ABSTRACT
Research into the effects of serious games often engages with interdisciplinary models of how human behaviors are shaped and changed over time. To better understand these different perspectives we articulate three cognitive models of behavior change and consider the potential of these models to support a deeper understanding of behavior change in serious games. Two of these models – Information Deficit and Procedural Rhetoric – have already been employed in the design of serious games, while the third – Emergent Dialogue – is introduced from the field of Environmental Studies. We situate this discussion within a context of designing games for public engagement with issues of environmental sustainability.

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Serious Games; Sustainability; Behavior Change; Procedural Rhetoric; Emergent Dialogue

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INTRODUCTION
In the games research community the power of games to influence behavior is subject to ongoing debate. Researchers invested in games as a significant medium of cultural expression often are faced with the conundrum of wanting to be on two sides of an argument at once. On one side, games are defended against the critiques of myriad advocacy groups who seek to scapegoat them as a cause of youth violence [3]. On the other side, games are lauded as powerful vehicles for learning and persuasion [6]. Researchers interested in advocating for either of these perspectives had best be prepared to accept the ethical implications of the other. We contend that a more nuanced understanding of interdisciplinary perspectives on behavior change can productively broaden the conversation around games, particularly as it applies to "serious games", "games for change", and "game-based-learning".

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We are conducting this research within the context of Vancouver's *Greenest City Conversations (GCC) Project :* an interdisciplinary collaboration aimed at fostering and evaluating multiple channels for public engagement on sustainability policies. In this paper we present three perspectives on persuasion and behavior change and consider how they may be used to inform the design of serious games and other digital media for sustainability. The first perspective–the Information Deficit Model–is in common use in current approaches to sustainability education, and can also frequently be seen in many learning games. The second perspective–Procedural Rhetoric–derives from recent theories around persuasive games and is employed in what have been termed "newsgames" (most notably Gonzalo Frasca's *September the 12th*) [4, 13]. The final perspective–Emergent Dialogue–is an approach from Environmental Studies to public engagement that emphasizes bottom-up local solutions arrived at through participation in a dialogic process [9]. These three perspectives are by no means the only (or even the *best)* strategies for affecting behavior change, however we contend that they represent a useful continuum for designers to take into consideration when developing serious games.

THE INFORMATION DEFICIT MODEL

The Information Deficit model of behavior change operates on the premise that unsustainable behaviors occur because people don't know any better. This model posits that providing information changes values; value change drives changes in attitudes; attitude change drives changes in behaviors [7]. For example, it is common for local governments and organizations to run community workshops and lectures intended to educate participants about the benefits of recycling, conservation, reuse, and other environmentally friendly practices. These types of workshops work on the assumption that unsustainable behaviors arise from a lack of education. This same assumption also dominates current K-12 curriculum design and pedagogy. This model assumes a top-down model of sustainable behavior where some entity or organization (such as a national government, NGO, educational institution, or other authority) has already determined what the optimal behavior is for the individual to adopt (Figure 1a). This persuasive model depends on the intellectual commitment that what the public is largely lacking is

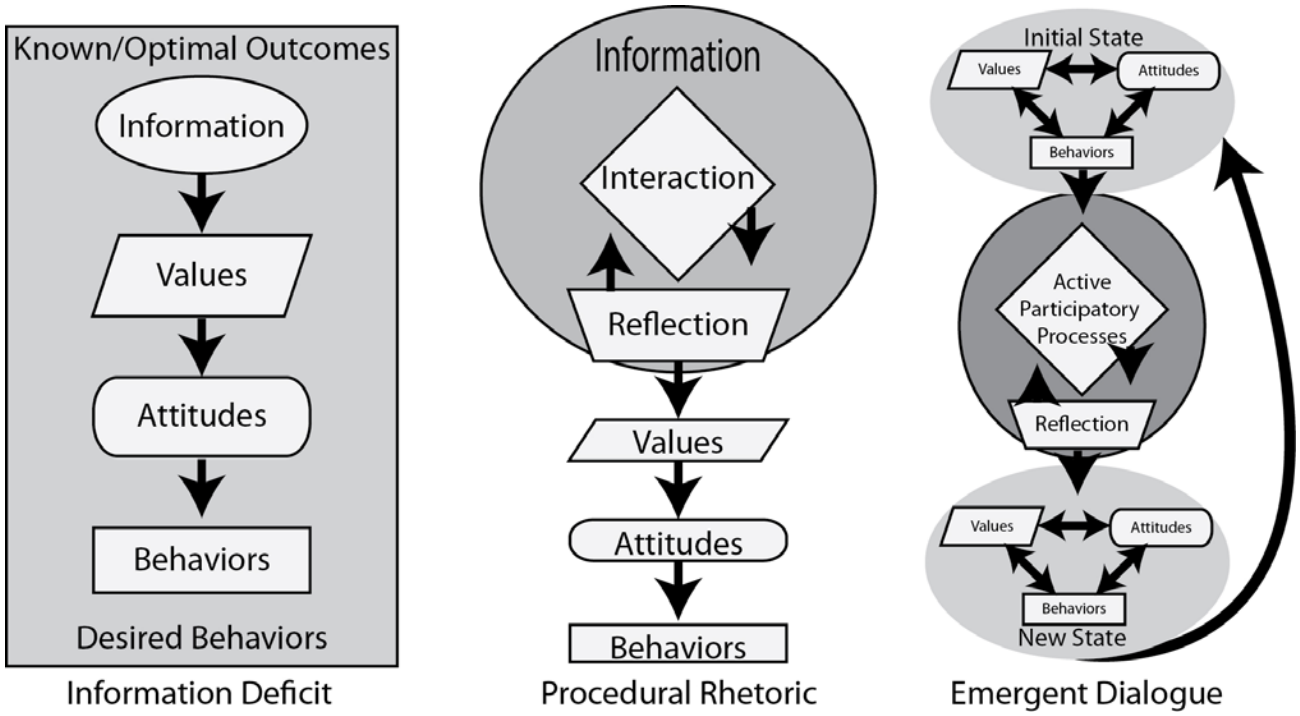

Figure 1 Three models of behavior change (left to right) a. Information Deficit, b. Procedural Rhetoric, c. Emergent Dialogue

information. This approach suffers when confronted with topics that do not yield easy answers. As John Robinson points out:

> "Multiple conflicting views of sustainability exist [that] cannot be reconciled in terms of each other. In other words, no single approach will, or indeed should be, seen as the correct one. This is not a matter of finding out what the truth of sustainability is by more sophisticated applications of expert understanding ... Instead we are inescapably involved in a world in which there exist multiple conflicting values, moral positions and belief systems that speak to the issue of sustainability." [9]

Games designed from the perspective of the Information Deficit model excel at delivering facts, but facts alone are insufficient to persuade. In situations where facts are unclear, or subject to disagreement, this approach breaks down. In these cases, the information deficit model does not reliably produce significant behavior change.

PROCEDURAL RHETORIC

In the field of Serious Games, one of the biggest areas of interest is sustainability and environmental issues (as evidenced by the substantial proportion of environment themed games listed on the *Games For Change* website) [5]. As interest in serious and persuasive games has risen, new models of persuasion in games have evolved. One current theory for how games persuade their players is Ian Bogost's concept of *Procedural Rhetoric* [1]. Procedural Rhetoric is based on the notion that the processes and activities that interactors engage in during play are more persuasive than the information that is layered on top of those processes.

> "Procedural rhetoric is a general name for the practice of authoring arguments through processes…Procedural rhetoric entails expression—to convey ideas effectively…its arguments are made not through the construction of words or images, but through the authorship of rules of behavior, the construction of dynamic models." [2]

An excellent example of Procedural Rhetoric in action can be found in Gonzalo Frasca's newsgame *September the 12th* [4]. In it the player is presented with a cartoon depiction of a city in the Middle East. The streets are populated with civilians going peacefully about their daily lives. Interspersed among the civilians are armed terrorists. The player has control to move a mouse cursor shaped like a targeting reticle around over the busy streets. When the player clicks the mouse button there is a brief pause and then a missile strike hits the section of the city that was targeted, killing any of the virtual inhabitants that may have wandered into the line of fire during the delay. When this action results in the death of a civilian, another civilian will stop and weep over his or her dead friend or family member, before picking up a gun and transforming into a new terrorist. Through this simple combination of rules and simulational logic, *September the 12th* makes a very pointed claim about collateral damage and the "war on terror".

Unlike the Information Deficit model, Procedural Rhetoric grounds itself in interactive cycles of experience and reflection, similar to those advocated by James Gee [6]. Information and values are still present in this model, but

the delivery of facts is not the basis for behavior change. Instead, information underlies the design of a set of simulated processes: it is the experience of interaction and reflection that motivates any changes in values, attitude and behavior (Figure 1b). Although for different reasons, Procedural Rhetoric and the Information Deficit model both employ a top-down approach. For Procedural Rhetoric, this emerges out of the necessarily asynchronous medium of communication: an author or designer must encode a procedural system with a set of potential activities which are then enacted by the interactor.

EMERGENT DIALOGUE

The final model of behavior change is a relatively new one from within sustainability research, based on extensive critiques of the Information Deficit model. As articulated by Robinson et al. [9-11], this model suggests that what is needed is not *information* but *participation* in meaningful processes exploring sustainability issues. Unlike the previous two models, this approach deals specifically with *groups* of people participating in some sort of civic activity.

Robinson's group argues that the previous conception of a unidirectional flow from information and values to attitudes to behaviors is inaccurate. Instead, they contend that information flows in a bi-directional manner, and that often the flow is in reverse: that people bring their attitudes in line with the behaviors they are already accustomed to, as is the case when an individual uses statistics about an increase in recycling to justify not turning off the light when leaving a room.

In participatory processes, the information content is not predetermined in a top down manner: instead it emerges through dialogue. This then leads to new understandings, which then feed back into the loop in an iterative process of ongoing negotiation and reevaluation. From this perspective, the goal of public engagement is not to *educate* people about correct or incorrect behavior but instead to *motivate* people to generate their own views about the type of world they want to live in. Unlike the previous two models, which focus on the decision making process of individuals, Robinson's Emergent Dialogue model positions people as social actors, collectively negotiating a shared vision of their desired future. The Emergent Dialogue model is not focused on individual behavior change but instead on social mobilization in support of collective behavior change. This emerges from the judgment that the most important changes are those (like land use, density, urban form, settlement patterns, transportation infrastructure, energy and water systems) that do not occur at the individual level but at the collective level (and indeed deeply constrain individual behavior change). Participating in these dialogical processes provides individuals and communities with a path to shaping civic policies, while also providing local governments and other stakeholders with a more direct mechanism for communicating their goals and constraints to the public.

Figure 1c shows one way of conceptualizing the Emergent Dialogue model, highlighting the iterative processes of feedback and reevaluation that it introduces.

Unlike the Information Deficit model, which is communicating a preset story about sustainable practices, processes of engagement which employ the Emergent Dialogue model create a context for individuals and stakeholders to imagine their own story for the future. The potential benefit of this model is that participants recognize the complex, multi-level nature of ecological, social and economic problems, and the consequent need for innovation, creativity and adaptive response.

Unlike the Procedural Rhetoric model, which is limited by what can be encoded within a computational system, the Emergent Dialogue model operates under the assumption of multiple human participants, all of whom are capable of creating new information through the process of engagement. This model is thus the only one of the three that fully supports the creation of new outcomes and information about sustainable practices. However, this strength also limits the approach, as the applicability and viability of these outcomes is a function of the commitment and effort of the participants. The biggest challenges faced in implementing this approach are establishing buy-in from a wide range of stakeholders with often very different needs and objectives, and finding ways to scale the process to accommodate a range of communities.

ANALYSIS OF THE MODELS

Each of these models has certain advantages and disadvantages for the design of serious games for sustainability. For many years the Information Deficit model dominated educational game design, which resulted in many games where the content being delivered by the game had very little to do with the gameplay itself. This is still a very common problem for educational games, with a proliferation of games with either game mechanics that are abstracted from the intended lesson, such as NASA's "Recycle This!", or games with no gameplay or game mechanics whatsoever, such as the EPA's "Dumptown" [8, 12]. Our biggest critique of the Information Deficit model is that it has historically failed to result in behavior change. From the perspective of Emergent Dialogue, this is because the Information Deficit model does not provide any avenue along which the recipient may arrive at her own conclusions. Both the Procedural Rhetoric and Emergent Dialogue models provide participants with opportunities to experience the issues through an active process and to arrive at their own conclusions about what is required to move themselves, their community, and their culture towards a more sustainable future. While Procedural Rhetoric still relies on a top-down asynchronous model of information, it does have the distinct advantage of being more easily communicated and transmitted via procedural systems such as games and simulations. Where Emergent Dialogue really stands out is in its ability to reincorporate

personal and local approaches to sustainability back into the dialogical process, however there are significant challenges in eliciting buy-in from relevant stakeholders, as well as scaling issues that make it difficult to engage larger communities. Emergent Dialogues can benefit from new methods of facilitation that do not require large scale community events in order to succeed, or that can incorporate a broader subset of community members.

We thus see these three models as existing along a spectrum from the most authoritarian top-down approach on one end (the Information Deficit model) to the most participatory and bottom-up approach on the other end (the Emergent Dialogue Model). Procedural Rhetoric represents the current limit of our ability to design and conceptualize computational systems that support participatory meaning making processes.

Serious Games for Sustainability

A full survey of the current state of serious games for sustainability is outside the scope of this paper, The specific challenge faced by the GCC project is how to implement and incorporate elements of the Emergent Dialogue approach within a games design. We contend that games utilizing Procedural Rhetoric can be used as part of a larger process of public engagement, by contextualizing them within a broader conversation about sustainability. Games and simulations provide configurable tools that can serve as shared points of reference and negotiation for intergenerational conversations and small scale workshop participation. If a Procedural Rhetoric is made sufficiently entertaining, it has the potential to engage members of the public who might not otherwise be motivated to participate in a dialogue about sustainability issues. In spite of their limitations, we see serious games as playing an important role in an emergent process of public dialogue, which we see as essential to a process of behavioral change.

CONCLUSION

Designers of serious games may employ each of these three strategies in parallel, depending on the desired outcome. For example, games that incorporate the Information Deficit model can provide participants with detailed access to facts, opinions, and other materials related to the issue, but may not provide the participant with an experience that is similarly relevant. Games designed using the Procedural Rhetoric model may not include as much factual information; however the activity of playing them should create a state of mind in the participant that communicates a message about the related issues. Finally, games designed with Emergent Dialogue in mind need to provide the participant with the ability to create her own models and potential outcomes by configuring different variables within a domain of concern. Any one of these approaches is going to incorporate elements of the other two: a game rooted in Emergent Dialogue will still require information to manipulate, and any interactive system is going to include a Procedural Rhetoric of some sort. By incorporating an awareness of these modes of engagement into our designs we are able to create game experiences that more specifically serve a particular approach to facilitating public engagement.

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REFERENCES

1. Bogost, I. (2007). *Persuasive Games: The Expressive Power of Video Games*. The MIT Press, Cambridge.
2. Bogost, I. (2008). *The Rhetoric of Video Games*.In The Ecology of Games: Connecting Youth, Games, and Learning, K. Salen, eds. The MIT Press, Cambridge, MA.117 - 140.
3. Engelhardt, C. R., Bartholow, B. D., Kerr, G. T. and Bushman, B. J. (2011). This Is Your Brain on Violent Video Games: Neural Desensitization to Violence Predicts Increased Aggression Following Violent Video Game Exposure. *Journal of Experimental Social Psychology*, 47, 5, 1033-1036.
4. Frasca, G. (2003). *September the 12th*.Retrieved from http://www.newsgaming.com/games/index12.htm on September 12, 2012
5. Games for Change. (2011). *Games for Change: Play*.Retrieved from http://www.gamesforchange.org/game_categories/environment/ on July 10, 2011
6. Gee, J. P. (2007). *What Video Games Have to Teach Us About Learning and Literacy*. Palgrave Macmillan, New York, NY, USA.
7. He, H. A., Greenberg, S. and Huang, E. M. (2010). One Size Does *Not* Fit All: Applying the Transtheoretical Model to Energy Feedback Technology Design. *Proc. CHI 2010* 927-936
8. Nasa. (2012). *Recycle This!*Retrieved from http://climate.nasa.gov/kids/games/recycleThis/index.cfm on September 14, 2012
9. Robinson, J. (2004). Squaring the Circle? Some Thoughts on the Idea of Sustainable Development. *Ecological Economics*, 48, 369-384.
10. Robinson, J. (2008). Being Undisciplined: Some Transgressions and Intersections in Academia and Beyond. *Futures*, 40, 1, 70-86.
11. Salter, J., Robinson, J. and Wiek, A. (2010). Participatory Methods of Integrated Assessment - a Review. *Climate Change*, 1, 5, 697-717.
12. The United States Environmental Protection Agency. (2012). *Dumptown Game*.Retrieved from http://www.epa.gov/recyclecity/gameintro.htm on September 14, 2012
13. Treanor, M. and Mateas, M. (2009). Newsgames: Procedural Rhetoric Meets Political Cartoons. *Proc. DiGRA 2009*