Games for Good: Why they Matter, What We Know, and Where We Go from Here

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This concluding essay compares games for good and cognitive technologies in order to articulate the importance of these interactive media technologies for the discipline. By better understanding what we know about games for good as cognitive technologies, and by considering what cognitive technologists can learn from game designers as well as what game designers can learn from cognitive technologists, we can continue our move toward exciting and productive new lines of research in both theoretical and applied domains. This essay integrates ideas from the work of the contributors for this special issue and speculates on new directions for future work in this area.

KEYWORDS: Video Games, Learning, Cognition, Characteristics, Future Research

INTRODUCTION: WHY THEY MATTER

Games for good as a genre of video games and cognitive technology as a domain of study have much in common. In their applied forms, both rely heavily on interdisciplinary practices. They borrow ideas and inspiration from several of the same fields, such as engineering, psychology, computer science, artificial intelligence, art and aesthetics, sociology, interface design, and sound design. Both attempt to open technologies to human audiences in order to augment, extend, educate, or enlighten the human experience. They often do this by using new forms of information visualization and enhancing usability in order to keep people focused, on task, and free of frustration. Both have had profound goals at their origin, with the potential for significant societal impact.

One of the earliest proponents of cognitive technology, Vannevar Bush, wrote in his famous 1945 essay *As We May Think* of the need for scientists to turn information technologies developed for the military into tools for augmenting human intellect and improving the world. In a similar thrust, today's games for good researchers hope to turn technologies developed primarily for commercial entertainment into something more beneficial to society. These designers advocate grassroots solutions, experimental and guerilla game design, and the promotion of awareness for issues such as poverty, climate change, and global conflict through the capabilities of interactive, multimedia gaming.

The above characteristics describe cognitive technologies and video games primarily in terms of their technological and operational capabilities. However, both of these forms also have social and cultural implications depending on the communities and practices in which they are embedded. Cognitive technologies and games for good can be used in a variety of ways for a variety of purposes. These purposes might be characterized as "good," "evil," "neutral," or any other number of things, depending on a particular audience and their beliefs. These descriptors are admittedly nebulous concepts tangled in notions of personal value systems and idiosyncratic interpretations, so we conceptualize games for "good" as systems that attempt to propagate social justice, expose the underlying mechanics at work in personal or organizational value systems, or make a positive change in the world according to the criteria of a reasonable social agenda. Of course this is mired in politics and ideological values, so one community's "game for good" might be another community's "game for moral corruption" or even "game for liberal (or conservative) propaganda." Regardless of personal perspectives and community value systems, though, since video games have the *rhetorical potential* to be so persuasive and engaging for audiences (see Bogost, 2007), we, as cognitive technologists, should have them on our radar. How we react to and shape the cognitive technologies of the future might expand from what we learn about video games and human behavior.

For the purposes of this issue, we have chosen to feature games that embody these types of goals—several of the games for good discussed here educate, empower, encourage empathy, and elicit compassion. Values such as these are easily classified as prosocial. This subset of video games does not, however, provide us with a fully generalizable understanding of the relationship between video games in general and the typical types of research undertaken by cognitive technologists. In order to better understand this relationship, we must a step backwards and consider the larger relationship between cognitive science, technology, and video games. We must create a conceptual space for research in which video games and cognitive technologies can be explored in various permutations as holistic systems.

WHAT WE KNOW

We can start this process by considering some of the work done in conceptualizing video games as subjects for scholarly and critical analysis. Perhaps no book has done more for positioning the field of video game design as a legitimate academic subject than Katie Salen and Eric Zimmerman's (2004) *Rules of Play: Game Design Fundamentals*. The book is notable not just for its attention to detail and focus on video games as a subject deserving of rigorous academic scrutiny, but also for its comprehensive treatment of the medium from a variety of perspectives and analytical lenses. As an interdisciplinary subject of discussion—much like cognitive technology—a balanced discussion of video games must include not only engineering and design principles, but also principles of human behavior, psychology, economics, art, and culture, to name but a few essential components. One of the interesting discussions provided by Salen and Zimmerman concerns the complex relationship between the activity of play and games. As the authors note, games can be seen as a subset of play, in the sense that "most forms of play are looser and less organized than games" (p. 72), but at the same time, play can also be characterized as a component of games, since "the experience of play is but one of many ways of looking at and understanding games" (p. 72). In this sense, then, how might we relate the similar concepts of games and cognitive technologies, where the goals of behavior are likely to be more goal-directed and prescriptive?

Following Salen and Zimmerman, one direct way of relating games and cognitive technologies is to conceptualize video games as a subset, or particular type, of cognitive technology. Certainly games can function as tools to enhance cognition—one need only to look at Matthew Sharritt's discussion of the staff happiness algorithms running in *RollerCoaster Tycoon 3* or Jonathan Belman and Mary Flanagan's mention of the mathematical models used to represent diplomacy in *Peacemaker* to realize that such computations would become cumbersome if done exclusively by the human mind—but they can also serve as technological tools for enhancing social, cognitive, or emotional functioning. This may occur through the simple act of enabling connections to other human beings in a technology mediated environment or through allowing the cathartic act of bringing down zombies in an alternate universe. From this perspective, then, games are specialized instances of cognitive technologies.

Alternatively, though, we can also think of cognitive technologies as components of games. The staffing mechanism in *RollerCoaster Tycoon 3* that Matthew Sharritt discusses is a cognitive technology, and so is the keyboard pressing mechanism recounted by Jonathan Belman and Mary Flanagan in their analysis of *Hush*. This classification of particular game components as cognitive technologies is fairly sound; both devices augment players' thinking by abstracting the details of the physical acts away such that the players' can focus on the experiences crafted by the game designer. The purposes of these two games, however, are quite different. The designers of *RollerCoaster Tycoon 3* wish for the player to understand and excel at the systems-based approach of running a theme park, while the designers of *Hush* wish for the player to experience the tension, angst, and terror of being one small cry away from a massacre at the hands of soldiers. The implementation of these tools is also dissimilar: *Hush* uses a basic keyboard press to allow player interactivity, while *RollerCoaster Tycoon 3* requires a more complex and investigative approach. From this perspective, games as cognitive technologies must be further analyzed by facets such as game genre, purpose, functionality, and audience.

Yet another way of considering games for good and cognitive technologies is as a Venn diagram in which each entity has its own individual properties and then there is shared space between them in which common properties overlap (Figure 1). For example, games must have quantifiable outcomes, rules, and conflict (Salen & Zimmerman, 2004) whereas cognitive technologies need not necessarily have quantifiable outcomes nor conflict. Rules are arguably an important component for cognitive technologies, but even rules operate differently than the mathematically precise rules we find in video games (see Table 1). Rules in a video game need to be clear and unambiguous, but rules for cognitive technologies, since they are designed to be in tune with the actual ways in which we think and process information, may be more fuzzy and open-ended. For example, returning to our opening example of the visionary cognitive technologist Vannevar Bush, a well-known early example of a cognitive technology was his memex machine. The memex was a hypothetical device designed to record the associative trails of memory and cognition that accompanied one's personal research efforts when looking up information about a particular subject. The sheer difficulty involved with collecting, arranging, and indexing these associative trails of information seeking is evidenced by the fact that no such device exists to this day. Humans are just too curious and too unpredictable; their thinking is too complex to easily and naturally categorize in the same fashion as we do with video game rules.

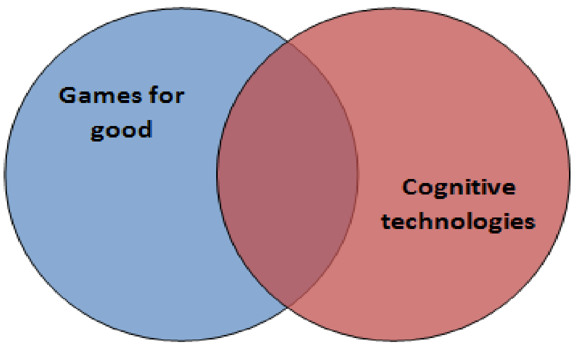

***Figure 1*. Venn Diagram of Games for Good and Cognitive Technologies.**

Given these three manners of conceptualizing this relationship of game genre and academic discipline, how do we approach the study of such a diverse and admittedly complex intersection with any sort of methodical plan? A systems-based approach is useful for this task. Returning to Salen and Zimmerman (2004), we see the authors articulating a three-pronged attack for understanding the complex space inhabited by game design and game studies. They suggest that an analysis of games can be performed according to understanding game systems through the lenses of rules, play, and culture. From the perspective of *rules*, games are mathematical formalisms in which logic and order construct the boundaries and challenge conditions which make gameplay enjoyable. This view is of a closed system since rules do not change once they are authored (unless, of course, there is a rule for that operation). As players *play* games, however, the elements of psychology and emotion are introduced and game design becomes observable from an active, human dimension. This may be an open or closed system, depending on whether or not we exclusively consider the player's interactions with the game itself or if we also consider the ways in which the players are shaped by the outside world as they play. Finally, the purely open dimension of games from a systems perspective is seen through a *cultural* lens in which games impact and are impacted by the cultures and communities in which they are embedded and played. For example, the discussion of violence in the *Grand Theft Auto* series (CBS News, 2005), or sex in the game *Mass Effect* by Fox News analysts (Grant, 2008) are examples of frequent and typical exchanges between culture and games in an open system.

Clearly, each of these perspectives can offer useful research ideas for cognitive technologists, and many of these areas have already been explored. For example, studies of violent acts in the real world after playing video games study the transfer of rules from the virtual to the real, while the socioeconomic impact of such studies and their use to influence public policy is a cultural phenomenon, ripe for analysis by those scholars interested in the sociopolitical implications of cognitive technology. Those more interested in player learning and the transferability of knowledge are engaging both the rules and the play layers of video games; in this case, rules are engaged as the player interacts with the game world, but the player's cognition is also influenced by the game and by the avatar in the game (refer back to Figure 1 in Shlomo Berkovsky et al. in this issue for a visual representation of this feedback relationship).

It stands to reason, then, that given the complex relationship between the open and closed systems at work in video games, play, and cognition, conceptualizing games for good as cognitive technologies is a sophisticated process. If we think of the prototypical "game for good as cognitive technology" as an applied product that must pass a series of tests along the dimensions of rules, play, and/or culture, then one potential matrix for building a general cognitive game for good might look something like what is shown in Table 1. The key characteristic added by cognitive technology in each dimension is italicized in the final cell of each row.

***Table 1*. Characteristics of Games for Good as Cognitive Technologies.**

	Cognitive Technology	**Game for Good**	**Game for Good as Cognitive Technology**
Rules (Closed/ Formal)	Procedural systems are in place to augment human cognition (e.g., by directing attention, limiting decision points, etc.).	Procedural systems are tied to game mechanics; these systems limit player action and create pleasurable challenges for players.	Procedural systems are designed based upon real world systems or linked to those systems through fantasy or metaphor. *What we know about cognitive science informs what we know about how to build good video games, and the two are seamlessly entwined.*

Play **(Closed / Gameplay)** **(Open / Experiental)**	The technology presents a flexible and configurable mechanism for people's individual settings and personal approach.	The technology encourages people to explore, both in terms of in-game mechanisms and the gameworld.	As an open system, the player is encouraged to play with her own value systems or beliefs and make decisions based on those beliefs. *The game system should adapt and provide feedback based on these systems accordingly.*
Culture (Open / Socio-political)	The technology is designed with the knowledge that it will be used in a particular place by a particular group of people, not in a sterile laboratory under controlled conditions. As such, adjustments are made to the tolerances and limits of cognitive technologies	Many of the prosocial benefits of games for good come from the cultural impact of the games: community discussions, media impact, and word of mouth. Feedback from communities continually improve games as open systems.	Best practices from over 35 years of cognitive science research can inform how community feedback and participation shape evolving games for good. *Games become organic, evolving entities that continue to mature and have impact as they are shaped by group cognition and collective intelligence over time.*

WHERE WE GO FROM HERE

Based on the preliminary matrix in Table 1, it seems logical that there is some benefit in these two disciplines getting to know one another a little better. To begin, we can consider how cognitive technology can learn from game design. There are two additional concepts from the game design literature that are worth pointing out to cognitive technologists. The first is the metaphor of the "magic circle," a concept described at length by Salen and Zimmerman (2004, pp. 93-99) as an imaginary set of boundaries in which players enter and agree to substitute game rules for the rules of ordinary life. In other words, the rules to make oneself visible, available, and noisy are thrown out by a young child when that child enters the magic circle formed by an impromptu game of hide-and-go-seek with a parent. Similarly, the rules of how we use a dining room table are thrown out when we sit down with guests for a rousing game of trivial pursuit. Now, the table serves as a defensive buttress, as a shared space for strategizing and perhaps even insulting the losing team, and as a virtual boundary in which both strategic and formal rules have been substituted in for the implicit, contextual rules describing how that physical space is normally used. Players are expected to behave according to the rules—both implicit and explicit—when they agree to enter the magic circle of a game.

We can also borrow from game design a unique way of thinking about interaction through three conceptual schemas—formal, experiential, and contextual (Salen & Zimmerman, 2004). These directly relate to the three lenses of rules, play, and culture described above. Rules are formal schema, play is characterized as experiential schema, and culture is a contextual schema which depends on the particular ideologies of a cultural system. Those familiar with the long line of research exploring scripts and schema theory (Schank & Abelson, 1977; Minsky, 1985; Schank, 1995) may find this approach familiar. Schema are ways to organize and frame knowledge that have variables, embed information, "represent knowledge at many levels of abstraction," and "represent knowledge rather than definitions" (Salen & Zimmerman, 2004, p. 103). Computer scientists might equate schema with object-oriented programming, or the practice of writing computer code that is abstracted, encapsulated, and modularized so that complex programs can be written that rely upon fairly simple base structures. The same idea is true for cognitive schema; they allow for a certain degree of mental efficiency when encoding and organizing information.

Since a schema is essentially an encoded experience in memory that creates placeholders for new variations of those experiences rather than encoding entirely new representations each time the event is encountered; this is more efficient when hundreds of thousands of events must be stored and eventually recalled from long term memory. As we move from one event to another, we simply substitute schema and recall the appropriate data relevant to the new schema along with our expectations and prior experiences with older, but related schema. We also have general expectations about behaviors and actions that are associated with these schema. For example, when we walk into a grocery store, we know from prior experience that the store holds various purchasable goods, that cashiers will be manning the registers and accepting money for said goods, and that if something goes horribly wrong there is generally an authority figure or manager available to help sort things out. Regardless of the particular type of grocery store being visited, we can generally store the same set of assumptions, expectations, and facets of knowledge related to this experience in memory using what Schank and Abelson (1977) call scripts, or our expectations about what is likely to happen in this type of situation. We can then react to the real world experiences of these encoded events using scripts. And when an event occurs which is not currently engaged by our current script, such as walking back to the pharmacy section of the grocery store, a new and appropriate script is substituted in.

The functioning of the magic circle is in fact very much like the functioning of a script substitution in which one experience is replaced by another one and needs to be responded to based on prior experiences as stored in memory. What makes the magic circle interesting, however, is the playfulness that generally accompanies this substitution of rules. For instance, if I am leaving a restaurant and I replace my "eating in a restaurant" script with a "walking down the street" script, I am not likely to assign much affective importance to that transaction or feel a particular sense of pleasure as I do it. With the magic circle found in gaming, however, this sense of playfulness is an essential requisite to the entrance fee. Further, a sense of commitment is required of the player before they are allowed entry (the entry is generally agreed upon by the former occupants of the magic circle who may choose to welcome the new player with open arms or deny that player altogether). Imagine if current tasks involving cognitive technologies, such as detailed searches with autonomous agents or even simple search engines, which can sometimes be quite tedious, engendered within humans the same type of playful willingness to engage, experiment, and suspend disbelief as even the simplest game experience is likely to produce in a player who has entered the magic circle? Certainly information retrieval and access would be more pleasurable and less stressful.

The second concept worth noting for cognitive technologists was one originally articulated by the philosopher Bernard Suits (2005). This is a state of mind Suits coined the "lusory attitude" (p. 34). As Salen and Zimmerman explain, the basic idea behind the lusory attitude is that the player agrees to accept a more complicated set of rules than is necessary to accomplish a task in order to enter the domain of gameplay and increase the level of challenge. So, instead of simply sending airplanes to war in *Making History*, as Matthew Sharritt explained, the players must first position their planes at an adequate launch base before this action is enabled. To use an even simpler example, instead of walking over to a garbage can to throw away a piece of useless paper, we crumple the paper in a ball and make a game of trying to launch it across the room and into the basket. The lusory attitude is the psychological state of being that makes playing a game both challenging and enjoyable.

The concept of a lusory attitude is something interesting to think about from the perspective of cognitive technology, which generally exists to create a *more* direct path to an informational resource. The reason that players are willing to accept the lusory attitude is because games are enjoyable, engaging, and rewarding. The decisions made by a designer that encourage such an attitude are worth noting and perhaps adapting for other types of assistive technologies. For example, one finding well supported in literature is the importance of practice for building expertise (Ericsson, Krampe, & Tesch-Römer, 1993). As practice becomes boring, a new level of challenge can be introduced in order to make the material elevate in difficult according to a player's growing competency with the subject. At some point, the lusory attitude becomes an important psychological state for learners to recognize that they are taking a more difficult approach to the task of learning material that could be internalized in an easier way. A simple example is one that is often used by mathematics teachers: pupils are shown a longer way to complete a problem that demonstrates the nuances and theories behind a particular principle, then in a later lesson they are given the shortcut that allows them to complete the problem more speedily.

Our argument is not that cognitive technologists should learn from game designers the ideas of the magic circle and the lusory attitude, but rather the principles and techniques used by game designers to bring players into that mindset. Salen and Zimmerman (2004) call this a double seduction: first, we must convince players to enter our magic circle, but then, we must further convince them to stay. While inside, we must persuade them to solve problems and overcome obstacles in a more roundabout way than is normally necessary.

This is not to say that the relationship between game design and cognitive technology is one way. There is much the former can learn from the latter, and cognitive technologists may wish to take a role in building games that embody best practices in research from cognitive science. For example, despite promising early work from researchers such as Malone (1981), there has been a general lack of empirical research examining the impact of games and testing games for educational effectiveness and for transfer of learning. Recently, there have been a few promising studies looking at particular elements of games (such as story and interactivity) for particular types of learning content (Greenwood-Ericksen, 2007) and game features such as fantasy and reward (Derouin-Jessen, 2008), but much remaining territory in this area remains unexplored. Well-established research protocols from cognitive science, including methodologies for behavioral experiments, brain imaging studies, computational modeling, and neurophysiological methods offer additional research heuristics for further assessing the credibility of claims made by educational game designers. Similarly, qualitative and ethnographic work from cognitive technology bears potential for improving and extending the possibility space of game design, particularly with educational games and games for good. It is important to, figuratively, see into the minds of players to assess whether or not they are thinking about the same things that the designers hoped they would think about during design. Specifically, there is always going to be a need to dig deeper and in ways not possible through quantitative studies; case studies, ethnographies, and observational recording sessions can do much to help us understand how players play in practice rather than in theory. This is why qualitative data analysis such as that done by Matthew Sharritt in this issue will continue to be important, as will the quantitative and statistical approaches such as those done by Shlomo Berkovsky and colleagues.

Fortunately, there is a large body of general work from cognitive technology and related fields that can be of use to designers of games for good. One research area from cognitive science that has been frequently connected to game design is the flow concept as conceptualized by Csikszentmihalyi (1990). The flow state, referenced by Matthew Sharritt in this issue, is a particular mode of functioning in which a person is highly immersed in an activity—such as an engaging game of chess, a bout of rock climbing, or an athletic event—and as a result they experience a specific set of cognitive effects. These effects include the merging of action and awareness, intense concentration, the loss of self-consciousness, and the transformation of time (Salen & Zimmerman, 2004). In other words, a person in a flow state loses track of time and feels intensely and personally connected to an experience to the extent that they feel "in the zone" and both comfortable and confident in their abilities. From the perspective of a game designer, such characteristics are highly desirable for players to possess; gamers in a flow state will be easier to seduce into entering the magic circle, will more likely feel immersed in the game, and will be more likely to stay within the game for longer periods of time. Cordova and Lepper (1996) found that additional characteristics such as contextualization, personalization, and choice further engaged learners to stay intrinsically motivated, to become more deeply engaged, and to learn more in a fixed period of time. Refining and more fully operationalizing and testing this concept of "flow" represents an important growth area for interdisciplinary research with cognitive technologies.

Designers of games for good can also learn from studies of transfer done in the domain of cognitive technology. As an essential problem of game design and education referenced in the introduction to this issue (Squire, 2002), transfer is perhaps the most important question we can attempt to answer as cognitive technologists and game designers. If a game for good does not allow players to transfer their newfound knowledge, empathy, or awareness to the outside world, then their usefulness is of a very limited nature. The problem here is that even very general problem-solving abilities, such as those used to complete mathematical word problems, do not transfer well when students encounter problems of a similar type (Cooper & Sweller, 1987; Willingham, 2009). Cooper and Sweller (1987) have suggested three potential reasons for this difficulty: people have trouble recognizing the relationships between problems, they have trouble activating the appropriate cognitive schema to deal with the new problems, and they have trouble automating the problem-solving process, which leads to an overload of working memory. More open collaboration between game designers and the cognitive science community is needed to fully explore the enabling and boundary conditions of transfer of learning in the context of games.

CONCLUSION: MAKING A DIFFERENCE THROUGH RULES, PLAY, AND CULTURE

Given the suggestions above for conceptualizing a research space and applying best practices to design, how do we use this knowledge for maximum impact? In other words, which lines of research are most likely to produce meaningful gains in the areas described above? We cannot yet know the answer to this, but we can certainly speculate based on what we know about the current state of the field in both video game design and in the design and study of cognitive technology. Below, we suggest several areas which seem to hold promise for generating data related to the production of more cognitively-sound games for good and more pleasurable and engaging cognitive technologies. These ideas are extracted from or inspired by the essays contained in this issue.

First, rules present a rich area of opportunity for research in cognitive games for good simply because rules are so important to existing research in the field. The research cited above has studied rules in all different areas of cognitive technology, from knowledge acquisition to memory and retention, but studying games for good as cognitive technologies brings new types of rules into scholarly discussion. For example, Jonathan Belman and

Mary Flanagan ask us to consider the ways in which a prejudice-reduction program might be used to combat stereotypes if motivation were at a sufficient level, or to think about how research in cognitive and emotional empathy might translate into a set of guidelines for activist game designers. Such rules and ideas suggest exciting new avenues for the field of cognitive technology to pursue.

Second, in the "play" or experiential category, we should pay attention to the design of future studies to determine whether or not playing games for good increases knowledge acquisition and retention of relevant learning outcomes (and what such learning outcomes might be in the area of games for good). Some research suggests that video games trump textual training materials in both knowledge acquisition and retention (Ricci, Salas, & Cannon-Bowers, 1996), but these studies are generally done for a particular audience (in this case, for military training) and have not been replicated on a wider scale or for the particular topic of games for good. Similarly, work being done in embodiment and embodied cognition has direct bearings on the concept of play as an open system between the real and the virtual. As Shlomo Berkovsky and colleagues suggest, if we are motivated by the virtual to exercise more in the real, then certainly this can be considered a positive solution to the health problems posed by sedentary lifestyles.

Third, we should pay close attention to cultural issues as they pertain to cognitive technologies and games for good. In some ways, culture is easier to capture in video games because it can be represented with atmospheric and descriptive game design elements rather than explicit and unambiguous rules. For example, a game designed to showcase the importance of family values for Hispanic cultures might provide images of family photographs, afford numerous interactions with family members, and design game rewards based on helping family members in a general sense rather than trying to build specific and precise rules for every possible interaction between the player's character and her virtual family members. In this sense, atmosphere and game design can capture culture quite well. In another sense, however, the particular nuances and details that are representative of discourse communities are difficult to capture and embed in games and technologies.

This type of cultural training model is familiar to the designer who attempts to change the behaviors and thinking processes engaged during the process of teaching about scientific communities of practice, something that is challenging to design from the bottom up (i.e., starting with scientific data rather than a set of generative questions). Marjee Chmiel calls this the process of teaching authentic scientific inquiry, while Scot Osterweil and Lan Le write of the "heuristics of scientific practice." In these cases, transmitting cultural knowledge with games is more difficult because of the somewhat intangible and tacit nature of knowledge seeking and knowledge representation in general science.

Regardless of which model for relating video games to cognitive technologies seems the most appropriate, it is clear that each domain relies heavily on a similar cross-section of scientific theory and application, although the goals of each may or may not be directly in line with one another. An awareness of the principles, objectives, and methods of both game design and cognitive science can make development easier and results more powerful, *if* this process is done in a controlled and carefully planned fashion.

This Special Issue only scratches the surface of what is possible when exploring the relationships formed by video games and cognition. Several additional areas of expansion and exciting new opportunities for research exist in this area, for example: embodiment and embodied connection, the link between physicality and cognition, personality and personality dynamics, creativity, engagement in fictional environments, the nature and power of learning through endogenous fantasy and play, the nature of exploration, experimentation, and inquiry, and so on. These areas of exploration may lead us to broader understanding of the human condition and suggest more effective means of teaching, learning, and socializing with technology. They also may offer us a more comprehensive understanding of how to encourage a prosocial way of thinking in the minds of individuals. Research that combines theoretical principles from the game studies literature and applied inspiration from prosocial initiatives and experimental or activist game design further expands the interdisciplinary problem space formed by human behavior, technology, and cognition, and generates possibilities for new and exciting areas of research that are sure to advance the field of cognitive technology.

As Vannevar Bush reminds us in the closing of his essay, "the applications of science have built man a well-supplied house, and are teaching him to live healthily therein." As cognitive technologists, it is our job now to use this science, a science that has further progressed another 65 years since Bush's time, to peek out the window, to see what is happening in our communities, our neighborhoods, and our global societies, and to pass along this behavior to the young people who will soon be the policy makers and the primary stakeholders in the 21st century. If for no other reason than the immense popularity of video games with this young demographic, we owe it to ourselves as an open-minded community of scholars to further explore the implications, possibilities, and capabilities of video games and carefully investigate their possibilities for use as cognitive technologies.

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AUTHOR NOTES

Contact information for Rudy McDaniel, rudy@mail.ucf.edu and for Erik Vick evick@mail.rit.edu. The authors wish to thank the many individuals and anonymous reviewers who made this Special Issue possible. We are especially thankful to Stephen M. Fiore for his advice, enthusiasm, and guidance while organizing and preparing this collection of essays and the University of Central Florida, Department of Philosophy Ethics Center Initiative for its support of this special issue.