Enhancing the Therapy Experience Using Principles of Video Game Design

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Purpose: This article considers the potential benefits that applying design principles from contemporary video games may have on enhancing therapy experiences.
Method: Six principles of video game design are presented, and their relevance for enriching clinical experiences is discussed.
Results: The motivational and learning benefits of each design principle have been discussed in the education literature as having positive impacts on student motivation and learning and are related here to aspects of clinical practice. The essential experience principle suggests connecting all aspects of the experience around a central

emotion or cognitive connection. The discovery principle promotes indirect learning in focused environments. The risk-taking principle addresses the uncertainties clients face when attempting newly learned skills in novel situations. The generalization principle encourages multiple opportunities for skill transfer. The reward system principle directly relates to the scaffolding of frequent and varied feedback in treatment. Last, the identity principle can assist clients in using their newly learned communication skills to redefine self-perceptions.
Conclusion: These principles highlight areas for research and interventions that may be used to reinforce or advance current practice.

Video games are captivating. Around the world, people spend more than three billion hours a week playing them (Knewton Inc., 2014), with the average gamer playing 8 hr per week (Entertainment Software Association, 2014). Contemporary video games are successful because they are personally meaningful, experiential, and social (Shaffer, Squire, Halverson, & Gee, 2005). Players are highly engaged: They concentrate hard, they stay on task, and they often find it hard to put the game down even when mentally fatigued (Beck & Wade, 2004). Can the same things be said for clients receiving intervention from speech-language pathologists? Are there lessons we can learn from video games that might enhance client engagement and motivation in therapy?

An example of a client who might benefit from increased engagement of this type is Martin, a 12-year-old with specific language impairment who was recently seen in our clinic.[1] Although we were able to quickly determine an evidence-based intervention approach to facilitate Martin's language development, we were concerned about his motivation and participation in therapy. He had been in therapy

for a number of years, both at school and at our clinic. Martin typically showed low levels of engagement in both environments despite multiple attempts to make sessions interesting and enjoyable. Although some treatment protocols include statements related to client motivation and engagement, we were unable to find any research in the speech and language literature that directly examined specific strategies (outside of the technique of motivational interviewing; e.g., Behrman, 2006). Textbooks and consultations with colleagues yielded interesting but unsupported ideas.

This article considers how the design principles of contemporary video games, independent of the games themselves, may provide meaningful guidance for clinicians looking to increase their clients' engagement and motivation. It was inspired by clients like Martin as well as recent discussions in the education literature about improving student motivation and learning through the design principles of video games (Gee, 2005, 2007a, 2007b; Kapp, 2012; McGonigal, 2011). The following discussion presents and analyzes six principles of contemporary video game design: essential experience, discovery, risk taking, generalization, reward systems, and identity. A summary of these principles is provided in Table 1. If design features such as

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[1]The name *Martin* is a pseudonym. His case is a fictional account that is loosely based on a client with whom one of us worked. All descriptions of Martin are used for illustrative purposes only and do not depict a full case study.

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Table 1. Six principles of contemporary video game design that increase player engagement.

Principle	Description
Essential experience	Fundamental themes that evoke targeted emotional and mental responses immerse players in the world of the game.
Discovery	Learning through exploration and experimentation promotes active attention and creative problem solving.
Risk taking	Risky challenges that are commensurate with players' skills encourage exploration and increase enjoyment.
Generalization	Connecting skills acquired early in the game to later challenges reinforces their development and increases their application to new circumstances.
Reward systems	Incorporating multiple forms of reinforcement and punishment signifies achievement, enhances skill development, and entertains.
Identify	Complex characters, whose motivations and skills vary, encourage players to take and act from perspectives that may be different from their own.

these can be used to facilitate learning in nongame contexts, they may also increase engagement and motivation, and thereby learning, in clinical intervention.

Current Therapy Design in Speech-Language Pathology

Speech-language pathologists have many factors to consider when creating clinical experiences for their clients. They select long-term and short-term goals and objectives, choose or create therapy activities, and develop ways of tracking progress, often in cooperation with the client and his or her family. Such decisions have long been guided by many different theoretical perspectives (e.g., psychological, educational, and cognitive). A clinician setting out to design therapy typically begins with some theoretical understanding of a disorder and how to modify it. For example, stuttering therapy might be guided by principles of stuttering modification, fluency shaping, or acceptance. Likewise, a clinician's theoretical understanding of specific language impairment or auditory processing may influence the design of receptive language therapy for a child.

Behavioral objectives for therapy are developed from these underlying theoretical models of disorders, and their implementation is typically embedded in broader theories of learning and development, such as operant learning theory or social learning theory (Fey, 1986). The treatment approach selected may be clinician directed, client centered, or a hybrid of the two (Roth & Paul, 2002). Principles such as modeling (Burns, 2011), scaffolding (Bellon, Ogletree, & Harn, 2000), or distributed practice (Maas et al., 2008) may be considered. Procedural factors are also important; for example, as Roth and Worthington (2015) noted regarding efficiency, "Every session should be efficiently designed to provide a client with the maximum number of opportunities to practice target behaviors" (p. 23). Roth and Worthington also considered proxemics, which is the spatial arrangement between clinician and client. It is implied throughout these design considerations that client motivation, attention, and satisfaction are vitally important to therapy success.

Video Game Design Principles and Learning

There have been a number of attempts to apply video games and their design principles to address issues

outside of gaming. Some, for example, use video games to crowdsource solutions to difficult problems (e.g., Cooper et al., 2010; Kapp, 2012), whereas others use them as simulations to teach particular concepts or skills (e.g., Moore, 2008; Shaffer et al., 2005). A third general approach, and the one emphasized in this article, is gamification, defined as "using game-based mechanics, aesthetics, and game thinking to engage people, motivate action, promote learning, and solve problems" (Kapp, 2012, p. 10). Gamification is more than simply adding individual aspects of video games, such as points and badges, to other experiences or incorporating games into learning environments (see Egenfeldt-Nielsen, 2006, for a review of such applications). Gamification involves understanding the principles that make video games so engaging and applying them to other contexts. Gee (2007a), for example, discussed how 36 learning principles inherent in video games can be applied to education. Kapp (2012) cited examples of recent interest in applying gamification to aid business and industry in innovation, marketing, training, employee satisfaction, employee performance, health, and social change. As stated by Shaffer et al. (2005), "The question is this: How can we use the power of video games as a constructive force in schools, homes, and workplaces?" (p. 3).

Aldrich (2009) highlighted that video game design principles used to enhance educational activities are aimed at procedural learning. Students are taught not only facts but also how to analyze and act in the situation; that is, how to perform as a skilled participant or professional (Schön, 1983, 1990; Shaffer et al., 2005; Shulman, 2005). This is relevant to the field of communication disorders in two ways. First, speech-language pathologists and audiologists need to know not only information about disorders and clinical activities but also how to perform as skilled practitioners (Brackenbury, Folkins, & Ginsberg, 2014). In addition, most therapy is aimed at helping the client develop new knowledge or skills, with the emphasis generally on implementing the skill. For example, some adult clients with dysarthria might find it useful to understand phonological rules as they practice new strategies, whereas a child with phonological impairment may benefit most from opportunities to practice without remembering or understanding the theory behind the practice. It therefore follows that principles of video game design, which emphasize

engagement in procedural learning, may offer insights into clinical success.

Application of Video Game Design Principles to the Clinical Process

At their heart, video games are based on motivational principles of games in general (Chatfield, 2010; Kapp, 2012; Koster, 2005; McGonigal, 2011). However, video games have built on these general principles and combined them in unique enough ways that designers and scholars have begun studying them as a cohesive unit (e.g., Lecky-Thompson, 2007; Rogers, 2010; Schell, 2008). The specific principles addressed differ by author, can number in the hundreds, and are not universally part of every game's development. They have been organized into an extensive array of categories applying to diverse aspects of the video game experience. Examples of these categories include characters and worlds; emotions; engagement and motivation; genre; graphics; information dissemination; levels, missions, and completion; mechanics and rules; music and sounds; platforms and technology; points of view; story; and user interface. The six principles discussed below were selected from the broader pool of design features discussed in the gaming and educational literatures for having positive impacts on learning (Gee, 2005, 2007a, 2007b; Kapp, 2012; McGonigal, 2011) and their potential for improving therapy. They are intended to be relevant exemplars, not a list of exhaustive or foremost features. These six principles were chosen explicitly because, as we argue below, they are likely to be effective. We do not assert that they are necessarily the only or the most effective principles that could be chosen.

Since the early 2000s, evidence-based practice in communication sciences and disorders has prompted clinicians to make assessment and treatment decisions on the basis of the existing research literature, their own clinical expertise, and the values and preferences of their clients (e.g., Fey & Justice, 2004). There are currently no direct research studies that evaluate the effectiveness of applying principles of video game design to clinical practice. As a result, we do not advocate the uncritical adoption of these principles in therapy. However, the theoretical support from these design features and their potential educational benefits is worth consideration. They may provide internal evidence for designing therapy (Dollaghan, 2007) and promote further research on intervention efficacy.

The six principles are described individually below. Explanations of why each principle may be useful are offered, and specific video game examples and clinical applications are provided. To demonstrate how these principles can be seen in existing therapy approaches and used to augment multiple forms of therapy, some of the clinical examples are from existing, research-supported intervention protocols, whereas the others relate more to the clinical expertise aspect of developing new practice techniques. We then revisit Martin's case in order to demonstrate how the six principles can be integrated into a client's therapy.

Last, suggestions are made for how readers might apply the principles to their own clinical and research practice.[2]

Six Video Game Design Principles

Essential Experience Principle

Early in his book on video game design, Schell (2008) discussed the difference between the game and the experience of playing it. He defined the game as the tangible aspects of the activity, including the hardware, characters, storyline, and visual design. The essential experience includes those aspects plus the specific thoughts and emotions that the player has while participating in the activity. It is the emergent, holistic, and immersive experience of the player that occurs when the tangible game elements are combined with the player's actual participation. Gee (2007a) refers to this same principle as *systems thinking*, and Squire (2011) discusses it as working within the ideological world of the game. What we term the *essential experience principle* manifests differently in different games. One game, for example, may emphasize the thrill of being on a wild ride, whereas another might focus on the anguish involved with life-and-death decisions. Each design element of the game is incorporated to support this fundamental theme, whatever it may be. Schell (2008) argued that the true purpose of playing a game is not to complete it or to win but rather to participate in its essential experience. Thus, some designers first identify the essential experience they want to invoke and then consider all subsequent design decisions with it in mind. Other video game developers acknowledge the importance of designing an overall experience but do not necessarily see it as the first task. Rogers (2010), for example, suggested developing the game's world and levels prior to defining its essential experience.

Minecraft (Mojang, 2011) is a video game in which the essential experiences of exploration and creation are addressed in at least three important ways. First, it is a sandbox or free-roaming game (Janssen, n.d.), meaning that it does not provide players with central goals to achieve or problems to solve. This compels players to explore and manipulate the game's open, infinite landscape in order for something to happen. Second, play begins with raw materials that must be transformed into tools and then structures. Players cannot buy premade buildings, for example. This prompts them to follow their own interests and ideas to

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[2]Three caveats should be made. First, we are not making a statement about how games (including video games) have been or are currently being used during therapy sessions. Second, we are not making a sociocultural statement about video games that have violent or mature content. Whether or not one has a position on the appropriateness of some video game content is not relevant to the points addressed. Last, to varying degrees, the design principles addressed here reflect established theory and methods in learning and instruction, including current clinical practices. For example, Kapp (2012) explains that the theories behind gamification directly relate to general principles in psychology and education, such as Malone's theory of intrinsically motivating instruction, operant conditioning, or self-determination theory.

develop limitless creations. Third, the game allows players to share and build within each other's worlds, encouraging the evaluation and incorporation of multiple ideas. By promoting exploration and creativity in these ways, *Minecraft* creates an essential experience that connects with players' imaginations and motivates deep engagement.

Reflecting the essential experience principle, key themes and goals can be applied throughout many aspects of therapeutic intervention. Communication disorders affect more than just an individual's ability to transfer information along the speech chain. They can have major impacts on clients' relationships, self-perceptions, and professional opportunities. Although clinicians often consider these factors in their long-term goals, explicitly incorporating and addressing these aspects as part of the essential experience of therapy may better serve their clients. For example, Brook (2010) wrote about positive and negative aspects of the speech-language therapy he received after he had a laryngectomy. The negative issues were the different levels of expertise among the speech-language pathologists he worked with, their varying opinions, and the emotional toll of the entire experience. Clinicians may be able to address this type of frustration by thoughtfully designing therapy around an essential experience of discovery for clients like Brook. This could be facilitated by emphasizing clients' day-to-day questions and concerns, building on their curiosity and problem-solving skills, and educating them about the multiple factors to consider in therapy. An approach such as this is designed to increase clients' engagement and motivation by empowering them to be active agents in their learning.

The essential experience is also reflected in a number of different clinical interventions developed to address clients' psychosocial needs. These interventions relate to the essential experience principle because they address integration of the client's thoughts and emotions in a communication disability and speech-language therapy. One such intervention is acceptance and commitment therapy for people who stutter (Beilby & Byrnes, 2012; Beilby, Byrnes, & Yaruss, 2012; Boyle, 2011; Palasik & Hannan, 2013). Rather than focusing exclusively on reducing or eliminating the occurrence of disfluencies, acceptance and commitment therapy also works to improve clients' self-perceptions, acceptance of their disfluencies, and role as an agent for positive change in their lives. Through techniques adapted from behavioral psychology and meditation, clients are guided to be aware of their present thoughts about themselves and their stuttering, assess the validity of these thoughts, identify the impacts of these thoughts on their self-concepts, and create and implement a value-based action plan. The essential experience of this form of therapy is for clients to experience and apply the thoughts and emotions of mindfulness, acceptance, and responsibility to decrease the occurrence and negative impacts of disfluencies.

Discovery Principle

The discovery principle promotes learning through exploration and experimentation, minimizing direct instruction

(Gee, 2007a). Players (as learners) are more likely to remember and apply information they discovered rather than information they have been told (Alfieri, Brooks, & Aldrich, 2011). Instead of providing how-to manuals, contemporary video games immerse players in complex situations that contain enough hints, tips, and other small pieces of information to facilitate—but not guarantee—success. Rogers (2010) directed video game developers to achieve this by beginning the game with the player having access to few or no particular abilities. As game play progresses, the player interacts with activities and puzzles that reward correct responses by unlocking, or providing access to, new knowledge and skills. Players must be actively engaged during game play, using skills such as critical and creative thinking and building on their previous experiences to figure out how to play and how to become a good player. This increases their engagement in the game by challenging them and providing the intrinsic motivation of being clever enough to discover solutions (Shaffer et al., 2005). An additional feature of learning via the discovery principle is that the knowledge and skills obtained are believed to be more meaningful, memorable, and conducive to generalization than methods in which the learner is more passive (e.g., Weimer, 2002).

Early video games were typically didactic in their approach to the player. They included explicit instructions for how to play the game, and there was often a very limited range of ways to win. In contrast, contemporary video games often keep instruction to a minimum. The initial play screen from *World of Goo* (2D Boy, 2008), for example, includes animated goo balls rolling about a rectangular structure, a small drain pipe at the top of the screen, and a sign that reads "Drag 'n drop to build to the pipe," with a diagram showing a ball suspended over the base structure. There are no additional instructions provided. Players are not told how to build the structure, what it should look like, or what will happen once they reach the pipe. Other games provide knowledgeable characters that dispense information at key points during play. *Epic Mickey* (Junction Point Studios, 2010) includes a friendly gremlin that appears at different points in the game to tell Mickey the goals of the level and special skills that might be helpful. The gremlin appears only at certain points in the game, however, and cannot be summoned directly, thus preventing the player from relying too much on his assistance.

There are a number of intervention approaches for children with speech and language disorders that reflect the discovery principle. The technique of environmental manipulation (Ellis Weismer & Robertson, 2006; Pepper & Weitzman, 2004; Warren et al., 2006), for example, is a form of discovery learning that is used with young children who have expressive language problems. Environmental manipulations are changes that are made to the setting so that the play or activity is disrupted in a minor and easily fixable way. Examples of environmental manipulations include placing a favorite toy out of the child's reach, including a broken toy in a play set, and leaving out a necessary object. The purpose of such manipulations is to provide

a naturally occurring reason for the child to communicate, hopefully using the target form or providing an opportunity for a recast. Instead of directly instructing the child to say something such as, "I want ball," a clinician using environmental manipulation may bounce a ball to get the child's attention, put it in a tightly closed container, and wait for the child to request it. If the child's request is not at the targeted level, the clinician may not respond. This challenges the child to use another way to make the request. As in video games, successful attempts are reinforced by naturally occurring consequences, such as receiving the ball, whereas unsuccessful attempts are followed up with more cues and another opportunity.

Another speech intervention exemplifying the discovery principle is minimal pairs therapy. In minimal pairs therapy, clinicians work on phonemes in an error pattern by using pairs of words that differ by one phoneme, comparing and contrasting the targets to the child's productions (e.g., Baker, 2010). Minimal pair words for a child who fronts velar phonemes, for example, may include *key* and *tea*. Using these minimal pair words in activities, such as Go Fish, provides opportunities for semantic confusions when the child requests the word that contains the target sound but uses the erred sound. The natural consequence of getting the response to what was actually said rather than what was intended is believed to encourage the child to reanalyze, discover, and adjust his or her phonological system in order to not be misunderstood.

Outside of specific approaches such as these, clinicians can incorporate the discovery principle into a multitude of activities. For example, they may engage their clients in tasks that are particularly challenging, emphasizing the difficulties that are encountered and problem solving methods to get around them, rather than simply emphasizing the accuracy of the client's performance. Likewise, clients and clinicians can watch videos of other people with relatable communication problems to identify methods and skills that they themselves could apply. Even game-based helpers, such as the clinician offering clues and suggestions during a complex task, can help promote a sense of discovery in a therapy activity.

Risk-Taking Principle

The risk-taking principle encourages players to take chances in their game play. Game designers understand that achievements and failures are powerful tools for learning and skill development. To promote risk taking, contemporary video games offer a variety of challenges that are planned to be difficult enough to motivate achievement but not so hard that they are viewed as unsolvable. As Lecky-Thompson (2007) wrote, "The risks have to balance the rewards, and the rewards have to be placed so that the player believes that he [or she] is justified in taking the reward because it was earned" (p. 215).

The risk-taking principle in video games is often discussed using a variety of different terms (Kapp, 2012; McGonigal, 2011). Gee (2007b) refers to this as reaching a level of challenge that is "pleasantly frustrating"; that is, the challenges that a player faces should be risky enough to provoke some anxiety but still be enjoyable (see also Rees, 2011; Schell, 2008; Squire, 2011). Sherry (2004) posits that this balance leads to motivation and enjoyment. From another perspective, this balance between ease and difficulty is akin to the successful adult scaffolding described in Vygotsky's (1978) zone of proximal development, as the risk-taking principle relates to the implementation of other principles. For example, following Vygotsky, the tasks that are based on the discovery principle must be structured to be hard enough to discover that they are interesting, thus encouraging risk taking, but not so hard to discover that they are frustrating, which might cause the client to stop engaging in the activity.

Another way the risk-taking principle draws players into challenges is by minimizing the penalties for failure. In early video games such as *Super Mario Brothers* (Nintendo, 1985), faulty decisions by the player typically resulted in the loss of the character's life and eventual resetting of the game. This did not promote risk taking because the time and effort required to return to the point of the mistake was too great. Negative consequences in contemporary video games focus instead on small losses, such as decreases in specific powers or the return to a checkpoint within the level. As a result, the character may be weakened or incur a loss of time but is still competitive and can quickly apply what has been learned from the failure (Gee, 2007a).

Perhaps no video game takes the risk-taking principle to heart more than *Braid* (Number None Inc., 2008). The gameplay in *Braid* emphasizes solving puzzles while avoiding deadly obstacles and monsters. Risk taking is encouraged through the game's feature of time manipulation, which allows the player at different points of the game to slow down the time stream, view alternative timelines, and even reverse time. The ability to manipulate time promotes risk taking because any mistake made by the user—even a deadly one—can be seen and reversed before the full consequences are realized. Although the ability to manipulate time and undo mistakes can be welcome to novice players, it runs the risk of making the overall game less enjoyable by disrupting its flow. *Braid*, and other games like it (e.g., the *Prince of Persia* series; Ubisoft, 2003, 2010), guard against this by including puzzles that are complex enough and rewards that are appealing enough to maintain players' interest in the game.

Risk taking is a fundamental element of the clinical process. During communication assessment, for example, clients are vulnerable because they are being asked to display their communication difficulties, often in demanding contexts. They may feel great risk in identifying or admitting a problem, even when doing so may lead to resolution of the difficulties. Risks clients may take during the intervention process include putting trust in the clinician and the treatment method, committing to learning and trying new skills in different contexts, and the chance of experiencing failure if the intervention is not successful. In addition to these social risks, the assessment and intervention of some forms

of medically based disorders, such as dysphagia, may include direct physical risks. Applying the risk-taking principle to clinical practice challenges clinicians to anticipate and manage the possible points of failure, their negative impacts, and their potential for fostering growth.

Clinicians may not be able to apply the time manipulations of *Braid*, but they can structure therapy in other ways to take advantage of the risk-taking design principle. The context of therapy can provide a much safer environment than the outside world for learning new skills. As communication partners, clinicians can offer greatly reduced social consequences for errors. They can also provide an increased number of practice opportunities for the client to attempt a goal behavior during a session, which reduces the significance and perceived risk of each individual trial. The therapy context essentially lowers the risk of communication attempts (i.e., promotes risk taking) compared with the high-risk social context of life outside of therapy.

Generalization Principle

The generalization principle in video game design is based on the idea that skills learned at the beginning of a game should be transferrable to later, related tasks (Shaffer et al., 2005). This applies not only to more difficult applications of a skill but also to more complex or partly related tasks. For example, if a particular command in a video game is trained in the context of opening doors, the same command will often be used for interacting with other structures in the game, such as picking up objects or selecting menu options. Rogers (2010) reported that he designs video games so that the first 75% of the game is spent acquiring the skills and equipment for success and the last 25% is spent using them to complete the game. Some games begin with training modules, in which skills are taught outside of but connected to the main story or environment of the game. These are used to directly foster skills that are needed for the next levels. Rogers explained that other games build the learning and generalization throughout the game.

The game *Dragon Age: Inquisition* (BioWare, 2014) provides a large-scale example of the generalization principle. The player first creates a character and quickly learns to control that single character during combat through freezing time, assigning actions and targets, and flexibly adding or altering actions through the course of a single battle. As the plot progresses, more characters under the player's control are added. Because each of these characters has his or her own specialized skills that differ from those of the original character, the player must coordinate and monitor the group and generalize the characters' abilities across different battle contexts. These skills are required throughout the game, and the player is expected to evolve and generalize them to opponents that are more complex and difficult as well as to noncombat situations.

Two ways in which the generalization principle occurs in the context of speech-language therapy are (a) generalizations across the knowledge and skills targeted and (b) generalizations to other contexts. Maximal opposition (Gierut, 1989, 2001) is a speech intervention that was designed to promote maximal generalization across the majority of a child's erred phonemes, as opposed to other speech interventions that address only generalizations to phonemes that are similar in articulation or within the same error pattern. Maximal opposition uses minimal pair words that are based on two erred phonemes that are maximally different from each other, often later developing, and less represented in the child's current system (e.g., *she* and *Lee*). A clinician using maximal opposition does not directly teach the child about how the two target phonemes are similar or different. Instead, the child is expected to learn about the two phonemes during imitation and minimal pair production tasks and to generalize that learning to nontarget phonemes. Gierut (2001, 2007), as well as others, has demonstrated that addressing such complex phoneme pairs yields greater generalization than does targeting phonemes that are minimally different.

Clinicians and clients are also challenged to generalize skills learned during therapy to real-life situations. As with contemporary video games, therapy can explicitly incorporate generalization into the design of clinical tasks. If therapy ignores generalization at the start, then it will be limited in other contexts, in terms of both the number and scope of opportunities. There are many aspects of speech-language therapy in which clients need to both learn a skill and apply it outside of the clinic. Well-designed therapy takes this transition into account. As noted by Ylvisaker, Szekeres, and Feeney (2001), "Behaviors or skills acquired in a laboratory or training context are unlikely to transfer to functional application contexts and be maintained over time without heroic efforts to facilitate that transfer and maintenance" (p. 762). This observation is applicable across clinical contexts; for example, we cannot assume that a client who is able to demonstrate a chin-tuck strategy for safe swallowing in the therapy setting will spontaneously repeat the behavior at home in front of the television, at a restaurant surrounded by friends, or even in a hospital bed down the hall from the speech-language pathology department. Therapy must be structured to address explicitly the challenge of bridging the skill from clinical tasks to everyday functioning.

Reward System Principle

Contemporary video games have built-in reward systems that are varied, are customized to the player, give frequent feedback, and signal ongoing achievement. This principle is often referred to as the *pointification* of video games, but the real emphasis is not just on accumulating points (Rees, 2011; Robertson, 2010). Rather, in addition to the extrinsic point systems, reward systems incorporate intrinsic rewards that reinforce desired behaviors (Koster, 2005; Smith-Robbins, 2011). In the case of video games, the desired behaviors include appropriate interaction with the game mechanics, continuing to spend time playing the game, enjoying the game, and recommending it to others. Extrinsic rewards can include praise, points, badges,

additional play, gateways to other places, hidden video clips, modifications, powers, and resources (Schell, 2008). Video games can also include punishments and negative reinforcements, such as shaming messages, loss of points or lives, setbacks, removal of powers, depletion of resources, and termination of the game (Schell, 2008). Rewards and punishments such as these not only need to be placed within the game for functional purposes but also must be organized and displayed in meaningful ways (Rogers, 2010).

The *Pokémon* series of games, including most recently *Pokémon Omega Ruby* and *Pokémon Alpha Sapphire* (Nintendo, 2014a, 2014b), provides an example of the reward system principle of video game design. In these games, players wrangle a cohort of *Pokémon* creatures. The Pokémon themselves have points related to their strengths and skills, which can be increased or decreased through training and battle. The player also earns points on the basis of each creature's development and receives badges for winning certain battles. These badges allow the player to participate in higher level competitions and progress to new areas. This progression, in turn, allows the player to get one step closer to becoming a champion trainer and catching legendary Pokémon. Thus, there are multiple layers of rewards, including story advancement, points, and badges, as well as the celebratory visual and auditory signals that accompany game successes.

Speech-language therapy often incorporates extrinsic markers of success and encourages intrinsic rewards and motivation. Clinicians use multiple trials and activities, and these are scaffolded to match the level of the client. The rewards of therapy extend beyond verbal reinforcement and winning games and include the intrinsic rewards of successful communication in outside contexts and improvements to self-image. Applying the reward system principle to therapy design challenges clinicians to think beyond pointification and engage in a deeper understanding of intrinsic rewards related to the client's motivations and preferences. Simple extrinsic rewards can be useful in certain contexts, such as receiving a small prize or other tangible reward for completing a difficult activity. However, trial-by-trial reward strategies are only a small component of incorporating a rich reward system into a therapy design that is ultimately dependent on the intrinsic rewards inherent in a client's successful behavior.

An example of applying the reward system principle to therapy design is demonstrated in the treatment of an elderly client who has swallowing impairments after a stroke. The client has a long-term goal of being able to drink regular coffee. He acknowledges that drinking thin liquids makes him cough and choke and is willing to participate in therapy but states that he hates doing swallowing exercises and practicing strategies. Because it may be weeks before the final goal of drinking thin liquids is reached, the clinician and client can work together to develop a system of intermediate goals and rewards. For example, the client may decide to reward himself for independently doing daily exercises with something motivating but unrelated to swallowing, such as watching a television show he enjoys. He

could identify intermediate goals, such as eating honey-thick and then nectar-thick coffee-flavored ice cream, and could track daily progress toward each goal as part of therapy. Depending on the client's cognitive and metacognitive abilities, he might need more assistance and other external rewards, such as the negative reinforcement of being able to leave therapy once his exercises are completed each day.

Identity Principle

Video games often encourage the player to identify with the characters they control and to make choices within the context of the game's story from the perspective of the characters. Gee (2007a, 2007b) referred to this as the *identity principle*. Shaffer et al. (2005) refer to it as *powerful identities*. The choices that players make for their character can result in an array of outcomes, allowing players to explore the varied ramifications of decisions and to experience empathy for the game's characters. Rogers (2010), for example, described a game that he once created in which the hero was motivated only by defeating the villain, getting the princess, and collecting treasure. In the game's sequel, the hero became more complex as the game introduced victims that the hero could rescue across the play. Even though rescuing the victims was not required to complete the game, Rogers found that players became more engaged and reported greater satisfaction because they now connected more with the identity of a hero.

Some games take the exploration of identity another step by having players define various traits of the game's characters, which can affect elements of game play. These include not only abilities and skills but also emotional and mental states such as empathy, imagination, motivation, and character judgment (Schell, 2008). Books, movies, and stories of all kinds have long allowed us to see the world from the perspectives of people who are different from us. Video games can go a step further and allow players to make the decisions and take the actions of individuals whose thoughts and motivations are different from their own (Gee, 2007a).

The game *Mario Kart: Wii* (Nintendo, 2008), a racing game in which players choose their identity from a menu of characters, offers a simplified example of the identity principle. Each character has his or her own identity that is based on different strengths and weaknesses: The smaller characters may be lighter, quicker, and more maneuverable, but they are also more vulnerable to damage when hit by a competitor. By playing the same race course multiple times with different characters, players have the opportunity to develop a deeper understanding of the course characteristics; they also develop skills in perspective taking and in anticipating which characters will serve them best depending on the different features of each course. As players empathize with different characters they are controlling, they learn to adopt perspectives on the basis of the strengths and limitations of each one.

Being able to explore questions of identity can be an important skill for clients' communicative development.

Activities such as role-playing and developing scripts can help clients with communication disorders practice for specific communication scenarios, such as ordering food at a restaurant. Clients can also use experience with understanding alternative identities in order to learn how to predict communication partner responses, such as when an adolescent with autism practices anticipating comments that might not be well integrated into the flow of a conversation. Experimenting with roles can also take advantage of the risk taking principle by freeing clients to try out new, unfamiliar behaviors. For example, an adult who has historically had the role of family caregiver might benefit from practice with accepting help from others.

Another example of the identity principle as applied to speech-language pathology is the case of a young adult with traumatic brain injury who is reluctant to participate in therapy or use strategies for social interactions. He doesn't like people "telling him what to do" despite being unsuccessful at several jobs and wanting to improve his work skills. On the basis of the work of Ylvisaker and Feeney (2000), the client and speech-language pathologist can work together to identify a metaphorical role model who embodies the assertive, tough, yet socially appropriate and vocationally successful features that the client wants to achieve. Ylvisaker and Feeney offer examples such as a sports coach or Clint Eastwood as metaphors for the complex set of attitudes and self-regulatory behaviors that clients can identify with and use as behavioral guides. Rather than trying to evaluate every aspect of a potential action or decision, which can be overwhelming, the client can ask him or herself, "What would my role model do in this situation?" Using the identity principle, the client can explore various options for how he wants to behave and choose those behaviors that will help him achieve his goals.

Applying the Six Video Game Principles to Martin's Intervention

The six design principles discussed above are relevant to many aspects of therapy development for the clinical example introduced at the beginning of this article. Martin's language goals included (a) producing definitions that consist of at least three different semantic features with 80% accuracy, (b) formulating complex verbal instructions that include enough detail for novel listeners to be able to complete with 90% accuracy, and (c) acquiring target vocabulary items in linguistic contexts that do not directly define the items with 90% accuracy. Martin's clinician decided to improve his semantic skills by increasing his knowledge and retrieval of semantic and phonological features for known and novel words on the basis of the results of intervention studies (Bragard, Schelstraete, Snyers, & James, 2012; McGregor & Leonard, 1995; Motsch & Ulrich, 2012). The features that she decided to emphasize were category, size and shape, uses, first sound, rhymes, and syllable length. The treatment began with Martin's clinician introducing the target features. She told him what they

meant, and they worked together to identify each feature for common objects. They then used the features to explore the meaning of the word *sport*. After this, the bulk of the intervention was spent on an activity in which Martin and the clinician developed a new sport. The clinician brought up specific topics, such as the objects needed and type of playing field, while modeling and highlighting each of the lexical features associated with each word. This facilitated Martin's use of the features in his comments and helped him clarify his knowledge of familiar words and learn new vocabulary items. Martin and his clinician kept written notes, often in the form of concept maps used to keep track of the ideas and visually demonstrate the connections between important words and the features. To help generate ideas and provide opportunities to encounter new words, they also looked at different resources about sports. The clinician checked Martin's understanding of the words in the resources by connecting them with the features. She also worked with Martin to identify which of the features were included in unfamiliar words in the text. After months of working in this way, they were able to test the new sport with Martin and a couple of his peers. Martin was guided to use feedback from his peers to refine the rules and instructions. Martin's clinician hoped that emphasizing the features in a functional manner would help him develop richer semantic networks and provide him with a framework that would help him when his descriptions were not adequate.

Essential Experience Principle

When planning this intervention, Martin's clinician decided to target an essential experience of freedom. She wanted to motivate Martin by allowing him the freedom to contribute his own thoughts to the therapy experience. She also planned to emphasize to Martin how his improving language skills would become a method for successfully achieving his ideas and plans (i.e., the freedom that comes with contributing to decision-making processes in meaningful ways). She had worked with Martin before and knew that he tended to withdraw from situations in which his ideas were not understood or received. Because she suspected that Martin would not respond favorably to direct statements connecting his language intervention with the idea of freedom, she planned to address this essential experience theme implicitly with only occasional statements about freedom. One of the first steps that she took toward this essential experience was to allow Martin to choose the topic of their focus this semester. He was given options to create a comic book story, a television show pilot, or a new sport. Martin chose to create a new sport.

Identity Principle

As a speech-language pathologist, Martin's clinician provided teaching and demonstrating experiences as well as numerous opportunities for Martin to practice in each session. However, she acted more like a colleague in the

sport's development than a clinician with all of the answers. She allowed him to lead the topics discussed in each session and determine when they had adequately covered a feature of the new sport, providing her own guidance only as needed. This elevated Martin's identity status from a student with a language disorder to a creator, writer, and sport tester. Martin appeared to respond to this status by becoming more and more involved with the activity. His energy level greatly increased over the sessions, and he spontaneously shared new ideas that he came up with between sessions.

Discovery and Risk-Taking Principles

The collegial structure that Martin's clinician developed also allowed him the freedom to discover and take risks. Her comments during the development sessions were designed to provide enough scaffolding for him to be successful and were based on how someone unfamiliar with the new sport might react rather than focusing on the accuracy of his statements. The clinician provided the natural consequences of being confused when rules or descriptions did not make sense and then worked with Martin, with minimum penalty or negative connotations, by using the features to help address the issue. She also gave affirming statements and added to his detailed and clear descriptions. At one point in the development, for example, she asked if the sport was going to have a referee. Martin said *no* but was unable to state why. They then used the semantic and phonological features to describe what a referee is. This opened up the conversation to comparisons of advanced vocabulary items such as *arbitrate* and *mediate*. When Martin then provided a well-reasoned description of how the sport would work through disputes, his clinician said, "That's a great way for the players to settle arguments. You've set that idea free and now we can use it." This particular conversation also provided an opportunity for Martin to experience the identity principle by taking the perspectives of the different sides in a dispute.

Reward Systems and Generalization Principles

Probing questions and positive statements from Martin's clinician, such as the ones above, are direct examples of the reward systems that were provided. By becoming Martin's colleague in the sport's development, the clinician encouraged new thinking and reinforced Martin's semantic learning. From Martin's point of view, the primary reward was to be able to play the sport with other children. This was a meaningful outcome because it provided a real-world result for his work. A third level of the clinician's reward system was to require Martin to talk with other children and adults about the sport and solicit their input. This was done at all stages of the game's development. It provided Martin and the clinician with additional feedback and gave him multiple opportunities to generalize his developing semantic skills in meaningful contexts. During their discussions about these conversations, Martin's clinician not only asked for the feedback but also probed for information about what

he did to make sure that he was understood and how successful his communication attempts were.

Implementing Principles of Video Game Design in Therapy

The descriptions and case presented thus far suggest that at least these six principles of video game design can be applied to speech and language therapy. It is hoped that this introduction to lessons learned from some principles of video game design will be helpful, leading to research on the design of the therapy experience and ultimately enhancing client motivation and achievement. It should be emphasized that all six of the design principles we have discussed may underlie existing theories of therapy design that lead to useful experimental studies of therapy success. In addition to developing therapy goals, following the most effective clinical protocols, and using one's own personality, talent, and quick judgment, perhaps the most important lesson that can be learned from these principles of video game design is that there are broader aspects of effective therapy design that may encourage personal learning and interaction. Further research is needed to explore the extent to which these principles can be applied systematically to improve therapy design and to determine the most effective ways to use the principles. Nevertheless, they provide a valuable change in perspective for clinicians to consider as they approach the process of designing the therapy experience for their clients.

References

2D Boy. (2008). *World of Goo* [Video game]. San Francisco, CA: Author.

Aldrich, C. (2009). *Learning online with games, simulations, and virtual worlds.* San Francisco, CA: Jossey Bass.

Alfieri, L., Brooks, P. J., & Aldrich, N. (2011). Does discovery-based instruction enhance learning? *Journal of Educational Psychology, 103*(1), 1–18.

Baker, E. (2010). Minimal pair intervention. In A. L. Williams, S. McLeod, & R. J. McCauley (Eds.), *Interventions for speech sound disorders in children* (pp. 41–72). Baltimore, MD: Brookes.

Beck, J. C., & Wade, M. (2004). *Got game: How the gamer generation is reshaping business forever.* Boston, MA: Harvard Business School Press.

Behrman, A. (2006). Facilitating behavioral change in voice therapy: The relevance of motivational interviewing. *American Journal of Speech-Language Pathology, 15,* 215–225.

Beilby, J. M., & Byrnes, M. L. (2012). Acceptance and commitment therapy for people who stutter. *SIG 4 Perspectives on Fluency and Fluency Disorders, 22,* 34–46.

Beilby, J. M., Byrnes, M. L., & Yaruss, J. S. (2012). Acceptance and commitment therapy for adults who stutter: Psychosocial adjustment and speech fluency. *Journal of Fluency Disorders, 37,* 289–299.

Bellon, M. L., Ogletree, B. T., & Harn, W. E. (2000). Repeated storybook reading as a language intervention for children with autism: A case study on the application of scaffolding. *Focus on Autism and Other Developmental Disabilities, 15,* 52–58.

BioWare. (2014). *Dragon age: Inquisition* [Video game]. Redwood Shores, CA: Electronic Arts.

Boyle, M. P. (2011). Mindfulness training in stuttering therapy: A tutorial for speech-language pathologists. *Journal of Fluency Disorders, 36,* 122–129.

Brackenbury, T., Folkins, J. W., & Ginsberg, S. M. (2014). Examining educational challenges in communication sciences and disorders from the perspectives of signature pedagogy and reflective practice. *Contemporary Issues in Communication Science and Disorders, 41,* 70–82.

Bragard, A., Schelstraete, M. A., Snyers, P., & James, D. G. (2012). Word-finding intervention for children with specific language impairment: A multiple single-case study. *Language, Speech, and Hearing Services in Schools, 43,* 222–234.

Brook, I. (2010). Speaking again: A physician's laryngectomy experience. *The ASHA Leader, 15,* 36.

Burns, M. S. (2011). Apraxia of speech in children and adolescents: Applications of neuroscience to differential diagnosis and intervention. *SIG 2 Perspectives on Neurophysiology and Neurogenic Speech and Language Disorders, 21,* 15–32.

Chatfield, T. (2010). *Fun Inc.: Why gaming will dominate the twenty-first century. New York,* NY: Pegasus Books.

Cooper, S., Khatib, F., Treuille, A., Barbero, J., Lee, J., Beenen, M., . . . Foldit Players. (2010, August 5). Predicting protein structures with a multiplayer online game. *Nature, 466,* 756–760.

Dollaghan, C. A. (2007). *The handbook for evidence-based practice in communication disorders.* Baltimore, MD: Brookes.

Egenfeldt-Nielsen, S. (2006). Overview of research on the educational use of video games. *Digital Kompetanse, 1,* 184–213.

Ellis Weismer, S. E., & Robertson, S. (2006). Focused stimulation approach to language intervention. In R. McCauley & M. E. Fey (Eds.), *Treatment of language disorders in children* (pp. 175–202). Baltimore, MD: Brookes.

Entertainment Software Association. (2014). *Industry facts.* Retrieved from http://www.theesa.com/facts/gameplayer.asp

Fey, M. E. (1986). *Language intervention with young children.* Boston, MA: Allyn & Bacon.

Fey, M. E., & Justice, L. M. (2004). Evidence-based practice in schools: Integrating craft and theory with science and data. *The ASHA Leader, 9,* 4–32.

Gee, J. P. (2005). Good video games and good learning. *Phi Kappa Phi Forum, 85*(2), 33–37. Retrieved from http://www.phikappaphi.org/web/publications/PKP_Forum.html

Gee, J. P. (2007a). *What video games have to teach us about learning and literacy.* New York, NY: Palgrave McMillan.

Gee, J. P. (2007b). *Good video games + good learning: Collected essays on video games, learning, and literacy.* New York, NY: Peter Lang.

Gierut, J. A. (1989). Maximal opposition approach to phonological treatment. *Journal of Speech and Hearing Disorders, 54,* 9–19.

Gierut, J. A. (2001). Complexity in phonological treatment: Clinical factors. *Language, Speech, and Hearing Services in Schools, 32,* 229–241.

Gierut, J. A. (2007). Phonological complexity and language learnability. *American Journal of Speech-Language Pathology, 16,* 6–17.

Janssen, C. (n.d.). Sandbox [Web log comment]. Retrieved from http://www.techopedia.com/definition/3952/sandbox-gaming

Junction Point Studios. (2010). *Epic Mickey* [Video game]. Glendale, CA: Disney Interactive Studios.

Kapp, K. M. (2012). *The gamification of learning and instruction: Game-based methods and strategies for training and education.* San Francisco, CA: Wiley.

Knewton Inc. (2014). *The gamification of education.* Retrieved from http://www.knewton.com/gamification-education/

Koster, R. (2005). *A theory of fun for game design.* Sebastopol, CA: O'Reilly Media.

Lecky-Thompson, G. W. (2007). *Video game design revealed.* Boston, MA: Cengage Learning.

Maas, E., Robin, D. A., Hula, S. N. A., Freedman, S. E., Wulf, G., Ballard, K. J., & Schmidt, R. A. (2008). Principles of motor learning in treatment of motor speech disorders. *American Journal of Speech-Language Pathology, 17,* 277–298.

McGonigal, J. (2011). *Reality is broken: Why games make us better and how they can change the world.* New York, NY: Penguin.

McGregor, K., & Leonard, L. (1995). Intervention for word-finding deficits in children. In M. Fey, J. Windsor, & S. Warren (Eds.), *Language intervention: Preschool through the elementary years* (pp. 85–105). Baltimore, MD: Brookes.

Mojang. (2011). *Minecraft* [PC game]. Stockholm, Sweden: Author.

Moore, K. (2008). *A brief history of aircraft flight simulation.* Retrieved from http://homepage.ntlworld.com/bleep/SimHist1.html

Motsch, H. J., & Ulrich, T. (2012). Effects of the strategy therapy "lexicon pirate" on lexical deficits in preschool age: A randomized controlled trial. *Child Language Teaching and Therapy, 28,* 159–175.

Nintendo. (1985). *Super Mario brothers.* [Video game]. Kyoto, Japan: Author.

Nintendo. (2008). *Mario kart: Wii* [Video game]. *Kyoto,* Japan: Author.

Nintendo. (2014a). *Pokémon: Alpha Sapphire* [Video game]. Kyoto, Japan: Author.

Nintendo. (2014b). *Pokémon: Omega Ruby* [Video game]. Kyoto, Japan: Author.

Number None Inc. (2008). *Braid* [Video game]. Redmond, WA: Microsoft Studios.

Palasik, S., & Hannan, J. (2013). The clinical applications of acceptance and commitment therapy with clients who stutter. *SIG 4 Perspectives on Fluency and Fluency Disorders, 23,* 54–69.

Pepper, J., & Weitzman, E. (2004). *It takes two to talk.* Toronto, Ontario, Canada: The Hanen Program.

Rees, D. (2011). *The next best thing to being there.* Retrieved from https://instructionaldesignfusions.wordpress.com/tag/pointification/

Robertson, M. (2010). *Can't play, won't play.* Retrieved from http://hideandseek.net/2010/10/06/cant-play-wont-play/

Rogers, S. (2010). *Level up!: The guide to great video game design.* West Sussex, United Kingdom: Wiley.

Roth, F. P., & Paul, R. (2014). Principles of intervention. In R. Paul (Ed.), *Introduction to clinical methods in communication disorders* (3rd ed.) (pp. 175–202). Baltimore, MD: Brookes.

Roth, F. P., & Worthington, C. K. (2015). *Treatment resource manual for speech-language pathology* (5th ed.). Clifton Park, NJ: Cengage Learning.

Schell, J. (2008). *The art of game design: A book of lenses.* Burlington, MA: Elsevier.

Schön, D. A. (1983). *The reflective practitioner: How professionals think in action.* New York, NY: Basic Books.

Schön, D. A. (1990). *Educating the reflective practitioner: Toward a new design for teaching and learning in the professions.* San Francisco, CA: Jossey-Bass.

Shaffer, D. W., Squire, K. R., Halverson, R., & Gee, J. P. (2005). *Video games and the future of learning* (WCER Working Paper No. 2005-4). Retrieved from http://www.wcer.wisc.edu/publications/workingpapers/Working_Paper_No_2005_4.php

Sherry, J. L. (2004). Flow and media enjoyment. *Communication Theory, 14,* 328–347.

Shulman, L. S. (2005). Signature pedagogies in the professions. *Daedalus, 134,* 52–59.

Smith-Robbins, S. (2011). *This game sucks: How to improve the gamification of education.* Retrieved from http://www.educause.edu/EDUCAUSE+Review/EDUCAUSEReviewMagazineVolume46/ThisGameSucksHowtoImprovetheGa/222665

Squire, K. (2011). *Video games and learning: Teaching and participatory culture in the digital age.* New York, NY: Teachers College Press.

Ubisoft. (2003). *Prince of Persia: The sands of time* [Video game]. Montreal, Québec, Canada: Author.

Ubisoft. (2010). *Prince of Persia: The forgotten sands* [Video game]. Montreal, Québec, Canada: Author.

Vygotsky, L. S. (1978). *Mind and society: The development of higher psychological processes.* Cambridge, MA: Harvard University Press.

Warren, S. F., Bredin-Oja, S. L., Fairchild, M., Finestack, L. H., Fey, M. E., & Brady, N. C. (2006). Responsivity education/prelinguistic milieu teaching. In R. J. McCauley & M. E. Fey (Eds.), *Treatment of language disorders in children* (pp. 47–76). Baltimore, MD: Brookes.

Weimer, M. (2002). *Learner centered teaching.* San Francisco, CA: Jossey-Bass.

Ylvisaker, M., & Feeney, T. (2000). Reflections on Dobermanns, poodles, and social rehabilitation for difficult-to-serve individuals with traumatic brain injury. *Aphasiology, 14,* 407–431.

Ylvisaker, M., Szekeres, S. F., & Feeney, T. (2001). Communication disorders associated with traumatic brain injury. In R. Chapey (Ed.), *Language intervention strategies in aphasia and related neurologic communication disorders* (4th ed., pp. 745–792). Philadelphia, PA: Lippincott, Williams & Wilkins.