ADAPTING BEHAVIORAL PARENT TRAINING AS AN INTERACTIVE COMPUTER
GAME

Team VIRTUAL

by

Emily Cheung, Christopher Lim, Sharise Marshall, Chris Purdy, Christina Winkler

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Advisory Committee
Dr. Yiannis Aloimonos
Dr. Andrea Chronis-Tuscano
Ms. Tahl Frenkel
Dr. Kathryn Amey Degnan
Dr. Kent L. Norman
Dr. David Mount

ABSTRACT

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Behavioral Parent Training (BPT) is a well-established therapy that reduces child externalized

behaviors and parent stress. Although BPT was originally developed for parents of children with

defiant behaviors, the program's key concepts are relevant to parenting all children. Since

parents might not fully utilize BPT due to cost and program location, we created an online game

as a low-cost, easily accessible alternative or complement to BPT. We tested the game with

nineteen undergraduate students at the University of Maryland. The experimental group

completed pretest survey on core BPT knowledge, played the game, and completed a BPT

posttest, while the control group completed a pretest and posttest survey over a three week

period. Participants in the experimental group also completed a survey to indicate their

satisfaction with the overall program. The experimental group demonstrated significantly higher

levels of BPT knowledge than the control group and high levels of satisfaction. This suggests

that an interactive, online BPT platform is an engaging and accessible way for parents to learn

key concepts.

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CHAPTER ONE: INTRODUCTION

Background and Relevance

The interactions between parents and children are critical in shaping both immediate and long term child behavior (Patterson, 1982; Reid & Patterson, 1989). In fact, Loeber & Dishion (1983) determined that poor parenting management techniques are the strongest predictor of future child delinquency. Such parenting techniques reinforce maladaptive child behavior, trapping both the parents and the child in an interaction referred to as the coercive cycle (Patterson 1976). When trapped in the coercive cycle, the child's maladaptive behaviors increase while the parents' strategies continually worsen (Patterson, 1976). By breaking the coercive cycle, parents and children are able to improve both their relationship and the quality of parenting, and reduce maladaptive child behaviors (Chronis, Chacko, Fabiano, Wymbs, & Pelham, 2004; Patterson, 1982). While coercive interactions are the most common when children have defiant behavior disorders, such as Oppositional Defiant Disorder (ODD), they are ubiquitous between all types of parents and children (Anderson, Lytton, & Romney, 1986; Patterson & MacCoby, 1980; Patterson & Reid, 1970). Consequentially, there is a demand for widely distributed and low cost parent training resources (Fell, Bierman, Landry, & Wasik, 2015).

The large amount of parenting resources available on the Internet suggests that parents are aware of the direct impact their actions have on the behavior and development of their child. In March of 2015, Amazon and Google searches for "parenting" and "parenting self-help" returned 138,312 and 99,700,000 results, respectively. These are just a fraction of the resources parents seek out to improve their parenting skills. Outside of their family members, to which 94% of American parents turn for parenting advice, 76% of parents use the Internet as a tool for

parenting strategies (Radey & Randolph, 2009). The computer is an accessible resource: 75.6% of families across the U.S. report consistent access to a computer and 71.7% of families report consistent access to an Internet connection (File, 2013). The Internet is especially accessible for parents, with 70% of parents using the Internet, compared to only 53% of non-parents (Allen & Rainie, 2002). Although the majority of parents rely on their family and Internet resources for parenting support, much of the self-help literature is based on anecdotal accounts, rather than evidence-based practices (Sorge, Moore, & Toplak, 2009). Only about 29% of parents utilize parenting workshops (Radey & Randolph, 2009).

One such evidence-based workshop is Behavioral Parenting Training (BPT), a training model originally developed by Constance Hanf (1969), built on the premise of behavior modification to target noncompliant child behavior. BPT is a well-established means to break parents and children from the coercive cycle (Bor, Sanders, & Markie-Dadds, 2002; Chronis et al., 2004; Kaminski, Valle, Filene, & Boyle, 2008; Webster-Stratton, Rinaldi, & Reid, 2011). Instead of a traditional psychotherapy format, where a child would meet with a therapist, BPT is a family-centric approach (Eyberg & Robinson, 1982; Reitman & McMahon, 2013). The child and the parent work together, under coaching from a trained therapist, to develop a stronger emotional connection, increase positive interactions, and promote structure in their everyday life (Barkley & Benton, 2013). This model, with the parents and child working together, promotes skill generalization outside of the therapy session and into everyday activities (Reitman & McMahon, 2013).

BPT consistently results in a clinically significant reduction in both internalizing and **externalizing maladaptive child behaviors** (Eyberg & Robinson, 1982; Forehand, Merchant, Long, & Garai, 2011; Jones, Daley, Hutchings, Bywater, & Eames, 2008; Lundahl, Risser, &

Lovejoy, 2006; McMahon, Long, & Forehand, 2010; Sanders, 1999; Webster-Stratton, 1984).

Participating parents also report increased levels of parenting knowledge and confidence after

participating in BPT (Bor et al., 2002; Enebrink, Hogstrom, Forster, & Ghaderi, 2012). The

improvements in both parent and child behaviors following BPT hold true for rural families

(Sanders, 1999), immigrant families (Cunningham, Bremner, & Boyle, 1995), and economically

disadvantaged families (McMahon et al., 2010; Rogers, Forehand, Griest, Wells, & McMahon,

1981). The principles of BPT are applicable to all types of children, not just children who display

severe noncompliance. Furthermore, parents of multiple children are able to generalize the skills

they develop in BPT to all siblings in the house (Eyberg & Robinson, 1982).

Problem Statement

In spite of the benefits of BPT, many obstacles can prevent parents from taking full

advantage of BPT programs. Studies have found that a traditional group BPT program costs

$400-500 per child (Enebrink et al., 2012; Honeycutt, Khavjou, Jones, Cuellar, & Forehand,

2015). Many parents are unwilling or unable to incur this cost and the additional cost of booster

sessions, especially if their child does not have a diagnosed behavioral disorder (Koroloff et al.,

1996). BPT programs typically occur in clinics, which may be inconvenient for families in rural

or low-income areas to reach (Cunningham et al., 2000; Nordstrom, Dumas, & Gitter, 2008).

Indeed, many parents with low socioeconomic status (SES) have inconsistant access to reliable

transportation and childcare as well as very busy schedules (Barkley et al. 2000; Chronis et al.,

2004; Cunningham et al., 2000; Koroloff et al., 1996; Nordstrom et al., 2008). They are also

more likely to have low education levels and to be overwhelmed with the mental health system,

or with the terminology in session content (Firestone & Witt 1982; Koroloff, et al.,

1996). Additionally, even though fathers play a vital role in child development (Fabiano, 2007;

Fabiano et al. 2012; Fletcher, Freeman, & Matthey, 2011), there is markedly limited father enrollment in BPT programs (Chronis et al., 2004; Fabiano, 2007; Fletcher et al., 2011; Tiano & McNeil, 2005). Consequently, there has been a push in the early child intervention field to create cost-effective and easily disseminated versions of evidence-based programs such as BPT (Fell, Bierman, Landry, & Wasik, 2015).

A potential solution for this issue to create a serious video game teaching BPT concepts. Indeed, some programs are integrating multimedia to increase accessibility and lower the cost of BPT sessions by using phone calls, video modeling, and online modules. These adaptations of BPT have demonstrated success across various populations (Enebrink et al., 2012; Kacir & Gordon, 2000; McMahon et al., 2010; Sanders, 1999; Webster-Stratton, 1984). However, these are typically passive forms of technology: the user is not an active agent in determining the course of events displayed or concepts covered. On the other hand, video and computer games provide an active digital platform that individuals can engage with (Oblinger, 2004). Prensky (2001) argues that the digital native generation, the generation that grew up with technology, strongly prefers active technology interactions, such as a video game, where the user is able to demonstrate a sense of agency within the technology, over passive observations, such as watching television.

While many video games exist as purely a form of entertainment, games whose major purpose is to instruct, train, or change an attitude are referred to as **serious games** (Blumberg, Almonte, Anthony, & Hashimoto, 2013; Djaouti, Alvarez, & Jessel, 2011). Indeed, Mayer and Johnson (2012) define any game as an environment that is rule-based, responsive, challenging, and cumulative for the individual user. In serious educational video games, players use a hands-on approach to construct and apply their knowledge, instead of passively reading, listening to, or

watching information that is presented to them. Educational games are an appropriate way to disseminate information, as they are inexpensive and can be used in informal environments (Niehaus & Riedl, 2009), which is becoming an increasingly preferred way for learning to occur (Oblinger, 2004).

The Internet is a well-used source of parenting information, and the majority of US families report consistent access to both a computer and Internet connection (File, 2013). However, no BPT program has been adapted into an Internet-based serious game, where parents can learn and practice parenting strategies with immediate feedback and checks for understanding. An electronic BPT game would increased accessibility of BPT knowledge to rural families who live far from treatment centers, to socioeconomically disadvantaged families with inconsistent transportation and childcare availability, and to the parents who are unable to participate in BPT sessions with their spouses. A BPT game would also allow for parents to engage in **refresher sessions** after their formal BPT instruction has ended at no additional cost.

The Current Study

In order to address this need, we developed a serious game based on the structure and content of the game on the work of Constance Hanf, as her model was the basis for a number of BPT programs, including Community Parent Education (COPE), Helping the Non-Compliant Child (HNC), Parent-Child Interaction Therapy (PCIT), Your Defiant Child, Triple P, and *Parenting the Strong Willed Child* (PSWC), the bibliotherapy adaptation of HNC) (Reitman & McMahon, 2013). As with most BPT programs, the game teaches the five key BPT principles: **attending** (see Appendix for A for definition), rewarding, ignoring, giving commands, and time out. Each skill, is taught in a module, referred to as a lesson. Each lesson is made up of 4-7 scenarios that provide users an opportunity to practice the skill in a variety of contexts they may

encounter in everyday life with their child, such as bath time, getting ready for school, and shopping at the grocery store.

In developing the game, we are able to ensure that each of the five key skills of BPT is represented with a strong tutorial, consistent logic, and multiple representations of daily life. Additionally, users are able to take an active role in BPT learning. However, before we can recommend this game as a supplement or alternative to traditional BPT, we must first determine whether learning can occur through this medium. To this end we recruited a diverse group of undergraduate students at the University of Maryland to test the game's usability and instructional potential of the five key skills with a pretest and posttest.

Research Questions

In order to evaluate the efficacy of the adapted BPT game we created, we ask the following questions:

RQ1: Will participation in a BPT computer game increase BPT knowledge?

To evaluate RQ1 we randomly assigned participants into control and experimental groups. Both groups completed a pretest and posttest survey with approximately three weeks between surveys. The experimental group played the entire BPT game, while the control did not.

RQ2: Is a digital BPT game an engaging platform for users?

To evaluate RQ2 we administered a qualitative survey to all participants in the experimental group. Participants described their perception of the game's storyline, dialogue, content, tutorials, and usability.

RQ3: Will users perceive a digital BPT game as a useful tool for learning BPT skills?

To evaluate RQ3, participants in the experimental group described their perceived learning and likelihood of recommendation to another party on the final qualitative survey.

Hypotheses

We hypothesize that posttest assessment results will indicate a statistically significant difference between participants in the experimental group and control group. Furthermore, we hypothesize that experimental posttest scores will be significantly higher than experimental pretest scores, while control pretest and posttest scores will not show any significant growth. Finally, we hypothesize that participants will rank the platform as an engaging learning medium, and would recommend it as a useful tool.

CHAPTER TWO: LITERATURE REVIEW

Behaviorism, Operant Conditioning, and Parenting

To understand what drives behavior modification, we should begin by understanding what motivates human behavior. B.F. Skinner, one of the fathers of **behaviorism**, builds upon the work of Watson (1913), Pavlov (1927) and Thorndike (1898), to assert that organisms change future behavior based on environmental consequences they received for that behavior in the past (1953). Using reinforcement or punishment, one could change the probability of an organism repeating a behavior, and even shape new, unnatural behaviors (1953). He calls this process **operant conditioning**, since the organism operates on its environment to generate a consequence.

Skinner defines a **reinforcer** as any stimulus that makes an organism more likely to repeat a behavior in the future, while a **punisher** makes a behavior less likely to occur (Skinner, 1953). Skinner further categorizes these stimuli as *positive* or *negative* based on whether the stimulus is added or subtracted (1953). Thus, one can encourage a certain behavior by either giving something desirable or by taking away something undesirable (1953). At the same time, one can discourage a certain behavior by adding an undesirable consequence or revoking a desirable one (1953). Additionally, one can extinguish a behavior through a process known as **extinction**. In extinction, an organism will stop producing a formerly-reinforced behavior if that behavior is no longer being rewarded (S1953).

However, Skinner and other psychologists warn against using punishment as a primary means to shape behavior (Estes, 1944; Skinner, 1953). Punishment is difficult to implement consistently and has only short-term effects, so subjects will often continue to carry out the undesired behavior in secret (Bouton & Schepers, 2015; Church, 1963; Estes, 1944; Rescorla,

2004). Punishment also carries added emotional consequences, such as shame or anger, which outweigh the benefits of temporary behavioral control (Skinner, 1953). Instead, Skinner and others recommend focusing on rewarding the desired behavior so that it occurs more often than undesired behavior (Skinner, 1953; Wang, Galinsky, & Murnighan, 2009).

While these behavioral modifications seem simple, they are incredibly useful. Therapists and psychologists have been using operant conditioning techniques successfully to explain, shape, and treat a variety of behaviors and behavioral disorders, including phobias (Silverman, Pina, & Viswesveran, 2008), OCD (Barrett, Farrell, Pina, Peris, & Piacentini, 2008; Geller & March, 2012), ADHD (Chronis et al., 2004), and anxiety (Deacon & Abramowitz, 2004). Thus, operant conditioning is an evidence based and effective way to shape behavior.

Drawing from behaviorism, the assumption of programs aimed at changing child behavior is that the origin of this behavior is not solely internal to the child, but also influenced by factors in the environment. At the same time, other prominent theories emphasize the role parents and guardians have in shaping child behavior and development. Bandura's **Social Cognitive Theory** asserts that children learn not only through direct interactions, but also by observing behavioral models in their environment (Bandura, 1977). Constructivists such as Vygotsky (1978) place an even greater emphasis on the ability of parents and teachers to provide the scaffolding that supports child learning and development (Freund, 1990), though his work focuses more on cognitive than behavioral development.

Parenting Influence and Coercive Cycles

One of the most well studied categories of interaction between a parent and child is coercive interactions, or the coercive cycle. Coined by Patterson while researching predictors to

antisocial behavior, the coercive cycle describes patterns of behavior where parents and children reciprocally reinforce maladaptive behavior (1976). In these coercive interactions, parents unintentionally reward their child's undesirable behavior, and may fail to notice or reinforce desirable behavior. As a result, the child is more likely misbehave than he or she is to behave well, as misbehavior gives them the outcome they desire. At the same time, children reinforce flawed parenting techniques by behaving well or ceasing to act out when they get what they want. In the future, the parent is thus more likely to use this flawed technique when the child misbehaves in the future (Patterson & Reid, 1970; Patterson, 1976, 1977).

In these coercive processes, the parent and child are more likely to behave poorly in the future. If these interactions happen frequently, bad behavior and hostile feelings will intensify and become worse in a positive feedback loop (Johnson, Wahl, Martin, & Johanssen, 1973; Patterson & Reid, 1970; Patterson, 1976, 1977, 1979). In fact, researchers have shown that people are most likely to react to unwanted aggression with aggression of their own, both in laboratory and natural environments (O'Leary & Dengerink, 1973; Rausch, 1965). The more poorly the child behaves, the worse a parent's strategies become.

All types of parents and children have **aversive events** and coercive interactions at least occasionally, though some with more frequency than others (Anderson et al., 1986; Patterson & MacCoby, 1980; Patterson & Reid, 1970). For example, within a sample of 407 five-year-old boys and girls, Eddy, Levy, and Fagot found that even normally-developing children behaved adversely eight times an hour on average (2001). Parents averaged only one two aversive behaviors an hour, but responded to almost two thirds (65%) of aversive child behaviors (Eddy et al., 2001). However, other studies have documented higher rates of aversive behavior from

mothers, as often as every three or four minutes (Minton, Kagan, & Levine, 1971; Patterson, 1976).

Factors such as marital conflicts, divorce, poverty, and child conduct disorders make coercive interactions more likely to happen (Hetherington, Cox, & Cox 1976; Johnson et al. 1973; Patterson, 1979). While most research focuses on delinquency and antisocial behaviors in boys (Anderson et al., 1986; Baldwin & Skinner, 1989; Patterson & Reid, 1970; Terdal, Jackson, & Garner, 1976), additional studies have shown Patterson's coercive model to apply to girls as well (Eddy et al., 2001). In all cases, coercion does not originate from just the child or the parent, but is the result of an interaction between both parties (Anderson et al., 1986; Burke, Loeber & Birmaher, 2002; Burke, Pardini, Loeber, 2008). For example, Anderson and colleagues (1986) examined the way mothers of children with conduct disorders (MCDC) and mothers of normally developing children (MNC) interacted with their own children, children with conduct disorder (CDC) and with normally developing children (NC) (1986). They found that both MCDC and MNC used more low quality parenting techniques, such as negative responses, when interacting with any CDC, indicating that CDCs elicit maladaptive behavior from parents (Anderson et al., 1986). Nonetheless, Burke and colleagues (2002) highlight that the most successful interventions for breaking the coercive cycle begin by changing parenting techniques as opposed to child behavior, and note that there have been no successful interventions that exclude parental input entirely. These findings are appropriate under the Hanf model, which states that the most efficacious and externally valid way to change child behavior is to change factors in the child's environment, rather than working to change the child directly (Hanf, 1969).

Effect of Coercive Interactions and Ineffective Parenting

     Less severe effects. In less extreme cases, coercive interactions cause stress between the parent and child, and can make bad child behaviors worse (Forehand & Long, 2010; Patterson & MacCoby, 1980; Patterson, Reid, & Dishion, 1992). The mothers of children who frequently exhibit coercive behavior are also more likely to focus on negative child behavior but ignore positive prosocial behavior (Sallows, 1973; Snyder, 1977). These parents give their children significantly more demands than praise, and will punish high amounts of positive behavior as well (Delfini et al, 1976; Sallows, 1973; Snyder, 1977). Unfortunately, these punitive measures do little to decrease problematic behavior and often simply increase it (Forehand, King, Peed, & Yoder, 1975; Forehand & Long, 2010; Johnson & Lobitz, 1974; Lobitz & Johnson, 1975; Terdal et al., 1976). Worse, children with frequent coercive interactions often believe that their parents will not follow through with disciplinary measures, and that parents do not know how to set limits (Goldin, 1969).

     Patterson found that these repeated coercive interactions culminated over time to lower parental self-esteem (Patterson, Reid, Jones, & Conger, 1975). Mothers of highly coercive children also have above average levels of depression, anxiety, and feelings of isolation (Patterson et al.,1975; Wahler, Leske and Roberts, 1979). While it is difficult to determine whether factors such as low self-esteem and anxiety are a catalyst or a symptom of coercive interactions, training in non-coercive parenting techniques does cause increases in parental self-esteem and feelings of confidence (Hanf & Kling, 1973; Hembree-Kigin & McNeil, 1995; Patterson & MacCoby, 1980), suggesting that coercive interactions may worsen pre-existing self-esteem issues (Patterson & MacCoby, 1980).

Severe effects. In extreme cases, researchers find that children who frequently have coercive interactions with their parents are more likely to develop antisocial, delinquent, or other problem behaviors later in life (Patterson, 1982; Patterson, DeBaryshe, & Ramsey, 1989; Patterson & Yoerger, 1997). The quality of parent supervision and discipline within the first year of child's life predicts the development of conduct problems across the next five years, and family dysfunction is a major component of causal theories for Disruptive Behavior Disorders (Frick, 1994; Frick, Lahey, Loeber, Stouthamer-Loeber, & Kalb, 1992; Loeber & Stouthamer-Loeber, 1986; Wakschlag, Lahey, Loeber, Green, Gordon, & Leventhal, 1997; Wasserman, Miller, Piner, & Jaramillo, 1996). Indeed, frequency of coercive interactions between parent and child predict conduct problems and disruptive behavior disorders, such as Oppositional Defiant Disorder (Burke et al., 2008; Gomez & Sanson, 1994).

Patterson and other researchers at the Oregon Social Learning Center found that disciplinary techniques and parental monitoring predicted between 10-40% of the variance in antisocial child behavior across multiple studies (Baldwin and Skinner, 1989; Eddy, Levy, & Fagot, 2001; Patterson and Bank, 1986; Patterson, Dishion, & Bank, 1984). Similarly, Reid and Hendricks (1973) find that frequent coercive interactions within parent-child dyads also predict child social aggression, but do not widely predict other poor outcomes, such as child thievery, suggesting a more specific relationship between coercive interactions and later child behavior. Burke and colleagues (2008) warn against assuming that parenting techniques specifically *cause* these disorders, theorizing that parents of children with conduct disorders may "experience decreasing success with their efforts to supervise their children, and desist over time… [or] that children who engage in CD behaviors exert greater effort to evade their parents' supervision," (Burke et al., 2008, p. 689). Whether coercive interactions are a cause, catalyst, or symptom of

conduct disorders, researchers have find that breaking the coercive cycle results in in improved parent-child relationships, parenting efficiency, and child behavior (Chronis et al., 2004; Forehand & Long, 2010; Hanf & Kling, 1973; Patterson, 1982). One of the most well-known method of breaking the coercive cycle is to teach parents Behavioral Parent Training (BPT).

Behavioral Parent Training as a Solution

Behavioral Parent Training (BPT) is a therapy model that teaches parents how to identify their child's positive behavior, respond to child behavior appropriately, and utilize ignoring and time outs to decrease the frequency of negative behaviors (Chronis et al., 2004). Before this model, child therapies excluded parents entirely and were similar to adult therapies, including psychodynamic treatment and client-centered play therapy (Axline, 1947; Freud, 1946; Reitman & McMahon, 2013). These treatments were not overly effective, likely because they were not very externally valid. The lack of parents in the therapy session and instruction of skills without practice in everyday situations made generalization from therapy to real life very challenging for most children (Levitt, 1957; Reitman & McMahon, 2013; Weisz & Weiss, 1993). Even when these treatments fostered improvement, the progress reversed itself when the child returned home to encounter the same maladaptive environmental factors as before (Berkowitz & Graziano, 1972). The wider acceptance of Skinner's operant conditioning and an increase in the use of paraprofessionals in mental health services supported the transition from traditional psychotherapy to models that treated the child together with their family (Reitman & McMahon, 2013). Breaking away from the tradition, Hanf developed a model that sought to restructure familial interactions instead of the child's behavior in isolation (Eyberg & Robinson, 1982). By involving the family, the therapist is able to treat the child "within their [natural] context",

supporting all the gains made in treatment, ensuring children are able to generalize beyond their sessions (Hanf, 1969; Hanf & Kling, 1973; Reitman & McMahon, 2013, p. 107).

Hanf developed her original model for mothers with children who exhibited conduct problems that were too severe to be examined or treated by doctors, as well as with mothers who exhibited exhaustion and depression as a result of child noncompliance (Hanf, 1969). Prior to the start of treatment, therapists collect baseline data over three separate trials (Hanf, 1969; Reitman & McMahon, 2013), providing a point of comparison at the conclusion of treatment. Training occurs over two and a half months, spread across 15 sessions of 15-30 minutes each in an observation room and a playroom, divided by a one-way mirror (Hanf, 1969). As the mother interacts with her child, the therapist records data and provides coaching through an earpiece the mother wears (Hanf, 1969). The bug allows for immediate verbal feedback from the therapist to the mother, which allows for both the immediate praise and immediate correction of behavior (Hanf, 1969; Eyberg & Matarazzo, 1980; Reitman & McMahon, 2013).

Initial observations of the mother-child dyads suggest that when mothers are asked to interact with the child on a game or activity he or she had chosen, they often attempt to either take control of the game or play passively, rarely commenting on or praising the child (Hanf, 1969). Stage I seeks teach the mother to increase her **following** and rewarding behaviors during a game the child selects (Hanf, 1969; Kaminski et al., 2008). In order to move from Stage 1 to Stage II, the mother needs to exhibit following behavior for 50 seconds per minute in a five minute trial period across 3 consecutive sessions (Hanf, 1969). The requirement of empirical data to move the mother-child dyad from one stage to the next is a crucial component of the Hanf model (Reitman & McMahon, 2013).

Stage II, the mother's game, teaches the mother how to give appropriate commands and use the time out procedure. Mothers are expected to decrease the number while increasing the clarity of commands they give to their child (Hanf, 1969). Additionally, mothers are taught the specific time out sequence to use in instances of child misbehavior. First, the mother must state the rule in an "if…then" statement. For example, "If you continue to throw your toys, then I will put you in time out." As with stage I, mothers need to demonstrate mastery based on empirical data collection, including a 50% reduction in commands and a minimum of 40 seconds per minute the child was freely interacting with the parent (Reitman & McMahon, 2013). Hanf successfully tested this model both on parents of children with various disabilities as well as typically developing children (Hanf, 1969; Hanf & Kling, 1973; Kazdin, 1985; Reitman & McMahon, 2013).

Branching Behavioral Parent Training Models

Hanf's students evolved and adapted her model into multiple BPT programs, including COPE, HNC, The Incredible Years, PCIT, Your Defiant Child, Triple P, and PSWC (Barkley & Benton, 2013; Chronis et al., 2004; Cunningham, 1996; Eyberg & Robinson, 1982; Kaminski et al., 2008; McMahon et al., 2010; Reitman & McMahon, 2013).

In order to break parents and their children from the coercive cycle, each BPT model teaches parents to increase positive interactions with their child through modeling and parent role-play (Barkley & Benton, 2013; Kaminski et al., 2008; Reitman & McMahon, 2013). Many aspects are consistent across programs: each program teaches the five key BPT skills, including attending, rewarding, ignoring, giving effective commands, and a time out procedure (Anastopoulus, DuPaul, & Barkley, 1991; Barkley, 1988; Chronis et al., 2004; Cunningham, 1996; Eyberg & Robinson, 1982; Forehand & Long, 2010; The Incredible Years, 2008;

McMahon et al., 2010; Sanders, 1999). However, each of the authors have adapted Hanf's model to best fit the populations they work with and their respective clinical experiences.

Behavioral Parent Training Variations

Individual and Group Therapies. In the original Hanf model, therapists conduct individual sessions, allowing them to observe and coach parents through the one-way mirror with a bug-in-the-ear device (Hanf, 1969). HNC and PCIT both traditionally follow this model, so that therapists can provide individualized feedback and coaching throughout the parent's and child's game (McMahon et al., 2010; Eyberg & Matarazzo, 1980). These individual sessions allow for individualized attention and feedback, a flexible pace, and content tailored to the individual family's needs (Eyberg & Matarazzo, 1980; Chadwick, Momcilovic, Rossiter, Stumbles, & Taylor, 2001). However, individual sessions are more costly, time consuming, inefficient, and may be seen as more stigmatizing than group sessions (Chronis et al., 2004; Webster-Stratton, 1984).

An alternative to individual sessions is group BPT. Group sessions are up to six times more cost effective and provide additional opportunities for social support from families in a similar situation (Chronis et al., 2004; Cunningham et al., 1995). Additionally, they allow the most at risk parents, including families with children with the most severe challenges and parents who speak English as a second language, with a program they are more likely to attend and engage with than individual therapy sessions (Chronis et al., 2004; Cunningham et al., 1995; Webster-Stratton, 1984). Further, individual sessions and group sessions show no statistically significant difference in child behavior immediately after treatment and at 1-year follow up (Chadwick et al., 2001; Webster-Stratton, 1984). Incredible Years, COPE, and Triple P all offer group adaptations of their therapies with comparable efficacy to individual sessions

(Cunningham, 1996; Sanders, 1990; Webster-Stratton, Hollinsworth, Kolpacoff, 1989; Webster-Stratton, 1984).

      Multimedia supplements. To increase the interactivity and widespread use of BPT, psychologists in the last few decades have adapted traditional programs to include video conferencing, bibliotherapy, videotapes, and computer-based resources. An adapted version of Triple P, incorporating videoconferencing between therapists and parents, produced similar outcomes when compared to in person group Triple P sessions (Reese, Sloane, Soares, & Sprang, 2015). PSWC, a textual adaptation of HNC, resulted in parenting and child behavior improvements with gains maintained at two-month follow ups (Forehand, Merchant, Parent, Long, Linnea, & Baer, 2011).

      In addition to videoconferencing, a few programs have gone a step further and added videos. As a lower cost treatment condition, the Incredible Years adds video modeling to supplement their group sessions (Webster-Stratton, 1992). Both COPE and Incredible Years use video models of poor parenting practices or challenging child behavior within their sessions, allowing parents to divide into groups, discuss their observations, and provide suggestions (Cunningham, 1996; Webster-Stratton, 1992). Inclusion of video modeling and discussion in treatment sessions is more effective than lectures, presentations, and role-playing during group sessions, allowing for both exposure to a standardized variety of child behaviors and collaboration within the discussion group (Enebrink et al, 2012; Flanagan, Adams, & Forehand, 1979; Mackenzie & Hilgedick, 1999; O'Dell, Krug, Patterson, & Faustman, 1980; O'Dell, Mahoney, Horton, & Turner, 1979). Similarly, Kacir & Gordon (2000) developed a scenario based CD-rom training to increase accessibility of BPT to rural families. Parents see 1 of 9 videos of a specific problem and are prompted to choose the best response. Although each

scenario ends with a quiz, there is no formal instructional on BPT principles prior to the scenario. Parents demonstrated improvements at 1 and 4 month follow ups on the Eyberg Child Behavior Inventory (ECBI) and reported an increase in parenting knowledge (2000).

Another computer-based BPT developed by Mackenzie & Hilgedick (1999) presents participants with a text based overview of old lessons, new content, and a quiz with immediate feedback. Two of the four lessons also provide parents with one interactive scenario to practice the target skill. Both undergraduate students and parent participants reported high levels of consumer satisfaction (1999). However, parents did not demonstrate statistically significant different in their own parenting behaviors (1999), perhaps suggesting that more interactivity might be needed to increase learning. Enebrink and colleagues (2012) also used Internet modules to develop an online adaptation of a parent management training program targeting the same key five skills as BPT. This program consists of written facts, vignettes, and discussion, with no individualization to individual family needs. Parents using this program effectively decreased problematic behaviors at the conclusion of the program and at a six month follow up (2012).

BPT efficacy across various modalities, including in person, videoconferencing, bibliotherapy, video modeling, and computer-based programs, supports the adaptability of BPT content. The success of various BPT models across modalities has been demonstrated in terms of parent and child behaviors, populations, and socio-economic status of participants.

Behavioral Parent Training Success

Behavioral Parent Training programs have historically been successful both in reducing problematic child behavior and parental stress. Across formats and modalities, including HNC, PSWC, The Incredible Years, PCIT and Triple P, Behavioral Parent Training results in clinically

significant reductions in child maladaptive behaviors (Eyberg & Robinson, 1982; Forehand et al., 2011; Jones et al., 2008; Lundahl et al., 2006; McMahon et al., 2010; Sanders, 1999; Webster-Stratton, 1984). Specifically, BPT programs that explicitly instruct on time out procedures demonstrate increased improvements in child externalizing behaviors (Kaminski et al., 2008). The majority of children maintain clinically significant gains from BPT, even up to one year following the discontinuation of treatment (Bor et al., 2002; Enebrink et al., 2012; Eyberg, Nelson & Boggs, 2008; Jones et al., 2008; Webster-Stratton, 1984; Webster-Stratton, et al., 1989; Webster-Stratton et al., 2011), supporting the external validity.

In order to fully combat the coercive cycle, BPT must improve parental knowledge and behavior in conjunction with improvements in child behavior. At the conclusion of BPT, parents demonstrate improvement in parenting strategies, practice, and confidence (Bor et al., 2002; Enebrink et al., 2012). Specifically, parents decrease the number of commands they use and questions they ask, while increasing positive attention, including praise to their child, following a BPT intervention (Eyberg & Robinson, 1982; Sanders, Markie-Dadds, Tully, & Bor, 1999). This improvement applies to both the target child of the intervention, as well as other siblings in the house (Eyberg & Robinson, 1982). By providing more attends and praises, parents develop their emotional communication with their child, which Kaminski and colleagues (2008) describe as a key factor in the success of treatment. Additionally, BPT is linked to improved parental attitudes (Eyberg & Robinson, 1982; Webster-Stratton, 1984) and a decrease in maternal anxiety and pessimism (Eyberg & Robinson, 1982). Beyond these improvements, parents often indicate high levels of satisfaction with their treatment (Bor et al., 2002; Forehand et al., 2011).

The benefits of a BPT intervention hold true for parents and children from diverse populations. Sanders (1999) determined self-directed Triple P complemented by a weekly phone

call demonstrates a reduction in child disruptive behavior and parental stress among rural families who otherwise did not have access to BPT resources. Furthermore, parents for whom English is a second language (ESL), immigrant families, and parents of children with the most severe behaviors demonstrate the highest rates of improvement at the conclusion of a community group BPT delivery model (Cunningham et al., 1995). BPT is proven effective across economically disadvantaged populations in terms of parenting strategies, child behavior, and parenting stress (Bor et al., 2002; Lundahl et al. 2006; McMahon et al., 2010; Rogers et al., 1981).

Limitations of Behavioral Parent Training

While Behavioral Parent Training is an effective and evidence based way to address unruly child behaviors, some limitations prevent parents and children from reaping the full benefits of the program. The main limitations include limited accessibility, lack of participation by fathers, difficulty maintaining treatment gains, and stigmatization.

Accessibility. Limited accessibility encompasses many issues. For example, numerous studies find that parents may not use or fully benefit from BPT because of logistical concerns: lack of transportation or childcare, inconvenient BPT location, or conflicting commitments (Barkley et al. 2000; Chronis et al., 2004; Cunningham et al., 2000; Koroloff et al., 1996; Nordstrom, Dumas, & Gitter, 2008). In addition to problems with physical accessibility, financial burdens can impact a parent's use of BPT. In fact, one study estimates BPT costs $405 per child (Enebrink et al. 2012) while Honeycutt and colleagues (2015) put the estimates around $501 per child. This high cost can act as a deterrent for many parents, especially those of low SES (Chronis et al., 2004; Koroloff et al., 1996). Additionally, while BPT has touted for its effectiveness targeting Disruptive Behavior Disorders, it is also effective as a preventive strike

against later conduct problems (Anastopoulos et al., 1991; Eyberg & Matarazzo, 1980; Malmberg & Field, 2013). However, the high cost and time commitment can deter parents of typically developing children from seeking out BPT as a preventative measures (Koroloff et al., 1996).

Issues of accessibility are particularly poignant for low SES families who may have particularly busy work schedules, and less access to childcare and transportation, putting them at more of a disadvantage (Cunningham et al., 2000; Nordstrom et al., 2008). Parents in these situations may only selectively attend sessions, drop out without completing the full number of sessions, or forgo treatment altogether. The parents' ability to attend sessions is particularly important: those parents that attend fewer BPT sessions show similar levels of functioning as control groups that receive no treatment (Barkley et al., 2000).

Father participation. Most research on BPT has been conducted using mother and child dyads, and there is little information about the role of fathers in BPT (Chronis et al., 2004; Fabiano, 2007; Fletcher et al., 2011; Tiano & McNeil, 2005). This is particularly problematic as fathers play an important role in a child's social, emotional, and academic development (Fabiano 2007; Fabiano et al. 2012; Fletcher et al, 2011). As such, it is important that fathers not only spend time with their kids, but are involved with all aspects of parenting, including attending BPT sessions. Fortunately, those few studies that do include fathers generally yield equivocal positive results to those including mothers (Chronis et al., 2004; Fabiano, 2007).

The clear lack of father participation may present problems because the father is not as well versed in the techniques used in BPT. Parents providing a unified front and creating consistency is very important for child development: Tiano and McNeil (2005) find that children receiving consistent parenting are less likely to develop conduct disorder compared to peers with

more inconsistent parenting, and father's involvement in BPT is associated with more consistent parenting. Additionally, having the emotional and parental support of fathers is crucial (Chronis et al., 2004) and can help maintain positive treatment gains (Fletcher et al., 2011; Tiano & McNeil, 2005). Fathers are usually unable to engage in BPT for the same reasons as mothers (i.e. scheduling conflicts, transportation conflicts, etc). An additional barrier may be that fathers stereotypically do not have primary caregiving duties and BPT content may not seem as relevant to them (Fabiano, 2007). BPT programs that specifically target fathers, such as Coaching Our Acting Out Children: Heightening Essential Skills (COACHES), are shown to increase engagement and attendance (Fabiano et al., 2012). Thus, a BPT format that would allow for increased participation of fathers should help improve child outcomes.

Booster sessions. Even once families have completed BPT, they may not continue to fully benefit from it. Chronis and associates (2004) noted parents' ability to generalize the new techniques to their child's behavior may be compromised at the commencement of treatment. Without the continued help of therapy, parents may have a difficult time applying BPT concepts to their lives. Some studies note that BPT needs to be refreshed over time in order to ensure lasting positive effects (Chronis et al., 2004; Eyberg, Edwards, Boggs, & Foote, 1998). However the additional cost of BPT booster sessions can drive parents away (Chronis et al., 2004).

Session format. Finally, there are other session or parental factors that can limit the effectiveness of BPT. One factor is general parent noncompliance. According to Forehand and Kotchick (2002), parents may not be able to, may feel uncomfortable with, or may refuse to take on the high demands that these kinds of treatment programs place on them. In the same vein, parents may have difficulties navigating the mental system or understanding session content. Parents who are new to the mental health system may not know who to contact for help or how

to contact them (Koroloff, et al., 1996). Similarly, this kind of structured learning may be particularly foreign or difficult to grasp for those with poor learning skills (Firestone & Witt 1982). Additionally, the terminology or presentation of BPT material may be confusing or overwhelming to parents. Navigating the mental health world can also leave some parents feeling stigmatized and prevent them from seeking the treatment they need (Koroloff et al., 1996).

Digital Learning

Given the increased prevalence and success of digital learning platforms, a digital version of BPT may be an appropriate way to address many of these limitations in accessibility. Prensky (2001) refers to individuals born after 1982 (Oblinger, 2004) who grew up in a digital environment as **digital natives**, and notes that these digital natives speak the language of digital technologies with ease, making these digital technologies a logical platform for both entertainment and instruction. Unsurprisingly, digital approaches to learning have grown significantly in the past decade (Squire, n.d.), in part due to the increased interest in informal self-directed learning made possible through the Internet and video gaming technology (Oblinger, 2004).

Though the word game has a playful connotation to it, not all games are intended to entertain. Mayer & Johnson (2012) define any game as an environment that is rule-based, responsive, challenging, and cumulative. The rule-based nature of the environment provides a consistent logic that is used to teach a concept (2012), which players discover through active, trial-and-error learning (Oblinger, 2004; Prensky, 2001). A responsive environment provides the user with consistent, immediate, and contextualized feedback (Mayer & Johnson, 2012). It is a key component of good instruction to minimize uncertainty (Oblinger, 2004) and increase comprehension (Erhel & Jamet, 2013). A challenging environment promotes the player's sense

of agency and self-efficacy within the game, while a cumulative environment builds on the player's past actions (Mayer & Johnson, 2012). A challenging and cumulative environment allows for the users to demonstrate their knowledge and move on to more challenging levels when they meet pre-established benchmarks for competence (Oblinger, 2004).

As opposed to passive activities such as watching television, video games provide an active digital platform individuals can engage with (Oblinger, 2004; Prensky, 2001). Video games are increasing popularity across the U.S. population, and not just among children: as 59% of Americans play video games, and the average player is 31 years old (Entertainment Software Association [ESA], 2014).

Video games are classified as entertainment-based or serious. While the video game platform is intended to entertain, serious games expand beyond pure entertainment (Djaouti et al., 2011). The purpose of a serious game is to instruct, train, or change an attitude (Blumberg et al., 2013). An educational computer game is a type of serious game that maintains the definition of a game, with the added caveat that the game occurs on a computer and is intended to bring about cognitive change (Mayer & Johnson, 2012). Serious game developers draw from Bandura's (1969) Social Cognitive Theory (SCT), which suggests that individuals acquire knowledge through observation of others within a social context, to provide users as many or as few opportunities as needed to practice the target behavior to mastery (Blumberg et al., 2013). Additionally, serious games are beneficial because they are inexpensive, in that user failures can occur with no lasting consequences, and they can be utilized in informal environments, allowing more opportunities for inexpensive learning (Niehaus & Riedl, 2009).

Serious games are used successfully for training and instruction across various disciplines, including business, higher education, health, and medical education. Pasin & Giroux

(2011) observed an increase in understanding of complex skills, particularly skills that are learned best by doing, in business administration undergraduate students after they played an electronic simulation in a team. Ritterfeld, Shen, Wang, Nocera, and Wong (2009) administered a multimodal and interactive computer game about the human digestive system to students who originally did not demonstrate an interest in biology. At the conclusion of the game, students demonstrated increases in overall knowledge, definition knowledge, self-reported learning, and interest (Ritterfeld et al., 2009). Kato, Cole, Bradlyn, and Pollock (2008) provided adolescents diagnosed with cancer with a computer game highlighting key issues surrounding cancer care that led to an increase in their self-efficacy, cancer knowledge, and adherence to their oral medication regimen. Finally, Fukuchi, Offutt, Sacks, and Mann (2000) establish a positive correlation between the number of games played and the number of questions third year medical students answered correctly. Students who play the game also self-reported an increase in learning of and appreciation for oncology, the focus of the game (Fukuchi et al., 2000).

Researchers have also studied similar programs for use in adults to increase learning and expertise. Niehaus, Li, and Riedl (2011) suggest that expertise stems primarily from experience and reflection and that digital learning programs are conducive for these types of learning (Niehaus & Riedl, 2009). Further, games exhibit principles of good pedagogy, including activating prior learning, providing context and individualized feedback & assessment, supporting transfer of knowledge into daily life, and scaffolding the player through their zone of proximal development (Oblinger, 2004). A final benefit of electronic games is that they support a potential in person or online community and discussion board, where players can share strategy (Oblinger, 2004).

Digital Learning and BPT

According to Lundahl and associates (2006) BPT would be enhanced by an audio visual experience. Indeed, many programs already incorporate videoconferencing, video modeling, and online practice to produce similar positive results as in-person BPT (Enebrink et al, 2012; Flanagan, Adams, & Forehand, 1979; Mackenzie & Hilgedick, 1999; O'Dell, Krug, Patterson, & Faustman, 1980; O'Dell, Mahoney, Hortan, & Turner, 1979). This suggests that BPT could be improved by presenting it in a digital format. Because of this, we believe that a digital approach to learning can address the limitations and inconveniences of conventional BPT.

Digital versions of BPT would give the parent the ability to access the content from any computer or any Internet enabled device. The parent would be able to play the game in the comfort of their home. In fact, computer programs are more accessible to the American public than medical clinics: in 2013, the US Census Bureau estimated that 83.8 percent of American households own a computer and 78.5 percent of households have internet access (File, 2013). These households would be able to access digital learning programs distributed through online platforms. Furthermore, since the home is the average American's primary informal environment, parents will very easily be able to access materials hosted through the internet. This eliminates any additional fees or charges a parent may incur when trying to access traditional BPT, such as the cost of gas or of childcare. Digital BPT also allows the parent to access the game on a flexible schedule, or when the child is sleeping. Lastly, giving the parent control over the environment where BPT is accessed will combat issues of stigma and privacy. Parents would access this at home in private. They would not need to worry about others in the community judging their situation. Thus, issues of psychical and financial accessibility and stigma are addressed with online BPT.

Another benefit of digital learning is the machine's ability to dynamically generate content based on user preferences. Digital teaching programs are most effective when they offer opportunities to gain simulated experience (Niehaus & Riedl, 2009). Players demonstrate increased learning when given custom modules (Zook & Riedl, 2014), so digital learning programs often aim to provide specialized experiences to their users. This can be achieved through dynamic narrative generation (Riedl, 2010), difficulty adjustment (Lloyd, Persaud & Powell 2009), or interface augmentation (Riedl, 2010). The increased learning opportunities provided by an online version of BPT may also address the difficulty in maintaining treatment gains and parent noncompliance. For parents who have used traditional BPT, this online game can be used for booster sessions, allowing parents to practice and maintain skills without additional financial burden. Lessons and scenarios can be replayed with new content as a refresher. For parents who cannot or do not comply with BPT requirements, an online game which moves step by step and is easy to understand will put less demand on the parent.

Additionally, an online version of BPT with dynamic content generation may be more appealing to fathers. Video games are appealing to men as well as women: 52% of game players are male, with most male players having played for an average of 18 years (ESA, 2014). Furthermore, Fabiano (2007) highlights that fathers highly value in-vivo practice of BPT skills. An online game will allow for practice and feedback during typical situations involving a parent and child. Fathers would get a simulated version of in-vivo feedback with the auditory and visual feedback provided by a digital BPT game. Finally, this provides the opportunity for both parents to learn the BPT techniques, thus addressing issues of consistency of discipline between parents.

In order to address the limitations of BPT, we propose the use of a computer game to instruct on the core principles of BPT. However, no interactive computer game that teaches BPT skills has been established yet. Before a computer game is able to take the place of traditional in person or over the phone BPT, researchers must demonstrate that learning can occur through a computer game, and that this game would be an appealing and engaging way with which to learn these concepts. We believe that participants will demonstrate higher levels of knowledge of BPT principles after completing a BPT computer game version as compared to their pretest and a control group.

CHAPTER THREE: METHODOLOGY

Participants and Recruitment

We recruited 33 undergraduate students from the University of Maryland to participate in our study. Participants were recruited through flyers and listserv announcements. In order to enroll in the study, participants needed to: (a) be over 18 years old, guaranteeing that all participants are adults; (b) not have any biological or adopted children ensuring that if there was any misunderstanding of information, participants would not act on this misunderstanding with actual children; (c) have consistent access to a computer with reliable internet connection, confirming participants would be able to complete all related surveys without interruption and access the game consistently, as all study involvement was completed electronically; and (d) be an undergraduate student at the University of Maryland, as all participants were compensated with Terrapin Express, which is a form payment at the University of Maryland, College Park.

Thirty-three students, 9 male and 24 female, enrolled in our study by indicating interest over e-mail. Participants were randomly assigned into either the experimental or control condition with a random number generator. We assigned 19 students, 6 male and 13 female, to the experimental group, though only 10 students, average age 19.7 (SD = 1.25), completed the entire experimental treatment condition. We assigned 14 students, 3 male and 11 female, to the control group, with 9 students, average age 19 (SD = .87) completing the entire control condition. Both the experimental and control group were similar at the start of the study across group size and gender breakdown. The participants who completed the control and experimental conditions did not differ across racial background, gender, and age, as noted in Table 1. The control group noted a wider spread in both maternal and paternal levels of education.

Table 1*:* Demographic Breakdown of Participants

	Control	Experimental
N	**9**	**10**
Race		
White	**67%**	**60%**
Hispanic	**0%**	**0%**
Black	**11%**	**10%**
Native American	**0%**	**0%**
Asian/Pacific Islander	**33%**	**30%**
Prefer Not To Answer	**0%**	**0%**
Average Age	**19 years**	**19.7 years**
Gender		
Male	**2**	**2**
Female	**7**	**8**
Maternal Level of Education		
Trade/Vocational/Tech Training	**1**	**0**
Associate's Degree	**1**	**0**
Bachelor's Degree	**3**	**6**
Master's Degree	**3**	**3**
Doctorate	**1**	**1**
Paternal Level of Education		
High School Diploma	**1**	**0**
Some college credit, no degree	**1**	**3**
Trade/Vocational/Tech Training	**1**	**0**
Bachelor's Degree	**2**	**1**
Master's Degree	**1**	**3**
Professional Degree	**2**	**1**
Doctorate Degree	**1**	**2**

Note: Percentages reflect the percentages of participants who indicated a certain answer. Number indicated the number of participants who responded to a specific question on the survey.

Previous Experience. Both the control and experimental groups indicated similar levels of experience with young children, as described in Table 2, but differed in their psychology background. The control group reported slightly higher levels of a background in psychology than the experimental group (55% in control group, 40% in experimental group). This is likely a result of two psychology majors participating in the control group and zero participating in the experimental group. As noted in Table 2, most participants are not majoring in psychology. Participants in both the experimental and control conditions similarly reported diverse academic fields of study, including engineering, mathematics, journalism, and government. Further, both conditions consist mostly of freshmen and sophomore students, however the experimental condition also has 4 seniors, while the control condition has none.

Measures

BPT pretest. Participants in both the control and experimental groups completed an electronic BPT assessment we developed to measure a baseline understanding of the five key BPT principles: attending, rewarding, ignoring, giving effective commands, and time-outs. *Parenting the Strong-Willed Child* (Forehand & Long, 2010) provides an eleven question check for understanding of effective commands, where parents select which commands are effective and which are not. For attending and commands, participants select all of the options that are effective attending and commands of 14 and 16 possible options, respectively. To measure understanding of rewarding, ignoring, and time-outs, we gave participants two to three conceptual or situational multiple choice questions. For example, participants must select the most effective way to improve behavior with rewards, or answer a situational question about child behavior at the dinner table related to rewarding. To see the entire survey, refer to Appendix B.

Table 2: Prior Experiences and Academic Background

	Control	Experimental
N	9	10
Psychology Background		
PSYC100 (Intro)	5	3
PSYC200 (Statistics)	1	0
PSYC221 (Social)	3	2
PSYC289E (Psychology of Evil)	1	0
PSYC300 (Research Methods)	1	0
PSYC301 (Biology of Behavior)	1	0
PSYC330 (Child Psychopathology)	1	0
PSYC353 (Abnormal)	1	1
PSYC479 (Special Topics)	1	0
Experience with young children		
No experience	1	1
A little experience	3	4
Moderate experience	3	4
Extensive experience	2	1
Experience teaching young children		
No experience	2	2
A little experience	6	5
Moderate experience	1	2
Extensive experience	0	1
Class Standing		
Freshman	4	3
Sophomore	4	3
Junior	1	0
Senior	0	4
Academic College		
Engineering	3	5
Behavioral and Social Sciences	4	2
Computer, Mathematical & Natural Sciences	1	2
Journalism	1	1
School of Public Health	1	1

Note: Participants provided a self assessment of their previous experience with children on a scale from no experience to extensive experience. All participants indicated their major code and were grouped into their specific academic college at the University of Maryland.

BPT posttest. All participants completed the BPT posttest assessment, consisting of the same questions as the BPT pretest assessment. The control group received the posttest survey three weeks after they completed the pretest, while the experimental group was prompted to complete the posttest immediately after the completion of lesson 5, time-outs. To combat an order effects that could arise from using the same measure twice, we compared experimental scores to control group scores at each test. To see the entire survey, refer to Appendix B.

Qualitative survey. At the completion of the game, participants reviewed the dialogue and storyline of the game in a qualitative survey. Additionally, participants rated their overall satisfaction with information presented through the tutorials, gameplay, and the user interface. As with many BPT curriculum (Bor et al., 2002; Eyberg & Matarazzo, 1980; Forehand et al., 2011; Webster-Stratton, 1984), participants were given the opportunity to rate their overall satisfaction with the program, their confidence with their own parenting skills as a result of participating in the program, and their likelihood to recommend the product to a friend or family member. Finally, participants provided demographic information, including their psychology background, major, ethnicity, parent education levels, and year at the University of Maryland. To see the entire survey, refer to Appendix B.

Exit survey. Participants were informed that they had the right to leave the study at any time. If participants chose to withdraw from the study, they had the option to select "exit game" within the user interface. If they selected this option, they would be withdrawn from the study and prompted to complete an exit survey. This survey was not required to be officially withdrawn from the study, but allowed participants to provide the research team insight into their reason for withdrawing. On the survey, participants could indicate how far they had progressed

through the game, aspects they enjoyed and aspects they did not enjoy. To see the entire survey, refer to Appendix B.

Procedures

Participants were recruited through listserv email announcements and flyer postings across academic buildings at the University of Maryland. Both the flyer and listserv announcements listed participant eligibility requirements. Interested participants were directed to contact researchers via email to indicate interest and sign up for the study. At the end of every day, we created a list of interested participants and randomly assigned participants to the experimental or control group. Once we assigned a participant to a condition, we sent a follow up email outlining their next set of directions. Both groups received a consent form, which they signed electronically, and then were directed to the pretest. At the completion of the pretest we instructed the control group to wait three weeks for a follow up email while providing the experimental group with access to the game.

All participants were compensated for their time with money added to their Terrapin Express (TE) accounts. The control group was entered into a drawing for $20 TE, while all participants in the experimental group earned $30 TE. To encourage game completion, experimental group participants were compensated $10 TE halfway through the game and $20 TE at the completion of the game and related surveys. The Institutional Review Board (IRB) at the University of Maryland, College Park, approved all procedures within this study.

Experimental condition. Participants in the experimental group access the game through a link sent to them via email, where they create a secure and unique username and password. We recommended participants play the game two or three days per week for 30 minutes at a time, anticipating game play would take around two to three weeks, but participants could play the

game for as long they wished. After completing lesson three participants were compensated $10 TE. Upon game completion, participants were linked to the BPT posttest, which then linked them to the Qualitative Survey. In order to receive their final $20 TE compensation, participants were required to complete the Qualitative Survey.

Control condition. Participants in the control group filled out the BPT pretest to determine baseline BPT knowledge. Three weeks later, the research team contacted them to take the final BPT posttest. In order to be entered into the raffle for $20 TE, participants must complete the final posttest survey.

Game Description

Logging in. To separate personal user data from gameplay performance, we require that users make their own user accounts through our game website. The account creation page prompts them for a user ID, password, and security questions/answers. These user records are stored in a table in a MySQL database. Users must successfully log in in order to access our game.

General gameplay. After logging in, participants are required to complete a tutorial scenario for the first lesson in order to access the rest of the scenarios that comprise the lesson. There are a total of five lessons and users are given permission to engage each of these through sequential completion of the previous lessons. The game's linear design models one of BPT's core principles, requiring users to demonstrate mastery of each lesson in order to proceed.

The game is modeled like a visual novel, a genre where the user progresses through narrative while making pre-set decisions to influence their gameplay. In our program, the user takes on the role of a parent and experiences the actions and behaviors of a child avatar through text and images. The user is given agency through decisions they are given at specific points.

Responding appropriately at these decision points will lead to an increase in score, as seen in

Figure 1. Incorrect responses will result in increased child belligerence and decreased scores, as

seen in Figure 2.

Figure 1. Correct player responses will result in positive child behaviors, expressed through the textbox and the child's facial expression.

Figure 2. Incorrect player choices will result in negative child behaviors, as displayed through the child's speech in the textbox and negative facial expressions.

Each lesson has a tutorial that teaches its core principle. These tutorials are not scored (users are not evaluated on performance), but serve to prepare the user for the rest of the lesson by outlining the main principle in the lesson, showing the user what correct and incorrect answers would look like. These tutorials can be replayed at any point if the user needs to refresh themselves on the material. See Figure 3 for a screenshot from a tutorial.

Figure 3. Tutorials provide didactic explanations about the lesson's core principles.

The other scenarios in a given lesson are scored. Users must receive a passing score in order to complete the scenario. The threshold for successfully completing a scenario is 70% of the total achievable score in the scenario. Failing a scenario does not punish the player besides requiring them to repeat that scenario. The game requires that the user compleres all the scenarios in a given lesson in order to unlock access to the next sequential lesson. Each lesson has a variable number of scenarios, as reflected in Table 3.

Table 3: Scenarios per Lesson

Lesson	Scenarios	Target Skill
1	7	Attending
2	4	Rewarding
3	5	Ignoring
4	5	Giving Effective Commands
5	5	Time-Out

Flowchart development. We adopted a two-step method for creating scenario content for the game. We first describe the flow of the scenario as a directional graph. As shown in Figure 4, the starting node of the graph describes the entry point of the scenario and edges describe the possible transitions allowed by the game. Each of these edges has a score assigned to them. Nodes with multiple edges represent decision points for the player: in the end, a user playing the scenario would perform a unique traversal of the graph and would receive a score based on which edges they traveled along.
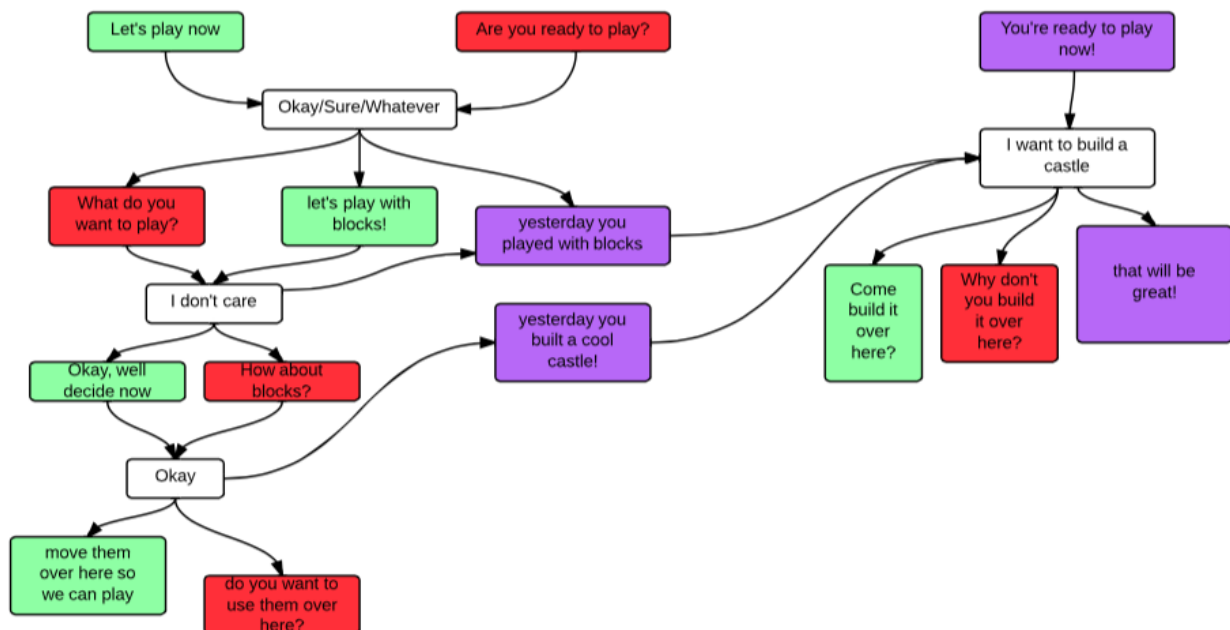
Figure 4. A portion of a flow chart from Lesson 1, Attending.

After the flowcharts were written out, they would be coded into the game. The game's engine reads scenarios as text files. These files are generated to match a corresponding spreadsheet containing the narrative and choices that the user could make. Thus, the game's educational content is a collection of text files, and by modifying the corresponding spreadsheets, the different scenarios can be edited easily.

Scoring. We devised a scoring system in order to evaluate user progress, promote learning, and encourage positive user decisions. The scoring system simultaneously prevents cheating and provides immediate feedback to the user about their choices. Each decision has a score assigned to it: the decision with the most points assigned to it is always the correct response according to BPT. Choosing the correct responses leads to the highest achievable score in a scenario. The user receives immediate visual feedback based on the correctness of their responses: correct responses would prompt the game to flash a green aura around the screen's edges and negative responses would result in a red aura. Additionally, the child avatar changes facial expression depending on the response chosen, so the user can easily tell when their answers were correct.

Data storage. User records are stored in an industry-grade server. In addition to user credentials, we collect data about user progress and time spent. Progress is saved whenever the user returned to the main screen, either by completing a scenario or exiting a scenario. Thus, we were able to monitor progress of the users during the entire duration of the study.

CHAPTER FOUR: RESULTS

Pretest-Posttest Assessment

The pretest-posttest survey is scored out of ten total points, and each of the five categories of questions is worth two points. Participants in the control and experimental groups earned similar scores on the BPT knowledge pretest, as shown in Table 4: control participants averaging 7.10 points (SD=1.06) and experimental participants averaging 6.63 points (SD=1.09). However, the control group scores decreased slightly on the posttest (M=6.59, SD=1.06), while experimental group scores increased to 9.21 points (SD =0.533).

Table 4: Average scores on Pretest and Posttest Survey

	Pretest		Posttest	
	M	SD	M	SD
Control	7.10	1.06	6.59	1.06
Experimental	6.63	1.09	9.21	0.533

Note: Test is scored out of 10 total points, with each of the 5 sections worth 2 points.

After collecting all of pretest-posttest data, we wanted to establish that scores increased significantly for the experimental group but not for the control group. We first needed to show that the pretest scores for the control and experimental groups did not significantly differ. We ran a two-sample t-test on these scores with a 95% confidence interval, resulting in a t-value of 0.93 and a p-value greater than 0.05 (p= 0.365), indicating no significant difference in pre-test scores. To show a difference in posttest scores, we ran a two-sample t-test on posttest data: this resulted in a t-value of 6.37 and a p-value less than 0.001 (p= 0.00), indicating a statistically significant difference between the control and experimental in posttest score. The results of these two-sample t-tests are displayed in Table 5 and Figure 5.

Table 5. Control vs. experimental group pretest and posttest scores.

	Control	Experimental	*t*	*df*
Pretest	7.1 (1.06)	6.63 (1.09)	0.93	15
Posttest	6.59 (1.06)	9.21 (0.533)	**-6.37	9

Note. *= p < .05, ** = p < .001. Standard Deviations appear in parentheses below means.
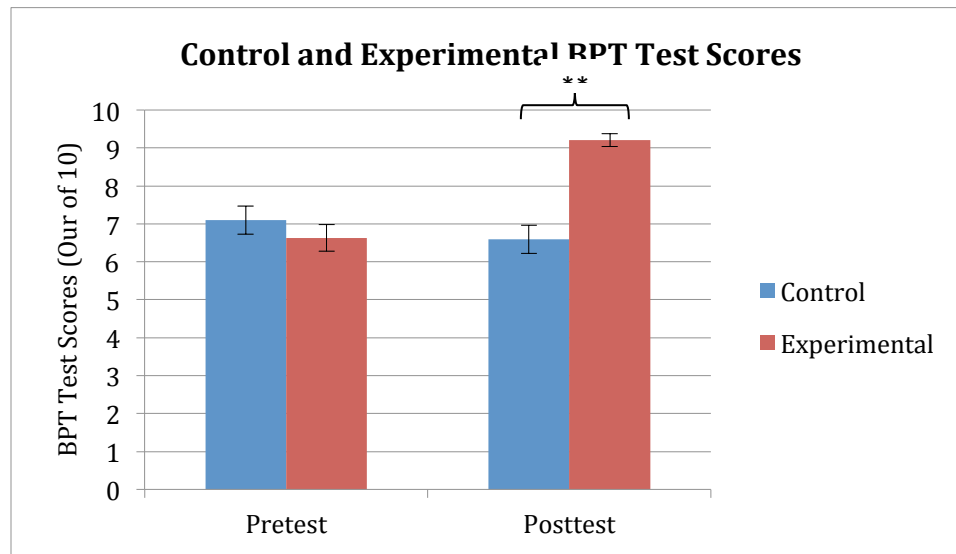

Figure 5. Control and experimental BPT test scores. Control and experimental scores on the pretest did not differ significantly. However, experimental posttest scores were significantly higher than the control group scores (** = p< 0.001)

To determine whether there was significant growth between pretest and posttest scores in each group, we ran paired t-tests. As shown in Table 6, the control group did not show a significantly significant increase in score: t(7)=0.99, p=0.355. When we performed the paired t-test over the experimental group scores, we noticed a statistically significant increase in score: t(9)=7.1, p= 0.00. These results are displayed in Figure 2.

Table 6. Pretest vs. posttest scores.

	Pretest	Posttest	*t*	*df*
Control	7.1 (1.06)	6.59 (1.06)	0.99	7
Experimental	6.63 (1.09)	9.21 (0.533)	**7.1	9

Note. *= p < .05, ** = p < .001. Standard Deviations appear in parentheses below means
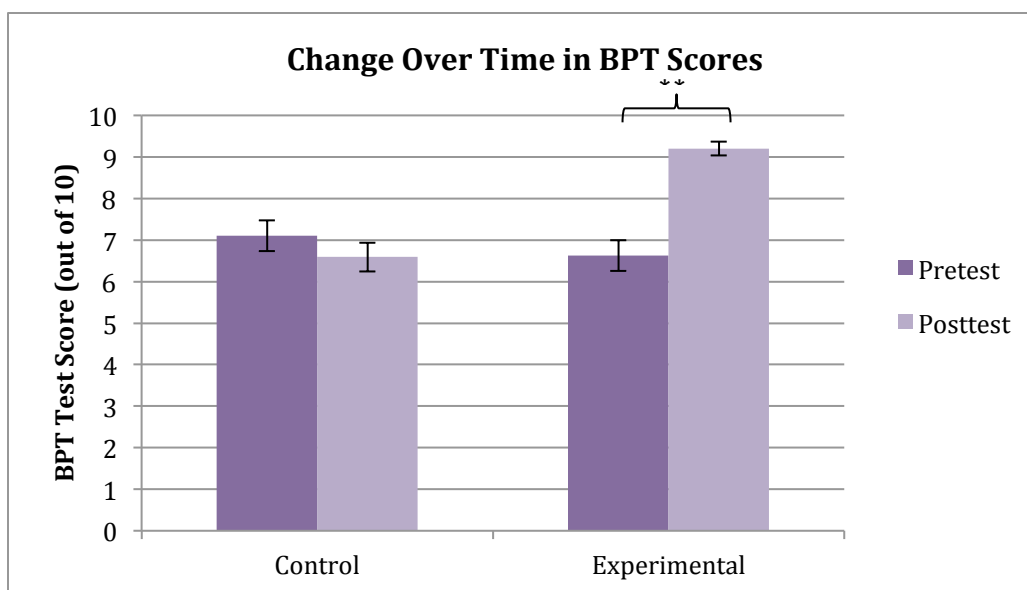
Figure 6. Change over time in BPT scores. There was no significant difference between control group pretest and posttest scores. However, there was significant growth in experimental scores from the pretest to the posttest (** = p< 0.001)

Qualitative Survey

After all participants in the experimental group (*n*=10) completed the BPT game and the pretest and posttest assessments, they completed a qualitative assessment of the game. In this survey, participants ranked statements satisfaction, game content, and usability on a 1 to 5 scale (1 being strongly disagree and 5 being strongly agree). Some items are reverse coded, so that all higher scores demonstrate higher satisfaction and all lower scores demonstrate lower satisfaction with a particular aspect of the game. Results for each subgroup are displayed in Table 7.

Participants rated the game overall as 3.856 (SD=.622). Participants endorsed the appropriateness of the parent and child dialogue as the most satisfying subgroup (m=4.4, SD=.14), and the scenarios as the second most satisfying out of all of the subgroups (m=4.33, SD=.208), encompassing logic, variety of experiences, and applicability to daily life. Participants rated being the least satisfied with the child avatar, giving it an average score of 3.20 (SD=.283).

Participants moderately agreed that they would recommend this game to a friend, endorsing a

mean score of 3.75 (SD=.338).

Table 7: Mean scores from qualitative assessment

Game Component	Mean Score (SD)
Overall	3.856 (.622)
Parent & child dialogue was appropriate	4.4 (.14)
Scenarios - logic, wide variety, applicability	4.33 (.208)
Tutorials - helpful & detailed	4.15 (.354)
Lesson content was appropriate	4.13 (.46)
Self-assessment of learning	4.13 (.208)
Helpful for future parenting	4.00 (.346)
Feedback was helpful	3.90
Game layout was easy to use	3.90 (.404)
Scoring was fair	3.80
Likelihood of recommendation to other	3.75 (.338)
Graphics - engaging & helpful	3.75 (.369)
Satisfaction with avatar	3.20 (.283)

Note: Standard Deviation appears to the right of the mean in parentheses. Two items, feedback & scoring only had 1 question and no standard deviation to report.
Participants rated agreement with each item on a scale of 1-5, with 1 indicating strongly disagree and 5 indicating strongly agree. Items were reverse coded so that higher scores indicate higher satisfaction.

Game Data

During the experiment, we recorded gameplay information from our users. By the end of

data collection, 16 participants registered for our game. Three of them did not progress past

Lesson 1, two of them did not progress past Lesson 2, and one of them did not progress past

Lesson 3. The remaining 10 participants completed the entire game, the posttest assessment, and the qualitative survey.

We measured the time it took each of our participants to complete the game, as displayed in table 5. On average, it took 24.02 minutes to finish (SD=9.95). The minimum completion time was 13.68 minutes and the maximum completion time was 43.73 minutes. The median completion time was 20.73 minutes.

Table 8. Game Completion Statistics

	Minutes
Average Time	24 min, 1 sec
Standard Deviation	9 min, 57 sec
Minimum Time	13 min, 40 sec
Maximum Time	43 min, 44 sec
Median Time	20 min, 44 sec

CHAPTER FIVE: DISCUSSION

Conclusions

Our primary research questions for this study were to determine (1) whether participation in a BPT computer game increase BPT knowledge (2) if a digital BPT game an engaging platform for users and (3) to what extent users would perceive a digital BPT game as a useful tool for learning BPT skills.

In our first research question, we hypothesized that BPT concepts can be taught through an educational computer game, as measured by a pretest-posttest analysis between experimental and control conditions. Our results show that control and experimental scores did not differ significantly on the pretest (though control scores were insignificantly higher than experimental scores) indicating that the two groups did not differ in the amount of pre-existing BPT knowledge. After playing the game experimental posttest scores were significantly higher than the control group scores, which actually decreased slightly (see Table 2 and Figure 1). Furthermore, the data reveals that the growth between the pretest and posttest scores was only significant for the experimental group (see Table 3 and Figure 2). This data supports our hypothesis that playing the computerized BPT game increases participant BPT knowledge. Additionally, since participants in both groups represent a variety of academic majors, most of which are not psychology or human development (see Table 1 for a breakdown of participant demographics), these findings indicate that future users will not need a background in psychology in order to learn from the game.

In regards to our second research question, we hypothesized that users would perceive the game as engaging, as measured through our qualitative survey. Overall, participants indicated satisfaction with the game, with an average score of 3.856 (SD=0.622) out of 5 possible points (see Table 4). They rated game content the most highly out of all of all game aspects, endorsing

game tutorials as being helpful, scenarios as being realistic and varied, and dialogue as appropriate. Participants also rated game layout and the game's use of feedback helpful and easy to use with an average of 3.90. This high rating is particularly important because immediate feedback plays a crucial role in all BPT programs, originating from the individualized feedback coming through a bug-in-the-ear essential to the Hanf model. The feedback in the BPT game came in many forms: textual response, changing facial expression from the avatar child, changes in score as indicated in the score-bar, and a flash of green for correct and red for incorrect.

Participants, on average, ranked their satisfaction with the avatar as the lowest item (M=3.20, SD=0.283) coinciding with their relatively low rating of the game's graphics (M=3.75, SD=0.369). We decided to keep our game graphics and child avatar simple based on game design literature finding that games do not need detailed graphics in order to be engaging (Kickmeier-Rust, & Albert 2010). However, it is possible that participants are used to playing video games with deeply detailed graphics, and thus found our cartoon design less engaging. It is also possible that our limited options for character customization may have impacted participants' satisfaction with the child avatar. This dissatisfaction coincides with Lim and Reeves' (2010) finding that users find games much more engaging when they can can personalize characters and have control over game characteristics.

For our final research question, we hypothesized that participants would rate our BPT game as useful, and indicate high agreement with survey items asking whether the participant would recommend it to others. Surprisingly, participants ranked likelihood of reuse and recommendation as one of the lowest items on the qualitative survey (M=3.75, SD=0.338). However, most participants also indicated high agreement with items assessing how helpful they thought this game is for future parenting (M=4, SD=0.346). This discrepancy may be due to a

misunderstanding of the question: our participants are not parents and it is likely that most of their friends are not parents, so this tool is not particularly relevant to their demographic at this stage in their life. If there were more questions targeting the likelihood of reuse and recommendation in the future, we expect participants would have ranked these items much higher.

Overall, our results support our hypotheses about the efficacy, engagement, and attractiveness of our BPT game. We found strong support for our first hypothesis: the pretest and posttest data show that participants who played our game demonstrated significantly more knowledge about Behavioral Parent Training than those who did not. We also found support for our second hypothesis: the qualitative survey results indicate that participants found the game engaging and interesting, and that they were especially satisfied with game dialogue, scenarios, lesson content. However, participants indicated less satisfaction with game graphics and the child avatar, suggesting that future improvements to the game should include more detailed graphics and customizable child avatars. Surprisingly, we found only mixed support for our third hypothesis about how useful participants perceived our BPT game: participants indicated that they were only moderately likely to recommend the game to a friend, but also believed that the game was a useful tool for parenting. However, this may be an artifact of the demographic of participants we recruited. Future research utilizing this demographic should take care to clarify survey items relating to being a parent to avoid this misunderstanding.

Limitations and Future Directions

Although a computer game proves to be an effective platform to increase BPT knowledge, there is still room for improvement of the program.

Sample demographic and size. Due to the exploratory nature of our research we decided to test our game on a convenience sample of college students. However, as all participants were students at the University of Maryland, and many were recruited through the Honors College listserv, they represented a limited geographic region, education level, and socioeconomic status. Therefore, it is difficult to say whether participants with less of an educational background would obtain similar results. Additionally, while demographic data shows that our participants were racially diverse and studied a number of different majors, our small sample size (N=19), makes it difficult to generalize these results to the entire population. Further research should be conducted on larger sample sizes and more appropriate populations to try and replicate these results. Testing on parents specifically would provide better generalizability for our target demographic. This population would also provide more specific insight about how to tailor the game to our audience.

Another limitation is the relatively high rate of attrition in both the control group and the experimental group, 36% and 47%, respectively. We suspect the high attrition rate is a product of low participant motivation. As most participants were college students and did not have children of their own, they may have felt less urgency to complete the game. It is also possible that some participants did not enjoy the game enough to continue playing it. This seems unlikely, however, given that most participants who did not complete the game also did not begin playing the game at all: only six participants stopped playing in the middle of the game. We created the exit survey with the intention of determining the motivations for game attrition, but unfortunately none of the participants chose to fill it out. We did compare the pretest scores of participants who completed both surveys with those who only completed the pretest and found that there was no discernible difference between them. However, it is impossible to determine absolutely whether

posttest scores of participants who dropped out of the study would have been significantly or systematically different from the scores of those who stayed. Future research should explore the reasons why people decided to stop playing the game, perhaps through interviews, and use this information to improve game utility.

Nonetheless, usability testing the game with students still yields valuable information: these participants are digital natives who in upcoming years may become parents themselves. These possible "future-parents" may be more likely to view computerized versions of early child interventions such as BPT more favorably than older generations of parents. As indicated by posttest scores, a computerized medium is an effective form of BPT instruction for these digital natives. We predict future research with parents will indicate not only learning of key BPT skills, but also a transfer and application of BPT knowledge to interactions with their own child, leading to a decrease in negative child behaviors and an increase in parenting competence and confidence.

Measures. Another limitation is that our study could not determine the external validity of the game. Due to time limitations and ethical constraints, we were unable to test this game with actual parents. Consequently, we were unable to measure whether the increase in BPT knowledge would translate into changes in parenting behavior and child noncompliance. In the absence of behavioral outcomes, we decided to use knowledge of BPT as a determinant of game success. However, we did not find a test of Behavioral Parent Training knowledge in the literature, we made our own unique BPT surveys. As a result, we were not able to run a power analysis to determine our sample size, are unsure of how these survey scores would related to behavioral outcomes, and cannot compare these scores to scores in the literature. Future research should invest in designing and testing standardized BPT knowledge survey, in addition to

measuring how participation in this game or similar games affects parent and child behavior directly.

Methodology adjustments. We allowed our participants to complete the game at their own pace, but this resulted in rapid game completion. Even though we measured significant learning from pretest to posttest, this period of time was most likely only around 30 minutes for the average user. Because of this, we have yet to make any conclusions about the retention of BPT knowledge over time. Future research should incorporate more scenarios and require the player to revisit the game periodically to increase retention. Having multiple survey evaluations across a longer period of time would give further insight about the instructional potential of our game. Additionally, researchers should follow up with participants a few months to a year after game completion to determine how long participants retain BPT knowledge. However, one of the benefits of a BPT computer game is the ability to replay the game at any time to review concepts, and participants may be able to increase their retention of knowledge for a longer period as a result.

In order to further improve the game's content, future researchers can also record more data about user play. We collected user information from the game about time spent, but we were not able to evaluate which scenarios and lessons gave participants the most trouble. Collecting more comprehensive and specific score and time data could allow researchers to modify any components of the game in order to increase learning.

Moreover, further researchers will want to link gameplay data to pretest-posttest data. Our pretest-posttest data and are gameplay data are disjointed, preventing us from making specific connections between scenario performance and survey score improvement. Constructing

complete longitudinal participant profiles could aid future researchers in the refinement of the game.

Game changes to increase learning. Due to time constraints and limited human resources, the program used for our project was overly simplistic compared to our initial vision. We had to forgo functionality of the game in order to successfully conduct research on time. However, given more time, there are many areas of the game that we would improve on, and would recommend future researchers to implement in order to facilitate increased learning.

The most obvious direction for future researchers to take would be the construction of additional content. The average completion time for our game was 24 minutes. This presents the risk that participants might have dedicated some knowledge to short-term memory and might not retain the information as well as possible. Currently, each scenario flowchart has a large number of nodes, but the graph height is such that it only takes around one minute for a user to complete. A lot of the graph complexity arises from the fan-out of the decision nodes and this complexity grows significantly as the graph height increases. To balance this, we can write a large number of scenarios in order to increase the length of time it takes to complete the game while making an efficient use of researcher time. Additionally, researchers will want to pace the users so that they complete the game over a long period of time in order to increase retention of knowledge.

We had initially intended to implement a few measures to increase personalization of the game. A simple way to increase user attachment would be to allow customization of the child avatar. Our current game only allows for users to interact with one male child avatar. In an improved game users would be allowed to alter the child character attributes to match those of their child as soon as they registered. Additionally, this feature could allow the user to include child information including behavioral patterns and characteristics of specific behavioral

disorders, such as ADHD or ODD. Lim and Reeves (2010) found that engagement in the game increases when users are able to control more aspects of the game and create personalized avatars. As such, we speculate that implementation of this feature will increase user attachment and thus learning.

Users will also want to view their improvement over time. We had initially intended to display the number of correct and incorrect choices the user had made at the end of each scenario, but were unable to carry out this feature due to time restrictions. Future researchers should implement a feature which tracks scores and presents changes in performance longitudinally. If users are routinely scoring poorly in a specific skill, the game could alert them to revisit a previous tutorial. This functionality could also encourage users to take booster sessions when their skill aptitudes begin to drop.

In order to enhance replayability, we wanted to incorporate natural language processing (NLP) techniques in our scenarios, to allow a degree of narrative generation. Traditional BPT has refresher lessons that parents can take in order to increase retention of knowledge. Since our scenarios are manually generated, users that repeat them would be able to memorize the correct answers. A mechanism by which the game can alter the dialogue and the choices of a scenario would enhance replayability of the game and possibly increase retention of knowledge.

Another possible avenue for exploration would be modifying the game engine and type of interaction the players have with it. Currently, the user interacts with the child avatar through decision points placed in the narration; users are guaranteed that the correct answer to a prompt is given in a list of options. A more open-world approach might force the user to generate correct responses on their own which has the potential to increase learning.

APPENDIX A: GLOSSARY OF TERMS

Aversive Events/Behaviors/Interaction - refer to interactions when a punishment is the primary method of behavioral control (Patterson & MacCoby, 1980).

Attending - increasing positive attention towards something. In Behavioral Parent Training (BPT), attending refers to paying positive attention to the child and his or her actions.

Behavioral Parent Training (BPT) - A therapy model derived from Constance Hanf intended to teach parents how to more positively interact with their child, while addressing negative behaviors in a more appropriate and consistent manner. There are many variations of BPT including, Helping the Noncompliant Child (HNC), *Parenting the Strong Willed Child*, Parent Child Interaction Therapy (PCIT), Triple P, The Incredible Years, Community Parent Education (COPE), and Your Defiant Child.

Behaviorism - a psychological theory that focuses on observable behavior. Behavioral psychologists have devoted much of their research to determining how to explain and shape human behavior.

Digital Natives - refers to individuals born after 1982, and who thus grew up in a digital environment (Oblinger, 2004).

Externalizing behaviors - negative, problematic behaviors that are directed towards the external environment. This may include violence, impulsive behavior, and refusal to follow rules

Extinction - describes when organism will stop producing a formerly-reinforced behavior if that behavior is no longer being rewarded (Skinner, 1953). For example, if the parent ignores its temper tantrum a child will eventually stop crying and settle down.

Following -- Hanf defined following as the imitation of the child's play behavior, a description of the activity, or refraining from introducing new elements into the play (1969). Most BPT programs use the word attending to describe following.

Internalizing behaviors - negative, problematic behaviors that are directed towards the self. This may include social withdrawal, nervousness, and feelings of sadness.

Maladaptive Behavior - inappropriate behavior or coping mechanisms in response to an anxious or unpleasant stimulus

Negative Punishment - Discouraging a behavior by removing a pleasant stimulus. For example, A mother who wants her son to stop running in the house can refuse to let him play outside with his friends if he is caught

Negative Reinforcement - Encouraging a behavior to happen more frequently by removing an unpleasant stimulus. For example, a father who wants his daughter to do well in school can excuse her from doing chores while she is doing homework.

Negative Reinforcement Cycle -- described when parents negatively reinforce poor behavior while the child negatively reinforces maladaptive parenting. For example, a father might ask his daughter to clean up her toys and start doing her homework. She ignores her father and continues to play with her toys. When the father comes by later and asks her again, she protests that she does not want to start homework and is going to play instead. The father gets upset and angrily demands that she starts studying. The daughter gets upset and shouts, "You aren't the boss of me!" and runs into her room. The frustrated father lets her stay in her room, and picks up the blocks himself so that he does not trip over them on his way to read the paper. In this interaction,

the father negatively reinforces Clara's tantrum and avoidance of chores by picking up the toys himself. At the same time, Clara negatively reinforces her father's yelling and permissive behavior by running away and leaving him with peace and quiet. Thus, not only is Clara more likely to argue with the father in the future, but the father is also more likely to let her get her way if she leaves him alone (Patterson, 1980).

Operant Conditioning - Conditioning that utilizes reinforcement or punishment to change the probability of an organism repeating a behavior or even shape new, unnatural behaviors (Skinner, 1953). Skinner first demonstrated this technique by training pigeons and rats to push levers or bob their heads in unnatural ways (Skinner, 1948; 1953). He called this process operant conditioning, since the organism operates on its environment to generate a consequence.

Positive Punishment - Discouraging a behavior by providing an unpleasant stimulus. For example, a mother who wants her son to stop running in the house can make him do extra chores if he is caught.

Positive Reinforcement - Encouraging a behavior by providing a positive stimulus. For example, a father who wants his daughter to do well in school can take her out for ice cream to celebrate good grades.

Positive Reinforcement Cycle -- when the parent reinforces bad behavior by giving the child something he or she desires in response. For example, a son might ask his mother for a cookie while she is making dinner. At first, the mother denies his request because it would spoil his dinner. However, after Bobby starts screaming and crying, his mother eventually gives in and lets him have just one cookie. The child stops crying and the mother can continue cooking in peace. In this example, the mother positively reinforced Bobby's temper tantrum by rewarding

him with the cookie. At the same time, Bobby negatively reinforced his mother's permissive behavior by ceasing to cry when she gave in. Though this interaction creates peace in the short term, the child's tantrums will only increase in the future (Patterson, 1980).

Punisher - any stimulus that makes a behavior less likely to occur (Skinner, 1953)

Reinforcer - any stimulus that makes an organism more likely to repeat a behavior in the future (Skinner, 1953)

Refresher Session (also called Booster Session) -- a short follow-up session or set of sessions intended to remind participants of concepts learned during an earlier more intensive program.

Serious Game -- a game intended to instruct, change an attitude, or train, as opposed to a game intended to entertain (Blumberg, et al., 2013)

Social Cognitive Theory (SCT) -- theory proposed by Bandura (1969) asserting that humans acquire knowledge through the observation of others within a social context.

APPENDIX B: ADMINISTERED SURVEYS

BPT Pretest – Experimental Condition

Consent Form

Project Title	Behavioral Parenting Training Computer Game
Purpose of the Study	*This research is being conducted by Yiannis Aloimonos and Gemstone team VIRTUAL at the University of Maryland, College Park. We are inviting you to participate in this study because you are an undergraduate student at the University of Maryland, College Park and a potential future parent. The purpose of this research project is to present Behavioral Parent Training (BPT) principles through a functional video game.*
Procedures	*The procedures involve playing the game and filling out 3 brief surveys. Upon signing the consent form, you will be given a username and password. If you forget your password, you will be able to have a new password sent to you within the game.* *You will have one month to complete the game. The game consists of five lessons, and each lesson has a tutorial and between 4 and 6 small scenarios in it. It is recommended, but not required, that you play the game three days per week for about half an hour each time. The game should take no longer than 4 four hours to complete.* *After game play you will fill out a BPT knowledge assessment and game usability survey. In addition, you will be required to complete various assessments through the game that will inform the research team of the usability of the game. It should take no more than 5 hours to complete this study.* *Sample survey questions:* **The scenarios covered a wide variety of experiences parents and children might have together** **Strongly agree – Agree – Neutral – Disagree -- Strongly disagree** **Sometimes I could not figure out how to navigate the game** **Strongly agree – Agree – Neutral – Disagree -- Strongly disagree** **The dialogue felt realistic** **Strongly agree – Agree – Neutral – Disagree -- Strongly disagree**
Potential Risks and Discomforts	*The risk of physical harm throughout the completion of our study is minimal. There is a chance that participants may become bored with the game, or frustrated with game play, though we have attempted to make the game as engaging and easy to use as possible. Confidentiality is always a concern, but we use encrypted user names to ensure the confidentiality of all participants.*
Potential Benefits	*There are no direct benefits for participating in this study. However, by participating in our study, you are helping us improve this experience for parents. We hope that, in the future, practicing therapists can provide parents with this tool as an additional support for treatment. Additionally, we hope that all types of parents will be able to use this tool as a means to develop stronger parenting strategies.*
Confidentiality	*Confidentiality will be maintained by ensuring identifying information is stripped from the data and usernames are assigned using a randomly generated code. Any data that you send will be encrypted and stored on a password protected computer and external hard drive. Anonymity will be protected through the use of pseudonyms and aggregate data analysis. Team VIRTUAL and our mentor, Dr. Yiannis Aloimonos will have access to the data collected.* *If we write a report or article about this research project, your identity will be protected to the maximum extent possible. Your information may be shared with representatives of the University of Maryland, College Park or governmental authorities if you or someone else is in danger or if we are required to do so by law.*
Compensation	*You will receive $30 credited to your Terrapin Express account for completing the study. Dropping out prior to the completion of lesson 3 will receive no compensation. If you drop out after completing lesson 3 but prior to study completion you will only receive $10. You will be responsible for any taxes assessed on the compensation.* ☐ *Check here if you expect to earn $600 or more as a research participant in UMCP studies in this calendar year. You must provide your name, address and SSN to receive compensation.* ☐ *Check here if you do not expect to earn $600 or more as a research participant in UMCP studies in this calendar year. Your name, address, and SSN will not be collected to receive compensation.*

Right to Withdraw and Questions	*Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify. Your grades and standing at UMD will not be impacted positively or negatively based on your decision to participate. In the game, there is an option to "quit study", which will automatically remove you from the game. You will be directed to an optional exit survey.* *If you decide to stop taking part in the study, if you have questions, concerns, or complaints, or if you need to report an injury related to the research, please contact the investigator:* **Principal Investigator: Yiannis Aloimonos** **Address: 4475 A.V. Williams Building** **University of Maryland, College Park, MD 20742-3255** **Telephone: 301-405-4526** **Email: yiannis@cs.umd.edu**
Participant Rights	*If you have questions about your rights as a research participant or wish to report a research-related injury, please contact:* **University of Maryland College Park** **Institutional Review Board Office** **1204 Marie Mount Hall** **College Park, Maryland, 20742** **E-mail: irb@umd.edu** **Telephone: 301-405-0678** *This research has been reviewed according to the University of Maryland, College Park IRB procedures for research involving human subjects.*
Statement of Consent	*By continuing with this survey, you indicate that you are at least 18 years of age; you have read this consent form; your questions have been answered to your satisfaction, and you voluntarily agree to participate in this research study.* *If you agree to participate, please sign your name below.* *You will receive a copy of this consent form for your records.*

Lesson 1: Attending

Please select all of the options that are attends

- ☐ You're stacking the blocks so high!
- ☐ Do you want to draw a picture?
- ☐ You are placing the green lego next to the yellow one!
- ☐ Let's build a castle
- ☐ Why don't you draw a picture on the sidewalk with chalk?
- ☐ The balloon is getting so big
- ☐ Let's line up all of the toys next to each other
- ☐ You're making the train go in lots of circles!
- ☐ Can you make the ducky swim in the water?
- ☐ You're coloring the house blue
- ☐ What color dress should we give the girl?
- ☐ Bring the red blocks over here
- ☐ You're ready to play now.
- ☐ Now that we have a castle, let's build a moat!

Lesson 2: Rewarding

When using rewards to increase a behavior, it is most effective to:

- ○ Punish bad behavior every time it occurs
- ○ Reward good behavior every time it occurs
- ○

- Reward every good behavior at first, then taper off
- ○ Punish every bad behavior at first, then taper off

Your child finishes all of his/her vegetables at dinner time. Which is the best response?

- ○ Now you can have dessert!
- ○ Now it's time to put your plate away!
- ○ You're awesome
- ○ Great job finishing your vegetables!

Lesson 3: Ignoring

Which of the following is a behavior that should be ignored?

- ○ Running with scissors
- ○ Drawing on the walls
- ○ Hitting a sibling or friend
- ○ Throwing tantrums

When ignoring, you should remove:

- ○ Eye contact
- ○ Physical contact
- ○ Verbal contact
- ○ All of the above

How long should you ignore a behavior?

- ○ Until it stops
- ○ 3 minutes
- ○ 1 minute
- ○ 30 minutes

Lesson 4: Commands

Please select all of the options that are effective commands

- ☐ Grab your sneakers, tie the laces, and come over here
- ☐ Let's go get in the car!
- ☐ Get ready for school
- ☐ Do you want to eat breakfast?
- ☐ Clean your room because I don't want to step on your toys
- ☐ Hand me the yellow lego.
- ☐ Brush your teeth, wash your face, and change your shirt.
- ☐ Let's clean up all of these toys
- ☐ Go brush your teeth so they will be healthy!

- [ ] Behave yourself
- [ ] Put all of your trucks in this bin
- [ ] Please be careful
- [ ] Do you want to put on your red shirt?
- [ ] Let's put away your clothes
- [ ] Give the girl blue eyes so she can have pretty eyes like you!
- [ ] Go get your coat, put it on, and zip it up.

Lesson 5: Timeouts

Where is an appropriate place to use for a timeout?

- ◯ A closet
- ◯ A chair in a hallway
- ◯ A bathroom
- ◯ The garage

What is NOT an appropriate response if your child gets up during a time out?

- ◯ add 3 minutes to the timer once
- ◯ Pick up your child and place them back in the time out
- ◯ Promise your child candy if they finish the time out
- ◯ Take away a privilege if the child is 5 years old or older

BPT Pretest – Control Condition

Consent Form

Project Title	Behavioral Parenting Training Computer Game
Purpose of the Study	*This research is being conducted by Yiannis Aloimonos and Gemstone team VIRTUAL at the University of Maryland, College Park. We are inviting you to participate in this study because you are a potential future parent. The purpose of this research project is to present Behavioral Parent Training (BPT) principles through a functional video game.*
Procedures	*In order to assess general knowledge of parenting skills, you will fill out a demographic survey and a questionnaire related to the content presented in the game. A month later, you will fill out a similar questionnaire. Each survey will take no more than 20 minutes to complete. You will not play the game.*
Potential Risks and Discomforts	*There are no potential risks associated with participating in this study.*
Potential Benefits	*There are no direct benefits for participating in this study. However, by participating in our study, you are helping us improve this experience for parents. We hope that, in the future, practicing therapists can provide parents with this tool as an additional support for treatment. Additionally, we hope that all types of parents will be able to use this tool as a means to develop stronger parenting strategies.*
Confidentiality	*Confidentiality will be maintained by ensuring identifying information is stripped from the data and usernames are assigned using a randomly generated code. Any data that you send will be encrypted and stored on a password protected computer and external hard drive. Anonymity will be protected through the use of pseudonyms and aggregate data analysis. Team VIRTUAL and our mentor, Dr. Yiannis Aloimonos will have access to the data collected.* *If we write a report or article about this research project, your identity will be protected to the maximum extent possible. Your information may be shared with representatives of the University of Maryland, College Park or governmental authorities if you or someone else is in danger or if we are required to do so by law.*
Compensation	*You will be entered into a raffle to receive a $20 Terrapin Express credit. There will be two winners in this raffle. If you do not complete both rounds of surveys, you will not be entered into the raffle. You will be responsible for any taxes assessed on the compensation.* ☐ *Check here if you expect to earn $600 or more as a research participant in UMCP studies in this calendar year. You must provide your name, address and SSN to receive compensation.* ☐ *Check here if you do not expect to earn $600 or more as a research participant in UMCP studies in this calendar year. Your name, address, and SSN will not be collected to receive compensation.*
Right to Withdraw and Questions	*Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify. Your grades and standing at UMD will not be impacted positively or negatively based on your decision to participate. In the game, there is an option to "quit study", which will automatically remove you from the game. You will be directed to an optional exit survey.* *If you decide to stop taking part in the study, if you have questions, concerns, or complaints, or if you need to report an injury related to the research, please contact the investigator:* **Principal Investigator: Yiannis Aloimonos** **Address: 4475 A.V. Williams Building** **University of Maryland, College Park, MD 20742-3255** **Telephone: 301-405-4526** **Email: yiannis@cs.umd.edu**
Participant Rights	*If you have questions about your rights as a research participant or wish to report a research-related injury, please contact:* **University of Maryland College Park** **Institutional Review Board Office** **1204 Marie Mount Hall** **College Park, Maryland, 20742** **E-mail: irb@umd.edu** **Telephone: 301-405-0678** *This research has been reviewed according to the University of Maryland, College Park IRB procedures for research involving human subjects.*
Statement of	*By continuing with this survey, you indicate that you are at least 18 years of age; you have read this consent form; your questions have been answered to your satisfaction, and you voluntarily agree to*

Consent	*participate in this research study.* *If you agree to participate, please sign your name below.* *You will receive a copy of this consent form for your records.*

<u>Lesson 1: Attending</u>

Please select all of the options that are attends

- ☐ You're stacking the blocks so high!
- ☐ Do you want to draw a picture?
- ☐ You are placing the green lego next to the yellow one!
- ☐ Let's build a castle
- ☐ Why don't you draw a picture on the sidewalk with chalk?
- ☐ The balloon is getting so big
- ☐ Let's line up all of the toys next to each other
- ☐ You're making the train go in lots of circles!
- ☐ Can you make the ducky swim in the water?
- ☐ You're coloring the house blue
- ☐ What color dress should we give the girl?
- ☐ Bring the red blocks over here
- ☐ You're ready to play now.
- ☐ Now that we have a castle, let's build a moat!

Lesson 2: Rewarding

When using rewards to increase a behavior, it is most effective to:

- ○ Punish bad behavior every time it occurs
- ○ Reward good behavior every time it occurs
- ○ Reward every good behavior at first, then taper off
- ○ Punish every bad behavior at first, then taper off

Your child finishes all of his/her vegetables at dinner time. Which is the best response?

- ○ Now you can have dessert!
- ○ Now it's time to put your plate away!
- ○ You're awesome
- ○ Great job finishing your vegetables!

Lesson 3: Ignoring

Which of the following is a behavior that should be ignored?

- ○ Running with scissors
- ○ Drawing on the walls

○ Hitting a sibling or friend

○ Throwing tantrums

When ignoring, you should remove:

○ Eye contact

○ Physical contact

○ Verbal contact

○ All of the above

How long should you ignore a behavior?

○ Until it stops

○ 3 minutes

○ 1 minute

○ 30 minutes

Lesson 4: Commands

Please select all of the options that are effective commands

☐ Grab your sneakers, tie the laces, and come over here

☐ Let's go get in the car!

☐ Get ready for school

☐ Do you want to eat breakfast?

☐ Clean your room because I don't want to step on your toys

☐ Hand me the yellow lego.

☐ Brush your teeth, wash your face, and change your shirt.

☐ Let's clean up all of these toys

☐ Go brush your teeth so they will be healthy!

☐ Behave yourself

☐ Put all of your trucks in this bin

☐ Please be careful

☐ Do you want to put on your red shirt?

☐ Let's put away your clothes

☐ Give the girl blue eyes so she can have pretty eyes like you!

☐ Go get your coat, put it on, and zip it up.

Lesson 5: Timeouts

Where is an appropriate place to use for a timeout?

○ A closet

○ A chair in a hallway

○ A bathroom

○ The garage

What is NOT an appropriate response if your child gets up during a time out?

○ add 3 minutes to the timer once

○ Pick up your child and place them back in the time out

○ Promise your child candy if they finish the time out

○ Take away a privilege if the child is 5 years old or older

BPT Posttest – Experimental and Control Conditions

3/25/2015   Qualtrics Survey Software

Lesson 1: Attending

Please select all of the options that are attends

☐ You're stacking the blocks so high!

☐ Do you want to draw a picture?

☐ You are placing the green lego next to the yellow one!

☐ Let's build a castle

☐ Why don't you draw a picture on the sidewalk with chalk?

☐ The balloon is getting so big

☐ Let's line up all of the toys next to each other

☐ You're making the train go in lots of circles!

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○ Physical contact

○ Verbal contact

○ All of the above

How long should you ignore a behavior?

○ Until it stops

○ 3 minutes

○ 1 minute

○ 30 minutes

Lesson 4: Commands

Please select all of the options that are effective commands

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☐ Let's go get in the car!

☐ Get ready for school

☐ Do you want to eat breakfast?

☐ Clean your room because I don't want to step on your toys

☐ Hand me the yellow lego.

☐ Brush your teeth, wash your face, and change your shirt.

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☐ Go brush your teeth so they will be healthy!

☐ Behave yourself

☐ Put all of your trucks in this bin

☐ Please be careful

☐ Do you want to put on your red shirt?

☐ Let's put away your clothes

☐ Give the girl blue eyes so she can have pretty eyes like you!

☐ Go get your coat, put it on, and zip it up.

Lesson 5: Timeouts

Where is an appropriate place to use for a timeout?

○ A closet

○ A chair in a hallway

○ A bathroom

○ The garage

What is NOT an appropriate response if your child gets up during a time out?

○ add 3 minutes to the timer once

○ Pick up your child and place them back in the time out

○ Promise your child candy if they finish the time out

○ Take away a privilege if the child is 5 years old or older

Thank you for completing the BPT game and this survey. In order to receive your compensation, please click on the following link and complete the last survey.

http://ter.ps/virtualqual

Qualitative Survey

Psychology Background

Do you have any background in Psychology?

○ Yes

○ No

Please list any PSYC (psychology) or EDHD (human development) classes you have taken.

[   ]

Do you have any experience with young children?

○ No experience

○ A little experience

○ Moderate Experience

○ Extensive Experience

Do you have any experience teaching young children?

○ No experience

○ A little experience

○ Moderate experience

○ Extensive Experience

Demographic Information

The dialogue felt realistic

○ Strongly Agree

○ Agree

○ Neither Agree nor Disagree

○ Disagree

○ Strongly Disagree

The child's dialogue was appropriate

○ Strongly Agree

○ Agree

○ Neither Agree nor Disagree

○ Disagree

○ Strongly Disagree

The parent's dialogue was appropriate

- ○ Strongly Agree
- ○ Agree
- ○ Neither Agree nor Disagree
- ○ Disagree
- ○ Strongly Disagree

Overall, the storyline of the scenarios made logical sense

- ○ Strongly Agree
- ○ Agree
- ○ Neither Agree nor Disagree
- ○ Disagree
- ○ Strongly Disagree

The scenarios covered a wide variety of experiences parents and children might experience together

- ○ Strongly Agree
- ○ Agree
- ○ Neither Agree nor Disagree
- ○ Disagree
- ○ Strongly Disagree

The scenarios were applicable to everyday life of parents and children

- ○ Strongly Agree
- ○ Agree
- ○ Neither Agree nor Disagree
- ○ Disagree
- ○ Strongly Disagree

Please rank the following items on a scale of Strongly Agree to Strongly Disagree.

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
The tutorials help me understand the skill the lesson was focused on	○	○	○	○	○
I wish the lessons had been more challenging	○	○	○	○	○
There was an appropriate amount of information in each lesson.	○	○	○	○	○
I wish there had been more information provided in each lesson	○	○	○	○	○
I wish the tutorials had more details	○	○	○	○	○
The scenarios did not add to my understanding of the lesson	○	○	○	○	○
If I made a wrong choice, I could figure out why it was wrong afterwards.	○	○	○	○	○
The scenarios were too short for me to					

learn from them.

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
	○	○	○	○	○

Please rank the following items on a scale of Strongly Agree to Strongly Disagree.

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
I found the graphics to be engaging and interesting	○	○	○	○	○
I felt that the scoring system was sometimes unfair	○	○	○	○	○
Navigating the game controls was easy	○	○	○	○	○
There were many technical problems that distracted me from the game	○	○	○	○	○
Sometimes I could not figure out how to navigate the game	○	○	○	○	○
The game's cartoon style was distracting and unhelpful	○	○	○	○	○
The game's cartoon style was engaging and entertaining	○	○	○	○	○
The font was clear and easy to read	○	○	○	○	○
I wish there were more options when creating the child avatar	○	○	○	○	○
I was satisfied with the options when creating the child avatar	○	○	○	○	○
I felt like I learned a lot from this product	○	○	○	○	○
I would not recommend this product to a friend	○	○	○	○	○
I would use this product again	○	○	○	○	○
I did not learn any new information from this product.	○	○	○	○	○
I would tell my friends and family members about this product.	○	○	○	○	○

Please rate the following items on a scale of Strongly Agree to Strongly Disagree

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
I did not learn skills I would apply to being a parent	○	○	○	○	○
I feel confident in my ability to discipline a young child.	○	○	○	○	○
I feel confident in my ability to be a parent in the future	○	○	○	○	○
This product would be helpful if I were to become a parent in the future	○	○	○	○	○
I did not learn any new information from this product	○	○	○	○	○

Which category describes you the best?

☐ Non Hispanic/White

☐ Hispanic or Latino

☐ Black or African American

☐ Native American or American Indian

☐ Asian/Pacific Islander

☐ Prefer not to answer

How old are you?

Which best describes your current status at the University of Maryland

○ Freshman

○ Sophomore

○ Junior

○ Senior

○ Prefer not to answer

What are your major(s)? Please write your major code (for example, Psychology would be PSYC)

What are your minor(s)? Please list them

What best describes the highest level of education your mother has completed?

○ No schooling completed

○ Nursery school to 8th grade

○ Some high school, no diploma

○ High School Graduate, diploma or equivalent

○ Some college credit, no degree

○ Trade/technical/vocational Training

○ Associate's Degree

○ Bachelor's Degree

○ Master's Degree

○ Professional Degree

○ Doctorate Degree

What best describes the highest level of education your father has completed?

○ No schooling completed

○ Nursery school to 8th grade

○ Some high school, no diploma

○ High School Graduate, diploma or equivalent

○ Some college credit, no degree

○ Trade/technical/vocational Training

○ Associate's Degree

○ Bachelor's Degree

○ Master's Degree

○ Professional Degree

○ Doctorate Degree

Thank you for the completing our study! Your participation has been invaluable to our team. In order to receive your final $20 of compensation, please provide your email address below.

Email:

[   ]

Content: Dialogue, Storyline and Information

Usability

Parenting Confidence

Exit Survey

Default Question Block

We are sorry you are choosing to exit our study. If you feel comfortable, please answer the brief exit survey to provide us with additional information. If you have any questions or concerns, please contact us at: umdteamvirtual@gmail.com. If you do not wish to complete this survey, please just click through to the next page. Thank you for your help in our study!

Please check off all of the lessons you played (even if you only played one scenario in that lesson)

- ☐ Lesson 1: Attending
- ☐ Lesson 2: Rewarding
- ☐ Lesson 3: Ignoring
- ☐ Lesson 4: Giving Commands
- ☐ Lesson 5: Timeouts

Please select all of the reasons why you are choosing to exit the study

- ☐ This game takes too much time
- ☐ The graphics are not engaging
- ☐ The dialogue sounds forced and awkward
- ☐ I don't feel like I'm learning anything
- ☐ The tutorials are confusing
- ☐ The scenarios are confusing
- ☐ Other:
  _____

Although you are choosing to exit the game, please select all of the aspects of the game you found to be enjoyable and/or engaging:

- ☐ The character graphics
- ☐ The background graphics
- ☐ The dialogue
- ☐ The scenarios
- ☐ The tutorials were helpful
- ☐ The logical flow of each lesson
- ☐ Other
  _____

By exiting this game, I understand I am no longer entitled to compensation

- ○ I understand
- ○ I do not understand

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