Effects of Cartoon Pacing and Fantastical Content on Executive Function

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Abstract

Television viewing has become increasingly common, with 2- to 11-year-olds viewing an amount well in excess of the exposure recommendation of the American Academy of Pediatrics. Most research focuses on the temporal length of television viewing rather than content-specific effects of television. Recent work has demonstrated that television viewing may impact children's executive functions (EF). However, it remains unclear what components of children's television may be responsible for evidenced decrements in EF. The impact of pacing has been debated, with several studies demonstrating positive associations with viewing fast-paced television and others documenting negative effects. In addition, research on the influence of fantasy content in television is lacking. The current study examined these two candidate aspects of children's television that may be responsible for impaired EF. Sixty-seven 4-year-olds completed an EF pretest, viewed a select cartoon show, and then completed two common assessments of children's EF. Post-viewing EF did not significantly differ based on television show viewed, but this may have been due to EF differences between groups before cartoon exposure.

Keywords: executive function, fantasy, pacing, cartoon, television

Effects of Pacing and Fantastical Content on Executive Function

Television viewing has become increasingly common, consuming a large part of contemporary children's lives. Recent research demonstrates that 2- to 11-year-olds view an average of 26 hours of television (TV) per week (Nielsen, 2011). This well exceeds the maximum exposure recommendation of 14 hours per week by the American Academy of Pediatrics (2012). Prior research demonstrates links between TV exposure and 1) increased aggression (Bushman & Huesmann, 2006), 2) decrements in attention (Zimmerman & Christakis, 2007), and, 3) more broadly, impaired executive functions (EF: Barr, 2010; Lillard & Peterson, 2011). The current study seeks to further elucidate the mechanisms underlying the impact of TV on EF by focusing on two candidate characteristics of children's TV: pacing and fantastical content.

Executive functioning is an important aspect of cognition that is developed over time. EF allows one to regulate goal-directed thoughts in new circumstances resulting in the organization and control of emotional responses or overt behaviors (Carlson, 2011; Isquith, Crawford, Espy, & Gioia, 2005). This regulatory process is influenced by the neural circuitry of the prefrontal cortex (Alvarez & Emory, 2006; Diamond, 1989). Working memory, inhibitory control, and mental flexibility or attention shifting are the most distinct executive functions that have been recognized in adults (Mikyake, 2000) and, more recently, also in children (Willoughby, Wirth, & Blair, 2011). These EF functions have been shown to become increasingly fundamental as a child ages and assimilates to the social environment (Carlson, 2011).

Preschoolers' limited verbal, motor, and attentional deficiencies contribute to the challenge of measuring EF (Isquith, Crawford, Espy, & Gioia, 2005); therefore, assessing it often requires the administration of a variety of tests, each aimed at respective aspects of EF (Anderson, 1998). Notably, EF skills are not static; instead they often change throughout development. For example, a child's cognitive flexibility, the ability to switch between different rules in a given task, evidences a clear developmental progression (Geiger & Reeves, 1993). However, changes in EF are not only associated with general cognitive development.

EF can also be modified through a variety of interventions. For example, 5-year-olds enrolled in Tools of the Mind classrooms, when compared to age-matched peers in standard curriculum classrooms, demonstrated statistically significant gains in EF (Diamond, Barnett, Thomas, & Munro, 2007). The Tools of the Mind curriculum was designed in response to Vygotsky's Cultural Historical Theory (1978) and includes a variety of components that may aid children's EF. For example, planned play and scaffolded writing require children to plan their activities thoroughly before executing actions (Bodrova & Leong, 2009). Although extensive research exists on this approach, it is uncertain whether one component or a combination of components is responsible for the evidenced gains in EF.

The Tools curriculum is not the only educational technique demonstrated to increase children's EF; Montessori schooling has also been shown to positively impact children's EF abilities (Lillard, in press). Developed in 1907 by Maria Montessori (Kramer, 1976), strict Montessori schooling calls for children to learn through a specific set of materials and activities, and to be permitted independent choice of the activities in which they wish to engage (Lillard, 2011a). However, Montessori programs do not uniformly adhere to the original guidelines, such that EF is impacted at different levels depending on the specific program, with strict alignment to the original curriculum resulting in the most gains (Lillard, in press). In sum, despite the contrasts between Montessori and Tools of the Mind, both approaches provide a unique manner for children to learn and have been linked to the enhancement of EF in children when compared to students in standard curriculum classrooms.

Add-ons to classroom curriculum have also been shown to be effective in improving EF. Add-ons such as Promoting Alternative Thinking Strategies (PATH) increased inhibitory control for 7- to 9-year olds (Riggs, Greenberg, Kusché, & Pentz, 2006) and the Chicago School Readiness Project (CSRP) improved EF for 4-year-olds, except in a delay of gratification (Raver et al., 2008; Raver et al., 2011). Activities outside of academics can further facilitate improved EF. Diamond and Lee (2011) reviewed a number of EF interventions, concluding that interventions such as aerobic exercise (e.g., running), martial arts (e.g., tae-kwon-do training), and mindfulness training can improve different aspects of 4- to 12-year olds EF over time (Diamond & Lee, 2011; Lillard, 2011b).

Thus far we have reviewed evidence demonstrating that environmental influences, such as the form of schooling a child receives, can positively affect EF. However, there are also deleterious environmental influences on EF, such as one's exposure to TV. One study used the National Longitudinal Survey of Youth and found that elevated TV exposure as a 1-year-old was associated with an increased probability of attention problems at 7 years old (Christakis, 2004). Similarly, parental reports of children's TV exposure at 6 two-year time points between 5 and 15 years old were positively correlated with attention problems in 13- and 15-year-olds (Landhuis, Poulton, Welch, & Hancox, 2007). Importantly, these studies did not document the nature of the programming that children were watching, opting instead to explore how the overall exposure length may be related to later attentional difficulties. In a study that diverged from this practice, 4,800 families completed time diaries of the programming their child was viewing at 5 and 10 years old (Zimmerman & Christakis, 2007). For every additional hour children viewed violent entertainment TV, there was approximately double the probability of attentional problems five years in the future. Focusing specifically on EF, Barr (2010) used a media diary to explore the effects of TV exposure. Parents first recorded their children's TV exposure for 24 hours when their children were 12 to 18 months old and then again when they reached 4 years of age. Behavior, vocabulary, spatial skills, prenumeracy skills, preliteracy skills, and EF were assessed. The TV diaries were coded based on child-directed programming (e.g., programs meant for preschool aged children and younger) versus adult-directed programming (e.g., programs intended for older children or adults). Children who were exposed to higher levels of adult-directed TV during infancy demonstrated significantly decreased EF skills and cognitive outcomes when assessed at age 4. Notably, Barr did not clearly define what aspects of the adult-directed programming may be deleterious to EF.

More recently, Lillard and Peterson (2011a) assessed children's EF after they viewed a fast-paced cartoon TV show, an educational cartoon TV show, or drew. Pacing was determined by the researcher manually counting the number of complete scene changes. After watching the fast-paced cartoon, 4-year-olds performed significantly worse on EF tasks than participants in the drawing condition. The disparity in EF between the participants who viewed the fast-paced and educational cartoons approached significance; but this disparity was not replicated between the EF scores of the participants who viewed the educational cartoon or drew. The researchers speculated that the fantastical events may have been responsible for the decrease in EF in the fast-paced cartoon condition but fantasy level was not directly manipulated. In sum, the difference between the EF of the participants who viewed the fast-paced cartoon and those who viewed the educational cartoon suggest that there is some characteristic of the fast-paced cartoon that differentially impacted children's EF. Nonetheless, in this study pacing was measured in a subjective manner and fantasy was not directly manipulated and, in turn, questions remain regarding the source of the decrements in EF.

The features of a TV show must be explored to begin to consider what factors of a fast-paced cartoon show may impact children's EF. The characteristics of a TV show are important in that the form of a show provokes and maintains children's attention to a program (Geiger & Reeves, 1993). TV shows consist of formal features that describe content elements (e.g., themes and plots) and will later be considered at the molar and molecular level, respectively (Huston-Stein, Fox, Greer, Watkins, & Whitaker, 1981). Moreover, perceptual salience, a subset of formal features, is characterized by a TV show's intensity, change, and novelty. Children are particularly intrigued by animated programs, when compared to live programming, because they have more perceptually salient features, rapid action, varied scenes, and rapid tempo (Wright & Huston, 1983). When children enjoy a show and are attentive, they continuously integrate and interpret new information, thus active cognitive processing can be induced through TV viewing (Wright & Huston, 1983). Individuals have varying thresholds for cognitive processing and on an intrapersonal level a stimulus may require too much or too little processing, resulting in cognitive overload or boredom (Watt & Welch, 1983; Lang, Geiger, Strickwerda, & Sumner, 1993).

The amount of processing required when viewing a TV show may vary based on the formal feature, pace. At the molar level, pacing is commonly operationalized as the number of cuts or discontinuous transitions between successive visual frames in a given program (Geiger & Reeves, 1993). The relative influence of pacing on children is disputed. One often cited study exposed 4-year-olds to a fast- or slow-paced version of *Sesame Street*, classified based on the frequencies of camera or editing action, changes in scene or auditory cues, as well as the percentage of lively music, active talking, and bit length (Anderson, Levin, & Lorch, 1977). No evidence that pace negatively impacted 4-year-old's perseverance, organization of behavior, or impulsivity was documented. Moreover, some have argued that fast pacing is a positive feature. When humorous segments were inserted into educational programs shown at a fast-pace, 5-to 7-year-olds demonstrated enhanced information acquisition and attention (Zillmann, Williams, Bryant, Boynton, & Wolf, 1980). Similarly, when 4-year-olds were exposed to fast- or slow-paced shows with 1-second attention cues centering around significant story events, children who viewed the fast-paced programming evidenced better recognition of temporal sequences and increased attention (Calvert & Scott, 1989). Cooper et al. (2009) discovered that children assigned to view slow-paced programming made significantly more errors in attention tests than those who viewed fast-paced shows. Taken together these studies demonstrate that fast-pacing in and of itself does not necessarily negatively affect children's behavior. In fact, under certain conditions, it appears that fast pacing may enhance attention and recall.

Conversely, other research contradicts the conclusions made above by demonstrating that TV pacing can be deleterious. Wright et al. (1984) had children view two of sixteen programs, which varied by continuity (high vs. low), pace (high vs. low), and animation (cartoon vs. live), and then assessed attentiveness and recall. Children who watched slow-paced shows had greater attention capacity and superior recall for high continuity story formats than the children who viewed the fast-paced shows. This study provides evidence in opposition to the research discussed previously regarding attention and recall in relation to pacing; it is unclear why there remains a discrepancy on this topic. On one side, it appears that elevated amounts of TV exposure are detrimental to children's future behavior and performance, yet in other cases, pacing positively impacts children's short-term attention and recall ability. In light of the contradictory evidence, the current study seeks to further unpack the effects of pacing on cognitive abilities.

Although pacing is frequently investigated in this literature, a largely unexplored feature of cartoons is fantastical content. Children enjoy cartoons because they have qualities of novelty and surprise, eliciting attention in the young viewer (Wright & Huston, 1983). These qualities can be placed on the molecular level of formal features and include violations of physical reality (Huston et al., 1981). In infancy, unexpected, impossible events evoke attention; 3 ½ -month-olds look significantly longer when a screen rotates through a space occupied by a box, a physically impossible event, than when a screen rotates and stops when reaching a box (Baillargeon, 1987). Although infants are capable of recognizing select violations of physical laws, their ability to do so continues to develop throughout toddlerhood. For example, when infants are tested on support events, there is a clear progression from 3 months old, when infants believe that a box is stable as long as it is in some contact with another box, to 12 ½ months old, when infants begin to understand the proportional distribution of the two boxes (Baillargeon, Needham, & DeVos, 1992; Baillargeon, 2002). Furthermore, 2 ½ - and 3 ½ - year-olds evidenced a developmental progression in their ability to predict the final location of a moving ball that could be blocked by a visible screen, with significantly more 3 ½ -year-olds successfully completing the task than 2 ½ -year-olds (Hood, Cole-Davies, & Dias, 2003). Thus, while there is evidence that young infants are capable of recognizing impossible physical events, it is also important to note that this capacity develops with age.

Attending more to unexpected events may transfer to TV viewing. For example, when children view unexpected fast cuts in programming an orienting response is provoked (Lang et al., 1993). Unrelated sequences also require significantly more attention than cuts between related sequences (Geiger & Reeves, 1993). Furthermore, attention to related sequences will decrease over time whereas attention to unrelated sequences should remain constant over time. When viewer's beliefs are inconsistent with what occurs in show, more cognitive processes, such as orienting responses, and attention may be needed to adapt. The concentration paid to a show is important to note because when attending to TV viewers use working memory, an aspect of EF, to construct TV sequences (Geiger & Reeves, 1993). This research suggests that unexpected fast cuts and unrelated sequences surprise children and require increased cognitive resources to adjust appropriately. Following this logic, fantastical events may also surprise children because they do not expect physical laws to be broken.

Certain components of TV programming, such as pacing, may impact attention levels, whereas other aspects, such as unexpected events, may impact the ability to register information. No work to our knowledge has identified whether pacing or fantasy differentially impact children's EF. Recall that Lillard and Peterson (2011a) specifically compared children's EF skills after they viewed either a fast-paced and fantastical cartoon, slow-paced and educational cartoon, or drew and found that children's EF decreased significantly in the first condition; but was it pace, fantasy level, or a combination of both that resulted in the detrimental effects on EF?

The aim of the current study is to address this question by manipulating both pacing and fantasy. To this end, we selected four cartoon TV episodes, based on their pacing and fantastical content: *SpongeBob Squarepants, Phineas and Ferb, Little Einsteins*, and *Little Bill.* A computer program, Scene Detector Pro (2002), assessed the number of scene changes present in each TV episode and served as the primary measure of pacing. The author reviewed each of the extracted scenes to verify that the cuts indeed contained separate scenes. Importantly, fantastical content was operationally defined as actions that could not occur under known physical laws (e.g., a talking starfish diving into a pool of chocolate and then turning into an ice cream cone or a spaceship responding contingently to a group of preschoolers). Although *Phineas and Ferb* contains fantastical content, the cartoon was edited to remove this; cartoons meeting our criteria were sparse, thus extracting the fantastical elements from the show was deemed the most satisfactory option.

Based on the results of previous research, it was predicted that fast-paced cartoon shows, when compared to slow-paced counterparts, would significantly decrease children's EF skills. Also, fantastical cartoons were expected to decrease children's EF skills more than realistic cartoons. Finally, we anticipated an interaction between pacing and fantastical content such that decrements in EF were expected to be most pronounced in children who viewed a fast-paced and fantastical cartoon.

Method

Participants

Participants were 66 four-year olds (*M* = *53.6*, *SD* = 3.4, 33 females). Seven were excluded due to failure to cooperate. Participants were typically developed and recruited through a database of families willing to participate in cognitive development research. The majority of the participants were middle- to upper-class and Caucasian.

Materials

For the fast-paced, fantastical show we chose an episode of *SpongeBob Squarepants* (*N* Scenes = 299, *M* Scene Length = 1.63s). This show stars an energetic sponge and his interactions with his friends who live under the sea. In the chosen episode, SpongeBob competed against his best friend, Patrick the Starfish, to see who was the best fry cook under the sea. The fast-paced realistic cartoon, *Phineas and Ferb* (*N* Scenes = 271, *M* Scene Length =

1.70s), follows two brothers as they create havoc in their neighborhood. Participants watched an episode in which the two boys became one-hit wonders as their sister struggled to compete in a singing competition. *Little Einsteins* (*N* Scenes = 95, *M* Scene Length = 3.72s) was the high fantasy, slow-paced show. The cartoon concerns a diverse group of preschool friends who solve problems and learn about the world. In the chosen episode, the preschoolers used a shrinking machine to help them rescue "instrument fairies", musical instruments that fly around with fairy-like wings. *Little Bill* (*N* Scenes = 135, *M* Scene Length = 3.72s) was the slow-paced, realistic cartoon and chronicled the process whereby a young boy learned to tie his shoes.

Measures

Pre-Visit. Prior to their child participating, parents completed a media diary and brought the diaries with them during the lab visit.

Barr Baby Media Diary. Parents noted all TV, videos, books, computer programs, videogames, and music that the child encountered on a typical day during the week and weekend (Barr, 2010). Two diaries were requested one for a typical weekday and one for a typical weekend day. The two time points were chosen to represent the usual media usage of the participant during the routine week and weekend. Both times were deemed necessary since a family's typical schedule could vary between the week and weekend, thereby permitting differing levels of media exposure. Parents were also asked their opinions about the pedagogical value of media their child interacted with.

Parental Assessments During Visit. Parents were asked to complete additional documents while their child completed the study, discussed in turn below.

General Media Form. Parents completed an additional media survey regarding their child's average TV, DVD, and book exposure as well as the child's familiarity with the four cartoons in the study. Children's favorite shows, movies, and books as well as exposure to media in the background (e.g., parents watching the morning news while children play in the same room) were also recorded.

Strengths and Difficulties Questionnaire. The Strengths and Difficulties Questionnaire (Goodman, 1997) assessed children's personality and behavior through five 5-question scales: Hyperactivity, Emotional Symptoms, Conduct Problems, Peer Problems, and Prosocial Behavior. The child's adjustment level was reviewed by placing them in one of three score ranges for each scale: normal, borderline, and abnormal (Goodman, 1997; Goodman, Ford, & Simmons, 2000; Mathai, 2002).

Child Assessments During Appointment

Dog/Fish. All participants first completed a pre-test measure, Dog/Fish. This task, modeled after the Day/Night task (Gerstadt, Hong, & Diamond, 1994), required children to verbally state the animal that was not the one depicted in a line drawing. Participants demonstrated that they understood the aim of the task through a brief two-trial training phase where errors were corrected and explained. The test phase consisted of 14 trials ordered in a manner such that no four consecutive dog or fish cards were presented at a time. Zero points were given for an incorrect response, 1 point was given for providing an incorrect response and then switching to the correct response, and 2 points were given for providing a correct response, giving each child a score between 0 and 28.

Head-Toes-Knees-Shoulders (HTKS). This task assessed children's self-regulation skills through their ability to touch an opposing body part than stated by the experimenter (e.g. "When I say touch your head, I really want you to touch your toes"; Ponitz, 2009). Participants could go through up to three progressively more difficult phases based on their performance.

Each new phase introduced children to new rules (e.g., “When I say touch your shoulders, I really want you to touch your knees” and “When I say touch your head, I really want you to touch your knees”). Participants could receive a total of 20 points per phase and 60 points in total, with 2 points for each correct answer, 1 point for reaching incorrectly and then switching to the correct answer, and 0 points for the incorrect answer. A total of 15 points was required to move on to the next round in each phase.

Dimensional Card Change Sort (DCCS). The Dimensional Card Change Sort task assessed participants’ ability to use higher-order processing abilities to remember different rules in order to control behavior (Zelazo, 2006). In DCCS participants are required to sort a series of cards in three different ways: by color, by shape, and by either color or shape depending on the card’s border. In the first two phases, participants were asked to first sort six cards by color and then sort six cards by shape. The cards were presented such that no more than two of the same color cards or the same shape cards were shown after another. Participants had to correctly sort five of the six cards in the color and shape phases in order to move on to the next phase. In the final phase, borders, or lack thereof, determined whether participants should sort by color or shape for 12 cards. Zero points were given for an incorrect answer, 1 point was given for a correctly switched answer, and 2 points were given for a correct answer for a total possible score of 48 points.

Memory for Cartoon. After completing the two tasks, the researcher asked the children to recall which cartoon they watched with the second researcher. Children were initially asked which cartoon they watched and if the child did not provide a clear answer then the researcher asked follow up questions about the plot and characters of the show. Their recall ability was not coded.

Procedure

Participants and their families were greeted by the researcher and brought into the lab waiting room where the researcher provided children with the opportunity to become familiar with her and permitted parents to consent to their child's participation. The participant and the researcher went to the testing room, where the pre-test, Dog/Fish, was administered. Next, this researcher left the testing room and a second researcher, who had randomly assigned the participant to one of four cartoon conditions, entered and asked the participant to watch a video while she did work. Thus, the researcher administrating all measures was unaware of the cartoons a participant had viewed. After the cartoon concluded, the second researcher left the room and the first researcher returned to administer the two post-test measures, DCCS and HTKS. Upon completion of the post-tests, participants were thanked for their time and given a small prize.

Results

Television Viewing

Parents reported similar television viewing times on both the Barr Baby Media Diary ($M = 392$, $SD = 364$) and the General Media Survey ($M = 487$, $SD = 447.98$). The latter survey also revealed that participants, on average, spend 1,019 minutes ($SD = 933.12$) viewing television, DVDs, or being exposed to background television on a weekly basis. Furthermore, participants in each condition did not differ in their exposure to all forms of media as assessed by the Barr Baby Media Diary and the General Media Survey, F's < 1.40, p's > .1.

Parent Reports

Chi-square test of independence analyses demonstrated that participants did not differ with regard to their familiarity (i.e., recognition) of the four cartoons used in the research, χ^2 (3, *N* = 59) < 6.77, *p*'s > .08, or in their viewing of the shows, χ^2 (3, *N* = 64) < 4.37, *p*'s >.1. No significant differences were found between conditions on the Strengths and Difficulties Questionnaire, *F*'s < 2.39, *p*'s > .08.

EF Measures

Next, participants' pre-test performance was examined. A *t*-test revealed that participants in the fast-paced conditions (*M* = 17.66, *SD* = 6.42) performed significantly better on the pre-test measure than those in the slow-paced conditions (*M* = 13.32, *SD* = 4.18), *t* (58) = -3.119, *p* = .009. Scores on the pre- and post-test measures, with averages that can be seen in table 1, were first converted to z-scores and then resulting z-scores for DCCS and HSKT were averaged to create one post-test z-score. Change between pre- and post-test was measured by the difference between the averaged pre-test score and the averaged post-test score. As seen in figure 1, EF scores on the post-test increased for the slow-paced conditions (*M* =.27, *SD* =1.24) and decreased for the fast-paced conditions (*M* =-.14, *SD* =1.25) but failed to reach statistical significance. Next, a series of hierarchical regression analyses were performed, covarying pre-test performance, but these were nonsignificant.

---Insert Table 1 about here---

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Discussion

Due to the discrepancy between the recommended television exposure and actual television exposure for children, television viewing is an important topic in children's development. The results of the media surveys reflected this issue with the average amount of media viewed per day at almost 2 ½ hours. Elevated exposure to television has been shown to be deleterious to children's cognitive development (Barr, 2010). While analysis of the Strengths and Difficulties Questionnaire did not reveal a significant relationship between viewing habits and behavioral difficulties or hyperactivity and attentional difficulties, as might be expected due to the longitudinal research on this topic (Christakis, 2004; Landhuis, Poulton, Welch, & Hancox, 2007; Zimmerman & Christakis, 2007), this may result from lack of access to extensive records of the participant's television viewing. Furthermore, additional reports, from the children and teachers of the children, of their behavior were taken into consideration in the longitudinal studies but not in the current research.

Barr (2010) and Lillard and Peterson (2011a) both demonstrated that specific aspects of television, such as amount of adult-oriented television viewed and pacing, can negatively impact children's EF. The current study did not replicate either of these findings. In fact, the results did not support the research previously discussed stating that fast-pacing can have a negative impact nor did it support the claims that fast-pacing can be a neutral or positive influence. There was no statistically significant difference in post-test scores between the fast-paced and slow-paced conditions or between the fantastical and realistic conditions. Moreover, no interaction between pacing and fantasy level was found.

This may be explained by the fact that participants' average pre-test scores were significantly higher in the fast-paced conditions than in the slow-paced conditions. This difference implies that, despite random assignment to conditions, the children in the fast-paced conditions began the tests with elevated EF. Despite this difference in initial EF abilities, participant's scores trended towards the predicted direction after viewing the fast-paced cartoons, suggesting that pacing may be deleterious to children's EF.

There were no differences or trends in post-test averages between fantastical and realistic conditions, but this may also be indirectly impacted by the discrepancies in initial EF. In light of prior research, other possibilities may account for the lack of differences between conditions. Baillargeon (2002) demonstrated that understanding physical laws shows a clear developmental progression; one possibility is that preschool-aged children's capacity to recognize impossible physical events may not be fully developed to recognize such events in cartoons that do not directly depict real life. Alternatively, 4-year–olds may have developed this capability completely so that fantastical events are no longer surprising and, in turn, do not take additional cognitive resources to process. In sum, no clear conclusions can be made from the results of the current research due to the significant differences between conditions in the pre-test. To overcome this issue, the study will be continued with stratified random sampling to ensure comparable initial EF between conditions.

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Table 1

Measures Means and Standard Deviations by Condition

	Dog/Fish		DCCS		HTKS	
Condition	*M*	*SD*	*M*	*SD*	*M*	*SD*
SpongeBob	17.69	5.42	32.25	10.06	24.06	17.72
Phineas and Ferb	17.62	7.30	29.83	11.25	25.61	17.52
Little Einsteins	13.18	4.05	25.88	10.87	22.41	17.04
Little Bill	13.50	5.76	8.40	11.69	20.87	15.47

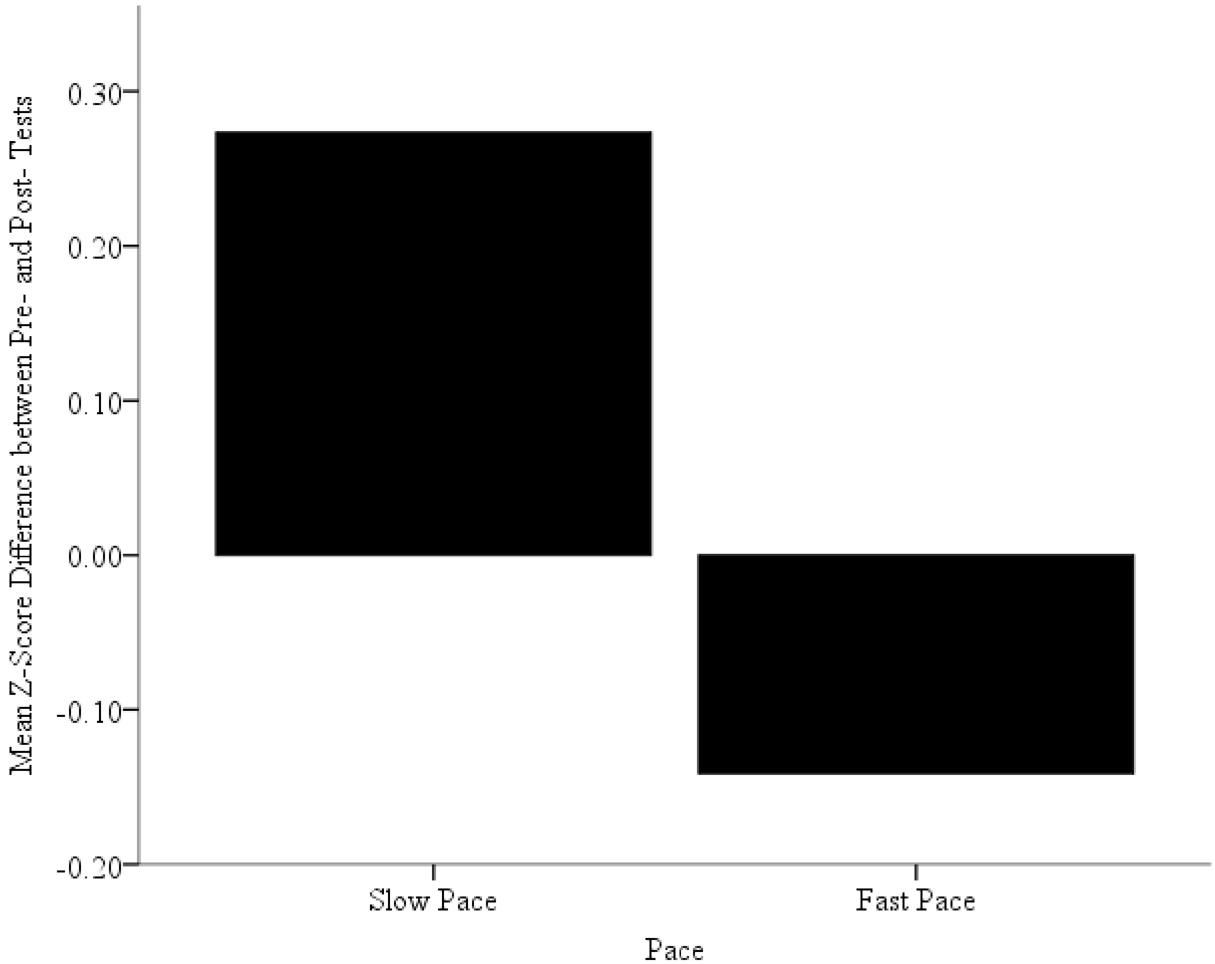

Figure 1. Mean z-score difference between pre- and post- tests for slow versus fast paced conditions.