Symbolic thought in the service of self-control:
Effects of social psychological distancing on executive function in young children

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Abstract

The current research assessed the influence of graded levels of social psychological distance on cool executive function (EF) in young children. Three- and 5-year-old children (*N* = 96) were randomly assigned to one of four manipulations of social distance (from proximal to distal: Immersed, No Distance, Third Person, and Exemplar) within the Executive Function Scale for Preschoolers, a comprehensive measure of cool cognitive control. Across the full sample, children in the distal Exemplar condition outperformed those in the No Distance control group. Individual analyses for each age group revealed significant condition effects only for 5-year-olds. Within this older group, increasing psychological distance from the self facilitated cool EF performance in both the Third Person and Exemplar conditions. Moreover, 5-year-olds showed a pattern of incrementally increasing EF as a function of social distancing across all four conditions. Three-year-olds' EF performance was not significantly influenced by the distancing manipulations. These findings speak to the importance of abstract, representational modes of thought in the expression of conscious control over thought and action.

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Chapter 1

Our ability to use symbolic thought is said to be a key aspect of cognition that sets us, as human beings, apart from other primates (e.g., Harris, 2000; Vygotsky & Luria, 1994). Advanced representational capacities allow us to mentally step away from the here and now and reevaluate our decisions so that we can plan for the future, understand others, and importantly, regulate our thoughts and behavior. In fact, this ability to psychologically distance ourselves from our current context through representation and reflection has been argued to be an essential element in the expression of self-control (e.g., Carlson & Zelazo, 2008; Mischel & Rodriguez, 1993; Piaget, 1951/1962; Vygotsky, 1933/1978; Vygotsky & Luria, 1994; Werner & Kaplan, 1963).

Executive Function

The cognitive processes that contribute to the conscious control of thought, action and emotion are collectively defined as executive function (EF). EF has been described as a unitary construct made up of several overlapping, but somewhat dissociable, components including set shifting (flexibly switching between mental sets), inhibitory control (suppressing a prepotent response in favor of a goal), and working memory (maintenance and use of goal-relevant information; Garon, Bryson, & Smith, 2008; Miyake & Friedman, 2012; Miyake et al., 2000). Recent research suggests that the operation of EF is dependent upon aspects of the task context such as the presence or absence of affective demands. “Hot” EF tasks involve the regulation of affect and motivation, whereas “cool” (i.e., abstract, decontextualized) situations draw upon more purely cognitive control processes (Hongwanishkul, Happaney, Lee, & Zelazo, 2005; Zelazo & Müller, 2002).

EF follows a protracted developmental trajectory from infancy through early adulthood (Carlson, Zelazo, & Faja, in press; Zelazo et al., 2012). Striking increases in EF performance have been noted between the ages of 3 to 5 (Carlson, 2005; Zelazo & Müller, 2002) concurrent with a period of rapid development of the prefrontal cortex (for a review see Zelazo, Carlson, & Kesek, 2008). Moreover, individual differences in EF measured during the preschool years predict a host of later outcomes ranging from academic success in kindergarten to criminal offenses in adulthood (Blair & Razza, 2007; Shoda, Mischel, & Peake, 1990; Moffitt et al., 2011). Such findings underscore the importance of inquiries into the potential positive influences on the early expression and development of EF.

Given their immature EF skills, young children are prone to attend to highly salient, albeit often misleading aspects of objects or events (Carlson & Zelazo, 2008; DeLoache, 1987). In order to exert cognitive control, however, one must direct attention away from situational distracters and consciously attend to higher-order goals in a flexible and reflective manner (Zelazo, Müller, Frye, & Marcovitch, 2003). For example, in Day/Night (Gerstadt, Hong, & Diamond, 1994), children must overcome the prepotent tendency to say “day” when presented with a picture of the sun (i.e., a salient situational factor) in order to say “night” as specified by the reverse-contingency rules of the task. Research has pointed to several factors that help children to exert conscious control over their thoughts and actions, including bilingualism (e.g., Carlson & Meltzoff, 2008; Bialystok & Martin, 2003), training (for a review, see Diamond & Lee, 2011), verbalizations (e.g., Luria, 1961; Jacques & Zelazo, 2005; Kirkham, Cruess, & Diamond, 2003), and psychological distancing (e.g., Carlson, Davis, & Leach, 2005; Mischel & Baker, 1975; Prencipe & Zelazo, 2005).

Faciliating EF Through Psychological Distancing

Psychological distancing refers to behaviors, events or mental representations that separate one cognitively from the here and now (Carlson & Zelazo, 2008; Sigel, 1993; Werner & Kaplan, 1963). Distance from the immediate context is a function of the level of abstraction from an individual’s subjective experience of reality, and as such it can vary on several dimensions including level of detail (similar – dissimilar), hypotheticality (possible - impossible), space (near - far), time (now - later), and social understanding (self – other; Liberman & Trope, 2008; Sigel, 1970). Across dimensions, distance allows one to step back and reevaluate a situation in representational terms rather than being dominated by immediate thoughts and surroundings. Greater distances induce greater separation from the events and objects within one’s immediate context, and in turn, the level of distance achieved by the individual from a particular stimulus can determine the quality of a behavioral response (Sigel, 1970).

Psychological distancing has been lauded as a key factor in successfully exerting conscious control over thoughts and actions (Liberman & Trope, 2008; Mischel & Rodriguez, 1993; Sigel, 1970; Vygotsky, 1978). Developmental theories assert that mentally transcending the exigencies of one's current context could promote executive function through mental disengagement from misleading or irrelevant stimuli. By decreasing the salience of a stimulus or of particular aspects of a situation, distancing could result in the suppression of impulsive, stimulus-bound responses (Carlson & Zelazo, 2008; Metcalfe & Mischel, 1999; Piaget, 1951/1962; Vygotsky, 1978). Psychological distancing could also draw attention to previously unnoticed aspects of an object or situation (Carlson & Zelazo, 2008; Sigel, 1970). Children's cognitive flexibility is thus increased as they are able to fluently and flexibly reflect on a situation in a larger problem space.

Similarly, construal level theory (Liberman & Trope, 2008; Trope & Liberman, 2010), from the area of adult social psychology, proposes that psychological distance affects an individual's behaviors, judgments and decisions because choices are based on mental construals of given stimuli or events, rather than the stimuli or events themselves. Proximal distances activate low-level construals and lead to narrow, goal-irrelevant, concrete categorizations. Subsequent decisions are based on these low-level features of an event. Alternately, the activation of distal, high-level construals through greater distance produces broad, abstract, goal-relevant categorizations and actions are based on the high-level features of the event. Self-control, from this perspective, is seen as making decisions and behaving according to global, goal-directed, high-level construals of a situation, rather than local, goal-irrelevant, low-level construals (Fujita, Trope, Liberman, & Levin-Sagi, 2006). Focusing one's attention on the here and now (i.e., a low-level construal) would therefore lead to impulsive, unreflective responses, whereas greater psychological distances (i.e., higher construal levels) could encourage more reflective responses based on abstract representations, goals or values.

Hot EF

To date, our knowledge of the effects of psychological distancing on self-control in young children is sparse and largely confined to affectively-charged, or hot EF. Previous studies in this area have shown that preschoolers can use physical or mental transformations of stimuli to impose psychological distance from tempting rewards and in turn, facilitate EF.

Walter Mischel's classic delay of gratification work provides evidence for behavioral change due to level of mental abstraction from a stimulus (Mischel & Baker, 1975; Mischel & Rodriguez, 1993). Encouraging children to mentally transform appetitive stimuli (e.g., marshmallows) into non-appetitive abstract symbols (e.g., fluffy clouds), increased children's ability to wait in the presence of the appetitive stimuli in order to receive an even larger reward at the end of the task. On the other hand, when children were told to focus on the concrete, proximal features of the stimulus (e.g., the crunchiness and salty taste of a pretzel) their ability to wait to maximize their rewards plummeted. In terms of psychological distancing, it appears that the abstract condition created greater distance and decreased the salience of the stimuli, allowing children to focus their attention on the overarching goal (i.e., the larger reward). The concrete condition, however, promoted greater immersion in the present context, increasing the salience of a tempting reward, and decreasing children's ability to exert conscious control. Thus, Mischel and colleagues provided strong evidence that psychological distancing can produce a wide spectrum of behavioral outcomes – both positive and negative - based on the level of abstraction from a given stimulus.

Carlson and colleagues (2005) provided a more direct assessment of psychological distancing in an EF task. In Less is More, a reverse-contingency EF task, children are presented with one larger and one smaller pile of snack treats and they must point to the smaller pile in order to keep the larger one for themselves. Although dealing with the actual stimuli is quite difficult for 3-year-old children, replacing appetitive stimuli with symbols can help children to override impulsive responses. Underscoring the influence of levels of distance on behavioral responses, performance was shown to increase incrementally as a function of the symbol's distance from the original stimuli—from a one-to-one correspondence of rocks to represent individual treats to a mouse to represent the small pile of treats and an elephant to represent the large pile.

Hot executive function can also be facilitated by contextual manipulations of distance. Prencipe and Zelazo (2005) found that 3-year-olds chose immediate rewards for themselves in a modified delay of gratification paradigm, but delayed rewards for the experimenter. Making decisions for another person seems to have induced a social distance from the self and made advantageous, delayed decisions easier for 3-year-olds. Four-year-olds did not show performance increases in making decisions for the experimenter; however, previous research indicates that by this age children have begun to integrate the perspectives of the self and other (Barresi & Moore, 1996). Therefore, the experimenter condition may not have been sufficiently distancing for four-year-olds because they perceived others as relatively proximal to the self. Overall, this study provides support for the idea that approaching a problem with greater perceived distance from the self can elicit greater cognitive control.

Furthermore, psychological distance is inherently present in pretend play as children engage in abstractions from their own lives as various characters, in faraway places, and across time. White and Carlson (2011) demonstrated that priming a pretense context boosted children's performance in a subsequent administration of the Less is More task by nearly 50% over a control group that had engaged in a non-pretense activity. In both White and Carlson (2011) and Prencipe and Zelazo (2005), psychological distance outside of a direct transformation of task stimuli decreased stimulus-bound, impulsive responses and promoted flexible, conscious control over behavior.

Taken together, these studies demonstrate that various forms of psychological distancing can affect young children's behavior in affectively-charged situations. By increasing levels of abstraction from one's current context, children can move from being bound to highly salient stimuli to consciously controlling behavior to reach a goal.

Cool EF

Compared to hot EF tasks, we know far less about the effects of psychological distancing on the more purely cognitive cool EF tasks. Psychological distancing theory, however, supports the hypothesis that increased levels of abstraction from the here and now should decrease children's impulsive or perseverative errors regardless of contextual motivational significance. Distancing could direct attention away from a broad range of conflicting or misleading aspects of an object or event (e.g., the sun and moon cards of the Day/Night task described above; Gerstadt et al., 1994), not only the tempting or otherwise affectively-charged ones. Moreover, if psychological distance allows children to attend to more higher-order aspects of a situation, it should also result in the cognitive flexibility and increased reflection upon task rules, goals or values required for conscious cognitive control across EF tasks. In short, the same psychological distancing mechanisms used to explain EF benefits in affectively-charged situations should also facilitate cool EF.

Although existing research does not directly address this hypothesis, several studies suggest that young children should be able to use a range of psychological distancing strategies to benefit cool executive function performance. First, when presented with the purely cognitive task to solve syllogisms such as "Tot is a fish. All fish live in trees. Where does Tot live?" children under four years of age typically fall victim to reality biases, stating that Tot lives in the water. But, when such problems are presented in a distanced fantasy context in which Tot lives on another planet, children as young as two years of age can correctly solve the problem (Dias & Harris, 1990;

Richards & Sanderson, 1999). Although syllogisms are not standard measures of EF, they do require children to inhibit the prepotent tendency to respond in a veridical manner and therefore support the idea that distancing could be beneficial to cool EF in young children.

Language is one of the first representational abilities to develop and plays a fundamental role in theories of psychological distancing (Vygotsky & Luria, 1994; Vygotsky, 1933/1978; Werner & Kaplan, 1963). Verbal labeling of objects or events could provide psychological distance as words serve as symbolic mediators upon which behaviors can be determined (Vygotsky, 1933/1978). The use of language to label objects has been shown to have facilitative effects in several studies related to early executive function abilities (Jacques & Zelazo, 2005; Kirkham et al., 2003; Luria, 1961; Miller & Marcovitch, 2011; Müller, Zelazo, Hood, Leone, & Rohrer, 2004). For example, in the Go-Nogo task (Luria, 1961) – an executive function task in which children must point to all instances of a "Go" stimulus and inhibit pointing to instances of an interspersed "Nogo" stimulus – 3-year-olds were better able to regulate their "Go" responses when they paired their pointing with verbal labels such as "Press." Older children showed improvements in the more difficult "Nogo" trials in a labeling condition as well. Labeling has also been shown to improve two-year-olds' performance on a multi-location search task (Miller & Marcovitch, 2011) and 3-year-olds' performance on the Dimensional Change Card Sort (DCCS; Kirkham et al., 2003). The effects of labeling, however, are controversial. While the studies described above indicated benefits to EF, other studies have failed to replicate these findings (e.g., Müller, Zelazo, Lurye, & Liebermann, 2008).

Finally, Schmeichel, Vohs, and Duke (2011) found that construal levels affected adults' performance in cool EF tasks. Participants were primed with high or low-level mental construals before completing a modified stop signal task in which they had to complete a primary (i.e., "go") task while inhibiting responses to every third stop signal. Researchers predicted that high-level construals would increase performance because they lead one to focus on the global, rule-based aspects of a situation and ignore the low-level details. As expected, participants in the high-construal condition outperformed those in the low-construal condition. Given that psychological distance is thought to induce higher construal levels, this study suggests that directly manipulating psychological distance could also promote cool EF.

In summary, theory and previous research suggest that cool EF should benefit from psychological distancing manipulations in much the same way as hot EF. Moreover, research into syllogisms and, to some extent, verbal labeling suggest that distancing strategies for cool EF tasks should have facilitative effects even in young children.

The Current Study

The goal of the current study was to assess the effects of varied levels of social psychological distance on cool EF across the preschool period. Three- and 5-year-old children were tested using the Executive Function Scale for Preschoolers (EF Scale;

Beck, Schaefer, Pang, & Carlson, 2011; Carlson & Schaefer, 2012), a graduated scale designed for use with children across the preschool age range. Based on the Dimensional Change Card Sort (Zelazo, 2006), the EF Scale is built upon increasingly complex hierarchical rule structures and provides a comprehensive assessment of EF skills by drawing upon inhibition, working memory and set shifting abilities. A major advantage of the EF Scale over prior measures of EF is that it is sensitive to development, individual differences and, to be tested here, intervention effects across the full preschool period.

Psychological distancing manipulations of the EF Scale were designed using the dimension of social distance. Although previous research has investigated the effect of making decisions for another person (Prencipe & Zelazo, 2005), the current study is the first inquiry into behavioral outcomes related to a full spectrum of social distancing in young children. Four conditions were created along a continuum of proximal to distal distances from the self. The No Distance control condition served as a measure of children's baseline level of psychological distance within the EF Scale. The Immersed condition was intended to induce a social perspective that was even more proximal to the self than baseline by explicitly encouraging children to think about their own thoughts and feelings during the EF Scale task. Moving toward the other end of the continuum, the Third Person condition was included to elicit a moderately distanced perspective from the self by encouraging children to take an outsider's perspective on their own actions. Similar manipulations have proven successful in studies with adults (e.g., Burson, Kross, & Ayduk, 2011). Finally, the Exemplar condition was expected to elicit the most psychological distance from the self as children were instructed to make decisions as another person entirely (i.e., a popular cartoon character chosen by the child). Greater psychological distances from the self were expected to decrease low-level, stimulus-bound perspectives on the target EF task and increase flexible, reflective responses based on higher-level features of the situation (i.e., task rules). An immersed perspective was expected to have the opposite effect (as in Mischel & Baker, 1975). Therefore, EF scale performance was predicted to improve incrementally as a function of psychological distancing (i.e., Immersed > No Distance > Third person > Exemplar).

Executive function abilities increase markedly over the preschool years and as such, 5-year-olds were expected to outperform 3-year-olds on the EF Scale across conditions. Predictions regarding age-related changes in EF due to distancing manipulations, however, were not as clear. Prencipe and Zelazo's (2005) delay study showed an Age x Distance interaction in which 3-year-olds were better able to use a socially distal strategy to improve self-control than their four-year-old counterparts. As such, in this study, it was possible that older preschoolers would show little (or no) improvement in the distanced conditions, while the younger children would show improvements. Alternately, it is also possible that with development, psychological distancing strategies are supported by increasing metacognitive and representational skills (Carlson & Zelazo, 2008). In this case, 5-year-olds' EF performance would be expected to increase incrementally with higher levels of psychological distance, whereas 3-year-olds would show more attenuated, or no, effects of distancing strategies.

Finally, the current study attempted to address the impact of individual differences on children's ability to successfully employ psychological distancing strategies in the service of self-control. Several cognitive factors were tested including verbal ability, theory of mind, memory, baseline EF, and representational abilities.

Chapter 2

Methods

Participants

Ninety-six children and their parents participated in this study. Of the children, 48 were 3-year-olds (24 girls, M_{age} = 42.51 months, *SD* = 0.61) and 48 were 5-year-olds (24 girls, M_{age} = 66.21 months, *SD* = 0.47). In addition, four children were excluded from analyses because they refused to complete the research session and one child was excluded due to experimenter error.

All participants were recruited through telephone calls. Families' contact information was obtained from the Institute of Child Development Participant Pool database. Children with known developmental delays (e.g., autism, speech or hearing impairments, significantly premature birth) were excluded from this study. Study procedures indicated that parents should have been questioned about these requirements during recruitment conversations. Nonetheless, for several children, research personnel only later obtained reports of significantly premature birth (i.e., the child was born more than three weeks prior to his or her due date) or other developmental delays when reviewing paperwork completed by parents. Thus, an additional ten children (four 3-year-olds and six 5-year-olds) were screened out of the study.

All families chose to provide at least some of the requested demographic information. Of the 95 children for whom ethnicity was reported, 86.5% were non-Hispanic Caucasian, 5.2% were Hispanic Caucasian, 4.2% were multi-racial, 1% was Asian, 1% was Native American, and 1% was of an "other" ethnicity. Most children came from middle- to upper-middle class, two caregiver households. The median level of education for children's primary caregivers was at the level of a Bachelor's degree.

Procedure

All testing sessions were administered by Rachel White or a trained undergraduate research assistant in the Developmental Social Cognitive Neuroscience laboratory at the University of Minnesota. This assistant was not informed of study hypotheses prior to testing. Upon arriving at the University, all parents gave consent for their child to participate. Children were also asked for verbal assent before starting the session.

Children were tested in a one-on-one session with the experimenter. Each session was digitally recorded and lasted approximately 45-60 minutes. Children first completed tests of verbal ability (PPVT-IV; Dunn & Dunn, 2006), baseline executive function (Rueda et al., 2004), theory of mind (Wellman & Liu, 2004), and working memory (Forward and Backward Digit Span, Davis & Pratt, 1996). Then, they completed the EF Scale for Preschoolers (Beck et al., 2011; Carlson & Schaefer, 2012) with additional instructions pertaining to one of four randomly assigned distancing conditions (i.e., Immersed, No Distance, Third-person, Exemplar; see below for further information on distancing manipulations). Finally, all children were interviewed about their pretend play habits, including the creation and impersonation of imaginary characters (adapted from Taylor & Carlson, 1997).

A parent was asked to complete five questionnaires about their child including a demographic information form and four brief questionnaires to assess their child's engagement in pretense and fantasy proneness (Role Play Questionnaire, adapted from Gleason, Sebanc, & Hartup, 2000 and Taylor & Carlson, 1997; Big 5 Scales for the California Q-Set, adapted from John, Caspi, Robins, Moffitt, & Stouthamer-Loeber, 1994), trait-level self-control (Children's Behavior Questionnaire – Very Short Form, Putnam & Rothbart, 2006; Big 5 Scales for the California Q-Set, John et al., 1994), and perseverance (Short Grit Scale, Duckworth & Quinn, 2009). All questionnaires were provided via mailed or e-mailed packets for parents to complete prior to the testing session.

Children received a small toy or t-shirt for their participation. Parents were debriefed and given $10 in travel reimbursement.

Executive Function Scale for Preschoolers

The EF Scale (Beck et al., 2011; Carlson & Schaefer, 2012) is a graduated card sorting task designed to assess cool EF performance in children from 2-7 years of age. Throughout the task, children were seated in front of two boxes with affixed, level-specific target cards (see Figure 1). The full EF scale has seven levels. At the most basic level (1) of the EF scale, children were asked to perform a simple sorting task (i.e., sorting elephants into an elephant box and fish into a fish box). At Level 2, children sorted big and little kitties into corresponding boxes and then sorted according to a reversed rule: “All the big kitties go in the little kitty box and all the little kitties go in the big kitty box.” Level 3 introduced additional complexity by asking children to sort based on two dimensions within the same stimulus - shape and background color. Target cards were a black heart on a pink background and a black flower on a yellow background. Test stimuli were flowers on a pink background and hearts on a yellow background. Children were first asked to sort test cards by color and then by shape. Level 4 also required children to sort by color and then by shape, but with integrated stimuli. Target cards (used for all subsequent levels) were blue stars and red trucks on a white background. Test cards were red stars and blue trucks on a white background. At Level 5, children had to switch flexibly between rules (i.e., sort by shape or color) to sort the integrated cards on a trial-by-trial basis. At Level 6, children were told to sort by one dimension (e.g., color) if there was a border around an integrated dimension test card, but to sort by the other dimension (e.g., shape) if there was no border. Finally, Level 7 was a reversal of Level 6 border rules. Instructions were given and rule checks were performed prior to the start of each level.

Children started the EF scale at predetermined levels based on their age; 3-year-olds began at Level 3 and 5-year-olds began at Level 5. Following instructions and rule checks for each level, the experimenter presented test cards while verbally labeling the relevant dimension (e.g., "Here's a star.") for each trial. Each level consisted of two rule sets and children needed to correctly sort at least four out of five test cards for each set to pass the level. If children passed a level, they moved up one level in the scale. If children failed a level, they moved down one level. Based on these criteria, the experimenter continued to move up or down within the scale until children passed a given level but failed the level above it, or until the child passed Level 7.

The dependent variable of interest in the EF Scale for preschoolers is the highest level passed. The range of possible scores for this variable was thus 0-7.

Scoring was completed by the experimenter during testing. Additionally, in order to determine reliability of coding, the EF Scale was rescored for 24 randomly selected participants (25% of the full sample) by an additional coder who was blind to study hypotheses. Reliability coding from video did not differ from in-session coding (*kappa* = 1.00).

Distancing Manipulations. Children were randomly assigned to one of three social psychological distancing conditions or a non-distanced control condition (from proximal to distant: Immersed, No Distance, Third-person, or Exemplar). All experimental manipulations were applied within the EF Scale for Preschoolers.

Following instructions and rule checks for the Executive Function Scale for Preschoolers, the experimenter proceeded to tell children about a distancing strategy they could use throughout the task (see Appendix C for full distancing scripts). In the Immersed condition, children were encouraged to think about their own thoughts and actions using "I" statements ("Where do *I* think this card should go?"). Children in the Third-person condition were instructed to think about their thoughts and actions using their own names to create social distance from the self ("Where does [*participant's name*] think this card should go?"). In the most distanced Exemplar condition, children were instructed to take on another persona through role-play and make decisions as their character ("Where does [*character's name*] think this card should go?"). Children in the Exemplar condition were presented with pictures of the currently popular cartoon characters Batman, Dora the Explorer, Bob the Builder, and Rapunzel (from the Disney® movie, *Tangled*) and asked which character they would like to pretend to be during the task. Once children chose their preferred characters, they were provided with props that would facilitate their role play as the character (i.e., Batman's cape, Dora's backpack, Bob's tool belt, or Rapunzel's crown). In order to approximate the time allotted to distancing directions in the other three conditions, children in the No Distance condition were told that if the game got tricky, they could take a guess and keep going (a redundant phrase also included in the child assent script).

As a reminder of the initial distancing instructions, each child was given a sticker to wear on their dominant hand for the duration of the EF Scale. A label with the word "I" served as the reminder for the Immersed condition, a label with the child's name was the was the reminder in the Third Person condition, and a sticker with the chosen character's picture was the reminder in the Exemplar condition. Children in the No Distance condition were given a task-irrelevant, green dot sticker.

Finally, the experimenter provided prompts throughout the EF Scale to further remind children of the initial distancing instructions. In the distanced conditions, each level began with the reminder, "Remember, in this game I want you to ask, 'Where do(es) *I/[child's name]/[character]* think the card should go?'" The presentation of EF scale stimuli on test trials was followed by the distancing prompt, "Where should *you/[child's name]/[character]* put it?" In the control condition, each level began with the reminder "Remember, if you don't know an answer, you can take a guess and keep going," but there were no reminders after individual trial presentations.

Additional Child Measures

The Peabody Picture Vocabulary Test - 4th Edition (PPVT-IV; Dunn & Dunn, 2006). The PPVT-IV is a measure of receptive vocabulary. Positive correlations have been found between individual differences in receptive vocabulary and both symbolic thought (Taylor & Carlson, 1997) and EF (e.g., Blair & Razza, 2007). Therefore, the PPVT-IV was included to measure individual differences that might impact performance on the EF scale and/or children's ability to use symbolic distancing strategies.

In this task, children were presented with a series of cards showing four pictures each. The experimenter then provided one word depicted by a picture on the card and asked the child to point to the corresponding picture. The test continued until children failed to correctly identify 8 or more pictures out of 12 in a predetermined set. Raw scores were used in all analyses.

Flanker (Rueda et al., 2004). A computerized Flanker task was included as a baseline measure of executive function. In this task, rows of five cartoon fish were presented on a laptop computer screen. An arrow was drawn inside each fish to indicate the direction it was pointing. In compatible trials, the center figure faced the same direction as outside (i.e., flanking) figures. In incompatible trials, the center figure faced in the opposite direction of the outside figures.

The experimenter led children through thorough task instructions before they independently completed four practice trials. Children were instructed to indicate the direction that the center fish was pointing by pressing a corresponding button on the keyboard (i.e., the right or left arrow key). If children failed to correctly respond to three or more practice trials, instructions were repeated. Following the successful completion of the practice trials, or the maximum of four repetitions of the instructions, children completed 20 randomly presented test trials (10 compatible, 10 incompatible).

The computer program automatically recorded children’s responses. Composite total scores, ranging from a possible 0 to 10 points, were created using accuracy and reaction time data.

Theory of mind battery (Wellman & Liu, 2004). Children's grasp of theory of mind, including their understanding of others’ beliefs and desires, could impact the effectiveness of social distancing strategies (Baressi & Moore, 1996; Principe and

Zelazo, 2005). The current study aimed to account for this possibility through the inclusion of a battery of theory of mind tasks.

The battery was administered in the following fixed order as suggested by scale creators. First, Diverse Desires tested children's ability to judge that they and another person can have different desires related to the same foods (i.e., a cookie and a carrot). Next, in the Knowledge Access task, children were shown the contents of a box and then asked whether another person, who never looked inside the box, would know what was inside. Third, in Contents False Belief, children were shown a Band-Aid box that really contained crayons. This task tested children's ability to determine whether another person, who had never looked inside the box, would have a false belief about its contents (i.e., they believed the box contained Band-Aids). Fourth, the Diverse Beliefs task tested children's ability to acknowledge that someone else can have different beliefs about a situation when they do not know which belief is correct. Finally, the Real-Apparent Emotion task tested whether children understand that another person can feel one emotion inside while displaying a different emotion on their face.

Correct responses to test questions as well as memory controls were required to pass each task. Children received one point for each task they passed. Scores for all tasks were then added to obtain total battery scores of 0-5 points.

Forward and Backward Digit Span (Davis & Pratt, 1996). Both the EF scale and distancing manipulations could be facilitated by children's ability to keep given rules in mind. Moreover, working memory is a key component of executive function that is positively correlated with performance on card sorting tasks (e.g., Carlson, White, & Davis-Unger, 2012). As such, Forward and Backward Digit Span tasks were administered to assess memory span and working memory, respectively.

In Forward Digit Span, children were introduced to a doll who demonstrated the task of repeating strings of numbers given by the experimenter. Following a practice trial, children were provided with increasingly large lists of numbers (from two to seven digits) until they were unable to sucessfully repeat the full string.

Similarly, in the Backward Digit Span task, the doll demonstrated saying a given string of numbers in reverse order. Number sets increased in size (from two to five digits) until the child was no longer able to correctly transpose the given numbers.

Dependent variables were the highest number of digits children could successfully repeat (Forward Digit Span) and transpose (Backward Digit Span). In both the Forward and Backward tasks, children who were unable to successfully pass the two-digit level were given a score of 1.

Child Pretense Questionnaire. Individual differences in experience with pretense, and role-play specifically, may also impact children's ability to understand and employ the various social distancing strategies provided in this study. Therefore, to measure their level of engagement in pretense, children were interviewed about impersonation and creation of imaginary characters (based on Taylor & Carlson, 1997). Imaginary companions were introduced to children as the friends that "are make-believe, that we pretend are real." Children were then asked "Do you have a pretend friend?" If they responded affirmatively, the experimenter went on to gather more information about the friend such as its name, what it looked like and what the child liked about him/her.

For the purposes of this study, children were considered to have an imaginary companion if they could (a) describe the companion in detail, and (b) their parent agreed that the child had an imaginary companion (although parents and children did not have to describe the same companion).

Parent Report Measures

Demographics. Parents were asked to complete a demographic information form that included questions regarding developmental delays, premature birth status, and ethnicity of the child as well as family income and parental education levels.

Parent Fantasy Interview (adapted from Gleason, Sebanc, & Hartup, 2000; Taylor & Carlson, 1997). Like the Child Pretense Questionnaire, the Parent Fantasy Interview was included as a measure of children's everyday engagement in symbolic activities. Parents were asked to report on a variety of pretense behaviors including the creation and impersonation of imaginary characters.

Following previous research (Taylor & Carlson, 1997), children were categorized into high- or low- fantasy groups using parent reports of impersonation, and combined parent and child report of imaginary companions. Children were classified as impersonators if their caregiver reported that they engaged in role play as a person, animal or machine, everyday for at least one month. As noted above, children were classified as having an imaginary companion if both the child and parent agreed that the child had an imaginary companion, and if both were able to provide in-depth descriptions of a companion. Children who were impersonators and children who had imaginary companions were placed into a high-fantasy group (scored as 1); children who did not engage in either of these activities were placed into a low-fantasy group (scored as 0).

The Children's Behavior Questionnaire – Very Short Form (CBQ-VSF; Putnam & Rothbart, 2006) is a parent-report measure of children's temperament used to assess self-control behaviors over the past six months. Parents were asked to rate each of 36 statements, such as "Is good at following instructions," on how true it was of their child (on a scale of 1-7). The standard CBQ-VSF includes three temperament subscales including Effortful Control, Surgency, and Negative Affect. The Effortful Control subscale addresses self-regulatory behaviors. It was therefore of particular interest among the CBQ-VSF subscales in this study. Scores were obtained by averaging the 12 items in the Effortful Control subscale.

Big 5 Scales for the California Child Q-Set (adapted from John et al., 1994) is another temperament questionnaire. Parents were asked to rate 20 statements on a scale of 1 (extremely untrue of your child) – 7 (extremely true of your child). For the purposes of this study, the subscales of Openness to Experience and Conscientiousness

Versus Lack of Direction were computed. Openness to Experience items related to imagination and creativity. This subscale included statements such as "He is creative in the way he thinks, works or plays." The Conscientousness Versus Lack of Direction subscale taps parent assessment of self-regulatory abilities, with items such as "He pays attention well and can concentrate on things." Openness to Experience and Conscientiousness Versus Lack of Direction scores were computed by taking the average of the four items included in each subscale.

Short Grit Scale (Duckworth & Quinn, 2009). The Short Grit Scale is a measure of trait-level perseverance and passion for long-term goals typically administered to school-aged children and adults. It was adapted for this study so that parents completed the questionnaire about their child. Items such as "Setbacks don't discourage him" and "He finishes whatever he begins" were rated on a scale from 1 (not at all like my child) to 5 (very much like my child). The eight items in the Short Grit Scale were averaged to obtain a total scale score.

Chapter 3

Results

Preliminary Analyses

An examination of descriptive statistics for all covariates (see Table 1) confirmed that task means were within typical ranges for both 3- and 5-year-olds. However, while not unusual given the difficulty of the task, there was a floor effect on Backward Digit Span for 3-year-olds. In addition, all lab-based measures showed significant increases with age, but no significant age differences were found for any of the parent-report measures.

As expected, EF performance across the full sample was positively related to verbal ability (PPVT), memory (Forward and Backward Digit Span), theory of mind and baseline EF (Flanker). However, after controlling for age, the relation between EF Scale scores and theory of mind was no longer significant. Parent report measures of children's self-regulation were not related to lab-based measures of executive function. Bivariate and partial correlations (controlling for age) for all measures can be found in Table 2.

A series of one-way ANOVAs confirmed that there were no systematic differences between children in each condition on any measured covariates prior to experimental manipulations. There were also no differences by condition in children's ability to correctly respond to preliminary rule checks for the EF Scale.

Finally, although small cell sizes prohibited statistical significance testing of mean EF Scale scores between the two experimenters, means for the primary experimenter (i.e., the author) and the "blind" research assistant appear to be quite similar across conditions and ages (see Table 3).

Condition and Age Differences

To assess the effects of psychological distance and age on EF Scale performance, I first conducted an omnibus 2 (Age) x 4 (Condition: Immersed, Control, Third Person, Exemplar) ANOVA. Consistent with study hypotheses, there was a significant main effect of condition, $F\ (3,88) = 3.18$, $p = .03$, $\eta_p^2 = 0.10$. Moreover, mean EF Scale scores for each condition followed the predicted positive linear pattern, increasing with greater social psychological distance (*Spearman* $\rho = .18$; $p = .08$): $M_{\text{Immersed}} = 3.87$, $SD = 1.54$; $M_{\text{No Distance}} = 4.0$, $SD = 1.47$; $M_{\text{Third Person}} = 4.41$, $SD = 1.79$; and $M_{\text{Exemplar}} = 4.71$, $SD = 1.65$ (see Figure 2). Planned comparisons revealed that children in the Exemplar condition performed significantly better on the EF scale than children in the No Distance condition, $p = .02$. Only this highest level of psychological distance produced increases in EF performance relative to the control group across both ages; Immersed and Third Person manipulations did not affect EF scores. There was also a main effect of age, $F\ (1,88) = 126.29$, $p < .001$, $\eta_p^2 = 0.59$. As expected, 5-year-olds ($M = 5.46$, $SD = 1.03$) outperformed 3-year-olds ($M = 3.04$, $SD = 1.15$) on the EF scale across conditions. The interaction between age and condition was not significant, $p = .36$.

Despite the lack of a significant Age x Condition interaction in the omnibus ANOVA, additional analyses suggest that the noted effects of psychological distance were driven by condition differences in the older group of children. A one-way ANOVA revealed a significant effect of condition among 5-year-olds, F (3,44) = 5.03, $p < .01$, $\eta_p^2 = 0.26$ (see Figure 3). It should also be noted that, this effect held up over and above all measured covariates, suggesting that preexisting individual differences did not affect the efficacy of distancing manipulations in this study. There was a significant linear trend in the expected direction (*Spearman* $\rho = 0.49$, $p < .01$): $M_{\text{Immersed}} = 4.83$, $SD = 1.11$; $M_{\text{No Distance}} = 5.08$, $SD = 0.67$; $M_{\text{Third Person}} = 5.83$, $SD = 1.03$; and $M_{\text{Exemplar}} = 6.08$, $SD = 0.79$. EF increased as a function of psychological distance from the self. On average, children in the Exemplar condition performed at one full level above children in the No Distance condition on the EF Scale, $p = .01$. Children in the Third Person condition also outperformed those in the No Distance condition, $p = .05$, but there were no differences between the Immersed and No Distance conditions.

Psychological distancing manipulations did not significantly affect EF scale performance for 3-year-olds. A one-way ANOVA revealed no effect of condition for the younger children, $p = .79$. Condition means, however, did follow the expected pattern of results; EF scores increased slightly (although not significantly) above baseline as a function of higher levels of psychological distance: $M_{\text{Immersed}} = 2.92$, $SD =$

1.31; $M_{\text{No Distance}} = 2.92$, $SD = 1.24$; $M_{\text{Third Person}} = 3.00$, $SD = 1.13$; $M_{\text{Exemplar}} = 3.33$, $SD = 0.98$ (see Figure 3).

Chapter 4

Discussion

The current research aimed to assess the influence of graded levels of social psychological distance on cool, cognitive control over thought and action across the preschool period. Specifically, I investigated the impact of four manipulations of social psychological distance (from proximal to distal: Immersed, No Distance, Third Person, Exemplar) on 3- and 5-year-old children's performance on the EF Scale for Preschoolers, a comprehensive measure of cool cognitive control. As predicted, cool EF performance was facilitated by greater distance from the self when collapsing results across both age groups. These effects, however, were driven by the 5-year-olds who showed incremental improvements in EF as a function of psychological distance. Three-year-olds' performance on the EF scale remained unchanged by social distancing manipulations. Individual differences in children's cognitive abilities, trait-level self-control or engagement in symbolic activities did not affect the impact of social distancing strategies on EF.

This study adds to our growing body of knowledge on psychological distancing by demonstrating that, by the late preschool years, children can use multiple levels of distancing to support conscious control in more purely cognitive, cool situations as well as the hot, affectively-charged contexts addressed in previous research. Successful performance on the EF Scale required children to inhibit non-affective, but still salient environmental cues (i.e., conflicting dimensions on target cards), and respond flexibly and reflectively in light of higher-order goals. It was predicted that, to the extent that psychological distancing relies on general representational abilities that allow one to transcend the concrete details of the current situation and promote a broad, higher-order perspective, social distancing strategies should facilitate flexible and reflective cool cognitive control. As predicted, when greater psychological distance from the self was induced through socially-based manipulations, children were less prone to perseverative responses and more likely to exert conscious control over their behavior. Across the full sample, considering what another person would do (i.e., the Exemplar condition) significantly boosted performance above and beyond baseline performance as measured in a standard administration of the EF Scale (i.e., No Distance condition). For 5-year-olds alone, psychological distancing facilitated EF in both the most socially distanced Exemplar condition and the more subtle Third Person condition. Notably, stepping away from the here and now by taking the perspective of another person via the Exemplar manipulation allowed them to perform at one full EF Scale level beyond their peers in the No Distance condition. Taken together with studies showing that distancing allows children to exert control in the face of tempting stimuli (e.g., Carlson et al., 2005; Mischel & Baker, 1975; Prencipe & Zelazo, 2005), these results suggest that transcending one's current context has comparable, general effects across EF tasks and may operate via similar representational mechanisms.

Indeed, the current results build upon prior research showing that greater distancing can enhance flexible problem solving in a wide range of perceptual, cognitive, and emotional domains - from shape recognition (Förster, Friedman, & Liberman, 2004) to anger regulation (Kross, Ayduk, Duckworth, Tsukayama, & Mischel, 2011). In line with both developmental and construal level theories, the facilitative effects of social distancing on cool EF found in this study provide an additional piece of evidence in support of the hypothesis that a domain-general representational ability underlies the effects of psychological distancing.

Results of this study also underscore the importance of levels of abstraction in determining behavior by demonstrating incremental changes based on distance from the self. Both Sigel's (1970) psychological distancing theory and construal level theory (Liberman & Trope, 2008) propose that the quality of a behavioral response should be a function of psychological distance from the here and now because decisions are made in light of the representation of the situation rather than the real objects or events. In line with this prediction, 5-year-olds demonstrated a linear pattern of improvements in EF as distance from the self was increased (EF mean scores in Immersed < No Distance < Third Person < Exemplar). Carlson et al. (2005) also found that increasing the distance of symbolic transformations of stimuli aided EF. Notably, however, the social distancing strategies used in the current study differed from previous research in that they were much more subtle manipulations. Rather than physically substituting symbols for real treats, social distancing encouraged children to transcend their current situation by way of representational means more akin to perspective taking or a mindset. Stimuli remained unaltered. That EF performance can be systematically changed as a function of both symbolic transformation of the task stimuli and more contextual, social distancing speaks to the power of the underlying *distance* of representations from the here and now in determining behavior.

Although there was a significant positive linear trend from Immersed to Exemplar, the decreased mean EF performance seen in the Immersed condition was not significantly different from the No Distance condition. Recent experimental studies with adults have also failed to find behavioral differences between self-immersed and control groups (Mischkowski, Kross, & Bushman, 2012) suggesting that people may generally operate from a rather egocentric perspective. As such, inducing a perspective that is more proximal to the self than baseline may not be easily achieved. The lack of significant change in the immersed condition does provide evidence against an alternative account of the current results. One could argue that asking children where each test card *should* go prompts them to take a moment to reevaluate and reflect upon their response, in turn increasing performance as seen in the Third Person and Exemplar conditions for 5-year-olds. However, after being presented with the test card on each trial of the EF Scale, children in the Immersed condition were also asked, “Where do you think it should go?” If such questioning promoted more conscious control in and of itself, one would expect to see facilitation in the Immersed condition as well as the distanced conditions. This was not the case. Only those questions that promoted a distanced perspective from the self boosted EF.

Age was also a factor in the efficacy of psychological distancing strategies in this study. While 5-year-olds benefited from increased psychological distance, 3-year-olds did not. Although we cannot definitively conclude developmental change from the current cross-sectional data, one possibility for age effects could be that development over the preschool period provides children with the skills necessary to make use of social psychological distancing in the context of cool, cognitive control. Analyses of other measured cognitive constructs did not point to any specific factor(s) responsible for this disparity, however. In fact, 5-year-olds outperformed their younger counterparts on every lab-based measure of cognitive functioning, including representational measures. Specific measures of representational and metacognitive ability, rather than simply proclivity to engage in pretense (a representational activity) will be needed to directly assess the hypothesis that increases in representational ability account for differences in the efficacy of psychological distancing across the preschool period. Longitudinal research could also inform our understanding of developmental changes in the ability to use social psychological distancing strategies.

Age differences might also be a function of differential task demands at varied levels for 3-year-olds and 5-year-olds. The hierarchical nature of the EF Scale for Preschoolers dictates that the starting level for 5-year-olds is considerably more complex than the starting level for 3-year-olds (although, the relative levels of difficulty for each group should have been equal). In addition to shifting focus on a trial-by-trial basis, as opposed to every five trials for lower levels, 5-year-olds are also faced with higher working memory demands (e.g., remembering rules associated with the shape game or border cards) than 3-year-olds. Moreover, Level 3 EF Scale stimuli treat the dimensions of shape and color separately (e.g., a black flower on a pink card), whereas Level 5 cards integrate both dimensions (e.g., a blue boat on a white background), which may require higher levels of inhibitory control in switching between dimensions (Diamond, Carlson, & Beck, 2005). Given these increased task demands, we may simply have more opportunity to successfully intervene in the portion of the EF Scale administered to 5-year-olds.

Aside from the developmental differences found in this study, the lack of significant condition effects for 3-year-olds stands in contrast to previous research showing effects of psychological distancing via symbolic transformation (Apperly & Carrol, 2009; Carlson et al., 2005; Mischel & Baker, 1975), pretense (White & Carlson, 2011), labeling (Kirkham et al., 2003; Miller & Markovitch, 2012; cf. Müller et al., 2008) and even social distancing (Prencipe & Zelazo, 2005) in this age group. Taken together, these studies differed in at least two ways from the current study. First, many of them addressed hot EF. Transcending one's current context may differentially affect conscious control in hot and cool contexts as hot stimuli may more profoundly undermine control systems than would cool stimuli. Second, some of these studies directly targeted children's processing of task stimuli. For example, Carlson et al. (2005) substituted symbols for real treats and Kirkham et al. (2003) drew children's attention to alternate aspects of cool stimuli through verbal labeling. The manipulation in the current study attempted to elicit conscious control through more indirect means. Still, it is important to note that the condition means for 3-year-olds did show a trend in the direction predicted by psychological distancing theory; they performed best in the Exemplar condition. Therefore, while these differences did not reach statistical significance, performance in this study is not entirely inconsistent with previous findings. Given the current data, however, it is impossible to know for certain whether the attenuated effects of distancing strategies on cool EF for 3-year-olds were due to child factors, task factors, or simply a lack of statistical power.

Finally, I found no evidence that individual differences in verbal ability, memory, social understanding, EF, trait-level self-control, or proclivity for pretense influenced children's ability to employ the social distancing strategies used in this research. Thus social psychological distancing could be a useful technique to boost EF skills for children with a fairly wide range of baseline abilities.

Implications for EF

EF is robustly related to age and brain maturation over the early years of life (Carlson et al., in press). Yet, the psychological distancing manipulations used in the current study support the idea that EF skills are somewhat malleable. Many previous studies have also investigated the maturational and task factors that influence EF. Three leading theories of EF development based on such research with the DCCS (the cool EF task upon which the EF Scale for Preschoolers is based) and related tasks are the attentional inertia account (Kirkham et al., 2003), the active-latent account (Munakata, 1998), and the cognitive complexity and control - revised/levels of consciousness accounts (Zelazo, 2004; Zelazo et al., 2003; Zelazo & Frye, 1997). I will discuss the implications of the current results for each, in turn.

Kirkham et al. (2003) proposed that children (and adults) have difficulty refocusing or redirecting attention once it has been tuned to a particular dimension. In terms of the DCCS, they get stuck on the “blueness” (when initially sorting by shape) or the “truckness” (when initially sorting by color) of stimuli, and lack the requisite inhibitory control of attention to then break their focus on the original sorting dimension. As such, their attentional inertia results in perseverative (i.e., incorrect) responses after a rule switch. It is not immediately apparent how this description would account for the results of the current study. First, the psychological distancing manipulations did not serve to focus attention on any one aspect of a stimulus over another, as in previous labeling studies (e.g., Kirkham et al., 2003) or change stimuli in any way that would have reduced attentional inertia (e.g., Diamond et al., 2005; Rennie, Bull, Diamond, 2004). Second, 5-year-olds demonstrated an existing aptitude for switching flexibly between rules in the face of conflicting dimensions on an integrated card set, even in the No Distance control condition. Thus, it seems distancing manipulations would have little added value in producing behavioral change in the Third Person and Exemplar conditions if they simply diminished attentional inertia.

Munakata’s (1998) active-latent account posits that fundamental differences in the use of competing rule representations accounts for the difference between perseveration and successful switching between rules. Children who successfully switch between rules are said to rely on active representations that are more abstract and dependent upon sustained neuronal firing in later-developing prefrontal cortical areas of the brain. On the other hand, perseverators use latent representations that are more stimulus-specific and based in changes in neuronal connections in early-developing posterior coritical and subcortical areas. Active representations support flexible, rule-based behavior (Kharitonova, Chien, Colunga, & Munakata, 2009). In terms of the active-latent account, 5-year-olds' conscious control could have improved because distancing from the self directed attention to higher-level features of the task, such as the rules, and thus supported relatively strong active representations of these features in working memory.

The present findings are perhaps most clearly compatible with Zelazo's (2004) levels of consciousness (LOC) model, which posits that age-related increases in reflection underlie the development of EF. Higher levels of reflection allow children to flexibly and selectively attend to certain aspects of their environments and, with development, children come to successfully inhibit salient, misleading properties of a stimulus and focus on more abstract, flexible representations. When children consciously reflect upon multiple perspectives of the same situation, they can consider aspects of that situation, such as rules, in relation to one another and integrate them into a complex rule structure, as described by the cognitive complexity and control theory – revised (CCC-r; Zelazo et al., 2003; Zelazo & Frye, 1997). Indeed, it is not surprising that these theories seem most germane to the current research. LOC and CCC-r both note the importance of gaining distance from a particular stimulus or way of thinking about it in order to exert flexible, conscious control. Zelazo (2004) suggests that distance is achieved through reflective reprocessing of a lower-order rule interposed between a stimulus and a response. In this study, transcending one's current context through social distancing increased 5-year-olds' ability to integrate several hierarchically-designed rule sets as they ascended the levels of the EF task. LOC and CCC-r would predict this outcome, as stepping back from the current situation could allow children to put competing perspectives into a larger context and thus encourage reflection at higher levels of consciousness. If reflection between the stimulus and response is increased, behavior can be determined consciously and flexibly.

Limitations and Future Directions

The present study represents an important step in understanding children's use of psychological distancing strategies, and particularly their role in facilitating cognitive control. Several outstanding questions should be addressed in future research.

First, the EF Scale for Preschoolers tests each of the subcomponents of EF – inhibition, working memory, and set shifting – and they cannot be fully disentangled from one another in this context. Thus, it is unclear whether the robust effects of psychological distancing seen in this study impacted EF as a whole or whether there were differential effects on these various subcomponents. To the extent that it is possible to dissociate EF components in separate tasks, future studies should look into the impact of distancing on each. Such research could shed some light on the specific ways in which psychological distance facilitates cool cognitive control.

Second, social psychological distancing improved cool EF when implemented within the task, yet it remains to be seen whether these methods can trigger longer-term change in regulatory systems. Sigel (1993) hypothesized that changes in the representational system due to distancing not only provide immediate learning experiences for children, but also alter the way they will approach later activities. Previous studies have demonstrated transfer of the effects of psychological distance from a first symbolic version of a task to a later non-symbolic version of the same task (Apperly & Carroll, 2009; Beck & Carlson, 2007). Research with adults also shows that the effects of distancing remain after one week (Ayduk & Kross, 2008; Kross & Ayduk, 2008). Further research is needed to establish the sustainability of EF gains through various forms of psychological distancing, starting with short-term transfer in one testing session and extending to greater lengths of time through longitudinal methods. Results could inform interventions for children with low or delayed EF.

Third, future research should address the hypothesis that psychological distancing is a domain-general imaginative ability that should operate consistently across content domains. To date, research has shown distancing effects in the areas of syllogistic reasoning (Dias & Harris, 1990), emotion regulation (Ayduk & Kross, 2008; Kross & Ayduk, 2008; Kross, Ayduk, & Mischel, 2005), dual representation (DeLoache, 1993), creative problem solving (Forster et al., 2004; Jia, Hirt, & Karpen, 2009), and executive function (e.g., Carlson et al., 2005; Luria, 1961; Miller & Marcovitch, 2011; Mischel & Baker, 1975; Schmeichel et al., 2010) to name a few. These studies, and the current research, support the idea that distancing effects could be due to a core underlying ability for flexible representation, but further research is needed to determine the effects of psychological distancing in more diverse problem solving domains, especially in children. Moreover, if a common representational mechanism underlies distancing strategies, advanced problem solving should be facilitated by a range of distancing methods: temporal, social, hypothetical, spatial and symbolic. The ability to use various distancing strategies to step back from a problem and reevaluate it on an abstract level could greatly influence a wide range of skills in childhood including, for example, theory of mind and emotion regulation.

Fourth, many comparisons have been made here between hot and cool EF tasks in relation to psychological distancing. In conjunction with prior research, the current study suggests similar effects of distancing on these two top-down executive function processes, but future studies could directly assess commonalities and differences in each by applying the same distancing manipulation to parallel hot and cool tasks. Moreover, the use of neuroimaging could further inform our understanding of the mechanisms that underlie psychological distancing in different contexts. Some have suggested that psychological distancing from an appetitive stimulus serves to cool relatively hot executive function tasks (Giesbrecht et al., 2010; Metcalfe & Mischel, 1999). In essence, by directing attention away from emotionally motivating aspects of the situation, children are left with a relatively emotion-neutral cognitive control task. Given the relative localization of functions associated with hot versus cool tasks in the brain – orbitofrontal and other medial regions versus lateral prefrontal cortex, respectively (Happaney, Zelazo & Stuss, 2004; Zelazo & Müller, 2002) – this should be a testable hypothesis via neuroimaging techniques.

Finally, a limitation of the current study was created by the decision to provide children with condition reminders on each trial. Asking "Where should Batman put it?" for example, after presenting test cards may have been essential to scaffold children's use of distancing strategies because they did not have to remember the distancing strategy. However, this meant that it was impossible for experimenters to be blind to the condition of each child during task administration, a situation that has been problematic in some previous research (e.g., Smith & Whitney, 1987). In an attempt to address the potential for experimenter bias, researchers in the current study took especial care to follow predetermined scripts and protocols exactly for each child and the second experimenter was not informed of the study hypotheses prior to testing. Although mean EF Scale scores for the primary experimenter and the "blind" experimenter were similar, statistical significance testing of differences was not possible due the small number of children run by the second experimenter in some conditions. Therefore, the possibility of experimenter bias cannot be ruled out. If at all possible, future research should avoid distancing instructions and reminders that are known to the experimenter— perhaps via automated computer-based tasks or double-blind procedures.

Conclusion

The current study provides support for the idea that psychological distancing through representation and reflection could be fundamental to successful conscious control over thought and action. Stepping back from the here and now via distancing from the self allowed 5-year-old children to exert flexible and reflective conscious control over behavior in a previously unaddressed cool EF context. Importantly, this study was also the first demonstration of behavioral effects of psychological distancing over the full gamut of social distance, with incremental gains in EF seen across conditions as a function of levels of abstraction from the self. The fact that this contextual manipulation successfully influenced EF without changing task rules or altering stimuli underscores the power of transcending the exigencies of one's situation through purely representational means. The ability to distance oneself from immediate circumstances and consciously reflect on higher-order goals could have wide reaching effects for children in a range of self-control situations (and beyond). This research has implications for our understanding of the basic processes that make conscious cognitive control possible and could inform interventions for children with low or delayed self-control.

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Appendix A

Tables

Table 1

Descriptive Statistics for Covariates

Task	3-year-olds	5-year-olds	Total	Age Effects
PPVT	78.75 (15.86)	119.02 (17.59)	98.89 (26.12)	$F(1,94) = 138.85$**
Flanker	3.80 (1.53)	6.46 (1.30)	5.13 (1.94)	$F(1,94) = 169.07$**
Theory of Mind	2.67 (1.08)	4.06 (0.79)	3.36 (1.21)	$F(1,94) = 46.76$**
Forward Digit	3.71 (0.97)	4.6 (0.79)	4.16 (0.99)	$F(1,94) = 19.26$**
Backward Digit	1.17 (0.38)	2.83 (0.98)	2.00 (1.11)	$F(1,94) = 66.67$**
Grit	3.20 (0.50)	3.31 (0.58)	3.25 (0.54)	$F(1,93) = 0.99$
Effortful Control	5.09 (0.53)	5.11 (0.58)	5.10 (0.56)	$F(1,94) = 0.04$
Conscientiousness	4.59 (0.89)	4.90 (0.90)	4.74 (0.91)	$F(1,94) = 2.81$
Openness	5.36 (0.72)	5.48 (0.79)	5.42 (0.76)	$F(1,94) = 0.55$
Fantasy	0.17 (0.38)	0.16 (0.37)	0.16 (0.37)	$F(1,91) = 0.02$

Note. $N = 96$ for all measures except Grit (95) and Fantasy (93). Conscientiousness = Big 5 Conscientiousness Versus Lack of Direction subscale; Openness = Big 5 Openness to Experience subscale; Fantasy = High/Low Fantasy Categorization.

** $p < .01$.

Table 2

Bivariate (and Partial) Correlations for Full Sample (N=96)

	Gender	PPVT	Flanker	ToM	FDS	BDS	EF	Grit	EC	Consc.	Open.	Fantasy
Age	0.00	0.77**	0.69**	0.58**	0.46**	0.75**	0.75**	0.10	0.02	0.17†	0.08	-0.02
Gender		-0.06	0.02	0.10	0.07	0.00	0.05	-0.05	0.18†	-0.09	-0.06	0.14
		(-0.10)	(0.03)	(0.12)	(0.08)	(0.00)	(0.08)	(-0.05)	(0.18†)	(-0.09)	(-0.06)	(0.14)
PPVT			0.62**	0.53**	0.43**	0.66**	0.74**	0.11	0.02	0.14	0.19	0.03
			(0.19†)	(0.16)	(0.14)	(0.18†)	(0.38**)	(0.04)	(0.01)	(0.02)	(0.21*)	(0.07)
Flanker				0.33**	0.42**	0.59**	0.66**	0.11	0.01	0.10	0.03	-0.03
				(-0.12)	(0.17†)	(0.15)	(0.31**)	(0.06)	(-0.01)	(-0.02)	(-0.02)	(-0.03)
ToM					0.34**	0.51**	0.49**	-0.04	-0.02	-0.02	0.19†	0.11
					(0.10)	(0.13)	(0.11)	(-0.13)	(-0.04)	(-0.15)	(0.18†)	(0.15)
FDS						0.45**	0.56**	0.02	0.08	0.05	0.20†	0.08
						(0.18†)	(0.37**)	(-0.04)	(0.08)	(-0.03)	(0.18†)	(-0.09)
BDS							0.64**	0.12	-0.04	0.16	0.07	-0.12
							(0.19†)	(0.07)	(-0.08)	(0.05)	(0.02)	(-0.16)
EF Scale								0.09	0.13	0.09	0.09	0.09
								(0.02)	(0.17)	(-0.06)	(0.05)	(0.15)

	Gender	PPVT	Flanker	ToM	FDS	BDS	EF	Grit	EC	Consc.	Open.	Fantasy
Grit									0.28** (0.28**)	0.45** (0.44**)	0.21† (0.20†)	0.15 (0.15)
Eff. Control										0.31** (0.31**)	0.29** (0.29**)	0.08 (0.08)
Consc.											0.02 (0.01)	-0.13 (-0.13)
Openness												0.15 (0.15)

Note. *N* = 96. Partial correlations (in parentheses) controlled for age. ToM = Theory of Mind; FDS = Forward Digit Span; BDS = Backward Digit Span; EF = EF Scale for Preschoolers; Eff. Cont./EC = CBQ-VSF Effortful Control subscale; Consc. = Big 5 Conscientiousness Versus Lack of Direction subscale; Openness/Open. = Big 5 Openness to Experience Subscale.
** p < .01, * p<.05, † p < .10.

Table 3

EF Scale Means by Age and Condition for Each Experimenter

		3-year-olds		5-year-olds		All children	
Condition	Experimenter	*M (SD)*	*n*	*M (SD)*	*n*	*M (SD)*	*n*
Immersed	A	2.90 (1.37)	10	4.90 (1.20)	10	3.90 (1.62)	20
	B	1.41 (2.00)	2	4.50 (0.71)	2	3.75 (1.26)	4
	Total	2.92 (1.31)	12	4.83 (1.11)	12	3.88 (1.54)	24
No Distance	A	3.00 (1.26)	11	5.00 (0.67)	10	3.95 (1.43)	21
	B	2.00 (-----)	1	5.50 (0.71)	2	4.33 (2.08)	3
	Total	2.92 (1.24)	12	5.08 (0.67)	12	4.00 (1.47)	24
Third Person	A	2.91 (1.14)	11	6.29 (0.76)	7	4.22 (1.96)	18
	B	4.00 (-----)	1	5.20 (1.10)	5	5.00 (1.10)	6
	Total	3.00 (1.13)	12	5.83 (1.03)	12	4.42 (1.79)	24
Exemplar	A	3.40 (0.97)	10	6.00 (0.87)	9	4.63 (1.61)	19
	B	3.00 (1.41)	2	6.33 (0.58)	3	5.00 (2.00)	5
	Total	3.33 (0.98)	12	6.08 (0.79)	12	4.71 (1.65)	24
All Conditions	A	3.05 (1.17)	42	5.47 (1.06)	36	4.17 (1.65)	78
	B	3.00 (1.10)	6	5.42 (1.00)	12	4.61 (1.54)	18
	Total	3.04 (1.15)	48	5.46 (1.03)	48	4.25 (1.63)	96

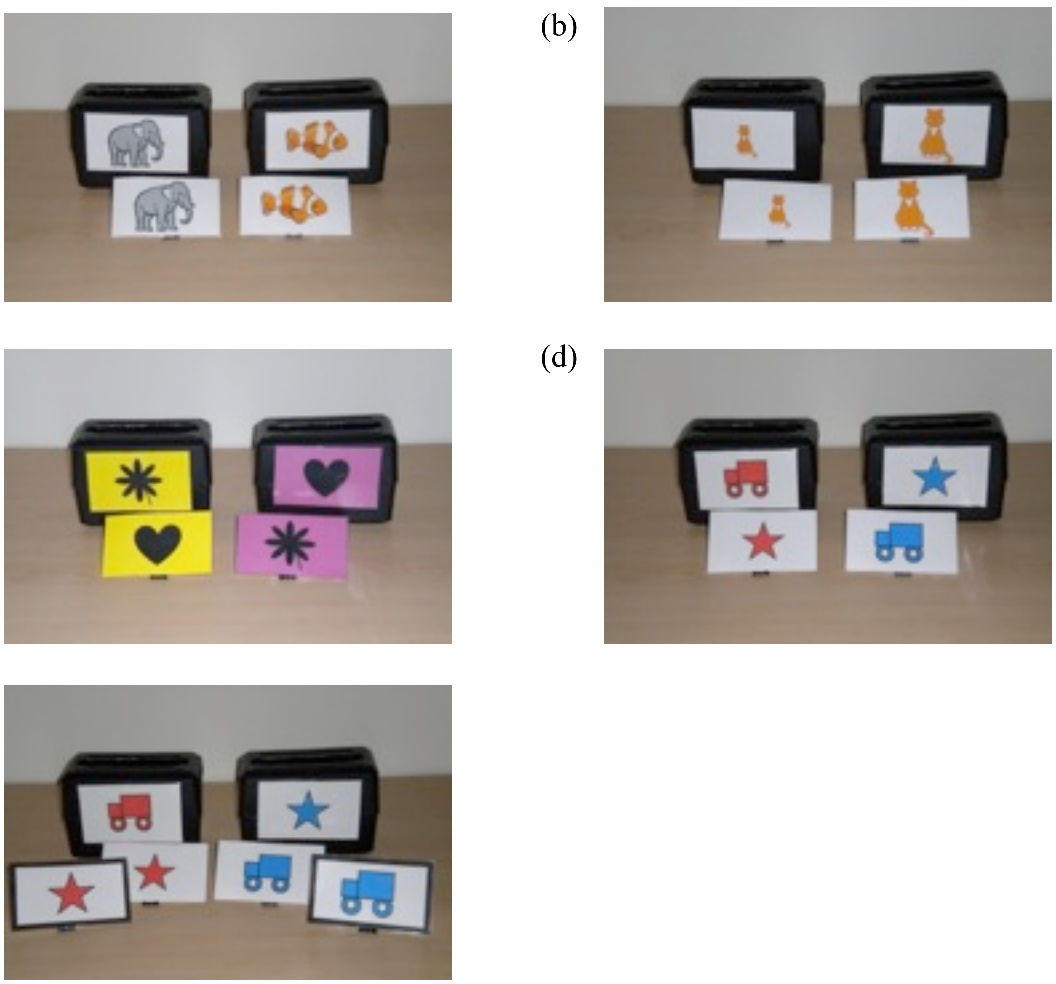
Note. Experimenter A is the author. Experimenter B was blind to the hypotheses of this study.

Appendix B

Figures

Figure 1

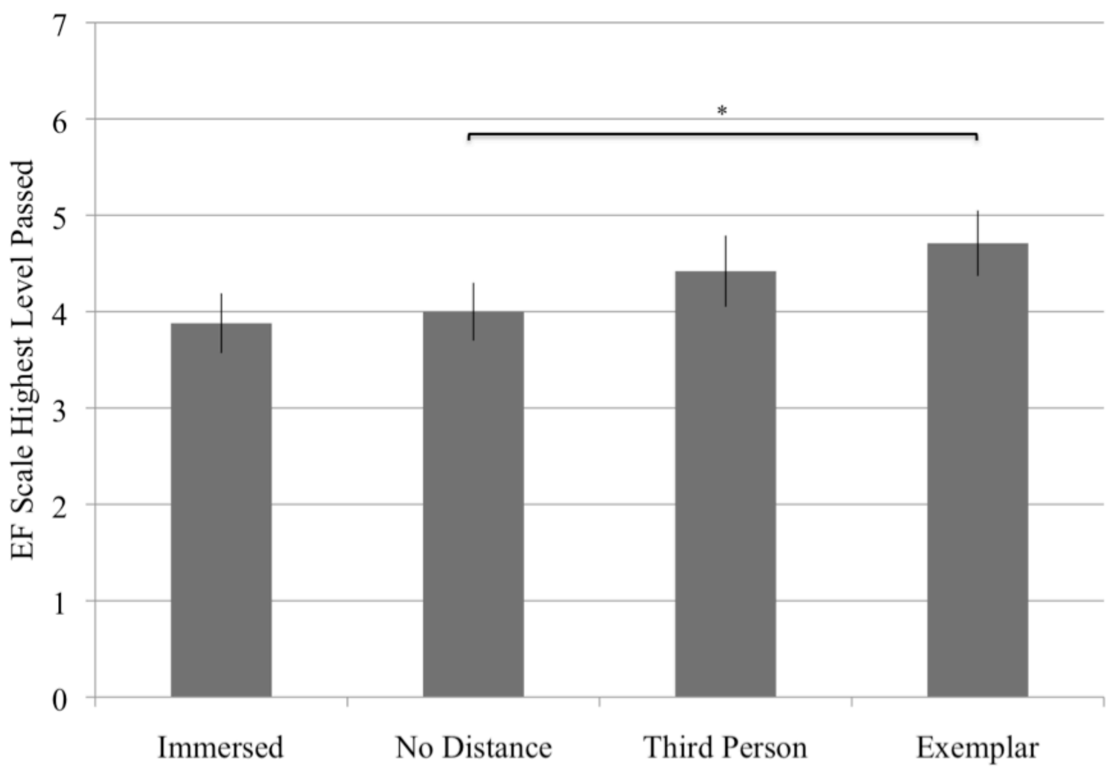
EF Scale for Preschoolers Stimuli



Note. Photographs of test cards (front) and target cards (affixed to black boxes) used in each of the seven levels of the EF Scale for Preschoolers. Panels depict stimuli for (a) Level 1: One Rule, (b) Level 2: Two Rule Categorization, (c) Level 3: Two Rules with Separated Stimuli, (d) Levels 4 and 5: Two Rules with Integrated Stimuli, and (e) Levels 6 and 7: Advanced Rule Use (Border and Reverse Border)

Figure 2

EF Scale Means by Condition for Full Sample ($N = 96$)

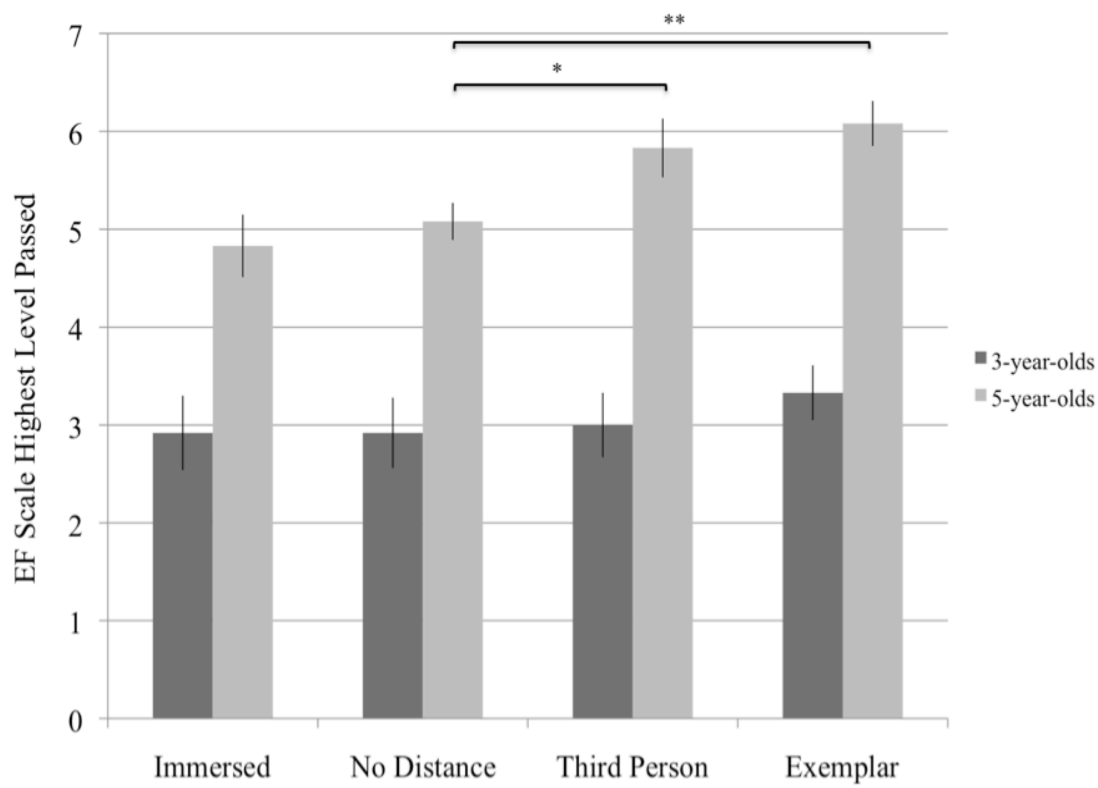


Note. Bars represent standard errors.

* $p < .05$.

Figure 3

EF Scale Means by Condition for Each Age Group ($N = 96$)



Note. Bars represent standard errors.

** $p < .01$, * $p < .05$.

Appendix C

Distancing Instructions by Condition

Immersed

Initial instructions: … That's how we play this game! But, you know what? Sometimes this game can be tricky! Some kids like to focus on what they are thinking and how they feel when it gets hard. That's what I'd like you to do today.

So, in this game I want you to ask yourself, "Where do ***I*** think the card should go?" *(E points to C)* I'm going to give you this sticker to help you remember. *(E places sticker on C's hand.)* See it says "I" *(E points to sticker)* to help you remember to ask yourself, "Where do ***I*** think this card should go?"

Reminder before each subsequent level: Remember, in this game I want you to ask yourself "Where do ***I*** think the card should go?"

Trial prompt: Where should ***you*** put it?

No Distance (Control)

Initial instructions: …That's how we play this game! But you know what? Sometimes this game can be tricky! But that's OK, because in this game you can take a guess and just keep going when it gets hard.

I have some stickers here. I'm going to give you this sticker to help you remember that if this game gets tricky you can just take a guess and keep going.

Reminder: Remember, if you don't know an answer, you can take a guess and keep going.

Trial prompt: *No prompts given.*

Third Person

Initial Instructions: … That's how we play this game! But, you know what? Sometimes this game can be tricky! Some kids like to talk to themselves using their own name, when it gets hard. That's what I'd like you to do today.

So in this game I want you to ask yourself, "Where does **[*child's name*]** think the card should go?" I'm going to give you this sticker to help you remember. *(E places sticker on C's hand.)* See it says "***[name]***" *(E points to sticker)* to help you remember to ask yourself, "Where does ***[name]*** think this card should go?"

Reminder: Remember, in this game I want you to ask, "Where does ***[name]*** think this card should go?"

Trial prompt: Where should ***[name]*** put it?

Exemplar

Initial instructions: … That's how we play this game! But, you know what? Sometimes this game can be tricky! Some kids like to pretend that they're somebody else who would be really good at this game when it gets hard. That's what I'd like you to do today.

Which one of these characters would you like to pretend to be for this activity? *(Shows page with Batman, Bob the Builder, Rapunzel and Dora the Explorer)* Okay! To help you pretend you get to wear this. *(E gives C character prop*)

So, in this game I want you to ask yourself, "Where does **[*character's name*]** think this card should go?" I'm going to give you this sticker to help you remember. *(Place sticker on C's hand)* See it's **[*character's name*]** *(points)* to help you remember to ask yourself, "Where does **[*character's name*]** think this the card should go?"

Reminder: Remember, in this game I want you ask, "Where does **[*character's name*]** think the card should go?"

Trial prompt: Where should ***[character's name]*** put it?