Training Prospective Abilities through Conversation about the Extended Self

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Abstract

Prospection is an important cognitive achievement, and is related to uniquely human abilities such as planning, delay of gratification, and goal attainment. While prospection develops rapidly during early childhood, little is known about the mechanisms that support its development. Here we explored whether encouraging children to talk about their extended selves (self outside the present context) boosts their prospective abilities. Preschoolers (N = 81) participated in a 5-minute interaction with an adult in which they were asked to talk about events in the near future, distant future, near past, or present. Compared with children discussing their present and distant future, children asked to discuss events in their near future or near past displayed better planning and prospective memory. Additionally, those two conditions were most effective in eliciting self-projection (use of personal pronouns). Results suggest that experience communicating about the close-in-time, extended self contributes to children's future-oriented thinking.

Keywords: prospection, future thinking, preschoolers, conversation, social context, extended self

Introduction

The ability to think about, plan for, and envision our future selves is an important cognitive achievement of early childhood. Prospection has been proposed to be a uniquely human ability and is critical for a variety of positive outcomes including goal-attainment and self-regulation (Atance & O'Neill 2001). Recent work on prospection has consistently found that prospective abilities develop rapidly during the preschool age (see Atance 2008) and continue developing through middle childhood (Lagattuta & Sayfan, 2011). While the structure and developmental timeline of young children's prospective abilities have received recent attention, relatively less is known about the mechanisms supporting their development. In our work, we explore the extent to which talking about one's extended-self improves children's prospective abilities.

Early precursors of prospection appear frequently in young children's verbal utterances and actions. Children begin to use future-oriented terms (e.g., "might", "may", "could") around the age of 2 (e.g., Bowerman, 1986; Atance & O'Neill, 2005) and are able to talk about the events of "tomorrow" by age 3 (Hayne, Gross, McNamee, Fitzgibbon, & Tammee, 2011). Yet it is not until later that children begin to act in service of their future selves: by the late preschool period, children show marked improvements in action-based measures of prospection such as delay of gratification (e.g., the ability to inhibit a desirable response in favor of a future reward; Mischel, Shoda, & Rodriguez, 1989), decreased temporal discounting (i.e., valuing future rewards over present rewards; Steinberg et al., 2009), planning (e.g., Atance & Meltzoff, 2005), and prospective memory (remembering to carry out intended plans at future time points; Gaujardo & Best, 2000). Recent work has investigated the extent to which such prospective abilities are associated (Atance & Jackson, 2009; Nigro, Brandimonte, Cicogna, & Cosenza, 2014; Neroni, Gamboz, & Brandimonte, 2014), underpinned by other cognitive competencies (e.g., language development, memory, or theory of mind; Hanson, Atance, & Paluck, 2014), or are linked to cognizing about the past (Coughlin, Lyons, & Ghetti, 2014; Cuevas, Rajan, Morasch, & Bell, 2015; Schacter, Addis, & Buckner, 2007).

One powerful predictor of children's social, cognitive, and linguistic abilities is their day-to-day social communicative context. For example, the quantity and quality of vocabulary input that parents provide to children predicts children's own vocabulary growth (see Hoff, 2006; Rowe, 2012); encouraging children and parents to talk about mental states predicts children's understanding of the mind (Lu, Su, & Wang, 2008; Reese, Sparks, & Leyva, 2010; Taumoepeau & Reese, 2013), and making even small changes in children's linguistic input has powerful effects on children's conceptual understanding (Rhodes, Leslie, & Tworek, 2012).

Such training studies are powerful in two respects: first, they are able to provide a basis for creating more formalized interventions targeting children's conceptual development. Second, they can help uncover the causal mechanisms underlying conceptual development. For example, in an important study, Rhodes and colleagues (2012) found that exposing children to generic talk in a short storybook task led to an increase in children's essentialist thinking, suggesting that generics and essentialism are causally related.

Inspired by the previous narrative work, we were interested in whether practice with projecting oneself into the future scaffolds children's prospective abilities. We designed a short training study in which we asked children to discuss and generate self-relevant future events. Prior theoretical work suggests that practice with simulating and anticipating future events helps motivate us to better prepare for those events (e.g., Taylor, Pham, Rivkin, & Armor, 1998). We reasoned that young children, who are still developing the ability to discuss their futures, and may therefore be unlikely to do so spontaneously, would be particularly likely to benefit from such intervention. On this account, simulating oneself in the future may help better

motivate young children to act in service of their future selves.

Our training study also allowed us to test several possibilities of how and why future-oriented talk might scaffold children's prospective abilities. One possibility is that simulating oneself in any context outside of the present helps children reason about themselves outside the here and now and make decisions on behalf of their extended selves (extended-self talk hypothesis). In support of this possibility, decontextualized talk (talk outside the here and now) in many forms (e.g., explanations, abstractions, future and past events) is shown to be a very powerful predictor of children's language and cognitive development (e.g., Rowe, 2012; Demir, Rowe, Heller, Levine & Goldin-Meadow, 2015). Yet another possibility, however, is that extended-self talk has to be restricted in content in order to scaffold prospective abilities (future-oriented talk hypothesis). Projecting oneself in the future specifically (rather than the past) might help anticipate future states, prepare for upcoming future events, or simply bring to mind one's future self. The concept of one's "future self" is taken out of an abstract, hypothetical state and brought to mind concretely through conversation and episodic mental simulation. Work with adults has shown that even brief reminders of one's future self specifically improves delay-of-gratification by helping adults feel closer to their future selves (see Hesrschfield, 2011). On this account, we would not expect any and all forms of extended-self talk to be similarly motivating, since talk about the past does not provide the benefit of anticipating upcoming future events. Finally, hybrid accounts are also possible: Because cognizing about the future and past are thought to rely on the same cognitive competencies (e.g., Schachter et al. 2007) discussing the extended self (in the future or past) might improve prospective abilities, but only in as much as the extended self is perceived as being relevant and concretely tied to one's present self (self-relevant extended-self talk hypothesis). In support of this possibility, Herschfield (2011) reports a link between adults' ability to delay gratification and how closely they believed future selves to be related to present selves. In the context of our work, this hypothesis predicts that discussing extended self events that are nearer in time to one's present self are more likely to feel self-relevant, would be particularly motivating for young children, and thus serve as salient reminders to act in service of one's future selves.

To distinguish among these different hypotheses, we designed a training study in which 3-5-year-old children were exposed to one of four different types of conversation about themselves. In one group (near future talk group), children were asked to generate events in their near future (within the next 24 hours) by being prompted to talk about "things that will happen later today." In a control group (present talk group), children were asked to talk about things in their present, contextualized context (e.g., "What do you see around you right now?"). In addition, we were interested in whether any future talk scaffolds children's abilities, or if future talk has to be temporally contiguous and closely related with children's present selves. We thus included a distant future talk group in which children were asked to discuss events that would occur after the next 24 hours (e.g., "things that will happen several weeks from now"). Finally, because cognizing about the future has been hypothesized to relate to the same cognitive processes as cognizing about the past we included a near past talk condition in which children generated events within the last 24 hours (e.g., "things that happened earlier today"). Immediately following training, children were tested on a broad range of prospective tasks.

Our primary question was whether the training groups would differ from one another on our prospective measures. In particular, we tested for three possible hypotheses using linear contrasts (weights explained below):

1. Extended-Self Hypothesis: Any conversations about the extended self, or self in the non-present (past, near future, or distant future), should boost prospective abilities. In this case, the near past, near future, and distant future conditions (weighted -1 each) should outperform children in the present condition (weighted +3) on prospective abilities.
2. Future-Oriented Hypothesis: Any conversation specifically about the future should boost prospective abilities. In this case, children in the near future and distant future conditions (weighted -1 each) should outperform children in the present or near past conditions (weighted +1 each).
3. Self-Relevant, Extended-Self Hypothesis: Conversation about the extended self that are close in time to the present self should boost prospective abilities. In this case, children in the near future and near past conditions (weighted -1 each) should outperform children in the present and distant future conditions (weighted +1 each).

Method

Participants

Participants were 81 three-to-five-year-olds (45 female; 36 male; Mean age = 4.40 years; Range = 3.0 – 5.71 years) recruited from six separate preschool centers. Demographics on individuals were not obtained, but two centers self-identified as serving low/lower-middle class communities, two served primarily upper-middle class communities, and two served mixed (both types of) communities.

Procedure

All children were tested in a separate room or quiet corner at their local preschool. One experimenter conducted the introduction and training phase, and a second experimenter, who remained blind to the training condition the children had just participated in, conducted the assessment phase. Sessions were videotaped for later coding and transcription. Sessions were coded by NC; a condition-blind research assistant then coded 25% of the data (reliability = 95%).

Timeline Introduction All children began by being introduced to the concept of linear time (e.g., Busby Grant & Suddendorf, 2009). Children were shown a rectangle divided into three colored squares signifying three distinct time periods ("before now", "now", and "after now"). The experimenter then placed the word "now" on the middle square and said, "this is everything that's happening right now" and then proceeded to list three examples of events in the present context (e.g., like us playing this game right here or your class playing outside or my friend (referring to the second experimenter) over there working"). Examples were modified slightly to fit the present context. The experimenter then asked the child to identify which square should signify "before now", and which square should signify "after now". Corrective feedback was provided until each child correctly identified "before now" and "after now", and the experimenter affixed the words "before" and "after" to their respective squares, such that the timeline showed "before now" "now" and "after now" in succession.

Training Period At this point, children were randomly assigned into one of four conditions (described below), in which they participated in a brief conversation with the experimenter about a specified time period.

1. Near Future Condition (n = 21): In the near future talk condition, children were told that they would be talking about events that are going to happen "after now". The experimenter then listed three examples of near future events (next 24 hours) in increasing temporal order: ("After now, are things like right after this game when you will go back to class, later today when you will go home from school, or even a really long time from now when will you go to bed tonight"). To encourage future self-projection, the experimenter then asked the child to draw a picture of him/herself in the last exampled future time period: "Can you draw a picture of yourself going to bed tonight?" After the child completed the drawing, she placed it on the square labeled "after now", and reaffirmed that it belongs on that square ("We're going to put this right here because this is going to happen after now!").

The child was then cued to generate events in his/her near future. The experimenter asked the child to list some events that would happen in three distinct time periods all taking place within the next 24 hours: (a) "right after" this game when the child goes back to his/her class (e.g., "What are some things you'll do right after this game, like when you go back to class?"), (b) "later today" when the child goes home from school, and (c) "a long time from now" when the child goes to bed tonight. The experimenter asked the question pertaining to each temporal cue and then encouraged the child to continually generate events (e.g., "and what are some other things you'll do later today?"). The experimenter proceeded to the next question/time period once the child had either: (i) repeatedly stated s/he could not generate further events; or (ii) generated five events.

2. Near Past Condition (n = 20): The near past talk condition proceeded exactly as the near future condition, except that the experimenter referred to events that happened in the preceding (rather than following) 24 hours. The experimenter pointed to the square labeled "before now" and stated she and the child would be discussing things that happened "before now". She then listed three examples of near past events (past 24 hours), which were matched to the near future events ("Before now, are things like right before this game when you were back in your class, earlier today when you first woke up, or even a really long time ago when you went to bed last night"). As in the near future condition, the experimenter then asked the child to draw a picture of him/herself going to bed last night and placed the drawing on the square titled "before now". The child was then asked to generate events during three time periods that took place within the past 24 hours: (a) "right before" this game when the child was in class, (b) "earlier today" when the child first woke up, and (c) "a long time ago" when the child went to bed last night.

3. Distant Future Condition (n = 20): The distant future talk condition proceeded in the same form as the near future talk condition, with the following modifications: First, the experimenter listed examples taking place after the proceeding 24 hours ("After now, are things like tomorrow when you will wake up in the morning, a few weeks from now when you will [celebrate Thanksgiving], or even a really long time from now when you are all grown up"). For the second example ("a few weeks from now"), we used a well-known upcoming holiday (e.g., Thanksgiving, Valentine's Day, Fourth of July), which varied depending on the day of the year that the child was tested. The experimenter then asked the child to draw a picture of him/herself when s/he is "all grown up" and placed the picture on the square labeled "after now". Finally, the experimenter asked the child to generate events in three distinct time periods: (a) "tomorrow" when the child first wakes up, (b) "a few weeks from now" when the child celebrates [an upcoming holiday], and (c) "a really long time from now" when the child is all grown up.

4. Present Condition (n = 20): The present condition was matched to the other three, except that children were told they would be talking about the square labeled "now". The experimenter then listed three examples of things in the child's present context, including something that the child could see around him/her ("things like what you see around you – like this game"), hear around him/her ("things like what you hear around you – like your class playing outside"), and feel around him/her ("things like what you feel around you – like this hard floor"). Examples were modified slightly to fit the context (e.g., the experimenter always used a prominent sound, such as children playing outside or teachers talking that could be easily heard by both herself and the child). The child was then asked to draw a picture of him/herself as s/he is "right now", and the picture was placed on the "now" square. The experimenter then asked the child to talk about the present context and

generate things that s/he (a) sees around him/her right now, (b) hears things around him/her, and (c) feels around him/her. As with the all other conditions, the experimenter gave the first prompt ("What are some things you see around you right now?"), and encouraged the child to generate examples. The experimenter proceeded to the next prompt once the child generated five examples or repeatedly stated s/he could not generate any further examples.

Assessment Following the training period, a new experimenter (blind to the child's training condition) assessed the child on a series of prospective tasks:

1. Prospective Memory Task: Following a procedure adapted from Guajardo and Best (2000), children were shown a wooden box and told there was a gift inside ("I have a gift for you in this box when we are all done with this game."). The experimenter then mentioned that the child had to remind her to open the box at the end of the game. To increase motivation, the experimenter then told the child that she often has trouble remembering things, and provided a cue that the child could use ("when I say 'we're all done', you have to remind me to open the box and give you your gift"). At the end of the game, the experimenter made sure to explicitly state the promised cue "We're all done!". If the child did not remind the experimenter within 10 seconds following the cue, she provided a second reminder "Did you have to remind me of anything?" and waited 10 more seconds. If the child still did not remember, she opened the box and retrieved the gift for the child.

Each child received a Prospective Memory Score between 0 and 2. Children were given a full score of 2 if they successfully remembered to tell the experimenter to open the box during the proper cue (after the experimenter said "we're all done!"), a score of 1 if they remembered after the second reminder ("Did you have to remind me of anything?"), and a score of 0 if they did not remember.

2. Mental Time Travel Task: We used two items adapted from Atance & Meltzoff's (2001) mental time travel task, in which children viewed a scene (e.g., a forest) and were told to imagine themselves planning to walk through it ("Let's pretend that you are going to walk across this road through the forest. Let's get ready to go!"). They were then shown three items – an item needed for a possible future state (e.g., water for drinking; correct response), an item that was semantically associated with the scene (e.g., a plant), and a distractor item (e.g., a present). The items were labeled and children were asked to provide an item selection ("Which of these things do you need to bring with you?") and a justification for their item selection ("And why do you need to bring the [chosen item]?").

Scoring. Children received a Mental Time Travel Correct Item Selected Score between 0-2 corresponding to the number of times children had selected the correct item across the two trials. In addition, children's explanations were coded according to whether they appropriately referred to a functional future use of that item (e.g., "I might get thirsty so I need to drink"; "the jacket because it's so cold outside"). Children received a Planning Explanation Score of 0-2.

3. Additional Tasks: We used three additional tasks testing temporal discounting and children's concept of linear time. These tasks did not show condition differences and are not discussed or further analyzed here.

Results

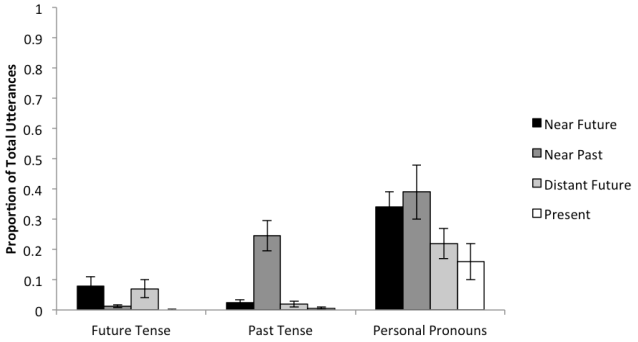
Talk Produced During Training

We looked at the types of events that children generated during the training session. Preliminary results revealed no effects of gender, age, or school center. We therefore collapsed across these variables in the following analyses.

The amount of utterances or the number of events that children generated did not vary across conditions (both p's $> .15$), confirming that all four of our training sessions were equated for the overall amount of talk children produced.

We then looked at the proportion of utterances employing the future and past tense (Figure 1). Note that for all events, children could use either the proper tense to which the time period referred (e.g., "I will sleep") or could answer without using the proper tense (e.g., "sleeping"). An ANOVA on the proportion of children's utterances containing the future tense revealed significant condition effects, $F(3,75) = 3.63$, $p = 0.02$, $\eta_{partial}^2 = 0.13$. In particular, children in the two future conditions (near future and distant future) produced a greater proportion of future-tense utterances than the near past and present: linear contrast $t(75) = 3.26$, $p = 0.002$. Similarly, an ANOVA on the proportion of past tense utterances revealed a significant effect of condition, $F(3,75) = 15.97$, $p < .0001$, $\eta_{partial}^2 = 0.39$. In particular, the near past condition differed significantly from the other three: linear contrast $t(75) = 6.90$, $p < .0001$. Therefore, while overall use of future tense was low (comprising less than 10% of the utterances children produced), our training successfully induced children to use it. Children produced future tense utterances in the two future conditions (near future, distant future), and past tense utterances in the one past condition (near past).

We also looked at the amount of self-projection involved when generating events. As a proxy for self-projection, we looked at children's use of personal pronouns (e.g., "I", "me") during the training session. Note that children could generate events either without the use of personal pronouns ("sleep") or with ("I'm gonna be sleeping"). In particular, we were interested in whether the two conditions in which children were asked to discuss their self-relevant (close-in-time) extended self might produce greater self-projection in comparison to their distally-temporal selves. An ANOVA on the proportion of utterances containing personal pronouns revealed significant differences across conditions, $F(3,75) = 2.79$, $p = 0.05$, $\eta_{partial}^2 = 0.10$. Planned linear contrasts showed that children in the near past and near future conditions used a greater proportion of personal pronouns in their utterances than those in the distant future or present condition, $t(75) = 2.75$, $p = 0.008$. Therefore,



talking about the close-in-time, extended self caused a greater amount of self-projection.

Figure 1: Proportion of (Bars Represent Standard Error) Future Tense, Past Tense, and Personal Pronouns Out of Total Utterances Across Conditions

Effects of Training

We then looked at the effect of our training on children's prospective abilities. Preliminary analyses revealed no effects of gender, so data was collapsed along this variable. We did, however, find, significant effects across ages and between preschool centers. We therefore control for age (as a covariate) and preschool center in all of our analyses. Figure 2 shows the analyses.

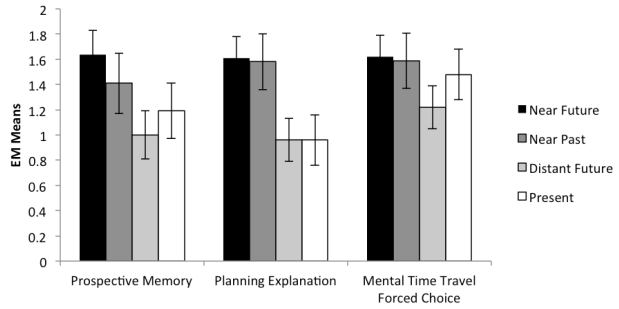


Figure 2: Estimated Marginal Means (Bars Represent Standard Errors) of Prospective Tasks Across Conditions

For Prospective Memory, there was a significant effect of Condition, $F(3,58) = 3.40$, $p = 0.02$, $\eta_{partial}^2 = 0.15$., School Center, $F(5,58) = 3.33$, $p = 0.01$, $\eta_{partial}^2 = 0.22$., and Age, $F(1, 58) = 4.01$, $p = 0.05$, $\eta_{partial}^2 = 0.07$. Planned linear contrasts supported the self-relevant extended-self hypothesis, $F(1,58) = 6.38$, $p = 0.01$.

Similarly, the Planning Explanation Score showed a significant effect of Condition, $F(3,59) = 2.91$, $p = 0.04$, $\eta_{partial}^2 = 0.13$, School Center, $F(5,59) = 3.99$, $p = 0.003$, $\eta_{partial}^2 = 0.25$, and Age, $F(1,59) = 4.61$, $p = 0.04$, $\eta_{partial}^2 = 0.07$. Planned linear contrasts once again supported the self-relevant, extended-self hypothesis, $F(1,59) = 16.62$, $p = 0.001$. There were no significant effects for the Mental Time Travel Forced Choice Scores (all p's > 0.05).

Discussion

Recent work in developmental psychology has taken an interest in the mechanisms that drive the development of young children's prospective abilities. Here we find that a short conversation about one's "extended-self" improved children's prospective memories and planning abilities. Our work suggests that experience communicating and thinking about children's extended selves may prime them to make decisions on behalf of their extended selves.

Across several measures, we also find support for our self-relevant, extended-self hypothesis: reminders of one's extended self are only useful when the extended self was temporally contiguous to the present self. Conversation about the temporally-contiguous extended self (near future and near past) improved planning abilities relative to conversation about the distally-related extended self (distant future). Moreover, children engaged in higher self-projection when discussing their close-in-time extended selves. Our results mimic prior work showing that adults' abilities to engage in saving for their future selves were predicted by how closely-related they believed their future selves were to their present selves (Herschfield, 2011). Moreover, brief visual reminders of one's extended self (i.e., age progressed portraits of one's future self) also helped improve saving behavior (Herschfield et al., 2011). Our work suggests that a similar mechanism may also account for children's prospective abilities – reminders of one's extended self may help activate concepts about the future self, or may make the extended-self appear closely-related to one's present self.

We note that our approach offers an important method for studying individual differences in how frequently children (and adults) conceive of their extended selves. We found that even a few directives from an adult could prime children to think about their future selves, but that the extent to which children engaged in true future-oriented thinking (i.e., used future tense) and engaged in self-projection varied across children and conditions. In particular, talking about close-in-time events caused greater use of personal pronouns. Such events may have been more readily recognizable to children as closely associated to their present selves, whereas temporally distant events (e.g., "adulthood") may have felt fundamentally distinct from and incompatible with children's present selves (Carey, 1985).

We provided several cues to help children understand, discuss, and visualize their extended selves: a linear time line, an adult's label of future time points (e.g., "later today"), the child's own self-generated discussion, and a pictoral label (that the child drew). The variety and number of these cues may have been particularly helpful in drawing children's attention to their future (or past) selves. Future work may also help to disambiguate the relative impact of each of these cues on children's prospective abilities.

Our work suggests that there is a strong role of social context in activating children's abilities to engage in future-oriented thinking and planning. Even brief conversations with adults help scaffold, shape, and active concepts about one's extended self. Training young children to to cognize, remember, and discuss their extended selves may ultimately

help them make future-oriented decisions that benefit those extended selves.

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