Ever Try Teaching a Dog To Read? Implicit Theories of Reading Ability

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ABSTRACT When explaining academic outcomes in specific content areas, people reveal their implicit theories of academic ability. Those who hold an entity theory generally attribute differences in achievement to stable, uncontrollable factors. In contrast, those who hold an incremental theory take into account controllable psychological or environmental variables. Implicit theories affect motivation and are expected to crystallize by about fourth grade. This research examined changes in southwest suburban third graders’ implicit theories of reading ability for self, others, and other species in a quasi-experimental, crossover design employing entity and incremental treatments. Seventy-one third-graders completed a 16-week reading program teaching a dog tasks that supported and challenged entity theories of what dogs can do. A therapy dog acted as our confederate because reading to dogs has been shown to improve children’s reading skills, but not necessarily change their beliefs about reading ability, because beliefs are resistant to change and require personal experiences that encourage revision. Repeated measures analysis of co-variance (ANCOVA) revealed a significant change in students’ theories of reading ability ($F_{(1, 59)} = 60.61, p < 0.001$). Students’ incremental scores increased following the entity condition ($F_{(1, 64)} = 1.165, p < 0.02$); their entity scores decreased following both conditions ($F_{(1, 59)} = 21.90, p < 0.001$). Students’ implicit theories of reading ability for self, other, and other species did not differ; a significant effect of belief in dogs’ reading ability ($F_{(1, 59)} = 29.04, p < 0.001$) was observed. Implications for increasing children’s reading motivation and achievement are discussed.

Keywords: ability, beliefs, children, dog, reading, teaching

People may describe differences in academic performance as fixed, that is, outcomes cannot be changed, or flexible, wherein improvement is expected. These descriptions reveal people’s lay
theories about academic performance. For example, one who holds an entity theory of intelligence generally attributes performance differences to stable, uncontrollable factors, and tends to believe that one can readily and reliably predict an individual’s intelligence using a single test score. In contrast, incremental views are less rigid and take into account controllable or changeable psychological or environmental variables. The difference is that an entity theorist assesses academic ability based on insufficient information or presumed innate facilities, whereas an incrementalist assesses effort or strategy use to explain an outcome (Dweck 2006). Holding fixed views of specific academic ability, such as reading, affects an entity theorist’s academic engagement because each related challenge presents a test of self-worth, a consequential opportunity to measure basic worthiness within a particular domain. In order to preserve this sense of self-worth, an entity theorist will display a performance orientation that, depending on self efficacy for the task, leads to the avoidance of challenge or to competition to indicate superiority. However, holding a more flexible view of academic ability, an incrementalist sees each related challenge as an opportunity to measure self-improvement, engendering a mastery orientation wherein task feedback does not address issues of self-worth (Dweck 1999).

The goal of our quasi-experimental crossover study was to shift third graders’ theories of reading ability toward the incremental view that is associated with a mastery orientation through their efforts to teach a dog to read. Certainly, some of the children may have held an incremental theory prior to our intervention, an issue we address in our research design. Our strategy of including a dog was based on two reasons. First, simply reading to a dog is associated with significant improvement in children’s reading achievement, as well as their reading persistence and motivation (Jalongo 2005). Further, Guthrie, Wigfield and Humenick (2006) demonstrated the effectiveness of what they term “situational interest” for increasing third graders’ intrinsic motivation to read and their reading comprehension. Guthrie, Wigfield and Humenick (2006) created situational interest for the children in their study by incorporating stimulating tasks, and Frieson (2009) posited that therapy dogs in the classroom can create situational interest in reading for elementary school children. Consequently, we reasoned that including a therapy dog in our design would create situational interest in our intervention as well. Second, we wanted to focus students’ attention on the dog’s reading ability rather than on their own reading levels.

In this study, third graders participated in a weekly reading program for 16 weeks working together to teach a dog tasks that challenged an entity perspective of what dogs can and cannot do, that is, to read a short list of vocabulary words. Focusing on incremental features of evaluation, including effort expenditure, persistence, specific types of praise and achievement goals, we hypothesized that students would embrace more flexible perspectives of human functioning, because, as Dweck (2006) reports from research with humans, people hold the same theories for others as they hold for themselves. We reasoned that this congruency principle would apply to our sample and thereby provide unique insight into the human–animal bond. Our research addressed two primary questions: (1) Can third graders’ implicit theories of reading be manipulated? and (2) Can teaching a dog to read encourage incremental implicit theories of reading ability? We operationally define dog reading as the dog’s ability to associate written words with objects arrayed before her and specific actions. This association is one component of the process of children learning to read.

**Implicit Theories**

Implicit theories are cognitive frameworks that help organize and filter meaning (Dweck and Leggett 1988; Plaks, Levy and Dweck 2009; Yang and Hong 2010). As such, they shape our
sense of the world. Implicit theories of academic ability vary in their effects on student motivation and achievement (Dweck, Chiu and Hong 1995; Dweck 2006; Mangels et al. 2006; Dweck and Master 2007; Yang and Hong 2010). Entity theories are built on the belief that one's innate capacities can be known with little evidence and cannot be changed (Bastian and Haslam 2006; Dweck 2006; Molden and Dweck 2006). In contrast, incremental theories are built on the belief that skills improve with practice. Entity theories of academic ability are strongly associated with performance goals vested in the sub-optimal outcomes of competition and self-handicapping strategies (Covington 1992; Molden, Plaks and Dweck 2006; Dweck and Grant 2008; Nussbaum and Dweck 2008; Olson and Dweck 2008), whereas incremental theories are strongly associated with mastery goals that lead to deeper understanding, meaningful subject matter engagement, persistence in the face of obstacles, and lifelong learning (Molden and Dweck 2006; Yang and Hong 2010).

Development of Implicit Theories
According to Dweck (2006), implicit theories initially form during early interactions with others. These early interactions shape worldviews based on whether caregivers are responsive, the environment is a safe place to explore, and self-worth is contingent or non-contingent. With this information, people learn whether to seek approval or challenge, and whether to interpret experiences as entity theorists or incrementalists. People can hold different theories across domains, yet it is the sort of praise that people receive that contributes to the formation of a specific theory within a domain (Molden and Dweck 2006). Particularly important in achievement contexts, praise that specifically addresses process or strategy contributes to the development of non-contingent feelings of self-worth, consistent with incremental theory, and encourages sustained effort and the development and selection of effective strategies (Dweck and Leggett 1988; Cimpian et al. 2007). However, person-centered praise encourages a concern for self-presentation due to contingent self-worth that is consistent with entity theories that discount the value of effort and strategy selection. Entity theorists exhibit a performance orientation and seek to prove their worthiness in achievement settings, whereas incremental theorists display a mastery orientation and seek to improve, rather than to prove, their skills and knowledge (Dweck and Leggett 1988; Dweck 2006; Dweck and Grant 2008).

Achievement Orientation: The Relation among Goals and Implicit Theories
Entity and incremental implicit theories foster different achievement goals, either besting others or besting one's self. According to goal orientation theory, people display either mastery or performance goals as they engage tasks (Pintrich and Schunk 2002). Mastery-oriented students are concerned with developing their understanding or skill, whereas performance-oriented students are concerned with documenting their abilities (Midgley, Kaplan and Middleton 2001; Dweck 2006).

Ascribing a fixed quality to intelligence leads one to believe and behave as though effort has little or no effect on achievement, creating an inverse relationship wherein high effort expenditure is perceived as an indicator of low intellectual ability (the harder one has to try, the less intelligent one is) (Dweck and Leggett 1988; Mangels et al. 2006). In contrast, according to Bandura and Dweck, viewing intelligence as growing incrementally allows for, and encourages, sustained effort (unpublished manuscript 1985). Equating effort positively with intelligence is associated with greater persistence and appropriate challenge seeking (Nicholls 1984; Dweck 2006; Mangels et al. 2006). Incremental students do not call their own abilities into question with such severe consequences as do entity theorists; instead, incremental theorists use information...
regarding success and failure merely as task feedback, adjusting their strategies or effort accordingly (Elliott and Dweck 1988; Dweck 2006).

Self-efficacy plays a significant role in goal choice, differentially influencing mastery and performance orientations. Consistent with a mastery orientation, incrementalists assess initial self-efficacy as a benchmark rather than as an endpoint. Consequently, these early assessments are less weighted. However, within the performance orientation, self-efficacy appraisals determine the approach or avoid behavior that establishes goal choice.

In an academic setting, entity theorists with a performance orientation constantly question their abilities, avoid challenges and seek to prove their self-worth based on social comparison of external symbols such as grades (Covington 1992; Mangels et al. 2006). When their self-efficacy is high, these students display a performance approach orientation and become particularly competitive for the scarce rewards in a classroom wherein social comparison issues are as salient as publicly posted grades (Dweck and Leggett 1988; Covington 1992; Mueller and Dweck 1998; Mangels et al. 2006). Yet, with low self-efficacy for a challenging task, these same students exhibit performance avoidance behaviors, become helpless, and withdraw effort in an attempt to protect the self-worth that they derive from those external sources (Covington 1992; Blackwell, Trzesniewski and Dweck 2007). Bandura and Dweck (unpublished manuscript 1985) also report that performance-oriented students consistently set lower goals in order to avoid committing errors. To an entity theorist, each task represents a test of self-worth. These students remain concerned with being judged and make global judgments (Dweck 2006) about their own abilities and the abilities of others based on superficial impressions or on insufficient criteria. One experience of poor performance indicates to an entity theorist that he or she is permanently doomed to perform poorly within that domain (Levy and Dweck 1999; Dweck 2006).

**Hypotheses**

Based on our review of the relevant literature and methodological considerations, our study tested three hypotheses:

$H_1$: The magnitude of third graders’ theory endorsement will be affected by the order of the presentation of condition, such that students will endorse the initial condition more strongly than the final condition, due to the novelty of having a dog in the classroom for the first time.

$H_2$: Third graders’ implicit theories of reading ability can be changed. Immersing students in the activities associated with each theory will cause students to endorse each condition.

$H_3$: Third graders’ incremental theories of reading ability can be increased following the experience of teaching a dog to read, as operationally defined for this research.

**Methods**

**Human Participants**

Eighty-four third graders enrolled in three classrooms at two demographically matched Title I public schools in a large district in the Southwestern United States participated in this research. Title 1 school are those that enroll 40% or more low-income students and thereby qualify for supplemental funding from the United States government to meet students’ educational goals. Title 1 designation of a school is determined by the percentage of students who are enrolled in the free or reduced cost lunch program at the school. Seventy-one students (85%) completed the study. Of these, (39 girls, 32 boys), 28 were in Classroom A (School 1), 19 in Classroom B, and 24 in Classroom C (School 2). Each school had a multicultural population
consisting of approximately 45.5% Hispanic, 43% Euro-American, 4.5% African American, 4% Native American or Alaskan Native, and 2.5% Asian or Pacific Islander children.

**Canine Participant**

Indy was a twelve-year-old black Labrador retriever holding dual certification as a service dog and as a therapy dog. She served as our confederate. Indy had worked with service learning students and students with special needs. She had worked with preschool, elementary school, and high school students for 10 years, but had not worked in the two elementary schools that hosted this research. One of the co-authors was Indy’s guardian and implemented the lesson plans with Indy and the third graders.

**Ethical Guidelines for Working Dogs**

Two independent veterinarians monitored Indy’s health throughout this research. Indy’s trainer provided the canine lesson plans and approved the children’s training activities as safe and effective for Indy. Together, Indy’s trainer and guardian outlined guidelines for these lessons. For example, Indy would always be treated with respect, would receive only positive reinforcements, and had the right to refuse these lessons at any time. No one was harmed in this research.

**Design**

This quasi-experimental crossover study involved carefully planned incremental and entity experiences for all participants. By the flip of a coin, School 1 was randomly selected to begin with the incremental condition. School 2 began with the entity condition. Outcome measures were implicit theories of reading ability, reading self-efficacy, and views of dogs.

**Instrumentation**

We created and administered five paper-and-pencil surveys to the third graders: Reading Skills; In the Next Grade; What I Think About Reading; Working Dog; and Dogs and Me. The Reading Skills survey was designed to measure third grade students’ reading self-efficacy. This measure includes two subscales that measure students’ assessments of their ability to perform specific reading tasks and reading skills. On the “reading tasks” subscale, students rate their ability to perform five tasks, including “read all the words on a page in one of your textbooks,” using a 5-point scale, ranging from 5 (I know I can) to 1 (I’m sure I can’t). On the “reading skills” subscale, students use the same 5-point scale to rate their ability to perform three skills such as “understand the main idea of a story.” The overall Cronbach’s alpha reliability estimates for the total scale ranged between 0.81 and 0.78. For the “reading tasks” subscale, it ranged between 0.81 and 0.78, and for the “reading skills” subscale it ranged between 0.59 and 0.55.

The In the Next Grade survey measures students’ expectation for reading improvement. Students were asked to imagine themselves reading in the next grade as they answered four forced-choice sentence completion questions such as, “When I am in the next grade I will read ….” These questions addressed student-anticipated general reading skill, speed, amount of reading, and size of reading vocabulary. The sentence completion options provided ranged from 3 (better/faster/more/bigger than now) to 1 (worse/slower/less/smaller than now). Cronbach’s alphas for this instrument ranged from 0.77 to 0.60.

The What I Think About Reading instrument was designed to measure students’ implicit theories of reading. We adapted items from Dweck’s instrument (1999, p. 178), designed to measure implicit theories of intelligence, by substituting “reading” for “intelligence.” These items address reading ability, speed, improvement limits, and possibility for change, including positive and negative statements to control for the social desirability associated with agreeing with...
positive incremental items. The 14-item scale is comprised of 7 entity and 7 incremental items that yield mean scores for entity and incremental responses, respectively. Students responded using a 4-point scale, with 4 indicating “strongly agree” and 1 indicating “strongly disagree.” An example of an entity item from this instrument is “If I am good at reading, then I’ll always be good at reading.” An example of an incremental item is “My reading ability can always change.” The overall reliability of this instrument, as measured by Cronbach’s alpha, ranged from 0.83 to 0.79. Cronbach’s alphas for the entity subscale ranged from 0.75 to 0.72. Cronbach’s alphas for the incremental subscale ranged from 0.88 to 0.80.

The Working Dogs instrument was designed to measure students’ implicit theories of a dog’s reading ability. We adapted items from our What I Think About Reading instrument to measure the students’ beliefs about a dog’s reading ability, limits of improvement, possibility for change, and reading speed. As with the What I Think About Reading instrument, this 7-item instrument includes an entity subscale and an incremental subscale. An example of an entity item from this instrument is “Dogs can’t change their reading ability.” An example of an incremental item from this instrument is “A dog’s reading ability can always change.” Students responded using a 4-point scale, with 4 meaning “strongly agree” and 1 meaning “strongly disagree.” The overall Cronbach’s alphas observed for this instrument ranged from 0.77 to 0.66. The Cronbach’s alphas for the entity subscale ranged from 0.59 to 0.51; for the incremental subscale, they ranged from 0.84 to 0.81.

We created the 8-item Dogs and Me instrument to measure students’ self-efficacy and comfort in working with a friendly dog in the classroom. Students responded using a 5-point scale, with 5 indicating “I’m sure I can” and 1 indicating “I’m sure I can’t.” A sample item from this instrument is, “If a friendly dog came to your classroom, could you pet a friendly dog?” Observed reliability was particularly strong for this instrument, with Cronbach’s alphas ranging from 0.93 to 0.90.

In addition to these instruments, we developed 8-week entity and 8-week incremental treatments, lesson plans designed to engage the students and guide their work with Indy. Both lesson plans met grade-specific state standards for third grade reading instruction.

Procedures

Indy was not present on survey administration days, but the rest of the research team was available to help students with individual questions. A team member read the instructions aloud in each class. After the first treatment, we re-administered the original surveys, then switched conditions so that each student experienced entity and incremental treatments. Students completed the first surveys as a pretest prior to meeting Indy (Time 1, two weeks into the fall semester). We re-administered these measures at the end of the first treatment (Time 2, eight weeks later), and again at the end of the second treatment (Time 3, at the end of the fall semester), to assess change scores.

In each condition, Indy’s guardian implemented the lesson plan 4 days a week, with groups of 4–6 children, 45 minutes each day, in the children’s classroom and in full view of their teachers. Teachers formed these groups, and groupings remained constant throughout the project. Table 1 provides example entity and incremental lesson plans.

Before meeting Indy, the students were asked to predict a dog’s reading ability. When Indy first arrived, she performed a few standard tricks such as “sit” “shake,” and “down” as part of the “get acquainted period,” and the researcher answered students’ questions such as, “Is Indy a boy or a girl? What’s her favorite color?” Following this period, the students challenged Indy
to a reading test to investigate their prediction, but first the students set forth a few guidelines for assessing Indy’s performance. Students named common classroom objects such as “eraser” and “pen” and named common tricks such as “sit,” “shake,” and “down.” These words were listed on the whiteboard as students laid the objects in a line on the floor near the board, and the researcher reviewed the student-approved rules for Indy’s reading test: 1) No hints, no helping. Indy is working independently, just as you take your tests independently, without any help, 2) If I point to the word and Indy gets the correct object or performs the correct task, then we know that she is reading. If she doesn’t, then we know that Indy is not reading, 3) No matter what happens, we will only clap at the end of the test, but we won’t make any other noise while Indy is taking the test. We want her to concentrate.

As part of the experimental design, Indy failed her reading test. After failing her test, Indy lay down and would not face the students. We had practiced this behavior to give the appearance that Indy was embarrassed and did not want to return to school because she could not read. Through guided discussion, students decided to write individual invitations to entice

Table 1. Example of the dog’s (Indy’s) lessons in incremental and in entity conditions.

<table>
<thead>
<tr>
<th>Incremental</th>
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<tbody>
<tr>
<td>Discuss learning to read as a process, plan lessons, model process-specific praise, and read aloud to Indy</td>
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<tr>
<td>Make flash cards, read them to Indy, and choose Indy’s first word</td>
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<tr>
<td>Practice spelling and praise Indy’s looking efforts, “Look, Indy! C-A-T spells cat. Good job looking at the card, Indy!”</td>
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<tr>
<td>Spell C-A-T as Indy looks at the flash card, then have Indy retrieve her nearby cat</td>
</tr>
<tr>
<td>Stop spelling aloud and have Indy retrieve her cat after looking at the flash card</td>
</tr>
<tr>
<td>Issue homework for Indy</td>
</tr>
<tr>
<td>Practice by having Indy retrieve her cat from various locations when she sees the flash card, and continue to praise her improvements</td>
</tr>
<tr>
<td>Vary practice by having Indy retrieve her cat from among other objects when she sees the flash card, and continue to praise her improvements</td>
</tr>
<tr>
<td>Conduct a practice test during which Indy sees the flash card in silence and retrieves her cat from among the original reading list items</td>
</tr>
<tr>
<td>Retest Indy’s reading before the entire class</td>
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<tr>
<td>Debrief</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Entity</th>
</tr>
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<tbody>
<tr>
<td>Discuss performing a new trick as a goal, choose roll over, plan lessons, model global praise, and read aloud to Indy</td>
</tr>
<tr>
<td>Split trick into roll lessons and over lessons because performing two tricks is better than performing just one</td>
</tr>
<tr>
<td>Provide direct rolling instruction, promise carrot reward for perfect roll, roll Indy</td>
</tr>
<tr>
<td>Plan and practice hand signals with verbal roll request</td>
</tr>
<tr>
<td>Implement hand signals with verbal roll request and provide cat food and global praise for perfect roll execution</td>
</tr>
<tr>
<td>Issue homework for Indy</td>
</tr>
<tr>
<td>Have Indy demonstrate a perfect roll with a silent hand signal, reward her with the carrot</td>
</tr>
<tr>
<td>Begin over lessons with more desirable reward of cheese instead of carrots</td>
</tr>
<tr>
<td>Use silent hand signals to have Indy demonstrate perfect roll and perfect over for cheese and global praise, “Indy, roll! Indy, over! Good dog, Indy!”</td>
</tr>
<tr>
<td>Retest Indy’s reading before the entire class</td>
</tr>
<tr>
<td>Debrief</td>
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</table>
Indy to return to their classroom with the promise of reading to her because she is such a good listener. The students constructed their own invitations to Indy; however, the researcher led a discussion with them about what they might emphasize in their invitations prior to the construction of the invitations.

Beyond the initial promise of reading to Indy, the specific content of the invitations varied by condition. In the entity condition, the invitations emphasized that reading ability is not important for a dog and encouraged Indy to return so that the students could teach her a new trick, because dogs are good at tricks, reinforcing the entity perspective of a dog’s permanently limited academic ability. The idea that Indy’s reading ability is limited is evidenced by her initial reading failure and her fixed membership in the species, *Canis*. In the incremental condition, the invitations emphasized that reading is a skill that is developed with practice and encouraged Indy to return so that the students could teach her how to read, reinforcing the incremental perspective of a dog’s malleable academic ability and discounting the possibility of learning limitations based on initial reading test results or species membership. It introduced the strategy of persistence and the expectation for improvement with effort. We taught the students both entity and incremental theories because appreciating both perspectives is critical to understanding how beliefs influence learning.

Because praise plays a crucial role in the development of implicit theories of academic ability, in the entity condition, students were coached to praise Indy herself, her very essence, with statements of “good dog!” consistent with the person-centered praise that encourages the entity perspective. In the incremental condition, students were coached to praise Indy’s efforts, not her essence, with statements of “good job!” consistent with process-centered praise that encourages the incremental perspective. Importantly, Indy was only praised and never rebuked.

**Treatment Switch Procedures**

During the incremental condition, Indy had learned to read her first word, so the challenge became convincing the students that Indy was not a very good reader because she had learned only one word. Because entity theorists do not believe in the capacity to change one’s innate abilities, we hypothesized that learning only one word should provide enough evidence to support the case that dogs may be able to improve their reading outcomes slightly, but not significantly. Indy again acted embarrassed by the results of her next reading test. She would not face the students and lay down facing the wall. Because the children agreed that the invitation strategy had worked following Indy’s first reading test, we suggested that the students create new invitations that embodied the entity perspective. In these invitations, we encouraged students to lessen Indy’s learning challenge and increase her likelihood of success. The researcher commented that although Indy did learn to read one word, it was hard for her, and because she knows so many tricks, learning tricks was much easier for her. In the new invitations, students offered to teach Indy a new trick because she was so good at doing tricks, and to read her another story because she was such a good listener. This time, students wrote that reading is not too important for a dog.

During the entity condition, Indy had learned to roll and to over. We told students that now Indy was ready to face a new learning challenge, but a second reading test revealed that listening to the stories had not improved Indy’s reading skill. She failed her reading test again, and, still acting as a confederate, Indy appeared embarrassed at her lack of improvement, lying down facing away from the students. The researcher commented that Indy wanted to learn something more challenging, because her tricks came so easily. Because the invitation strategy had proven successful after Indy’s earlier reading attempt, guided discussion led these
Debriefing
Debriefing consisted of conversations derived from the set of common experiences surrounding Indy’s learning, discussing the importance of not assuming that someone’s learning abilities are fixed. Students volunteered to summarize Indy’s learning experiences and to describe how they interacted with Indy throughout the process. We discussed the invitations that the students had created encouraging Indy’s return following her reading failures. We also discussed the specific types of praise that the students offered Indy, and her patterns of improvement with practice. Finally, we discussed what Indy would have learned, or not learned, if we had assumed that her initial test result provided a valid measure of her reading ability.

Results
Initial examination of the data showed that there were no effects of condition order; consequently, H1 was rejected. Given that school is confounded with order, the data are presented in terms of condition, rather than by school. Observed means and standard deviations for each measure, by time and treatment, are presented in Table 2.

To determine changes in students’ implicit theories, we looked for differences in scores across time within condition. To address H2—third graders’ entity and incremental implicit theories of reading ability can be changed—we analyzed incremental and entity scores pretest to posttest. A difference would indicate that there was a change in implicit theories. Analysis of covariance (ANCOVA) revealed a significant change in students’ implicit theories of human reading ability between pretest and posttest ($F_{1,59} = 60.61, p < 0.001$). Incremental responses increased and entity responses decreased. We took this same approach to examining students’ implicit theories of a dog’s reading ability. The main effect for time was not significant for Working Dogs.

In addressing H3—third graders’ incremental views of reading ability can be increased following the incremental experience of teaching a dog to read—we examined the data from

<table>
<thead>
<tr>
<th>Measure</th>
<th>Incremental Condition</th>
<th>Entity Condition</th>
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<tbody>
<tr>
<td></td>
<td>Pretest $M$</td>
<td>SD</td>
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<tr>
<td>Reading Efficacy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skills</td>
<td>4.08 0.88</td>
<td>4.02 0.89</td>
</tr>
<tr>
<td>Tasks</td>
<td>4.17 0.89</td>
<td>4.18 0.81</td>
</tr>
<tr>
<td>Next Grade</td>
<td>2.76 0.37</td>
<td>2.79 0.31</td>
</tr>
<tr>
<td>What I Think About Reading</td>
<td></td>
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<tr>
<td>Entity beliefs</td>
<td>2.82 0.68</td>
<td>2.69 0.63</td>
</tr>
<tr>
<td>Incremental beliefs</td>
<td>3.48 0.58</td>
<td>3.44 0.60</td>
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<tr>
<td>Working Dogs</td>
<td></td>
<td></td>
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<tr>
<td>Entity beliefs</td>
<td>2.91 0.58</td>
<td>2.90 0.53</td>
</tr>
<tr>
<td>Incremental beliefs</td>
<td>3.16 0.82</td>
<td>3.28 0.72</td>
</tr>
<tr>
<td>Dogs and Me</td>
<td>4.37 0.95</td>
<td>4.50 0.79</td>
</tr>
</tbody>
</table>
the What I Think About Reading measure. The differences between entity pretest and posttest scores, as well as the differences between incremental pretest and posttest scores were non-significant in a time by condition repeated measures ANOVA. Incremental scores increased by 0.09, and entity scores decreased by 0.15 over time, resulting in a significant time by belief interaction ($F_{(1, 59)} = 20.31, p < 0.001$). Students increased their incremental scores following the entity condition ($F_{(1, 64)} = 1.165, p < 0.02$), and decreased their entity scores following both conditions ($F_{(1, 59)} = 21.90, p < 0.001$). These data confirm $H_3$.

Next, we examined students’ implicit theories of dogs’ reading ability. A repeated measures 2x2 (time by condition by belief) ANOVA conducted on the Working Dogs data revealed a main effect of time by belief ($F_{(1, 59)} = 20.30, p < 0.001$). The effect of time was marginal ($F_{(1, 59)} = 2.92, p < 0.093$). There was a significant effect of belief ($F_{(1, 59)} = 29.04, p < 0.001$). Students in this study did not express different implicit theories of reading ability for self, others, or other species.

Results from the When I am in the Next Grade instrument revealed that the students’ expectations for reading skill improvement rose over time ($F_{(1, 59)} = 4.33, p < 0.05$). However, no other significant changes were observed for this measure.

Results from the Reading Skills survey indicated no change in the students’ reading self-efficacy. No significant differences in the self-efficacy scale scores or total score were observed over time.

In addition to the other potential benefits of participation to the students, our study provides evidence that participation in the project contributed to an increase in students’ level of comfort with dogs, as measured by the Dogs and Me instrument. As shown in Table 2, students’ comfort level increased in both conditions. This increase was significant ($F_{(1, 59)} = 3.89, p = 0.05$).

**Discussion and Conclusions**

This study combined curricular standards for third grade reading and writing with a therapy dog intervention designed to increase incremental implicit theories of academic ability. The effectiveness of the letter writing and reading method has been documented in research with college students (Aronson, Fried and Good 2002). Consistent with the idea that children’s implicit theories have not yet crystallized by third grade, this intervention sought to incorporate both entity and incremental experiences. We had predicted that, given this presumed flexibility, the treatments would cause children to endorse each theory according to its respective condition, and that order might present a modest novelty effect so that the first treatment would be endorsed slightly more strongly than the second treatment.

Our hypothesis regarding the potential to change third grade students’ implicit theories of reading ability was confirmed. Scores on entity belief items decreased while scores on incremental belief items increased. However, the way it happened seems counterintuitive in the entity condition. Participating in the entity condition actually increased incremental scores more than did participating in the incremental condition.

There are several possible explanations for these unexpected results. First, it may be that when students were participating in the entity condition, they were confronted more directly with the social and cognitive tasks of reconciling or rejecting the possibility of a dog’s learning limitations. As Indy’s performance improved, perhaps students overlooked the domain specificity and instead focused exclusively on her improvement, deeming that Indy’s rolling and overing provided valid and sufficient evidence of learning. The third graders may have detected
an incremental process in an entity domain. As students taught Indy to roll and to over, they may have developed working models of learning such that Indy can learn dog lessons, and people can learn people lessons.

Perhaps acknowledging through the lesson plan that Indy had to learn dog tricks in order to be able to perform them heightened students’ insight that Indy would be learning, and learning is an incremental process, regardless of the domain. Consequently, students could have interpreted the entity condition as an incremental condition because Indy had learned something new.

A second possibility is that the entity condition was somehow more convincing because the entity tasks of teaching Indy to roll and to over may have aligned with students’ expectations for species-specific learning limits. Aligning experiences with expectations could have caused students to more strongly endorse the species-specific aspect of this perspective. Therefore, teaching Indy a dog trick could have increased students’ incremental responses.

A third possibility is that the students did not perceive the content of the entity letters as entity statements. Without a separate check of their beliefs, it could be that writing a letter that we thought would make students more entity-oriented actually made them more incrementally-oriented. Student comments speak to the plausibility of this explanation. For instance, there is a statement on the Working Dogs measure, “Dogs can only get so good at reading,” intended to signify an entity perspective regarding the improvement limits of a dog’s reading ability. We scored agreement with the item as an indication of entity endorsement. However, some students commented that, “Yeah, dogs can only get so good at reading. They probably have to practice a lot, but they can get so good if we teach them.” Perhaps this thinking transferred to the letter writing task as well, and students took an incremental perspective when engaged in the entity condition. For third graders, maybe teaching is teaching and learning is learning, and teaching Indy anything means that she is learning something. Therefore, learning might be seen as incremental, no matter what the lesson content.

**Future Directions**

An improved design might include pre-post reading scores on standardized tests for groups of demographically matched students who taught Indy how to read, how to roll and over, and students who never met Indy. Future research should investigate potential gender differences that might yield new information about the specific implicit theories of girls and boys, as opposed to the broader measure of third grade children. It might be the case that boys and girls have different implicit theories about different academic domains, and learning more about such differences would allow for the development of more targeted interventions. Another interesting direction for future research would be to explore possible age-related differences in students’ implicit theories of academic ability. Such understanding would allow curricular adjustments to address issues of learning and motivation that enable students to take appropriate academic risks and reach higher levels of achievement. Clearly, it would be helpful to know more about this possible window of opportunity to help students decrease entity perspectives of learning abilities. Future research could investigate the existence of such a window and ways to open it as often and widely as possible.

In addition to including such quantitative approaches, qualitative measures could deepen our understanding of how therapy dogs in elementary school classrooms facilitate literacy development. For example, as students read aloud to Indy, there were many moments of tenderness that were not captured in our data.
Future research could also focus on teacher impressions of therapy dogs in the classrooms. Although we did not measure these data, teachers consistently mentioned that students were more willing to put forth effort on behalf of Indy and cited instances wherein they had used “dog time” as a motivator. Additionally, teachers mentioned Indy as a learning model and invoked her progress, her persistence, and achievements, when preparing their students for taking tests. One teacher told the research team, “Just before our class took their test, I reminded them to picture Indy, to think about how she kept working and learned how to read, and how she took her reading tests very seriously and always did her very best. I told my students to do their very best, just like Indy.” Teachers also remarked that students enjoyed reading and writing with and for Indy much more than they usually enjoyed these activities.

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References


