

Changing Language Learning Mindsets:
The Role of Implicit Theories of L2 Intelligence for Goal Orientations and Responses to Failure

by
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Abstract

Most people likely hold mindsets, or beliefs, about language learning. Some people ascribe successful second language (L2) learning to a natural talent or an innate ability that cannot be further developed (i.e., an entity mindset), while other people believe that L2 learning is a flexible ability that can be improved (i.e., an incremental mindset). The mindsets that we hold orient our approach to the learning task at hand. This research applied Dweck's (1999) implicit theories framework to the L2 context to understand the causal relation among students' mindsets, goal orientations (i.e., learning goal, performance-approach goal, and performance-avoidance goal) and responses to failure situations (i.e., mastery response, helpless response, anxiety, and fear of failure). University students ($N = 150$) who registered a L2 class were randomly assigned to two experimental conditions in which different mindsets were primed, and then they complete a questionnaire about their L2 goals and responses in failure situations. The results showed that priming for an incremental mindsets, regardless of their perceived L2 ability, participants set higher learning goals and in turn expressed more mastery-orientated responses in failure situations. L2 learners who were primed for an entity theory, if they perceived themselves to have strong L2 skills, set higher performance-approach goals and in turn were more fearful of failure. The implications of these findings for L2 education are discussed in terms of changing L2 learners mindsets.

Keywords: Implicit theories, goal orientations, second language learning, L2 competence

Words Count: 227

Preface

This thesis is an original work by Mantou Lou. The research project, of which this thesis is a part, received research ethics approval from the University of Alberta Research Ethics Board, Project Name “lay beliefs of language learning”, No. Pro00040752 , 4th October, 2013 to 3rd October, 2013.

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Introduction

“I feel humiliated and dumb, to be honest. I mean, I know I'm fairly good at Latin, it's just there's too much things to remember in so little time. Honestly, I just avoid going to classes nowadays.” – A Latin student primed with an entity theory reporting how she felt in a failure situation.

“I don't worry about people judging me so I don't actually get bothered by this situation much, I have continued to volunteer to read out loud in class regardless of this issue. I have made a friend who is francophone so talking to her and knowing she thinks I speak French well helps me to be less nervous regardless of what the other students may think.” – A French student primed with an incremental theory reporting how she felt in a failure situation.

Failures¹ are often a part of the process of learning a new skill. A critical characteristic of successful learners is how they approach these challenges and overcome setbacks. Successful learners focus on the learning experience and learn from the obstacles they face. They can adjust themselves and even redouble their efforts after experiencing failure. In contrast, unsuccessful learners are often fearful of failing. They respond to failure with helplessness and easily give up when learning challenging new tasks (Bandura, 1993; Gottfried, 1985; Stradling, Saunders, & Weston, 1991). Several studies in general academic contexts demonstrated that these

¹For the purposes of this paper, we use “failed” and “failure” in a broad sense, such that these terms refer to an action that resulted in a less than satisfactory effect. In a L2 context, this definition could apply to “failures” according to objective standards (e.g., failing a test) or according to more ambiguous subjective standards (e.g., an awkward social interaction).

maladaptive responses result in decreased performance and achievement (Cury, Da Fonseca, Zahn, & Elliot, 2008; Diener & Dweck, 1978, 1980). In the second-language learning (L2) context, a common characteristic of an unsuccessful L2 learner is that they are more likely to avoid difficulty and give up, and feel stronger negative emotion than those who are more successful (Gan, Humphreys, & Hamp-Lyons, 2004). As part of a cyclical dynamic, these negative responses (e.g., helplessness and anxiety) may interfere with L2 learners' language competence and confidence (Horwitz, 2001; MacIntyre, 1995; Phillips, 1992).

Research on mindsets (also termed “implicit theories” or “lay theories”) has sought to answer the question of why people react so differently in failure situations (Dweck, 1999, 2006; for a recent reviews, see Burnette, O’Boyle, VanEpps, Pollack, & Finkel, 2013). Implicit theories suggest that people have their own, unique lay theories through which they perceive and explain the world and human characteristics in the perspective of entity (theory that regards personal qualities, such as personality and intelligence, as fixed and stable) and incremental (theory that regards personal qualities as malleable and changing; Dweck, 1999). These lay beliefs lead people to think, feel, and act differently across similar situations (Dweck, 1999, 2006). When facing challenges, entity theorists tend to attribute failures to a lack of stable intelligence and thus feel more helpless, whereas incremental theorists attribute competence to their own (controllable) effort and work harder (Hong, Chiu, Dweck, Lin, & Wan, 1999). In failure situation, people can realize the gap between their current performance and their desired level of performance (Burnette, 2010). Entity theorists who focus on proving their ability are more likely to doubt their ability because they believe the gap is unlikely to be reduced. Thus they feel more helpless and anxious. In order to protect their self-esteem from these threat situations, they tend to avoid those challenging situations that might confirm their lack of ability (Robins & Pals,

2002). In contrast, incremental theorists who view challenges as an experience for learning are more likely to work harder because they believe that the gap can be reduced by their efforts.

Thus they remain more optimistic and persevere longer (Dweck, Chiu, & Hong, 1995).

Broadly, these mindsets differ across people and across different domains (Dweck, Chiu, Hong, 1995). The present study focus specifically on people's beliefs about second language learning. In a correlational study, Lou and Noels (2014) found that learners who held an entity (vs. incremental) belief about language learning responded more negatively to challenging communication situations. Building on Lou and Noels (2014)'s study, the present research further examine the implicit theory framework to a L2 learning context by using manipulation method to alter people's language learning mindsets. The priming of different mindsets was expected to guide L2 learners to pursue different achievement goals in language learning, which in turn will direct them to respond differently in challenging situations.

Review of the Literature

Language learning mindsets

The framework of implicit theories is important for understanding learners' motivation, coping to challenges, and achievement in different domains (Molden & Dweck, 2006). Many studies in school settings have demonstrated that incremental theorists, who believe hard work is a means to achieving greater mastery, are more likely to set learning goals, have stronger intrinsic motivation, and get significantly higher grades, than entity theorists, who believe effort is virtually useless because skills cannot be substantially changed (Blackwell, Trzesniewski, & Dweck, 2007; Dweck & Sorich, 1999; see also Burnette et al., 2013). However, little research has focused on implicit theories about language ability in a L2 learning context (see Lou & Noels, 2014; McIntosh, 2000; Mercer & Ryan, 2009).

Research demonstrates that implicit theories are domain-specific (Dweck, Chiu, & Hong, 1995). People can hold different mindsets for different domains; for example, a student could believe that his language ability can be developed, but not his math and science ability. A person's responses to a specific domain can only be explained by the related mindsets (Dweck & Master, 2008). L2 learning is a distinct domain, in that it involves learning linguistic and communication structures and processes, such as grammar, vocabulary, and pragmatics as well as sociocultural aspects, such as knowledge about other culture and often the target group's relation to one's own ethnolinguistic group (Bachman, 1990; Gardner, Lalonde, Moorcroft, & Evers, 1987). As L2 pedagogy has adopted more communicative approaches over the past couple of decades, it also required more social communication and interaction within the classroom (Gardner, 1988). Moreover, not only can students fail in a language task in the exams and tests, but also outside that classroom when using the L2 to interact with native speakers of the language. Thus, it is necessary to differentiate an implicit theory of language learning from other academic and social domains.

Building on the results of Ryan and Mercer's studies (2009, 2012), Lou and Noels (2014) developed an instrument to assess mindsets particularly in a language learning context. Their factor analytic results suggested three categories of language intelligence relevant for L2 learning. The first one, general language intelligence beliefs (GLB), is a mindset about whether language intelligence is fixed or malleable. The second factor focuses particularly on whether second/foreign language ability is a fixed ability or something that can be improved through effort (L2B). The third is beliefs related to age sensitivity and language learning (ASB). Some people may have a strong belief that an adult cannot learn a L2 as well as a child (Ryan & Mercer, 2012), thus L2 ability may be considered to be malleable up to a particular age, and

fixed thereafter. Others may not ascribe to such a clear division between child and adult learners and maintain that one can successfully learn a new language regardless of their age. Based on these three aspects and two components of beliefs (incremental and entity), Lou and Noels (2014) developed and tested the six-factor Mindset of Language Learning Scale (MLLS). The MMLS showed sound psychometric properties on internal reliability, test-retest reliability, construct validity, discriminant validity, and criterion validity.

“Mindsets-goals-responses” model

When learning a L2, students may find themselves in situations that challenge their capacities and result in awkward or even unsuccessful communicative interactions. Two responses to these kinds of failure situations have been identified in previous research: helplessness-oriented and mastery-oriented responses (Diener & Dweck, 1978, 1980). Helplessness-oriented responses are characterized by an avoidance of the challenge because people consider the setbacks to be beyond their ability to control (Diener & Dweck, 1978, 1980). This type of response leads to more negative emotions, a higher dropout rate (Dweck, 1999) and a deterioration of performance. In contrast, mastery-oriented responses refer to responses that are focused on achieving mastery in spite of the difficulties, seeking out challenging tasks, and maintaining striving even in the face of potential failure (Dweck & Leggett, 1988). Mastery-oriented students regard difficulties as learning opportunities, and tend to maintain a more positive mood, and eventually perform better in class (Dweck, 1999).

To explain the mechanism by which individual differences in reactions to failures arise, Dweck and Elliott used a social-cognitive approach and proposed a mediation model, such that implicit theories lead to students' achievement goals, and these goals in turn predict different patterns of helplessness and mastery-oriented responses (Elliott & Dweck, 1988; Hong et al.,

1999). Two important goals that learners hold are learning goals, where the focus is to acquire knowledge and improve ability, and performance goals, where the aim is to demonstrate and prove knowledge and ability. Implicit theory is an important antecedent to goal pursuits, which is a critical predictor to explain learners' behaviors in the face of failures and challenges (Dweck, 1999). It is important to note that the relation between implicit theories and goal settings was inconsistent across different studies. Although many studies showed that entity theory (vs. incremental theory) predict stronger performance goal and weaker learning goal (e.g., Chen & Pajares, 2010; Cury, Da Fonseca, Rufo, & Sarrazin, 2002), some studies didn't found an effect (e.g., Maurer, Mitchell, & Barbeite, 2002; Ziegler & Stoeger, 2010), and some even found the opposite effect (e.g., Biddle, Wang, Chatzisarantis, & Spraya, 2003). This suggests that there must be variables moderating the effects of implicit theories on goal orientations and one important factor is participants' competence levels.

Dweck and Leggett (1988) proposed in their social-cognitive model that perceived competence moderates the influence of implicit theories on behavior pattern, suggesting entity theorists who perceive different ability levels might show different responses when they meet failure. However, this proposed model has been the subject of some debates. Some research found that perceived competence moderate the relation between implicit theories and performance goals (e.g., Robins & Pals, 2002; Lou & Noels, 2014), while some research found that perceived competence doesn't moderate implicit theories on any goal setting (e.g., Cury, Elliot, Da Fonseca, & Moller, 2006; Elliot & Church, 1997). Moreover, most research didn't consider competence as a moderator or only consider it as another direct predictor (e.g., Chen Pajares, 2010; Dinger, Dickhäuser, Spinath, & Steinmayr, 2013). The interaction of implicit theory and competence needs to be paid more research attention.

In the L2 context, Mercer and Ryan (2009) suggested that the research on implicit theories in language learning context should consider learners' language level because language mindsets vary depending on learners' stage of learning (Horwitz, 1999). To further examine the moderating role of perceived competence, Lou and Noels (2014) developed a "mindsets-goals-responses" model that suggests that the interactive relationship between language learning mindsets and the level of L2 competence predicts L2 learners' goal orientations and responses to failure (Figure 1).

Specifically, the model hypothesized that learners who believe that language is a skill that can be developed (i.e. incremental theorists), regardless of their language competence, are more likely to set a learning goal. They are motivated by opportunities to learn and achievement for its own sake, and they focus on the development and learning of new skills. L2 learners holding incremental theory and learning goals focus on improving and learning in the failure situations. The goal orientations can facilitate intrinsic motivation and improve performance, as indexed by course grades (Ames & Archer, 1988; Ames, 1992; Grant & Dweck, 2003).

On the other side of the model, language learners who believe that language ability is fixed (i.e., entity theorists) are more likely to set performance goals. They are motivated by competence judgments. However, the mechanisms by which entity theory lead to negative responses may be different for people who perceive high competence and people who perceive low competence. The model hypothesizes entity theorists' perceptions of their level of competence influence the type of performance goals that they pursue. If they think that they are competent in their L2, they will tend to set a performance-approach goal, such that they are motivated to demonstrate their level of ability in order to win positive judgments of competence (e.g., getting a high grade). They are inclined to compare themselves with others and desire to

outperform others in order to look “smart”. Entity theorists who think that they are not competent will tend to set a performance-avoidance goal, such that they focus on avoiding unfavorable judgments of competence from themselves and others. They are motivated to “not fail the class.” Such students may be quite passive in their behaviour in order to avoid appearing “incompetent” to themselves or others. In failure situation, no matter they want to be judged competent (performance-approach) or avoid giving evidence of their incompetence (performance-avoidance), entity theorists will feel more anxious and fearful of failure, and react more helplessly because they attribute their failure to their unchangeable aptitude (Elliott & Dweck, 1988).

In sum, the “mindsets-goals-responses” model in the L2 context suggests that L2 learners’ mindsets interact with their perceive L2 competence, steering them towards setting different goals in challenging situations and in turn exhibiting different affective and behavioural responses. Previous path analytic research partly supported this hypothesized model in the L2 context (Lou & Noels, 2014). They found that implicit theories was a predictor on learning goal and significant interaction between language mindsets and perceived L2 competence on performance-approach goal. However, they didn’t find the interaction effect on performance-avoidance goal. One aim of the present study is to replicate these results and tested whether the interaction effect on performance-avoidance goal can be retained. One disadvantage of the previous study is that the correlational design did not allow us to determine causal relations between variables. Another aim of the present study is to test the causal sequence of the “mindsets-goals-responses” model by manipulating L2 learners’ mindsets of language learning.

Can language learning mindsets be changed?

Although the above description of the mindsets-goals-response model portrays persons as having either an entity or incremental theory, most people simultaneously hold both entity and incremental theories to varying degrees (although they tend to be negatively related). This point is underlined by the results of Mercer and Ryan's qualitative study (Ryan & Mercer, 2011, 2012), which indicated that most people spontaneously reported both entity and incremental mindsets about language learning. An implication of this duality is that one or the other mindset could become salient depending upon situational cues, personal exigencies and so on (Dweck, 1999; Hong et al., 1999).

Many studies have used priming in a lab setting to temporarily guide participants to a particular belief. For example, in one experimental study, Hong et.al (1999) used a mock paper method, in which participants read a pretend news article supporting either an entity or incremental theory to induce different mindsets about general intelligence. This priming method has been effectively utilized in other domains, such as social, cultural, personality and moral domains (Chao, Hong, & Chiu, 2013; Chiu, Dweck, Tong, & Fu, 1997; Kraus & Keltner, 2013; Plaks, Stroessner, Dweck, & Sherman, 2001), to shift people's implicit theories.

Previous studies in different domains provided sufficient supports that language learning mindsets can be primed depending on situational cues. Moreover, a recent meta-analytical review about implicit theories found that experimentally induced mindsets tend to be more salient and have stronger effects on behaviour than self-report mindsets that are naturally occurred, probably because the experimental setting reduces the influence of extraneous factors (Burnette et al., 2013).

The present study

The present experiment extended the framework of implicit theories about L2 intelligence in the following ways. First, Hong et al. (1999)'s "mock paper" paradigm was adapted and used to test the proposed causal sequence. Specifically, one group of participants received a mock news article supporting an entity theory about language intelligence and another group of participants received one supporting an incremental theory. In line with the "mindsets-goals-responses" model, I predicted that an incremental belief prime will direct L2 learners to set challenging goals regardless of their perceived L2 competence, which in turn will influence them to respond and react more positively in failure situations. When the entity belief is primed, L2 learners who perceive themselves to have stronger L2 competence will adopt performance-approach goals, but less competent participants will adopt performance-avoidance goals, and in turn they will feel more helpless, anxious and fearful in challenging situations.

Unlike Lou & Noels (2014)'s study which only focused on hypothetical situations, the present study also tested participants' real experiences of failure. One concern of the previous study was that the findings related to hypothetical scenarios might not generalize to a real world context. Therefore, in this study, it is important to examine how well the findings are related to hypothetical situations corresponds with participants' actual experiences. Specifically, after the priming and responding to the hypothetical failure scenarios, participants were asked to recall a real-life challenging experience related to learning and/or using the L2 and respond to questions about that experience.

Based on the Lou and Noels models (2014; see Figure 1), the present experiment hypothesize that L2 learners who are primed with incremental belief (compare to entity beliefs) may set more learning goals, and in turn respond more positively in failure situations (stronger

mastery response, weaker helpless, anxious, and fearful responses). The present study also hypothesize that L2 competence will moderate the link between mindsets manipulation and performance-approach goal, and the link between mindsets manipulation and performance-avoidance goal. Participants who are primed with entity belief (compare to incremental beliefs) and if they perceive high competence may set more performance-approach goals, while those who are primed with entity belief and perceive low competence may set more performance-avoidance goals, and in turns they will respond more negatively in failure situations (weaker mastery response, and stronger helpless, anxious, and fearful responses).

Although the “mindsets-goals-responses” model in other domains other than language learning has been theorized and the supporting results are well documented (see Dweck, 1999), very few studies tested a causal relation combining all of these constructs together. Previous experimental studies have mostly depended on methods such as separate ANOVAs, regressions, and bivariate correlations (see Dinger et al., 2013; e.g., Ziegler & Stoeger, 2010). This piecemeal analytic strategy increases the possibility of incorrect rejection of a true null hypothesis (i.e., type I error; Coombs, Algina, & Oltman, 1996). Moreover, different goal orientations (i.e., performance-avoidance, performance-approach, and learning goals) are apparently related to each other, as well as different responses to failure situations (i.e., fearful of failure, mastery, helpless, and anxious responses), but conventional methods ignore potential covariation between those related variables. The results from the conventional methods may be biased and easily misinterpreted. There are very little experimental study that reports the indirect effects of implicit theories manipulation/ intervention on achievement/ reaction to failure via the mediation of goal orientations. It is unknown whether the effect of implicit theories on responses is direct or indirectly mediated by different types of goal orientations.

To provide a more comprehensive model to understand the relation among implicit theories, goal orientations and responses to failure situations, this study will use path analysis with multiple mediators and bootstrapping to test the mediation hypotheses systematically. Bootstrapping is a nonparametric resample method that use to estimate the effect from the data that resampled thousands of times (Preacher & Hayes, 2008). Compared to the traditional method of testing mediation, such as Baron and Kenny's (1986) steps, bootstrapping is a more powerful method for testing indirect effects in a path model (Preacher & Hayes, 2008).

Method

Participants

University students ($N = 150$) who were taking a language class at the University of Alberta took part in this study. The sample consisted of 44 (29.3%) males and 105 (70.0%) females, and one person whose gender information was missing. The participants were aged from 16 to 34 years ($M = 18.91$, $SD = 2.09$), and most were first-year students ($N = 101$ (67.3%); 2nd year: $N = 39$ (26.0%); 3rd year: $N = 9$ (6.0%); one missing). There were 92 (61.3%) participants who indicated their native language was English, 28 (18.8%) who indicated both "English and another language," and 29 (19.3%) who indicated "language other than English" (missing = 1). The languages they were studying were ASL (0.7%), Arabic (4.0%), Chinese (3.3%), Cree (0.7%), French (26.0%), German (9.3%), Italian (7.3%), Japanese (11.3%), Korean (5.3%), Latin (1.3%), Norwegian (1.3%), Polish (0.7%), Punjabi (0.7%), Swedish (0.7%), Russian (1.3%), Spanish (24.7%), and Ukrainian (1.3%).

Procedure

The experimental protocol followed the ethical guidelines outlined by the University (i.e., consistent with the Canadian government's Tri-Council Policy) and the Canadian and American

Psychological Associations. At the beginning of the semester, participants in the Psychology subject pool at a Canadian university filled out a questionnaire including a question regarding their language course enrolment and the short version of Mindsets of Language Learning Scale (MLLS; Lou & Noels, 2014), which only included the nine entity items. Potential participants who were taking a language class were identified, and invited to a group-testing session in a computer lab about two months later. For attending the session, participants received partial course credit for the psychology course.

Prior to the experiment, all participants reviewed and signed a consent form that told them of the purpose and nature of the study and its voluntary and confidential nature. Participants were informed that the purpose of this study was to investigate “language ability and language attitudes.” The cover story stated that we would assess their language ability with a reading comprehension task and index their language attitudes using a questionnaire.

Participants were randomly assigned to read either an entity theory article ($n = 76$) or an incremental theory article ($n = 74$). In order to be consistent with the cover story that the article was part of a reading comprehension task and test whether they paid attention to the reading, participants were asked to answer a few multiple choice comprehension questions and an open-ended question about the paper they read.

After the mindset manipulation, participants completed an online questionnaire that assessed their perceived L2 competence, goal orientations, responses to failure situations, self-report a failure situation, fear of failure, and at last the MLLS was used to check the manipulation effect. At the beginning of the questionnaire, participants filled in the name of the L2 class they were taking that semester. The questionnaires were then tailored to the student, so that the items referred to their experience with the target language. At the end of the testing

session, they were fully debriefed about the purpose of the study. Experimenters provided them with explanations about both of the implicit theories of language intelligence, and participants were given a debriefing form with more detailed information regarding the research purpose and manipulation of implicit theories.

Material

Manipulation of Implicit Theory of Language Intelligence

To manipulate mindsets of language learning, we adapted two mock articles used in Hong et.al (1999) to the language intelligence context (see Appendix 1). The articles were presented ostensibly as “Psychology TodayTM” magazine articles that supported either entity or incremental mindsets of language learning. Participants were told that the reading was an “English comprehension task.” Consistent with the MLLS, evidence about three dimensions of “general language intelligence”, “foreign/second language learning”, and “age sensitivity of language learning” were included in the articles. For example, the entity article read:

“Current research shows that a person’s language ability is either inherited or determined at a very young age.....after the age of three, environmental factors such as language training, exposure to multiple languages and so on (barring brain damage) seem to have almost no influence on language intelligence.....Knowles found that twins raised apart had very similar levels of language ability. Twins separated at birth sometimes had small differences in language ability.....Knowles found some other interesting results: people cannot learn a second language fluently even when they received sufficient exposure to the language environment.”

And the incremental article said,

“Current research shows that language intelligence can be increased substantially by environmental factors..... ‘I see increases in language intelligence up to 50 points when people enter stimulating environments such as language training, exposure to multiple languages and so on’Knowles found that twins raised in different environments had very different levels of language ability.....Knowles found some other interesting results: people can learn a second language fluently if they received sufficient exposure to the language environment.”

After reading the two-page article, participant rated the difficulty (1 = not at all difficult to 6 = extremely difficult) of the article. The articles were easy to read to all the participants (mean of perceived difficulty is 1.71 out of a 6-point scale, $SD = .95$). To check if participants understood the article, they were asked to write a summary paragraph to outline the main theme of the article. All participants were able to summarize the article correctly.

Perceived L2 competence (Can-do test)

The “Can-do” test was used to access self-perceived language competence (Clark, 1981). The scale includes L2 speaking ($\alpha = .88$, 8 items), L2 reading ($\alpha = .86$, 5 items), L2 writing ($\alpha = .87$, 5 items), and L2 comprehension ($\alpha = .90$, 8 items). The alpha for the full scale was .96. Participants responded on a 4-point Likert scale how often they would be able to successfully carry out the task on the list from “1 = rarely or never” to “4 = always.” A sample item is, “Understand two native [L2] speakers when they are talking rapidly with one another.” The Can-Do list has been systematically related to objective measures of proficiency, as well as some affective factors ($r = .52$ to $.60$; MacIntyre, Noels, & Clément, 1997; see Appendix 2).

Goal Orientations

The Goal Orientations Scale (Elliot & Church, 1997) asked students about their goals in their L2 class. This instrument includes three dimensions with 6 items in each dimension, including learning goals ($\alpha = .82$, “I want to learn as much as possible from this class”), performance-approach goals ($\alpha = .84$, e.g., “My goal in this class is to get a better grade than most of the students”), and performance-avoidance goals ($\alpha = .75$, “My goal for this class is to avoid performing poorly”). Responses to each item vary along a 7-point Likert scale from “not at all true of me” to “very true of me”.

Responses to Failure Situation Scale (mastery, helpless and anxious responses)

We used the Responses to Failure Situation Scale developed in a previous study (Lou & Noels, 2014). The scale included 8 failure scenarios that students might encounter during learning or using their L2 (see Appendix 4). A sample scenario is, “Imagine that you are in a [L2] Club. The organizer asks students to form several groups for discussion, but you are left out probably because your [L2] is not as good as the others.” Students were then asked to rate the likelihood that they would respond in a helplessness- or mastery-oriented manner on a 6-point scale from “very unlikely” to “very likely” (i.e., “What is the likelihood that you won’t take part in the club again?” (Helplessness-oriented responses); “What is the likelihood that you will keep going to the club and try to try to learn from the others” (Mastery-oriented response). They were then asked to rate how anxious/concerned they would be in each situation on a 6-point scale from “not anxious/concerned at all” to “very anxious/concerned” (i.e., “How anxious/concerned would you be in this situation?”). The 8 scenarios covered the aspects of writing, reading, speaking and listening comprehension. The Cronbach alphas for the helpless responses, mastery responses, and anxiety responses were .70, .79, and .87 respectively.

Recall and Respond to real life failure experience in L2 context

Immediately after rating the hypothetical scenarios, participants were asked to recall a challenging situation when they were learning the target language. They were asked to describe the challenging experience in one paragraph, and then they were asked to reflect on that experience, and write down what they were thinking and feeling about those situation RIGHT NOW.

In terms of the contexts that participants recalled, 71% of the participants reported their experience in the classroom context (e.g., got low score failed a test/exam, unable to answering questions, felt incompetent in the group discussion, failed to speak in front of the class, misunderstood or felt lost when the classmates and professor talked, got many editing on the peer review essay by other students, struggling the class all the time, unable to read and translate sentences, failed to communicate properly in a group project), and 29% of the participants recalled a situations outside the classroom (e.g., poor/failure communication to people who speak the target language when they lived/ travelled to the country or meet the target language speakers in Canada, unable to help a customer who speak the target language in the workplace, people don't understand my accent, make a grammatical mistake in conversation, mis-translating something for somebody).

Two research assistants who were blind to the research purpose coded the answers in terms of participants' reflection (1 = negative/avoidance, 2 = neutral/ mixed, 3 = positive/mastery). Here is three examples from the responses that participants wrote, "I am very nervous and I don't want to be judged by those who have a better understanding of the language" is coded as "1" because the participant only mention negative emotion in the current moment about the event. "I don't feel ashamed or unhappy with my language performance in that

situation” code as 2 because the participants neither show mastery response, happy about the failure experience nor negative emotion. “I was glad I had basic knowledge of the French language but I did feel ambition to develop my language skills. If this event happens again I would approach it and try to emphasize my improvements in the French language” is coded as 3 because the participant emphasize learning goal and only mention positive emotion. Spearman’s rho coefficient $r = .72, p < .001$, indicating good inter-rater reliability. Without knowledge of the participants’ responses to other instruments, the first author made the final decision when there was a discrepancy between two coders.

Fear of Failure

The Performance Failure Appraisal Inventory (Conroy, Willow, & Metzler, 2002) was adapted to the language learning context in order to assess fear of failure in the second language class after participants respond to failure situations (6 items; $\alpha = .82$; e.g., “When I am not doing well in language class, I worry about what others think about me”, “ When I am not succeeding in language class, I am less valuable than when I succeed”). Responses to the items were provided on a 7-point Likert scale from “strongly disagree” to “strongly agree”. A higher the mean score represents a greater fear of failure in the language class.

Mindsets of Language Learning Scale (MLLS)

The full scale of the MLLS includes 18 items concerning beliefs about the fixedness and malleability of the three aspects of language ability (Lou & Noels, 2014, see Appendix 5). The three aspects are beliefs about general language intelligence (GLB; e.g. No matter how much language intelligence you have, you can always change it quite a bit.), beliefs about second language intelligence (L2B; e.g. “Many people can never do well in foreign language even if they try hard because they lack natural language intelligence.”) and beliefs about age sensitivity

on L2 intelligence (ASB; e.g. “Compared to young children, adults have a hard time mastering a new language well no matter how hard they try.”). Each dimension included three incremental items and three entity items. The items were modeled after existing instruments of implicit theories in the domains such as personality (Dweck, 1999) and intelligence (Dweck et al., 1995). Responses were on a 6-point Likert scale from “1 = strongly disagree” to “6 = strongly agree”. The composite measure of implicit theory is combined with the entity items and incremental items (reverse scored), such that a higher score indicate higher entity theory (vs. incremental theory). The internal consistency for the 9 entity items ($\alpha = .81$ in the testing session before experiment and $\alpha = .87$ in the experiment) and the 9 incremental items ($\alpha = .92$), and the composite score of implicit theories ($\alpha = .94$) was very good.

Results

Manipulation check

A 2 (between subjects: entity condition and incremental condition) \times 2 (within subject: testing session before experiment and testing after experiment) mixed design ANOVA was used to test the manipulation effect on entity theories of language learning. A significant between-subject effect was found, $F(1, 148) = 23.70, p < .000, \eta^2 = .14$, such that on average participants in the entity condition held stronger entity theory. The within-subject effect was not significant, $F(1, 148) = 2.10, p = .15, \eta^2 = .01$, suggesting that the mean score, regardless of the manipulation effect, of entity theory in the mass testing (before the experiment) equal to the entity theory after manipulation. An interaction effect was found, $F(1, 148) = 28.24, p < .001, \eta^2 = .16$. To unpack the interaction, two ANOVAs were conducted. In the mass testing session, participants who were assigned the entity condition, showed no difference between two conditions on their entity theory, $F(1, 148) = .17, ns, \eta^2 = .00$. After the manipulation,

participants in the entity condition endorsed stronger entity theory, $F(1, 148) = 49.94, p < .001, \eta^2 = .25$ than those in the incremental condition (see Figure 2).

Further, as shown in Table 1, participants in the incremental condition endorsed stronger incremental theory than participants in the entity condition, $F(1, 148) = 46.41, p < .001, \eta^2 = .24$. We also found a significant difference on combined score of incremental and entity theory, $F = 58.84, p < .001, \eta^2 = .28$. Participants in two conditions did not differ in their ratings of the perceived difficulty of the articles, $F(1, 147) = 1.63, p = .16, \eta^2 = .001$. In sum, the manipulation effectively shifted participants' language learning mindsets with regards to both entity theory and incremental theory.

There is no difference in terms of the language that participants were studying, $\chi^2(16) = 13.96, p = .60$. There is also no gender difference between two conditions, $\chi^2(1) = 1.92, p = .17$, entity and incremental conditions have similar amount of males and females. Moreover, there is no gender difference on language mindsets, $F(1, 147) = 2.62, ns$, so gender was not further considered in the following analyses.

Effect of mindset manipulation on goal orientations

The results of a one-way ANOVA comparing the two conditions showed that the mindset manipulation on learning goal orientations was marginally significant, $F = 3.56, p < .06, \eta^2 = .02$. Participants in the incremental condition endorsed stronger learning goal than the participants in the entity condition. However, endorsement of performance-approach goal ($F = .33, p = .57, \eta^2 = .002$) and performance-avoidance goal ($F = .60, p = .44, \eta^2 = .004$) did not differ between two conditions (see Table 1).

To test whether perceived competence moderated the relation between mindsets and goal orientations, goal orientations (mastery goal, performance-approach goal,

performance-avoidance goal separately) were regressed on mindset manipulation (-1= incremental, 1 = entity), the centered score of perceived L2 competence, and their interaction.

First, for the results of learning goal, the main effect of perceived L2 competence was not significant ($\beta = .10, t = 1.26, p = .21$), the manipulation main effect was marginally significant ($\beta = -.15, t = -1.81, p = .07$). But somewhat surprisingly, the interaction effect was marginally significant ($\beta = -.15, t = 1.85, p = .07$). Although the interaction effect was only marginally significant, we explored the interaction further, L2 competence predicted learning goal only in the incremental condition ($\beta = .28, t = 2.50, p = .02$) but not the entity condition ($\beta = -.04, t = -.38, p = .70$; see Figure 3).

For the results of performance-avoidance goal, the main effect of perceived L2 competence was marginally significant ($\beta = -.16, t = -1.93, p = .06$), the manipulation main effect was not significant ($\beta = .05, t = .63, p = .53$). But inconsistent to the hypothesis, the interactive effect was not significant ($\beta = .07, t = .85, p = .40$).

For the results of performance-approach goal, the main effect of perceived L2 competence was not significant ($\beta = -.03, t = -.38, p = .71$), and the manipulation main effect was also not significant ($\beta = -.05, t = -.61, p = .54$). Consistent to the hypothesis, an interaction effect was found ($\beta = .23, t = 2.89, p = .004$). Participants in the entity condition held a stronger performance-approach goal if they perceived stronger L2 ability ($\beta = .20, t = 1.80, p = .08$). On the other hand, participants in the incremental article condition hold weaker performance-approach goal if they perceived stronger L2 ability ($\beta = -.26, t = -2.29, p = .03$; see Figure 4).

In sum, the results partially supported the hypothesized model. L2 competence moderate the relation between language learning mindsets and performance-approach goal, but we found no significant interaction effect on performance-avoidance goal.

Paths analysis results of the “Mindsets – goals – responses” model

To examine the hypothesized model, Mplus 7.0 (Muthén & Muthén, 2010) was used to test the path analysis and provide statistical evidence of the mediation effect. The model test statistics included Chi-square ($p > .05$ is good fit), Comparative Fit Index (CFI $> .95$ is good fit), Root Mean Squared Error of Approximation (RMSEA $< .05$ is good fit), and Standardized Root Mean Square Residual (SRMR $< .08$ is good fit; Kline, 2011).

The “mindsets – goals – responses” model assumes that language learning mindsets, are the antecedents of goal orientations, and the goal orientations in turn predict students’ responses to failures. Thus, the initial model specified that the paths from mindsets manipulation, perceived L2 competence, and their interaction to goal orientations (learning, performance-approach, and performance-avoidance), and the paths from goal orientations to outcome variables (helpless, mastery, anxious responses, and fear of failure). Moreover, the paths from mindsets manipulation and L2 competence to outcome variables also drawn because study showed that language mindsets and perceived L2 competence also predict the outcome variable directly (Lou & Noels, 2014). The results show that the model explain the data well ($\chi^2 = 3.54$, $df = 4$, $p = .47$, CFI = 1.00, RMSEA = .00, and SRMR = .012).

As shown in Figure 5, an incremental (vs. entity) condition predicted stronger learning goals (but only marginally significant; $p < .07$)², which in turn predicted more mastery-oriented

² The marginally significant effect is acceptable because we specified the direction in our hypotheses that incremental priming predict higher endorsement of learning goal than entity priming. Moreover, this path was empirically supported in Lou & Noels (2014)’s study that

response, less helplessness-oriented response and less anxious response in failure situations. The indirect effects shows that the path from manipulation to helplessness-oriented and anxious response was significantly mediated by learning goal (see Table 2).

Independent from the manipulation language mindsets, stronger L2 competence was associated with setting fewer performance-avoidance goals. Moreover, the adoption of a performance-avoidance goal was related to greater fear of failure, more helplessness-oriented and less mastery-oriented responses and greater anxiety. The indirect effected also shows that the paths from perceived L2 competence to helplessness-oriented response, anxious response, and fear of failure were significantly mediated by performance-avoidance goal (see Table 2). Moreover, stronger self-perceptions of L2 competence directly predicted less fear of failure and anxiety, less helplessness-oriented, and more mastery-oriented responses, which suggests that the mediation between L2 competence and responses to failures is only partially mediated by goal orientations.

In the path model, the interaction between the mindsets manipulation and L2 competence significantly predicted performance-approach goals, which in turn predicted response to helpless response and fear of failure. Contrary to expectation, however, the interaction between the manipulation and L2 competence did not predict performance-avoidance goal. The indirect effects showed that the paths from the interaction term to helpless response and fear of failure were significantly mediated by performance-approach goal but not learning goal (see Table 3). This finding suggested a significant moderated mediation effect (aka a conditional indirect effect, Preacher, Rucker & Hayes, 2007).

stronger entity mindsets (vs. incremental) is associated with less endorsement of learning goal. Also in the present study, the correlation between language learning mindsets (manipulation check) and learning goal is significant, $r = .28, p < .001$.

In order to unpack the moderated mediation effect, the sample was split into two groups: participants in the entity condition and incremental condition. And then the perceived L2 competence was used as the predictor to rerun the mediation analysis separately on the two conditions. First, the mediation effect on helpless responses was tested. In terms of the direct effect, both conditions were found that stronger perceived L2 competence was related to less helpless responses (Entity condition: $\beta = -.24$, $t = -2.13$, $p = .037$; Incremental condition: $\beta = -.32$, $t = -4.19$, $p < .001$). However, the indirect effect was found in the entity condition (indirect effect = $.06$, $SE = .05$, 90% C.I. = $[.005, .175]$; 5,000 bootstrap samples), but not the incremental condition (indirect effect = $-.003$, $SE = .02$, 90% CI = $[-.044, .028]$). For participants in the entity condition, a stronger perception of L2 competence was related to a more endorsement of a performance-approach goal (i.e., stronger hope to outperform other students in their L2 class), and in turn predicted more helpless response in failure (see Figure 6a). Whereas in the incremental condition, perceived L2 competence predicted helpless response is not mediated by performance-approach goal (see Figure 6b).

And the indirect effect on fear of failure was tested. The similar pattern of results was found. In terms of the direct effect, both conditions were found that stronger perceived L2 competence was related to less helpless responses (Entity condition: $\beta = -.19$, $t = -1.73$, $p = .087$; Incremental condition: $\beta = -.23$, $t = -2.95$, $p = .004$). However, the indirect effect was found only in the entity group (indirect effect = $.12$, $SE = .08$, 95% CI = $[.003, .341]$) but not the incremental group (indirect effect = $-.01$, $SE = .05$, LL95% CI = $-.116$, UL95% CI = $.005$). For participants in the entity condition, a stronger perception of L2 competence was related to a more endorsement of a performance-approach goal (i.e., stronger hope to outperform other students in their L2 class), and in turn predicted higher fear of failure (see Figure 7a). Whereas in the incremental

condition, perceived L2 predicted fear of failure is not mediated by performance-approach goal (see Figure 7b).

In sum, a performance-approach goal mediated the relationship between perceived L2 competence and negative responses (helpless responses and fear of failure) only among entity theorists. The findings were generally consistent with the expectations, although performance-avoidance goals did not mediate the link from the competence-mindsets interaction to responses to failures as predicted.

Response to personal failure situations

Besides the hypothetical failure scenario, participants were also asked to recall a failure situation when they were learning the target language. One reason for the use of real-life experience is to test the ecological validity of the hypothetical scenario measure of fear of failure. Correlational results showed that participants' emotion for the personal experience was related to their (1) mastery-oriented response ($r = .18, p = .07$), (2) helplessness-oriented response ($r = -.23, p < .05$), (3) anxious responses ($r = -.19, p = .06$), and (4) fear of failure ($r = -.25, p < .05$) in the hypothetical scenarios (The correlation table in Appendix 6 shows all the correlations between participants' current emotion relating to their past failure situation and their implicit theories and goal orientations). The results also showed that positive (vs. negative) emotion for the personal experience was also negatively correlated with entity (vs. incremental) theory ($r = .20, p < .05$), positively correlated with perceived L2 competence ($r = .19, p = .06$), and negatively correlated with a performance avoidance goal ($r = -.19, p = .07$).

Entity (vs. incremental) belief was positively correlated to participants' negative emotion in their personal failure experience; a mediation analysis was conducted to test whether the manipulation influenced participants' emotion through their mindsets. The result shows that even

though neither the total effect ($\beta = -.02$, $SE = .07$, $t = -.22$, $p = .83$) nor the direct effect ($\beta = -.12$, $SE = .08$, $t = -.98$, $p = .33$) were significant, a significant indirect effect was found (indirect effect = $-.09$, $SE = .05$, 95% CI = $[-.202, -.011]$; 5000 bootstrap samples), suggesting that L2 learners who were primed for incremental (vs. entity) theory felt more positively when they recalled and responded to real life experiences of failure (see Figure 8). Given that the pattern of relationship is consistent with that found for the hypothetical scenarios, these results suggest that the hypothetical scenarios elicited reactions that were analogous to real-life experiences.

Discussion

The present study extended Dweck's model (1999) to the language learning context by using an experimental manipulation to prime learners' language learning mindsets, and tested whether the manipulation affected learners' goals setting and responses in challenging situations. The results from this study largely supported the causal model of "mindsets–goals–responses" (see Figure 1; Lou & Noels, 2014), such that priming an incremental or entity belief guided L2 learners to set different goals, which in turn predicted learners' reactions and feelings when facing failure situations. Below, the results and the contributions to implicit theories and language learning, and the implications for L2 education are discussed.

The present path model demonstrated that three different goal orientations are linked to different antecedents. The manipulations of language mindsets are the antecedent of learning goals (see also Burnette et al., 2013; Dinger et al., 2013; Dupeyrat & Mariné, 2005). The perceived L2 competence is the antecedent of performance-avoidance goals (see also Elliot & Church, 1997; Dinger et al., 2013). Even though neither implicit theory nor perceived competence predicted performance-approach goals (see also Dinger et al., 2013), the interaction between L2 mindsets and perceived competence predicted performance-approach goals (Lou &

Noels, 2014). This pattern in the results are also consistent with those of a recent correlational study (Lou & Noels, 2014).

Consistent with the hypotheses, the results showed that L2 learners who were primed for an incremental theory set higher learning goals than those primed with entity theory. Even though it was marginally significant, and the correlation results also showed that correlation between language learning mindsets (the manipulation check) and learning goals were significant ($r = -.28, p < .001$). But somewhat surprisingly, in the multiple regression analysis, the interaction between mindset primings and perceived L2 competence in predicting participants' learning goal was marginally significant. This influence of implicit theory priming on learning goals was more evident among those who perceived they had stronger L2 competence (Figure 3). Therefore it is possible that for L2 learners who believe language ability is changeable, as these learners become more competent, they are inspired to learn more and thus set a higher learning goal. But L2 learners who believe language ability is stable, are less likely to adopt a learning goal regardless of their competence level because they don't believe effort could change their ability. This pattern was only marginally significant in the present experimental study, and was not found in the previous correlational study (Lou & Noels, 2014). Further research is needed to address this issue.

The model also hypothesized an interaction between implicit theories priming and perceived L2 competence on performance-approach goals and performance-avoidance goals. The results support the interaction effect on performance-approach, such that L2 learners who perceived high competence, if they were primed for an entity theory, set more goals to gain positive judgments (performance-approach goals), but if they were primed for an incremental theory, they were less likely to set performance-approach goals. Entity theorists want to

outperform others and show off their language skills when they think they are good at that language (see also Lou & Noels, 2014).

However, both Lou and Noels' study (2014) and the present study did not support the interaction effect on the performance-avoidance goal; it was found that L2 learners with low perceived L2 competence, regardless of their experimental conditions/ their language learning mindsets, adopted more performance-avoidance goals and responded more negatively in failure situations. Poor language competence is a significant predictor to negative responses, such as anxious and fearful feelings (MacIntyre, Baker, Clément, & Donovan, 2002; MacIntyre, Dörnyei, Clément, & Noels, 1998), and this result may not change depending on what mindsets that people hold or primed for. One reason for this insignificant result is because people who hold entity beliefs and perceive low ability may be amotivated to learn (Legault, Green-Demers, & Pelletier, 2006; Wang, Liu, Lochbaum & Stevenson, 2009). Those people have no goal and motivation to learn the L2 because they don't believe in either their ability or their efforts. Unlike people who hold performance-avoidance goal that are motivated to learn by not being incompetent, they don't concern about their performance and tend to give up and drop the class (Ratelle, Guay, Vallerand, Larose, & Senécal, 2007). Future study should also consider to incorporate amotivation (no goal) in the achievement framework to further understand this mechanism between mindsets to responses to failure.

Perceived L2 competence is conceptualized as individuals' self-perception of their ability to use the L2 effectively, and is one aspect of the related notion of L2 self-confidence (see Sampasivam & Clément, 2014). A lot of findings suggest that perceived L2 competence is directly or indirectly related to learning outcomes (such as motivation, grades, task performance, and achievement) as well as affective states (such as school anxiety, stress, and fear; Clément,

Dörnyei, & Noels, 1994; MacIntyre, Baker, Clément, & Donovan, 2002; MacIntyre, Dörnyei, Clément, & Noels, 1998). The direct, negative relations between perceived competence and anxiety found in the present research is consistent with Clément's formulation of self-confidence. As well, students who felt less competent also perceived less control over the learning environment (Bandura, 1993). Some studies of implicit theories also incorporate perceived competence into their model (e.g. Dinger et al., 2013), and they found that even after controlling for implicit theory, perceived competence still was a strong predictor of motivation and academic achievement. Thus, the perceived competence may be an independent predictor of various learning-relevant variables.

The present model showed that it is necessary to distinguish performance-approach and performance-avoidance orientations because they have different antecedents (Elliot & Church, 1997). The avoidance-oriented goal is predicted by perceived competence, and the approach-oriented goal is predicted by the interaction between implicit theories and perceived competence. Not only are these goals predicted by different antecedents, in line with previous research (e.g. Elliot & Church, 1997, Chen & Pajares, 2010; Ziegler & Stoeger, 2010), the present findings showed that they are only modestly intercorrelated. Performance-approach goals are positively but only moderately associated with performance-avoidance goals ($r = .36$), such that they explain only 13% of the shared variance with each other. Learning goals were correlated with performance-avoidance goals but not with performance-approach goals. Indeed, a recent meta-analysis showed that approach-avoidance categories of goals consistently moderates the relation between implicit theories and goal settings (Burnette et al., 2013). Thus, different type of performance goals (approach and avoidance), although is correlated, are distinct from

each other, and future research on implicit theories should be attentive to the differences between goal categories.

One possible reason why some previous studies found a significant link between implicit theories and goal setting (Mangels, Butterfield, Lamb, Good, & Dweck, 2006; Robins & Pals, 2002) while others did not (Biddle et al., 2003; Dupeyrat & Mariné, 2005; Maurer et al., 2002; Sarrazin et al., 1996) is that these studies were framed within classic achievement motivation theory that focuses only on the “approach” aspect of goal orientations (Elliot & Church, 1997). For example, in Dupeyrat and Marine (2005), Maurer et al. (2002), Sarrazin et al. (1996) and Biddle et al. (2003)’s studies, the performance goals measured focused only on approach-oriented goals, including learning and performance-approach goals.

Another possible reason for the inconsistent link between implicit theories and goal setting (see Burnette et al., 2013) is that previous research almost always ignored the moderating role of perceived competence even though it has been argued to be an important factor that interacts with goal orientations and learning outcomes (Bipp, Steinmayr, & Spinath, 2012; Dinger et al., 2013). In the present study it was found that perceived competence moderates the relation between implicit theories and performance-approach goals (see also Lou & Noels, 2014). The interaction is important for understanding goal settings, such that those who hold a strong entity goal and feel highly competent are more likely to strive to outperform others. It is possible that previous studies included students with varied levels of competence that may moderate the results, and hence did not find consistent results. Thus, future research should not only consider perceived competence as a predictor (exogenous) variable, but should also consider it as a moderator.

Situated Implicit Theories

Implicit beliefs are usually framed as a trait of cognitive style that to be relatively stable over time (see Dweck, 2008; Franiuk, Pomerantz, & Cohen, 2004; Chiu, Hong, Dweck, 1997), but it can also be elicited perhaps many people actually hold both theories (Dweck, Chiu, & Hong, 1995). The present findings supported that people's language intelligence mindsets can also be a situated beliefs that can be changed in the short term based on situational cues. Priming an incremental theory inclines people to hold more positive emotions and mastery reactions when they respond to personal and hypothetical failure situations involving learning and/or using foreign or second languages. This pattern is consistent with prior experimental research in other domains (Chao, Hong, & Chiu, 2013; Chiu, Dweck, Tong, & Fu, 1997; Kraus & Keltner, 2013; Plaks, Stroessner, Dweck, & Sherman, 2001). Dweck posit that the mindsets, goals, responses to failure, achievement are not static, unchangeable individual differences, but a part of a dynamic process (Dweck et al., 1995). Although people may have chronic tendencies, perhaps more or less generalized across different domains, situational and temporal variations are possible. For example, if students perceive their improvement, or receive more positive feedback on their improvement, they may more likely to believe in incremental in that learning context. If teachers promote certain goals or attributions in the learning environment, students may come to hold a certain implicit theory more salient in that context (Rattan, Good, & Dweck, 2012), which can lead to a long-term impact on their academic performance (Blackwell et al., 2007; Good, Aronson, & Inzlicht, 2003). In the domain of L2 learning, more research is needed to assess the long-term effects of language mindset interventions on students' goal orientations, their responses to failure as well as their language competence.

A comprehensive model to understand “mindsets-goals-responses” links

One advantage of the present study is that it incorporated an experimental design and path analysis to test the causal model instead of testing different experimental hypotheses separately. Modeling the data as a whole network allows us to understand the effect of the manipulation on a system of interrelated variables, including mediators and moderators, more comprehensively. The present path model also highlighted the indirect effects of multiple mediators. It showed that priming incremental language mindsets (vs. entity) did not influence students' affective and behavioural responses directly, but rather indirectly, mediated via learning goals. Consistent with a recent study, the link from implicit theories to learning outcomes is mediated by learning goals but not performance-approach or performance-avoidance goals (Dinger et al., 2013), such that an incremental theory (vs. entity theory) fosters a learning goal and mastery response, and an entity theory exhibited an indirect effect on the helpless and anxious responses. This finding is important that showing the underlying mechanism of how priming for different language mindsets influences students' responses in challenging situations.

The mediation results also found that the link between perceived L2 competence and responses to failure was mediated by performance-avoidance goals. Specifically, L2 learners who perceived weaker language competence set more performance-avoidance goal, in turn, in language failure situations, they showed less mastery-oriented, but more helplessness, anxious and fearfulness of failure. Moreover, the mediation effect that L2 competence predicted helpless and fearful responses through performance-approach goal was only found among those who were primed for entity theories, but not incremental theories. This result supported our hypothesis: even though learners perceived strong L2 ability, if they hold entity theory, they felt more negative in failure situation because they tended to hold performance-approach goal. This

finding underscores the value of incorporating experimental methods and path analysis to understand complex relations between variables.

Theoretical Implications

More and more large scale intervention and practical procedure about mindsets are now applying to schools and general public across the United States (see Yeager & Dweck, 2012), such as the PERTS program (www.perts.net) and Brainology program (www.mindsetworks.com). It is important to receive sufficient empirical supports to understand the mechanisms and consequences of mindsets intervention. The study of language learning mindsets is a new direction and the intervention of language learning mindsets had remained unexplored. The present study filled this void. In general, the present findings concerning language learning are consistent with the previous research in different other domains, such as sports (Biddle et al., 2003; Ommundsen, 2001), music (Smith, 2005), math (Butler, 2000), and science (Chen & Pajares, 2010), such that fixed and malleable attributes of human qualities are central antecedents of individuals' motivation and performance (Dweck & Leggett, 1988). Further, the present study found that L2 learners' perceived language competence moderated the intervention effect on goal orientations. The interactive model should be generalized and tested in future studies in other domains.

Practical Implications

Challenges are inherent in the long-term process of learning a second language, and challenges are a double-edged sword. For incremental theorists, a challenge is a meaningful learning experience that motivates learners to try even harder. For entity theorists, a challenge is a frustrating experience that undermines learners' persistence. These learners interpret failures to mean that they are not smart enough, and so they feel they can never attain their goals. These

helpless responses occur when L2 learners think the situation is beyond their ability to manage. Once learners establish the sense that they cannot change, they would not expect to exert much effort (Dweck, 1975).

Research indicates that the learning environment has an important influence on shaping learners' mindsets, and one important factor in educational context is teachers' feedbacks (McCombs & Whisler, 1997; Rattan et al., 2012). The experimental manipulation used in the present study suggests that language learning mindsets is changeable, even if temperately. Can teachers encourage students to be more learning oriented? First of all, the teachers themselves should be incremental and believe that students' ability can be improved. But unfortunately, a study pointed out that not most teachers ($N = 372$) believe that students' intelligence is malleable ($M = 4.34$ out of a 7-point scale, $SD = 1.16$; Garcia-Cepero & Mccoach, 2008). If teachers hold an entity mindset, they may explicitly or subtly intricate an entity belief and create an entity-oriented climate to students (Rattan et al., 2012; Yeager & Dweck, 2012). Research also found that teachers who hold entity mindset create a less autonomy supportive climate for students (Leroy, Bressoux, Sarrazin & Trouilloud, 2007). For example, teachers' feedbacks can influence students' mindsets and motivation (Rattan et al., 2012). Teachers should be aware of the feedback that they provide to students, even when they praise and comfort students. Compared to students who received effort praises or strategic feedbacks (e.g. Your French is very fluent, you must practice very hard; You may want to consider practice your French with a tutor to improve your listening and speaking), students received intelligence praises or "entity comfort" (e.g. You have the language talent; You are a smart student, but it's not the case that everyone is good at French) adopt more entity mindsets and perform worse in the following task (Mueller & Dweck, 1998; Rattan et al., 2012; Yeager & Dweck, 2012).

The present study suggest that teachers should emphasize incremental mindsets and learning goals to help students to realize that the discrepancy between their ideal and actual ability can be reduced by putting in more effort, so that students can interpret their failures more positively. But unlike other domains, language learning can also take place outside the classroom context. For example, travelers, immigrants, and international students who have to use a foreign/second language to adapt to another culture may experience many communication failure situations as they navigate a new society. Those sojourners and immigrants who hold incremental mindsets may be more willing to communicate (MacIntyre et al., 1994) even though other people may not understand them. Thus they may ultimately adjust better to the new society than those who hold an entity theory. Immigrants' confidence about whether they can learn a new language well are very important to their language learning processes as well as their adjustment processes (Noels, Pon, & Clément, 1996). Thus, these results pertaining to university students in L2 classes might be of relevance to language learners in other contexts. Future study should explore other possible language learning situations outside the classroom.

Future directions

That implicit theories and goal orientations predict achievement outcomes has been clearly documented in many studies, such that holding an entity theory has a negative influence on achievement-relevant outcomes, whereas holding an incremental theory has a positive influence (for a review, see Dweck et al., 2006). The present research provides a model of these processes works in challenging L2 situations. However, whether and how this model can predict L2 performance outcomes such as achievement, attendance, and engagement remains an open question.

Dweck and her colleagues posit that implicit theories are unrelated to students' actual ability level (Blackwell et al., 2007; Dweck, 1999; Dweck & Leggett, 1988). In the domain of language learning, Lou and Noels's study (2014) and the present study also found that implicit theories were not related to students' self-perceived competence. The present study also found that the manipulation of language mindsets does not influence self-perceptions of L2 competence. Regardless of whether students holding or being primed for incremental theory or entity theory, their perceived L2 competence was equivalent.

Even if students' implicit theories are generally not related to how they regard their ability, these they may be related under certain conditions. A recent meta-analytical research showed that the link between implicit theories and ability/achievement is more likely to be evident in challenging situations (e.g. receiving negative feedback, in failure situations). In the face of difficulty, entity theorists are more likely to give up, but incremental theorists remain positive and work even harder (Dweck et al., 2006). Thus, incremental theorists perform better in the long run especially when challenging situations exist. In a similar vein, a longitudinal study showed that students' implicit beliefs were not related to their school performance at baseline, but during a challenging transition, students holding an incremental mindset perform better in school (e.g., grades) than students holding an entity mindset (Blackwell et al., 2007; Dweck & Sorich, 1999).

In the language classroom, L2 learners who hold an entity belief and an performance-approach goal may perform (e.g., good grades, answering questions) as good as students who hold an incremental and an learning goal because they believe that they are competent and motivated to outperform others and get a better grades than others (Harackiewicz, Barron, Pintrich, Ellito, & Thrash, 2002). But self-directed learning is a more important

educational goal because language learning is a long term processes that require extra times and efforts. After they finished the class, those students who hold strong entity belief and performance-approach goal may have less motivation outside the classroom (Bolhuis, 2003). When they are not in a performance climate, they show less interests than students who hold learning goal, and less likely to continue learning (Harackiewicz, Barron, Tauer, Carter, & Elliot, 2000). Thus, in a long term, students who hold incremental mindset about language learning may be more successful language learner than students who hold entity mindset.

Given that the model presented in the present study provides a snapshot of a dynamic and complex system (cf. De Bot, Lowie & Verspoor, 2007; Larsen-Freeman, 2002), this research underscores the importance of longitudinal studies to better understand the dynamic and potentially changing relations between implicit theories, self-perceptions of competence, and actual competence.

Achievement goals has been theorized as the underlying mechanism of implicit theory to the outcome variables (Dweck & Leggett, 1988). In the present study, we highlighted that the differentiation of performance-avoidance and performance-approach goals based on Elliot and Church (1997)'s hierarchical model of achievement goals. But more recently, Elliot and colleagues construct a 3 by 2 achievement goal model that further separate three goals (task-based, self-based, and other-based goals) with two competence valences (approach-based and avoidance-based; Elliot, Murayama, & Pekrun, 2011). They argued that task-based goal is more prevalent and predictive in the classroom context and self-based goal is more important in the achievement context that self-improvement is emphasized. To this point, it could be possible that task-based goal is more related to the classroom-based language learning outcomes, and self-based goal is more predictive outsides that classroom. However, whether implicit theories

can predict these different types of goals is unknown. Future research should also consider incorporate the 3 by 2 goal model into the implicit theory.

The present experiment has established a causal association between learners' implicit theories of language learning and how they respond to failure situations. However, the experiment was not conducted in a real situation; participants did not receive any negative feedback or meet any challenges during the experiment. Although supplementary analyses suggested that the responses to these hypothetical situations resembled reactions to past real-life situations, it still remains to be demonstrated whether language learners with incremental theory actually perform better (e.g., on objective language achievement tests or grades in a language class) than entity theorist in the face of actual challenges or in the long-term. Future experimental and longitudinal studies are necessary to detect whether actual L2 competence will change under challenging situations and over time if participants hold different mindsets or receive interventions promoting one or another mindset.

The present study measured participants' competence through self-reports method. Self-perceptions of competence are critical to the motivational process described in the current model; even highly objectively competent could perceive themselves as being relatively incompetent and this self-perception could undermine their motivation. Although the can-do list measure used in the present study consistently correlates with objective measures (ranging from .51 to .72), the score could be biased by participants' propensity such as language anxiety (MacIntyre et al., 1997). Similarly, previous studies have shown that people with strong performance-approach goals tend to overestimate, and those with performance-avoidance goals tend to underestimate their real competence (Bipp et al., 2012). Following the logic that implicit theories are associated with goal setting, it is possible that people's different mindsets could bias

their self-reports of L2 competence differently. Future studies should include more objective, third-party measures of competence coupled with self-reports.

Following the future direction about objective measurement of language ability, a related direction for future research concerns the relation between implicit theories and language aptitude (Carroll, 1973; Pimsleur, 1966). With some consistency, research suggests that people may differ in their propensity for language learning (Granena & Long, 2013). Although the current research shows that implicit theories are unrelated to self-perceptions of competence, the relation between language learning mindsets and language aptitude has not examined. It is possible that some people may have a sense of their aptitude or facility with language (perhaps because they lie at the extreme ends of the continuum) that leads them to hold a particular mindset about their personal capacity to learn language, quite apart from their affective and motivational perspective on language learning. Even though language aptitude is a strong predictor of achievement in second language learning (Sparks & Ganschow, 1995, 2001), it is also possible that, based on the present research, students' language mindsets may moderate this relation. To understand the relation between language aptitude and language learning mindsets, as well as whether they interactively influence the language learning outcomes would be beneficial to the field of language learning.

Conclusion

Why do some language learners respond positively while other respond negatively in failure situations? The issues of language mindsets, language confidence, language aptitudes, and other motivational measures of language learning are intertwined. The current study suggested that L2 learners' mindsets about language learning are important determinants of striving in difficult situations during the language learning process. Combining an experimental design and

path analysis, the present study demonstrated that manipulation of language learners' language learning mindsets, perceived competence, and their interaction predicted language learners' goal orientation, and as a consequence, influence how they respond to failure situations. This finding highlights the causal effect of language learning mindsets, the mediation mechanism of goal orientations, and the moderating role of perceived L2 competence. We hope that the insights from the current study will contribute new direction and inspire future research on language learning mindsets, and provide meaning guidance for language education.

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Table 1. Mean and F-test for the Key Measures

Measures	Incremental condition	Entity condition	<i>F</i>
Entity theory (mass testing)	2.91 (.85)	2.88 (.86)	.02
Language learning mindsets (manipulation check)	2.30 (.68)	3.25 (.83)	58.84***
Entity theory	2.57 (.85)	3.54 (.84)	46.41***
Incremental theory	4.97 (.68)	4.06 (.95)	49.94***
General language intelligence belief (GLB)	2.11 (.75)	3.31 (1.07)	63.01***
Second language learning belief (L2B)	2.22 (.75)	3.09 (.72)	51.69***
Age sensitivity and language learning belief (ASB)	2.54 (.90)	3.33 (.90)	28.25***
Difficulty (manipulation check)	1.74 (.99)	1.68 (.92)	.16
L2 competence	3.44 (.69)	3.34 (.72)	.78
Goal orientations			
Learning goal	5.83 (.85)	5.53 (1.07)	3.56 [†] (<i>p</i> = .06)
Performance-approach goal	4.33 (1.36)	4.20 (1.39)	.33
Performance-avoidance goal	4.45 (1.27)	4.60 (1.25)	.60
Responses to failure situation			
Helpless response	2.52 (.72)	2.59 (.94)	.23
Mastery response	4.41 (.80)	4.43 (.94)	.02
Anxiety	3.42 (1.13)	3.38 (1.11)	.06
Fear of failure	3.42 (1.31)	3.64 (1.11)	.87

Note: *p* = .06 is acceptable because the hypothesis is specified.

Table 2. Correlations between key variables.

	2	3	4	5	6	7	8	9	10	11
1. Manipulation	.53**	-.07	-.15 [†]	.06	-.47	.04	.01	-.02	.09	-.02
2. Language mindsets	--	-.12	-.28**	-.06	.07	.14 [†]	-.11	-.08	.21**	-.20*
3. L2 competence		--	.11	-.15 [†]	-.02	-.32**	.20*	-.35**	-.23**	.19 [†]
4. Learning goal			--	-.05	.15 [†]	-.31**	.48**	.14	-.09	.11
5. Avoidance goal				--	.36**	.34**	-.18**	.46**	.40***	-.19 [†]
6. Approach goal					--	.19*	-.01	.15 [†]	.29***	-.01
7. Helpless response						--	-.61**	.37**	.35***	-.23*
8. Mastery response							--	-.51**	-.20*	.18 [†]
9. Anxious response								--	.41***	-.19 [†]
10. Fear of failure									--	-.25*
11. Failure responses to personal experience										--
<i>Mean</i>	2.78	3.38	5.67	4.52	4.26	2.55	4.42	3.41	3.53	2.02
<i>SD</i>	.89	.70	.98	1.25	1.37	.84	.87	1.11	1.26	.68

Notes: ** $p < .01$, * $p < .05$, [†] $p < .07$

1. Manipulation (-1= incremental condition, 1 = entity condition)

2. Language mindsets is manipulation check score

3. Failure responses in real life (1 = negative/avoidance, 2 = neutral/ mixed, 3 = positive/mastery)

4. $N = 100$ for failure responses to personal experience, others $N = 150$

Table 3. Estimations and confidence interval (5000 bootstrap samples) for the indirect effect in the “mindsets-goals-responses” model.

Parameter	Estimate	<i>SE</i>	lower 2.5% C.I.	upper 2.5% C.I.	Effect Size
Manipulation→Learning→Helpless	.04	.02	.001	.094	.04
Manipulation→Learning→Mastery	-.06	.03	-.129	.003	.07
Manipulation→Learning→Anxious	-.02	.02	-.095	-.002	.02
Competence→Avoidance→Helpless	-.03	.02	-.094	-.001	.04
Competence→Avoidance→Anxious	-.10	.05	-.236	-.005	.07
Competence→Avoidance→Fearful	-.09	.06	-.224	-.005	.05
Mindsets×Competence→Approach→ Helpless	.04	.03	.005	.108	.03
Mindsets×Competence→ Approach→ Fearful	.08	.05	.013	.210	.05

Note: Confidence intervals not including zero indicate significant mediated effect. Effect sizes are the absolute value of the standardized estimates of the respective path coefficients.

Figure 1. The theoretical model of “Mindsets-goals-responses” in failure situation of second language learning

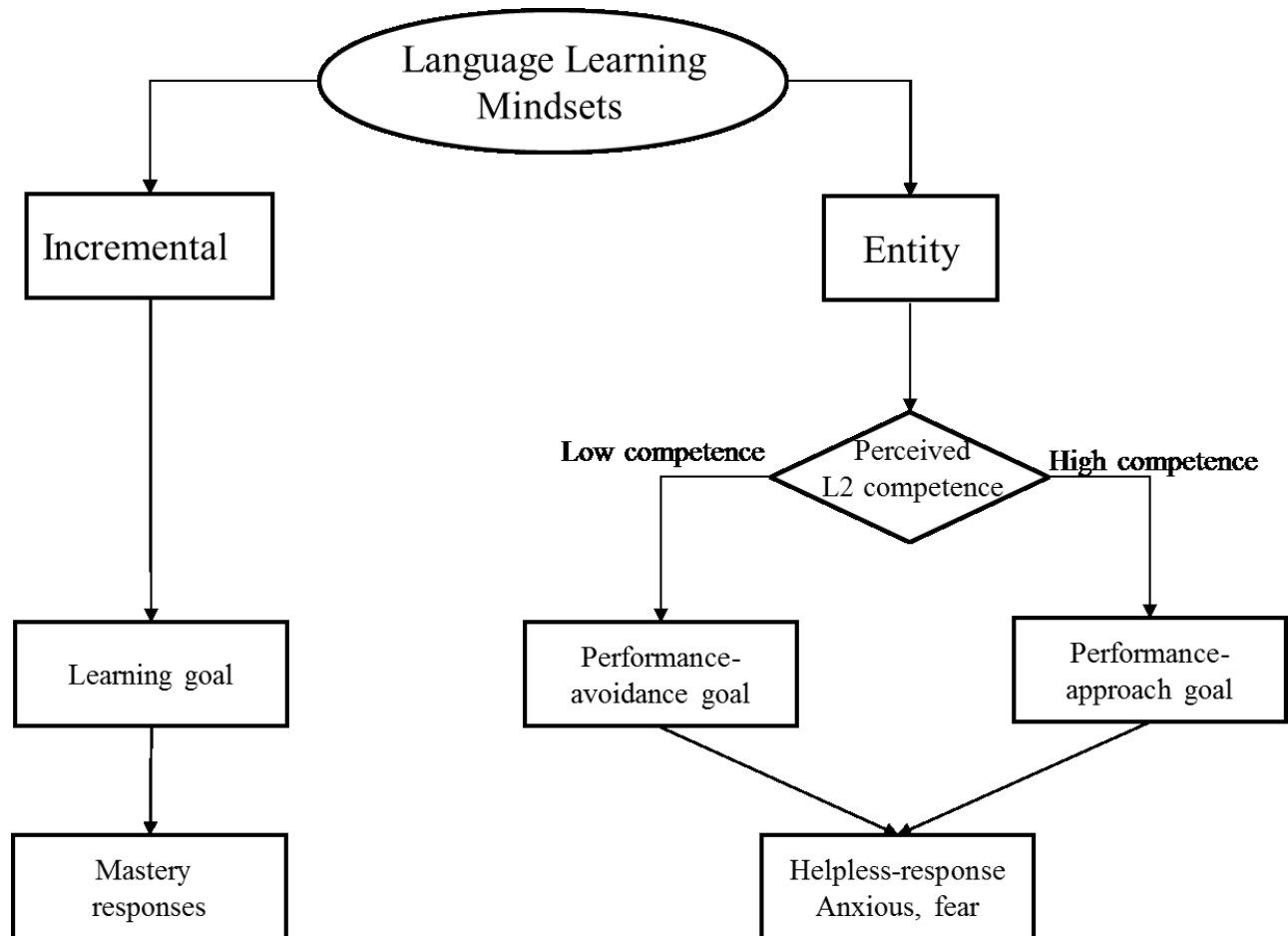


Figure 2. Results of manipulation effect of language learning mindsets

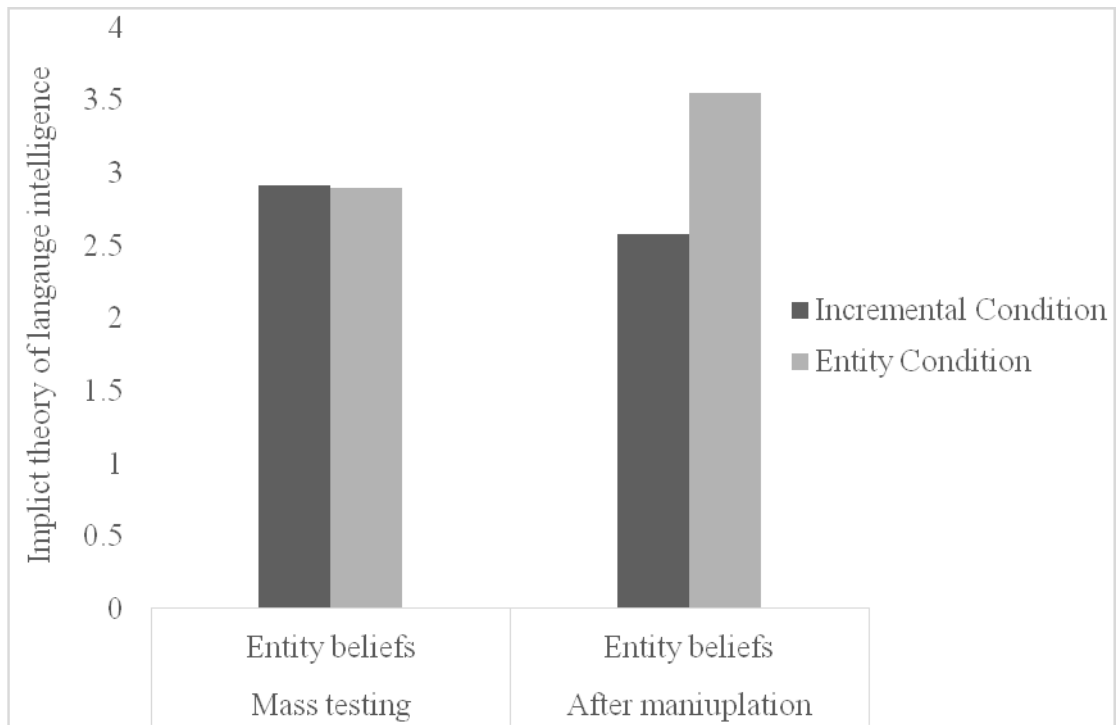


Figure 3. Interaction effect between experimental condition and perceived language competence on learning goal.

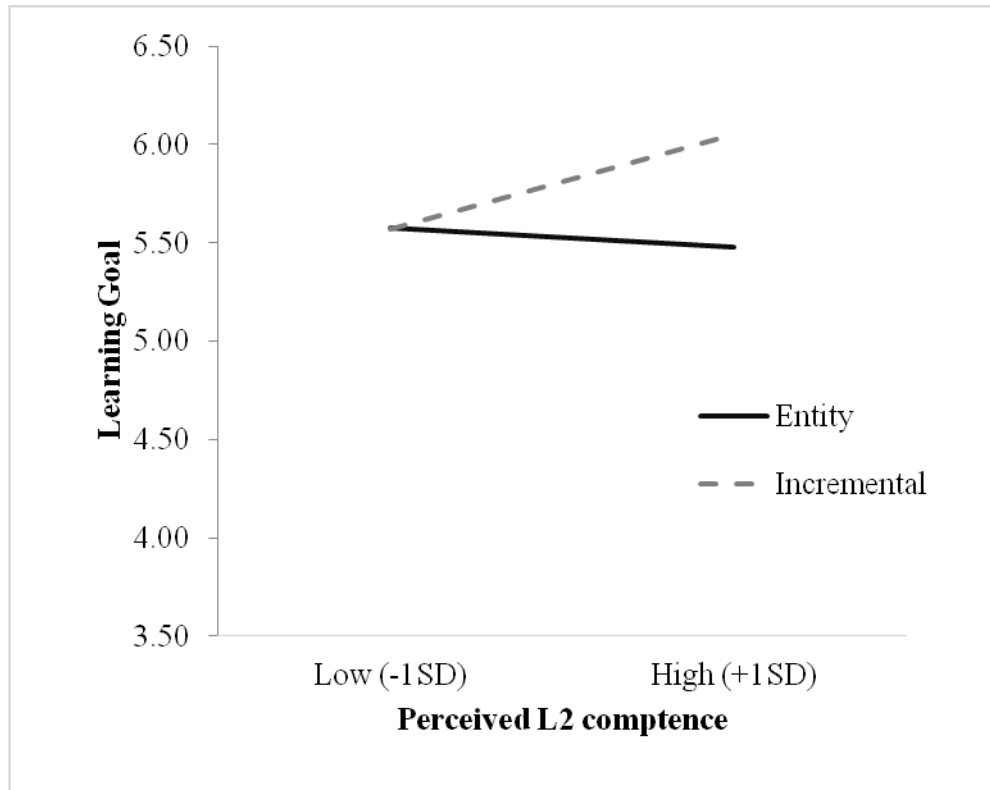


Figure 4. Interaction effect between experimental condition and perceived language competence on performance-approach goal.

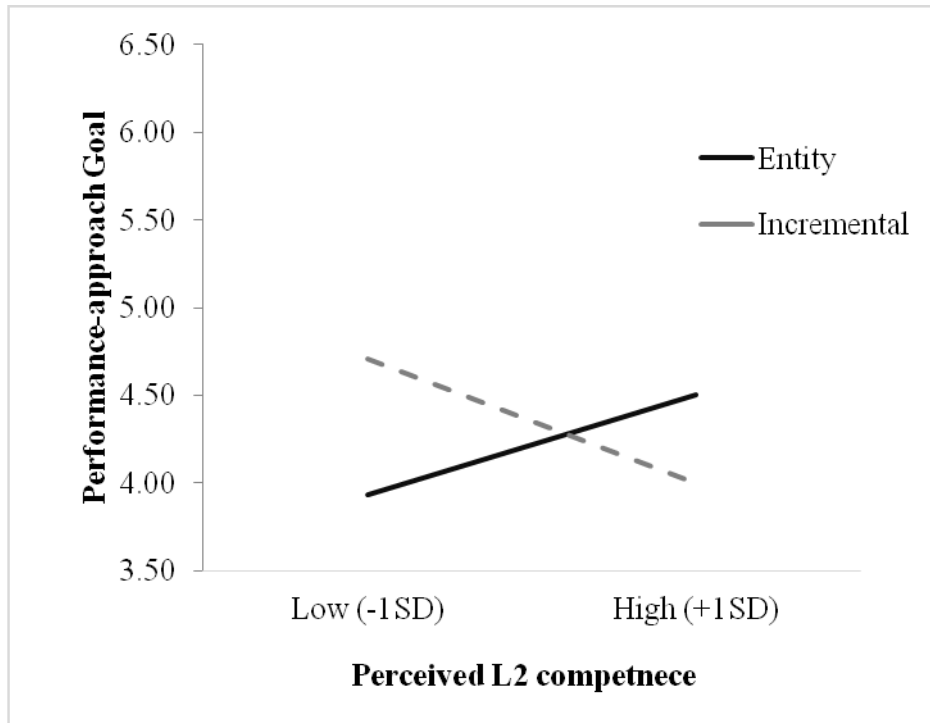
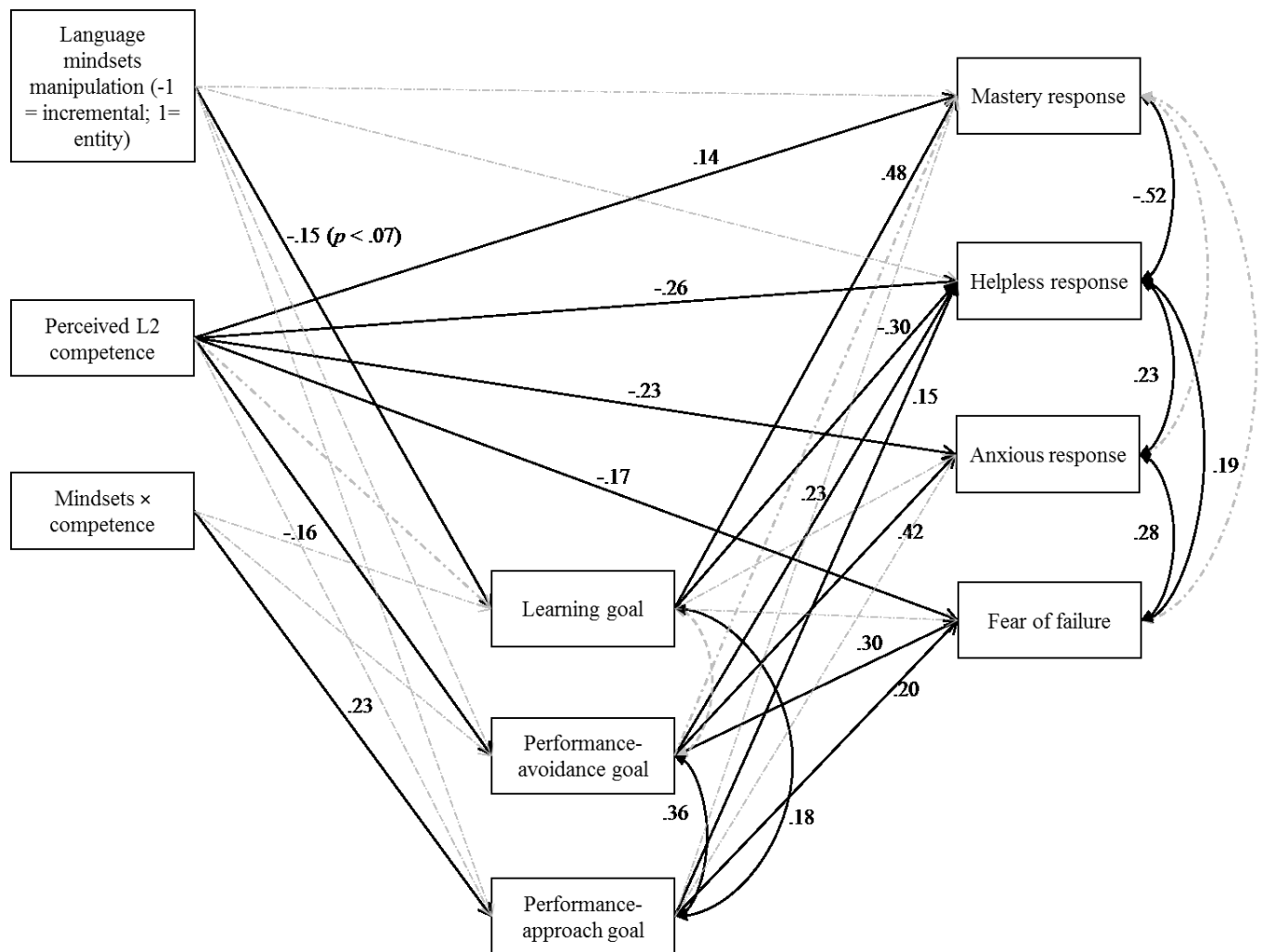
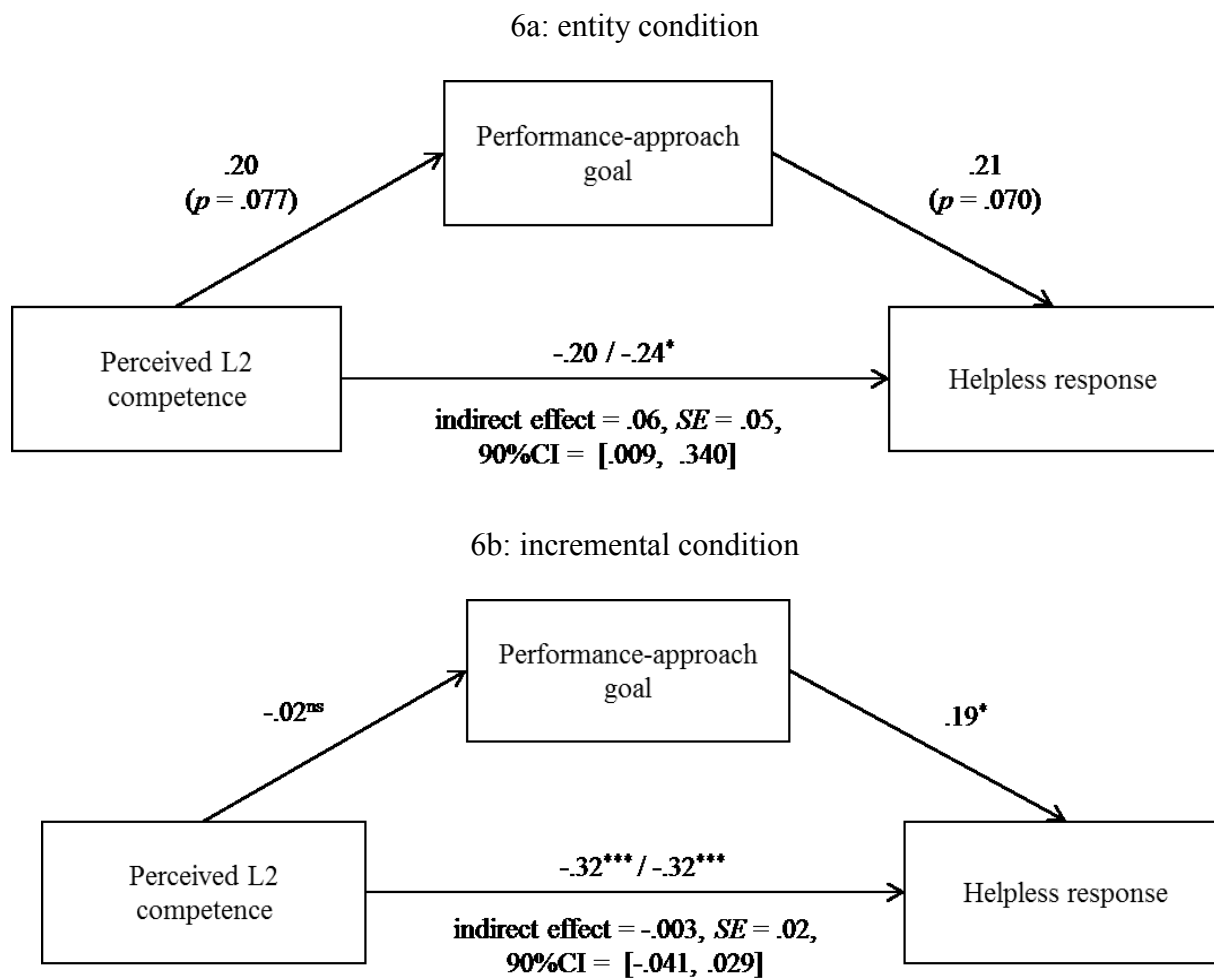


Figure 5. Path model of the “theories-goals-responses” model.



Notes. Numbers represent standardized factor loading coefficients. All the paths are significant and the path from language mindsets manipulation to learning goal is marginally significant ($p < .07$)

Figure 6. The mediating effect of perceived L2 competence to helpless responses through performance-approach goal for participants who were primed for entity theory (6a) and student who were primed for incremental theory (6b).



Note. Unstandardized regression coefficients are presented. On the bottom path, the number on the left represents the coefficient before including the mediating variable, the number on the right indicates the coefficient in the final model. Asterisks indicate the significance of the coefficients (* $p < .05$, ** $p < .01$). On the bottom path, the indirect effect is significant if the confidence interval (CI) is not included 0. The 90% confidence intervals is acceptable in these analyses because the hypothesis was specified.

Figure 7. The mediating effect of perceived L2 competence to fear of failure through performance-approach goal for participants who were primed for entity theory (7a) and student who were primed for incremental theory (7b).

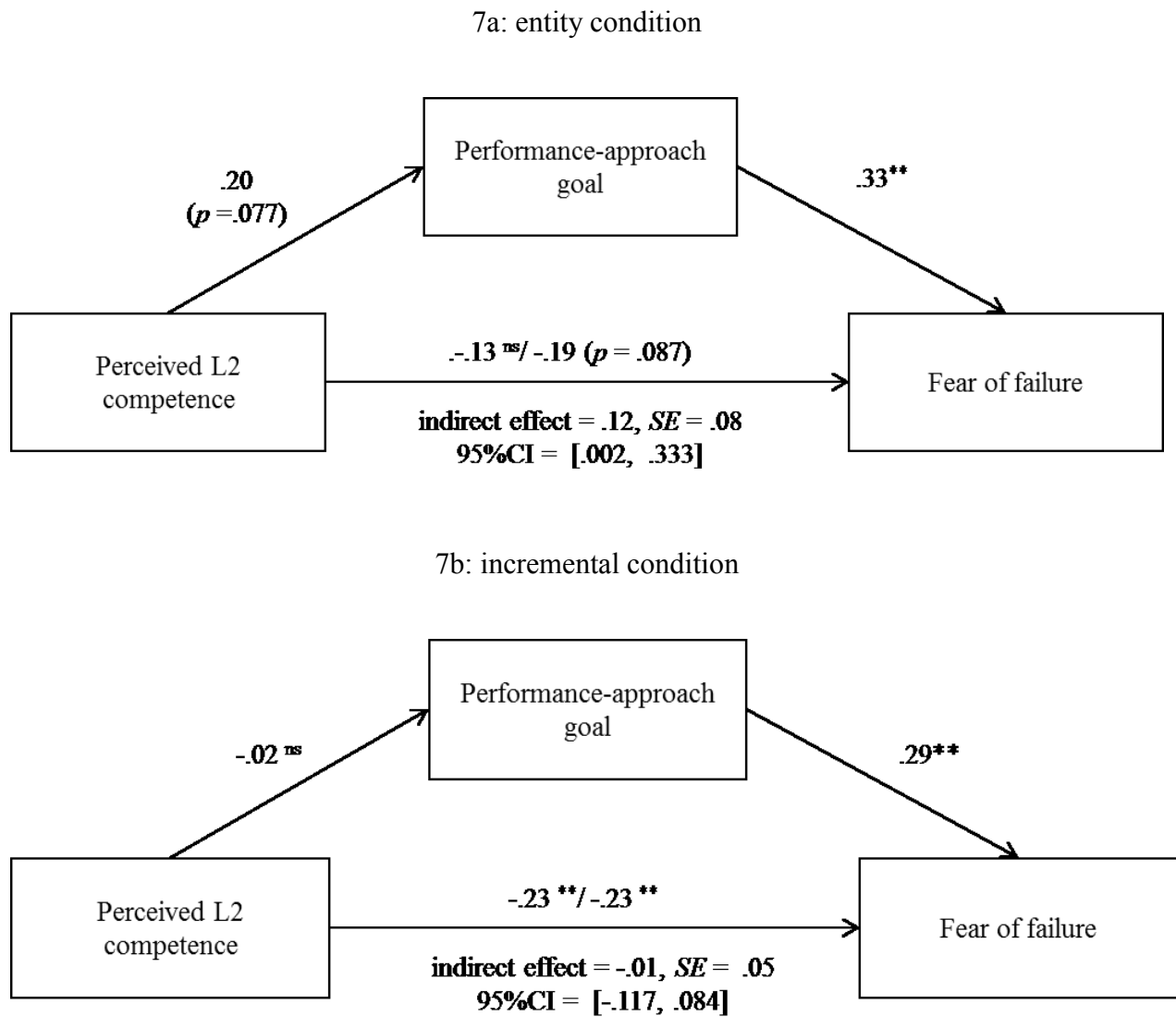
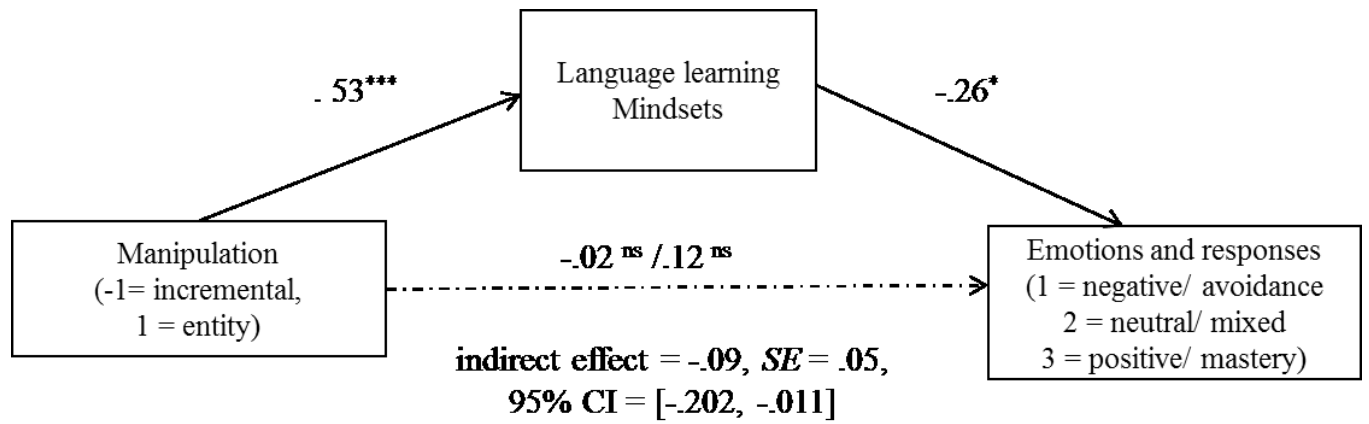


Figure 8. The mediating effect of manipulation of language learning mindsets to emotions and responses to reflective failure situation through mindsets of language learning.



Appendixes

Appendix 1a. Manipulation paper of lay theory of language intelligence – Entity condition

CROSSTALK

Psychology Today

The Origins of Language Intelligence:**Is the Nature-Nurture Controversy Resolved?**

By JEROME BERGLUND

The nature versus nurture debate about language intelligence is a controversial topic concerning the importance of innate qualities versus personal experiences in determining individual differences in language intelligence.

Adam Steagal is a gifted child. Although he is just eighteen months old, he can understand over 2000 words, has a speaking vocabulary of 500 words, and is even able to understand simple stories. Early in his life, Adam's parents had a hunch that he was unusual.

At the age of ten months old, Adam's parents brought him to University of Michigan's Unit for Language Intelligence Research (ULIR). Paula Rescorla, the director of ULIR, found that Adam had a score of 165 on language intelligence. Language intelligence refers to a person's capacity and facility to use spoken and written language in the native language, and perhaps other languages. Similar to IQ, experts consider a language intelligence score of 130 "superior." Adam's score on language intelligence is so extreme that only one person in a million has a score that even comes close. Researchers like Rescorla are keenly interested in what made Adam so smart with regards to language.

The traditional "is it heredity or is it environment?" question is battered around ULIR daily.

However, the answer is becoming increasingly clear. Current research shows that a person's language ability is either inherited or determined at a very young age. In a recent meta-analysis by Rescorla and colleagues, they showed that language learners can master another language only if they were exposed to the foreign language before 10 years of age.

In the past decade, a number of comprehensive studies have been published in the United States and in Europe. These studies provide the clearest answers so far in the ongoing debate. The most significant of these studies will be published this fall in *Psychological Review*, a prestigious psychological journal published in the United States.

John Knowles, the lead researcher of the article and a professor of psychology at Harvard, concludes that, "language intelligence appears to have a very strong genetic component. In addition, the environment seems to play an important role during the first three years of life. However, after the age of three, environmental factors such as language training, exposure to multiple languages and so on (barring brain damage) seem to have almost no influence on language intelligence."

Knowles spent the last decade following identical twins that were reared apart. Knowles located 83



pairs of twins reared separately in Latin America, Africa, and North America. The twins ranged in age from 7 to 51 and came from various economic backgrounds.

Knowles had an ideal sample to study the nature-nurture question. Many of the twins in his study were reared in different cities by parents of different social classes. The various pairs of twins came from different countries, spoke different languages, and he followed them for ten years.

Knowles found that twins raised apart had very similar levels of language ability. Twins separated at birth sometimes had small differences in language ability. Almost all of the twins in his study that were separated after the age of three, though, had essentially identical language intelligence. If one twin is fluent in language, the other was almost always equally fluent. If one twin was not-so-intelligent in language, the other twin was probably not-so-intelligent in language as well.

According to Knowles' results, up to 88% of a person's language ability is due to genetic factors. About 10% of language intelligence seems to be determined during the first three years of life. This means that language intelligence may be increased or decreased by only about two percent during most of a person's life. To support this claim, Knowles has also shown that people's language intelligence did not change much in ten years. Many things in their environment shifted in that time, but their intelligence stayed relatively constant.

According to Knowles, his results suggest that "the success of the famous writers and speakers like Shakespeare, Mark Twain, Abraham Lincoln, and Martin Luther King was probably due to their genetic make-up. Their genius was probably the results of their DNA, not their schooling, not the amount of attention their parents gave them, not their own efforts to advance themselves. These great men were probably born, not made."

Knowles found some other interesting results: people cannot learn a second language fluently even when they received sufficient exposure to the language environment. Their study with immigrants found that most immigrants from non-English speaking countries still cannot speak fluent English five years after immigration, and importantly, their second language ability is related to their language intelligence.

Other researchers are finding similar results. Joshua Kosslyn recently published an article supporting Knowles research. Kosslyn's studies show that a

person's environment does not alter his or her language ability. He found that children good at language placed in "dull" environments did not become less intelligent. Instead, they tended to take advantage of the less language intelligent people around them. Relatively lower language intelligent children placed in stimulating environments didn't seem to benefit their language ability.

Kosslyn remarked, "I set out to show that language intelligence was not genetically determined. Now my research suggests that some people do have superior genes." Their studies also suggested that people's second language ability is related to their language intelligence.

"The success of the famous writers and speakers like Shakespeare, Mark Twain, Abraham Lincoln, and Martin Luther King was probably due to their genetic make-up."

Needless to say, Knowles' and Kosslyn's research is drawing much attention from other psychologists. Leo Kamin of Princeton University is one such researcher. In the 1960s and '70, he argued strongly that there was insufficient evidence to show the link between language ability and genetics. He helped to prove that Sir Cyril Burt, a now infamous language researcher, falsified his data in order to show that language intelligence was inherited. When Burt was alive, he was knighted in England for his research. When Kamin examined Burt's results, he discovered serious

flaws that could only have resulted from faking the data.

More recent research has also been scrutinized by Kamin, including the work of Knowles. Kamin said he found no flaws in Knowles' methods or his analysis. "For me, these results are a little like finding out that the earth is round when you've spent 25 years trying to show it's flat. But I am a scientist first and foremost. If the best research shows that language intelligence is more or less genetically determined, I will accept that fact."

Paula Rescorla at University Michigan's ULIR is excited about Kosslyn's and Knowles' results. "It is about time we realize that language intelligence is a genetically-determined ability. The societal ramifications are huge. It will help identify those who would benefit from specialized training. In addition, we can help less language intelligent people find environments that won't frustrate them. We can put them into not-threatening environments that match their skills."

Based on this research, it would appear that Adam Stegal has a promising future ahead. If what the researchers say is true, there is a good chance that Adam is destined to be a good speaker, leader, mediator or writer in about the year 2030. We can only hope that he will use this language ability not to control us, but to help us find the ideal environments Rescorla described.

Jerome Berglund is a free-lance writer from Ann Arbor, Michigan. He is a frequent contributor to Psychology Today

The Origins of Language Intelligence:

Is the Nature-Nurture Controversy Resolved?

By JEROME BERGLUND

The nature versus nurture debate about language intelligence is a controversial topic concerning the importance of innate qualities versus personal experiences in determining individual differences in language intelligence.

Adam Steagal is a gifted child. Although he is just eighteen months old, he can understand over 2000 words, has a speaking vocabulary of 500 words, and is even able to understand simple stories. Early in his life, Adam's parents had a hunch that he was unusual.

At the age of ten months old, Adam's parents brought him to University of Michigan's Unit for Language Intelligence Research (ULIR). Paula Rescorla, the director of ULIR, found that Adam had a score of 165 on language intelligence. Language intelligence refers to a person's capacity and facility to use spoken and written language in the native language, and perhaps other languages. Similar to IQ, experts consider a language intelligence score of 130 "superior." Adam's score on language intelligence is so extreme that only one person in a million has a score that even comes close. Researchers like Rescorla are keenly interested in what made Adam so smart with regards to language.

The traditional "is it heredity or is it environment?" question is battered around ULIR daily. However, people who take the side that language intelligence is

genetically determined are going to be believed less and less. Current Research shows that language intelligence can be increased substantially by environmental factors.

In the past decade, a number of comprehensive studies have been published in the United States and in Europe. These studies provide the clearest answers so far in the ongoing debate. The most significant of these studies will be published this fall in Psychological Review, a prestigious psychological journal published in the United States.

John Knowles, the lead researcher of the article and a professor of psychology at Harvard, concludes that "language intelligence appears to have a minimal genetic component. People may be born with a given level of language intelligence, but we see increases in language intelligence up to 50 points when people enter stimulating environments such as language training, exposure to multiple languages and so on."

Knowles spent the last decade following identical twins that were reared apart. Knowles located 83 pairs of twins reared separately in Latin America, Africa, and North America. The twins ranged in age from 7 to 51 and came from all economic backgrounds.

Knowles had an ideal sample to study the nature-nurture question. Many of the twins in his study were reared in different cities by parents



of different social classes. The various pairs of twins came from different countries, spoke different languages, and he followed them for ten years.

Knowles found that twins raised in different environments had very different levels of language ability. According to his results, up to 88% of a person's language intelligence is due to environmental factors. In his study, if twins were raised in the stimulating environments with motivated parents, they tended to have high language ability. Twins raised in the unstimulating environments tended to have lower language ability. In an extreme case, a young girl adopted by a college professor and his wife, who was a kindergarten teacher, had a language intelligence of 138. The genetically identical twin was raised by the real mother who was a drug addict, this girl had a language intelligence of only 85.

Although this evidence is very strong, Knowles has even more evidence which may convince skeptics. He found that people in environments that challenge their language learning showed substantial increases in their

language intelligence during the ten year study. Children and adults who were in language stimulating environments had increases in language intelligence from 15 to 48 points. People who were in unstimulating environments showed slight drops in their language ability.

According to Knowles, his results suggest that “the success of famous writers and speakers like Shakespeare, Mark Twain, Abraham Lincoln, and Martin Luther King was probably due to challenging environments. Their genius had little to do with their genetic structure. These men are truly admirable because they were challenged on language learning and worked to overcome obstacles.”

Knowles found some other interesting results: people can learn a second language fluently if they received sufficient exposure to the language environment. Their study with immigrants found that most immigrants from non-English speaking countries can speak fluent English five years after immigration if they have strong motivation, and importantly, their second language ability is not related to their language intelligence.

Other researchers are finding similar results. Joshua Cohen recently published an article supporting Knowles research. His studies show that a person’s level of motivation can have a profound effect on language ability and second language ability. He found that children good at language placed in “dull” environments tended to become less competent in communication unless they were motivated to learn. Relatively less linguistically intelligent children

placed in stimulating environments appeared more competent in communication, especially if they were rewarded for learning. The same, if students expose enough time to the second language environment their second language ability enhance.

Cohen said, “I spent much of my life believing that language intelligence was genetically determined. Now my research suggests that people do not have superior genes regarding to language intelligence.”

“The success of famous writers and speakers like Shakespeare, Mark Twain, Abraham Lincoln, and Martin Luther King was probably due to challenging environments.”

Needless to say, Knowles’ and Cohen’s research is drawing much attention from other psychologists. Leo Kamin of Princeton University is one such researcher. In the 1960s and ’70, he argued strongly that there was insufficient evidence to show the link between language ability and genetics. He helped to prove that Sir Cyril Burt, a now infamous language researcher, falsified his data to show that language intelligence was inherited. When Burt was alive, the Queen of England knighted him for his “brilliant” research. When Kamin examined Burt’s results, he discovered serious flaws that could only have resulted from faking the data.

This has led Kamin to be a bit careful before accepting any language intelligence findings as the “truth”. Consequently, more recent research has also been

scrutinized by Kamin, including the work of Knowles. Kamin said he found no flaws in Knowles’ methods or his analysis. Kamin went on to say, “finally, the best available research shows what I have been arguing for 25 years. Knowles’ research is convincing, and it shows that language intelligence can be increased by stimulating environments.”

Paula Rescorla at University Michigan’s ULIR is excited about Cohen’s and Knowles’ results. “I think two absolutely critical things have come out of these studies. The first is that language intelligence is something that motivated people can acquire. The second is that language intelligence is not as important as some people think it is. These ideas will revolutionize education in the 21st century. We can help motivated children find environments that will help them increase their language ability, and when someone shows little interest in language learning, we can help them find environments that stimulate them in other ways.”

The eighteen month-old genius Adam Steagal seems to be in the ideal environment Rescorla described. His young brilliance is being challenged by enriched language learning environment, his parents and grandparents. Apparently, whether he will be brilliant in language when he grows up is largely his choice. It depends on whether he chooses to develop his language intelligence or not.

Jerome Berglund is a free-lance writer from Ann Arbor, Michigan. He is a frequent contributor to Psychology Today

Appendix 2. Perceived Second Language Competence (Can-do list, Clark, 1981)

Subscales examined perceived proficiency in L2 speaking (10 items), L2 reading (5 items), L2 writing (8 items), and L2 comprehension (9 items).

Instructions: Read each statement and select the answer that most accurately describes your current ability or skill in [L2]. Indicate how often you would be able to successfully carry out the communication activities described below (1= rarely or never, 2= frequently , 3= most of the time , 4= always).

1. On the telephone, understand a native [L2] speaker who is speaking slowly and carefully (i.e., deliberately adapting his or her speech to suit you).
2. Understand two native [L2] speakers when they are talking rapidly with one another.
3. In face-to-face conversation, understand a native [L2] speaker who is speaking slowly and carefully (i.e., deliberately adapting his or her speech to suit you).
4. In face-to-face conversation, understand native [L2] speakers who are talking to you as quickly and colloquially as they would to another [L2] speaker.
5. Understand very simple statements or questions in [L2] (“Hello,” “How are you,” “What is your name,” “Where do you live,” etc.).
6. Understand [L2] movies without subtitles.
7. Understand play-by-play descriptions of sports events on radio.
8. Understand news broadcasts on the radio.
9. Buy clothes in a department store.
10. Describe the educational system of your home province in some detail.
11. Describe the role played by parliament in the Canadian government system.
12. Order a complete meal in a restaurant.
13. Talk about your favorite hobby at some length, using appropriate vocabulary.
14. Give a brief description of a picture (e.g., photograph or picture in an art gallery) while looking at it.
15. Count to 10 in [L2].
16. Give directions in the street.
17. Understand cooking directions, such as those in a recipe.
18. Understand newspaper headlines.
19. Read personal letters or notes written to you in which the writer has deliberately used simple words and constructions.
20. Read popular novels without using a dictionary.
21. Read personal letters or notes written as they would be to a native speaker.
22. Make out a shopping list.
23. Fill out a job application form requiring information about your interests and qualifications.
24. Write a letter to a friend.
25. Leave a note for somebody explaining where you will be or when you will come home.
26. Write an advertisement to sell a bicycle.

Notes: [L2] was replaced by the name of the language class that participants were taking

Appendix 3. Goal orientations

Adapted from Elliot & M. Church (1997)

Performance-approach goal

1. It is important to me to do better than the other students in my [L2] class.
2. My goal in this [L2] class is to get a better grade than most of the students.
3. I am striving to demonstrate my ability relative to others in this [L2] class.
4. I am motivated by the thought of outperforming my peers in this [L2] class.
5. It is important to me to do well compared to others in this [L2] class.
6. I want to do well in this [L2] class to show my ability to my family, friends, advisors, or others.

Performance-avoidance goal

1. I often think to myself, "What if I do badly in this [L2] class?"
2. I worry about the possibility of getting a bad grade in this [L2] class.
3. My fear of performing poorly in this [L2] class is often what motivates me.
4. I just want to avoid doing poorly in this this [L2].
5. I'm afraid that if I ask my TA or instructor a "dumb question, they might not think I'm very smart.
6. My goal for this [L2] class is to avoid performing poorly."

Learning goal

1. I want to learn as much as possible from this [L2] class.
2. It is important for me to understand the content of this [L2] course as thoroughly as possible.
3. I hope to have gained a broader and deeper knowledge of [L2] when I am done with this [L2] class.
4. I desire to completely master the material presented in this [L2] class.
5. In a [L2] class like this, I prefer course material that arouses my curiosity, even if it is difficult to learn.
6. In a [L2] class like this, I prefer course material that really challenges me so I can learn new things.

Notes: [L2] will be replaced by the name of the language class that participants are taking

Appendix 4. Responses in failure situation scale (mastery, helpless, and anxious responses)

Instruction: Following I provide several scenarios that may happen to you. Imagine what you will react when you are in such situations. There is no right or wrong answers of the following questions.

Situation 1. Imagine that you are in a room with several [L2] speakers. You just heard a joke from one of them and everyone in the room is laughing but you totally didn't understand the joke.						
What is the likelihood that you will just leave the room or just ignore their speaking?	very unlikely			very likely		
	1	2	3	4	5	6
What is the likelihood that you will keep listening to their talk and try to understand their talking?	very unlikely			very likely		
	1	2	3	4	5	6
How anxious/concerned would you be under this situation?	very unconcerned			Very anxious		
	1	2	3	4	5	6

Situation 2. Imagine that you are in a [L2] classroom with native L2 teachers. You just hear an important announcement, but you are not very clear what the teacher said.						
What is the likelihood that you will ignore the announcement?	very unlikely			very likely		
	1	2	3	4	5	6
What is the likelihood that you will raise your hand and ask the teacher for clarification?	very unlikely			very likely		
	1	2	3	4	5	6
How anxious/concerned would you be under this situation?	very unconcerned			Very anxious		
	1	2	3	4	5	6

Situation 3. Imagine that you are at a fast food restaurant in the country where the [L2] is spoken and you are placing the order with the cashiers who cannot understand English, so you order in [L2], but the cashiers there does not understand your order.						
What is the likelihood that you will change to another restaurant where you could use English.	very unlikely			very likely		
	1	2	3	4	5	6
What is the likelihood that you will keep trying to use the [L2] order your food in different way.	very unlikely			very likely		
	1	2	3	4	5	6
How anxious/concerned would you be under this situation?	very unconcerned			Very anxious		
	1	2	3	4	5	6

Situation 4. Imagine that you are in a [L2] Club. The organizer asks students to form several groups for discussion. But you are left out probably because your [L2] is not as good as the others.						
What is the likelihood that you won't take part in the club again?	very unlikely			very likely		
	1	2	3	4	5	6
What is the likelihood that you will keep going to the club and try to try to learn from the others.	very unlikely			very likely		
	1	2	3	4	5	6
How anxious/concerned would you be under this situation?	very unconcerned			Very anxious		
	1	2	3	4	5	6

Situation 5. Imagine that you are in a [L2] class one day. The professor asks a particular question. A few students, including yourself, raise their hands to answer the question. Assume that the professor didn't choose you because he/she thinks your [L2] is not good enough to express your ideas.						
What is the likelihood that you won't raise your hand again?	very unlikely			very likely		
	1	2	3	4	5	6
What is the likelihood that you will get prepare and meet with the professor?	very unlikely			very likely		
	1	2	3	4	5	6
How anxious/concerned would you be under this situation?	very unconcerned			Very anxious		
	1	2	3	4	5	6

Situation 6. Imagine that you are going out and a few foreigners from the country where your [L2] is spoken ask for help because they lost their way to their hotel. You use [L2] to point them the way but all of them get confused because they didn't understand your [L2].						
What is the likelihood that you won't help [L2] foreigners speaking again?	very unlikely			very likely		
	1	2	3	4	5	6
What is the likelihood that you would better prepare yourself to help the [L2] speaking foreigners in the future?	very unlikely			very likely		
	1	2	3	4	5	6
How anxious/concerned would you be under this situation?	very unconcerned			Very anxious		
	1	2	3	4	5	6

Situation 7. Imagine that the L2 class that you are in is having a large group discussion. The professor invites the native speakers to the class and you have to discuss with them. They obviously don't understand you while you are expressing your opinion because you cannot speak it fluently.						
What is the likelihood that you will ignore the discussion and do your own task?	very unlikely			very likely		
	1	2	3	4	5	6

CHANGING LANGUAGE MINDSETS

What is the likelihood that you will keep expressing your opinion?	very unlikely			very likely		
	1	2	3	4	5	6
How anxious/concerned would you be under this situation?	very unconcerned			Very anxious		
	1	2	3	4	5	6

Situation 8. Imagine that the L2 class that you are in is having a voluntarily activity that students exchange their writing and provide comments. The first time, you received a comment from your classmate which have one sentence, “your writing is hard to understand.”						
What is the likelihood that you won’t take part in this voluntarily exchange writing activity again?	very unlikely			very likely		
	1	2	3	4	5	6
What is the likelihood that you will seek outside help/practice before the next class?	very unlikely			very likely		
	1	2	3	4	5	6
How anxious/concerned would you be under this situation?	very unconcerned			Very anxious		
	1	2	3	4	5	6

Notes: [L2] will be replaced by the name of the language class that participants are taking

Appendix 5. Implicit theory of language intelligence scale

Instructions: Below are a number of statements about language intelligence, language Intelligence is the capacity to use spoken and written language, your native language, and perhaps other languages, to express what's on your mind and to understand other people. People with high language intelligence display a facility with words and languages. They are typically good at reading, writing, telling stories.

Please rate how much you personally agree or disagree with these statements. There is no right or wrong answers. I are interested in your ideas.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

Beliefs bout general language intelligence (GLB):

1. You have a certain amount of language intelligence, and you can't really do much to change it.
2. Your language intelligence is something about you that you can't change very much.
3. To be honest, you can't really change your language intelligence.
- *4. No matter who you are, you can significantly change your language intelligence level
- *5. You can always substantially change your language intelligence.
- *6. No matter how much language intelligence you have, you can always change it quite a bit.

Beliefs bout second language learning (L2B):

1. To a large extent, a person's biological factors (e.g. brain structures) determine his or her abilities to learn new languages.
2. It is difficult to change how good you are at foreign languages.
3. Many people can never do well in foreign language even if they try hard because they lack natural language intelligence.
- *4. You can always change how your foreign language ability.
- *5. In learning a foreign language, if you work hard at it, you will always get better.
- *6. How good you are at using a foreign language will always improve if you really work at it.

Beliefs about age sensitivity and language learning (ASB):

1. How well a person speaks a foreign language depends on how early in life at he/she learned it.
2. People can't really learn a new language well after they reach adulthood.
3. Even if you try, the skill level you achieve in a foreign language will advance very little if you learn it when you are an adult.
- *4. Everyone could do well in foreign language if they try hard, whether they are young or old.
- *5. How well a person learns a foreign language does not depend on age; anyone who works hard can be a fluent speaker in that language
- *6. Regardless of the age at which they start, people can learn another language well.

Note: * These items are incremental theories.