[TITLE HERE]

The ability for individuals to accurately monitor the progress of their own learning is critical for the successful retention of new information, as effective monitoring allows individuals to maximize retention by adjusting their study strategies (Nelson & Narens, 1990). Metacognitive judgments (i.e., having individuals make judgments about their memorial abilities) can be used to obtain information about the learning process. The Judgment of Learning (JOL) task is a commonly used metacognitive judgment paradigm. In a standard JOL task, individuals are asked to estimate their likelihood of correctly retrieving a target word if shown only the cue on a later memory test. These estimates can be elicited using several types of measurement scales (e.g., Likert Scales or binary “yes-no” responses; Hanczakowski, Zawadzka, Pasek, & Higham, 2013), however, JOLs are commonly elicited using a continuous 0 to 100 scale representing the percent likelihood of the target item being successfully recalled at test (e.g., 100% = definitely would remember; 0% = definitely would not remember). The use of a 100 point scale is beneficial because it allows for an easy comparison between predicted recall (via JOLs) and the proportion of items that are correctly recalled at test.

Though JOL ratings can be accurate and well calibrated with recall, various factors have been demonstrated to show discrepancies between predicted and actual performance. These include perceived ease in identical cue-target word pairs (Castel, McCabe, and Roediger, 2007), increase in time spent studying word pairs (Koriat & Ma’ayan, 2005), [EXAMPLE; CITE], [EXAMPLE; CITE], and both the direction and magnitude of associative relationships between the cue-target study pairs (Koriat & Bjork, 2005; Maxwell & Huff, in press). In the study done by Castel et al. (2007), they found an illusion of competence for identical word pairs. Participants in Experiment 1 of this study were given a mix of strongly related, weakly related, unrelated, and identical cue-target word pairs and were asked to study the words and provide JOL ratings. The participants were later asked to recall the word pairs, and their JOL ratings were compared with their recall rates. The results showed an illusion of competence for the identical word pairs which could have been because the participants perceived the identical pairs to be easier compared to the other pairs and thus spent less time studying them or because the participants didn’t encode the identical pairs as deeply because they thought they would be easier to recall (Castel et al., 2007). In the study done by Koriat & Ma’ayan (2005), they found that when participants were allowed to self-pace their study of the word pairs, that the pairs they spent more time studying tended to show a decrease in JOL rating. The decrease in JOLs could be because the participants felt that the longer it took them to study the word pair the harder it would be for them to remember the pair later. Studies done by Koriat and Bjork (2005) and Maxwell and Huff (in press) found that associative strength and direction of cue-target word pairs had an effect on JOL ratings and recall. In the Koriat and Bjork study (2005), a mixture of weakly associated, strongly associated, and unrelated word pairs was used in Experiment 1 and a mixture of forward associated, backward associated, and unrelated word pairs was used in Experiment 2. In Experiment 1 it was found that even a weak association prevented an illusion of competence when compared with the unrelated pairs, and in Experiment 2 it was found that the backward associated word pairs had a large illusion of competence compared to the forward associated word pairs (Koriat & Bjork, 2005). In the study done by Maxwell and Huff (in press), they expanded on the results of Koriat & Bjork (2005) by looking at symmetrical word pairs. They replicated the illusion of competence found in backward associated word pairs and also found a small illusion of competence shown for the symmetrical word pairs. The present study further contributes to this area by manipulating the encoding strategies used by the participants. In our study, we had participants study the word pairs using either a relational encoding strategy, an item-specific encoding strategy, or a read encoding strategy which served as a control. For the relational encoding strategy, we had participants study the word pairs by thinking about how the two words were related (ex. cat-turtle, cats and turtles can both be pets). For the item-specific encoding strategy, we had participants study the word pairs by thinking about how the two words were different (ex. cat-turtle, cats are mammals while turtles are reptiles). For the read strategy, we simply had participants read the pairs silently. MENTION THE DIFFERENT ENCODING MANIPULATIONS]

[TRANSITION – SUMMARIZE EARLY WORK BY ARBUCKLE AND CUDDY] One of the first studies to evaluate metacognition through the use of ratings was done by Arbuckle and Cuddy in 1969. For Experiment 1, participants were asked to study letter pairs and say “yes” or “no” to predict if they believed they would remember the pair, then participants were asked to later recall the pairs and say whether their answer was “right” or “wrong”. The study found that participants were, on average, over 60% right in their predictions of their recall. Arbuckle and Cuddy (1969) concluded that participants were able to understand how difficult each pair would be to remember and adjusted their predictions accordingly and that there was a connection between the participants predictions, recall, and the strength of the association in the pairs.

[NEW PARAGRAPH ON KORIAT AND BJORK, CASTEL ET AL.]

[NEW PARAGRAPH ON MAXWELL AND HUFF, TALK ABOUT EXTENSION TO OTHER PAIR TYPES, CALIBRATION PLOTS, DELAYED MANIPULATION] The current study is modeled after a study done by Maxwell and Huff (in press). [I mentioned the extension to other pair types previously, should I mention it again?] In the Maxwell and Huff (in press) study, they evaluated participants’ metacognition through the use of associative cue-target word pairs and JOLs. The word pairs used were a mix of forward associative pairs, backward associative pairs, symmetrical associative pairs, and unrelated pairs. They found that participants JOL ratings for forward associative pairs were pretty well calibrated with their recall for the pairs. Unrelated and backward associative pairs were not very well calibrated, with the backward associative pairs showing a very large illusion of competence. The symmetrical associative pairs were a novel contribution, and they found that there was an illusion of competence displayed for symmetrical pairs even though there was an association in both directions for the pairs. Maxwell and Huff (in press) also created calibration plots to show whether participants were overconfident, where recall rates were lower than JOL ratings, or underconfident, where recall rates were higher than JOL ratings, for each of the pair types. Participants tended to be underconfident with forward associative pairs, but overconfident for all other pair types with backward associative pairs have the highest overconfidence. [ADD DELAYED MANIPULATION].

**Item-Specific-Relational Framework**

[OVERVIEW] In a study done by Hunt and Einstein (1981), they evaluated two different types of encoding strategies: relational processing and item-specific processing. They found that relational and item-specific processing can both be beneficial to memory, but that relational processing has a higher benefit for unrelated word pairs and item-specific processing has a higher benefit for related word pairs (Hunt & Einstein, 1981). Hunt and Einstein (1981) also found that the benefits of these processing types are dependent on the context of the words being studied. The example given in their study was that thinking about the color of the word pairs could either serve to relate the words (ex. blueness can relate ocean and blueberries) or to separate the words (ex. blueness can differentiate blueberries from strawberries). [ADD MORE ABOUT THIS STUDY]

As such, the present study…. [SUMMARIZE HYPOTHESES] seeks to reduce the illusion of competence found for backward word pairs through the use of relational and item-specific processing and through the use of warnings about the illusion of competence. Our hypothesis is that the item-specific processing will reduce the illusion of competence for the backward associative pairs because it will force the participants to create an association instead of relying on the weak association of the backward pair. Our hypothesis is also that by providing warnings to the participants that illustrate the illusion of competence found for backward word pairs that they will be more aware of the JOL ratings they provide for those pairs, and thus further reduce the illusion of competence.