The Effects of Creating a Cooperative or Competitive Environment on Social Sentence Comprehension

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Introduction:

It can be argued that social interactions rule the world. Animals are distinctly social creatures, and none are quite as social as human beings. The ability to successfully socially interact with other people is an incredibly necessary skill for humans, which has been demonstrated to occur at an incredibly early stage in human development .For example, recent research has demonstrated a direct link between the emotional displays of one person and the emotional response of the observer (Niedenthal, 2007). In fact, researchers Yamada et al. (2011) found neurological evidence to support an integrated representation of observed and personal emotions.

Researchers Lanzetta & Englis (1989) observed people in a complex social interaction in which they created the expectation of cooperation or competition. They found a direct correlation between the expected relationship, and participants’ physiological reactions to coactors emotional expressions; in other words, the high-level social expectations of the subject influenced their autonomic low-level reactions. This suggests the direct integration of social situations into the perception and action systems of the body.

The fascination with the psychology basis of social interactions is obviously not a passing trend. Researchers Reuschemeyer et al. (2015) also conducted a study on social interactions from a neurobiological and behavioral standpoint. Participants were presented with information that was both plausible to them and another participant in the room, they were more accurate in determining their own ability to understand the information than their co-participant’s ability. However, when presented with information that was implausible to both them and the other participant, they showed higher accuracy determining the co-participant’s ability to understand the plausibility of sentences presented. The findings of Rueshemeyer et al. highlight the influence of social interaction involved in tasks as simple as sentence comprehension.

For this study we combined the purposes of Reuschemeyer et al. (2015) and Lanzetta & Englis (1989) to determine the effect of a cooperative or competitive scenario on subjects’ behavioral reactions. We created a cooperative and a creative scenario between one participant and one confederate through the use of a game. We then tested participants’ comprehension of plausible, implausible, and contextual sentences (sentences in which the plausibility relied on the context provided by a previous sentence), as well as their belief of the confederate’s comprehension. We hypothesized that the cooperative or competitive perspective of the participant would influence their accuracy on these questions.

Methods:

Procedure

Subjects entered the testing room where the confederate and experimenter were already seated. Subjects were told that the confederate was their fellow subject and had arrived early and already filled out a consent form. Subjects then completed a consent form. Confederates were designated as competitive or cooperative before the experiment began, which determined the following procedures. In the cooperative setting participants were seated next to each other at a table in front of a tower of JengaTM blocks. They were informed that they would be working together as a team in a game of JengaTM, having five minutes to pull out as many blocks as possible and place them on top of the tower. The experimenter counted the blocks pulled out, and they received a prize of candy if they pulled out 15 blocks; if they pulled out 25 blocks the prize was doubled. An additional JengaTM tower was provided if the first one fell before the five minutes were up.

In the competitive condition the subject was placed across the table from the confederate, each person had their own Jengatm tower. They had five minutes to pull out as many tiles as possible and place them into a bin provided by the experimenter. There was an additional tower provided for each participant to use in case their first tower fell before the five minutes were completed. Once time was completed the experimenter counted the blocks removed. The winner received a candy prize.

After the JengaTM game the participant was moved into another room and seated in front of a computer screen. They were told that they would be receiving a sentence comprehension task. The sentence comprehension task was taken from Reuschemeyer et al. (2015), with a few sentence stimuli being altered to fit the needs of our study. A sentence was displayed on the screen for both the confederate and the subject to see. This sentence was displayed in three parts, with the final part being the critical word of the sentence. There were two categories of sentences shown, plausible and implausible. An example of a plausible sentence would be “The zookeeper saw the turtle”, while an example of an implausible sentence would be “The coffee tasted like steak”. Additionally, subjects were told that one of them had been randomly chosen to wear headphones to receive additional information. In reality, the subject had previously been chosen to always wear the headphones. Before each sentence was shown to both the subject and confederate on the screen, the subject heard an additional sentence that either made the following sentence implausible or did not change the plausibility of the following sentence. For example, the subject heard “In the dream, nothing tasted like it should” and then saw on screen, “The coffee tasted like steak”. In this case the viewed sentence was plausible because of the additional information provided by the auditory sentence.

After each sentence provided on the screen, the subject was asked (via a question on the screen) whether they themselves found the sentence plausible or not, given the context. Subjects were instructed to press y for yes, or n for no on the keyboard in front of them with their dominant hand. Subjects then received an auditory question asking if the other participant would have found the sentence on the screen plausible, knowing that this participant did not have headphones and therefore did not receive the additional contextual sentences. They were again instructed to press y for yes and n for no on the keyboard. Subjects were told that the other participant was performing a similar task.

The experimenter then stepped out of the room, supposedly in order to explain to the other subject their task. After an appropriate amount of time, the experimenter reentered the room with the confederate and placed the confederate next to the subject in front of the screen. The subjects were instructed to press the space bar in order to begin the test.

After the sentence comprehension task was completed the subject was given a survey to complete about the cooperative and competitive aspects of the task. They were told that the confederate was completing the same survey in the other room. Finally, subjects were debriefed and released.

Stimuli

Three types of sentences were presented to participants: Plausible, Implausible, and Contextual sentences. Plausible sentences were plausible without the additional information provided auditorily to the subject. Implausible sentences were implausible even with the additional information provided auditorily to the subject. Contextual sentences were plausible only with the information provided over the headphones, and were therefore implausible to confederates. Participants were presented with six practice trials, two of each type of sentence. They were then provided with 54 experimental trials, with equal numbers of Plausible, Implausible, and Contextual sentences. The order of these sentences was counterbalanced. The same target word was used three times, once for each type of sentence. Each of the three parts of the sentence was presented for 1000 ms. The Context sentences were played for 5500 ms and were recorded by a member of the research team not involved with the experiment implementation. These sentences were presented and tracked using the software E-prime.

Subjects

22 subjects were utilized, of ages 18-22 and varying genders. The data of one subject was eliminated because of extreme outliers. Therefore 21 participants worth of data was analyzed. All subjects were students at Vassar College.

Survey (you can

Participants were asked to complete a survey after the sentence comprehension task was complete. They were asked a variety of questions about their experience, including how competitive or cooperative they found the situation.

Results:

Accuracy of participants’ responses was measured. Where relevant, the greenhouse-Giesser p values are reported. A three way ANOVA was conducted between perspective (self/partner), trial type (Plausible/Implausible/Contextual), and condition (Cooperative/Competitive). There is no main effect of perspective (p > 0.05) or three-way interaction between perspective, trial type and condition (p > 0.05). There is a main effect of trial type, *F*(2,38) = 4.902, *p* = 0.016, *ηp2*= 0.205, with plausible questions (*M* = 0.971, *SD* = 0.152) and implausible questions (*M* = 0.969, *SD* = 0.152) being answered more accurately than contextual questions (*M* = 0.934, *SD* = 0.154) and a trend towards an interaction between perspective and trial type (*F*(2,38) = 2.576, *p* = .096) (figure 1).

Reaction Time of participants was also measured. Where relevant, the greenhouse-Giesser p values are reported. Response times were removed from the analyzed data if they were clear outliers. A three way ANOVA was conducted between perspective (self/partner), trial type (Plausible/Implausible/Contextual), and condition (Cooperative/Competitive). There is a main effect of perspective (*F*(1,19) = 15.126, *p* = 0.001, *ηp2*= 0.443) with subjects answering questions about themselves (*M* = 1086.891, *SD*= 558.53) faster than about their partner (*M* = 2845.824, *SD* = 2271.25). There is also a main effect of trial type (*F*(2,38) = 9.237, *p* = .001, *ηp2* = 0.327) with plausible questions (*M* = 1816.075, *SD*= 1845.924) being answered faster than implausible questions (*M* = 2019.909, *SD* = 1882.55), which were answered faster than contextual questions (*M* = 2063.088, *SD* = 1904.801). There are no interactions (p > 0.05).

Survey data was analyzed with a Mann Whitney test. There is a direct correlation between the rating of cooperative or competitive by the subject and the actual experimental category the subject was placed into (*Mdn* = 8), *U* =104, *p* < 0.001. No other results were significant (*p* > 0.05). Ratings of motivation, familiarity with Jengatm and skill of the other player were the same across all experimental conditions.

References:

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Figures:

*figure 1*. Results of a 3 way ANOVA between trial type, perspective, and condition. Almost significant interaction shown between trial type and perspective (accuracy %) (p > 0.05). Standard errors are represented in the figure by the error bars.