Nonverbal Feedback Integration: A Controlled System

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Abstract

Conversations involve the exchanging of feedback, both verbal and nonverbal, and the importance of these cues is well understood. The cognitive processes used in integrating the feedback have yet to examined, especially concerning how automatic and controlled the integration of nonverbal feedback is. Participants viewed a series of pictures that made up children's stories and gave a summary of the events under various feedback conditions: positive, negative, and neutral. The speech samples were analyzed for fluency using measures of pause duration and syllable count, and there were no significant results due to the various feedback conditions. The self-report measures of fluency indicated that participants thought their fluency changed as a function of the feedback despite no observed change in fluency.

Introduction

Conversations are more than just grammatical structures harbored within the framework of language – they extend into the social arena and involve cues between both the listener and the speaker. In normal conversation there are ways of communicating, both verbally and nonverbally. One such example is the use of back-channel speech, where a listener offers verbal feedback during a speaker's pause or even interrupts the speaker. This information often involves the listener's state of understanding, thoughtfulness, or reaction and can be phrased in any number of ways such as "yeah" and "m-hmm" (Leathers, 1979, as cited in Kraut, Lewis, & Swezey, 1982). Aside from back-channel feedback there is also a nonverbal component, one which primarily relies on facial cues but also involves body movements, position, and even other factors. The simple acts of standing, breathing, or making eye contact a certain way convey information about the listener's attention and thoughts on the conversation (Bavelas, Coates, & Johnson, 2000).

While verbal feedback is important, the more subtle nonverbal cues are the focus of much of today's research. These cues, ranging from facial expressions to posture, are being quantified along with their reactions (Kleinke, 1986). This research has produced data which help paint a more detailed picture of a conversation's intricate processes. These unwritten rules are seemingly natural to us, and even young children possess these skills – even as they begin to learn and use their languages they possess the ability to read subtle facial cues to derive meaning such as attention and reaction (Moore, Cohn, & Campbell, 2001). Though the structure of nonverbal cues is apparent, the cognitive processes that control feedback integration have yet to receive significant experimental research.

One of these nonverbal cues, and the one subject to the most research, is the head nod, a near universal method of conveying a sense of understanding and acceptance. While a simple gesture, it holds the potential of making conversations more detailed and fluent than they originally were. Research has shown that feedback showing the listener is paying attention to a speaker increases the level of detail in the story, the fluency, and the overall complexity (Dickinson & Givon, 1995, as cited in Pasupathi & Rich, 2005). It is this feedback that gives the speaker a sense of what the listener is feeling, which allows for adaptation and possible elaboration in the case of listener understanding. This adaptation is a dynamic process and the very act of withholding feedback causes the speaker to become frustrated and to communicate less accurately and fluently (Feffer & Suchotliff, 1966; Kent, Davis, & Shapiro, 1978). This evidence seems to show that listener feedback is an integral part of conversations, even if the speaker does not truly need feedback to form detailed and understandable sentences.

Further evidence for this can be found in the fact that speakers visually disengage their listeners and environment and yet return their gaze at the end of the sentence as if expecting some kind of response (Beattie, 1977, as cited in Beattie & Bradbury, 1979). During this return of the speaker's gaze it is most often the case that there will be a pause and it is during this time of silence that a listener is most likely to give a response, both verbal and nonverbal (Duncan, 1974, as cited in Kraut et al., 1982). The fact that these two events occur simultaneously is no coincidence, but it is instead one of the structures of conversation that is not grammatical – instead the silence serves as a method of obtaining feedback and is therefore social in nature.

Because these events, giving and receiving feedback, occur numerous times in individual conversations, which themselves occur multiple times throughout a day, it should not be surprising that this process is very well practiced. It is possible that this process mimics that of

reading, which is performed so much that it becomes an automatic process (Stroop, 1935). The Stroop test, the most famous example of automaticity, shows this incredibly well, and it is possible that the extensive practice an individual receives during their lifetime turns feedback integration into an automatic process as well. Knowing whether or not the integration of nonverbal cues is an automatic process could help uncover the cognitive underpinnings of these various social behaviors.

It is assumed here that the integration of feedback is an automatic process, brought about through repeated interactions with others which occur multiple times a day for most individuals. To determine the relative control an individual has over feedback integration, that is whether or not feedback received is used in any way or is simply ignored, methodology simply requesting individuals to ignore feedback given can be used. A lack of feedback can lead to disfluencies in speech, but what happens when unrelated feedback is given? If feedback integration is so engrained in human behavior, much like reading is, then the irrelevance of the feedback will play no role at all in the production of disfluencies. To test the hypothesis that feedback integration is such a practiced behavior that it is automatic and uncontrolled, participants will be given irrelevant feedback during a task that produces speech, and the fluency of those utterance will be measured according to syllable count and pause duration.

Method

Participants

Thirty Georgia Institute of Technology students participated in the experiment for extra credit given in psychology classes. There were a total of 18 males and 12 females and the mean age of participants was 20 (SD = 1.6). All participants were required to have a firm grasp on the English language, although having it as a primary language was not required. Four participants did not have English as their first language but learned before the age of 4, though in the end only one of these individuals had their data used in the final analysis. Out of the 30 participants only 24 had their data used in the analysis – one had to be removed due to computer malfunction and five others failed the debriefing check.

Materials

A short questionnaire asking for demographic information was used prior to experiment for information purposes. Three children's books were scanned, had their words removed, and were then used in a computer slideshow for participants to 'read.' A final short questionnaire was used at the end of the experiment; it served several purposes, such as a feedback condition check and a source for self-reported measures.

Design & Procedure

The feedback conditions for experiment were negative, neutral, and positive. In the negative trial the experimenter shook his head which traditionally mean "no" in American culture. In the positive trial the experimenter nodded his head which traditionally mean "yes", while the neutral trial consisted of no nonverbal feedback and instead the experimenter gave the participant silent attention which served as the control. The various nonverbal feedback modes were typically given at the end of a participant's phrase when they looked back to the

experimenter, though the implementation of nonverbal feedback tended to very from person to person due to individual differences in speech patterns. It is important to note that these head nods and shakes did not come in singular exchanges, but rather in a short series which is more typical for normal conversation. At no point in the experiment did the experimenter speak. Any questions addressed to the experimenter by the participants rendered a trial void.

Prior to the experiment, participants were asked to fill out a short demographic questionnaire and were fitted with a microphone. Instructions were given that informed the participant that nonverbal feedback would be given in the three forms (positive, negative, and neutral) and that it was unrelated to their speech so they should pay attention to it but should not let it affect their fluency in any way. Likewise, participants were instructed on the use of the slideshow feature displaying the pictures and were instructed that at no time should they address the experimenter else it would render a trial void. After the instructions was a practice session which consisted of the participant being asked what their favorite class was and why; negative nonverbal feedback was given during their answers so participants knew what to expect in upcoming trials.

After instructions were given, participants viewed a children's story with the words removed on a computer using a slide show feature. The participants were able to read through the story twice if they so wished, but stopping after one read-through remained an option if the participant felt comfortable enough with the material. After the story was read the slide show was shut down so that no cues from the story could be given to the participant while they recounted their summary, which is when the experimenter gave the nonverbal feedback. This same order of events was repeated for the final two stories, at which point the final debriefing

questionnaire was administered. Feedback order was completely counterbalanced across

participants and story order remained static across all participants.

Results

The results of the debriefing questionnaire were used for two reasons: as a manipulation

check for feedback condition as well as self-report measures. Specifically, the first three

questions on the questionnaire asked participants to recount what feedback condition they were

in. These questions were then checked against the participant's actual condition and if they did

not match for any reason the data for that participant was not included in the analysis. This

debriefing check resulted in data for five participants being rendered void and a sixth set of data

was likewise voided due to computer malfunction.

The speech files collected from the remaining participants that passed the debriefing

check were first parsed into a file that consisted of the middle 30 seconds of the speech sample.

This procedure was used to remove the beginning and end of the file, which can show difficulties

and expertise with the content, respectively. These files were then analyzed in Praat, a sound

modification and analysis program, using scripts written by the academic community to analyze

both pause duration and syllable count.

The means for the pause duration proved to be very similar for all conditions (see Figure

1). The means for the syllable count showed similarity in the positive and negative feedback

conditions, though the count for the control condition showed a decreased value (see Figure 2).

This data was coded into SPSS and a paired-samples t-test was used for the analysis. For pause

duration the t-test showed non-significant results for the comparison between the negative

feedback condition and the control ($t(23) = .268$, $p > .05$) as well as between the positive

feedback condition and the control ($t(23) = .026$, $p > .05$). The same results occurred for the

comparison between the syllable count of the negative condition compared against the control

(t(23) = .707, p > .05) and the comparison between the positive condition and the control (t(23) = .708, p > .05).

However, a result did arise from the debriefing questionnaire where the self-report measures for gaze and fluency showed a trend towards conforming to the hypothesis. Nine participants reported that they looked at the experimenter more for the positive feedback condition or less for the negative feedback condition, while only two individuals reported the opposite. Likewise, for the fluency self-report measure a total of eleven participants reported increased fluency for the positive feedback condition or decreased fluency in the negative feedback condition and there were no self-reported accounts that contradicted those.

A post-hoc analysis was subsequently run on the data to determine if there were any order effects as well as gender differences in pause duration and syllable count in the various conditions. The t-test run for the order effect showed no significant differences (p > .05) between the stories, even when all permutations were considered. Differences in gender response to feedback condition were likewise found not to be present (p > .05) when the positive and negative feedback conditions were checked against the control for both pause duration and syllable count.

Discussion

The results unanimously fail to support the proposed hypothesis that nonverbal feedback integration is an automatic process, much like that of reading. These results mean that while the process is indeed practiced day in and day out it is still controlled by the individual. The cognitive resources necessary for this task would be low considering the practice the individual has received, though the load would theoretically increase should the process be manually overridden. This should cause a shift in fluency, as it is a measure of performance, though the change is so miniscule that there appears to be no difference.

While the findings were rather explicit in their possible interpretation, the methodology used here is far from perfect. Throughout the experiment a recurring issue cropped up: one of gaze. Participants had a tendency to look away from the experimenter regardless of the feedback condition and multiple individuals made eye contact only a handful of times throughout the entire process. Because their gaze was averted to something less complicated, like the wall, the resources needed to formulate the story summaries were much smaller and so fluctuations in the fluency of the utterances would likewise be much lower. This tendency to look away while feedback was given was seemingly even more extreme on the negative feedback condition; this was observed by the experimenter though it was not coded in any way. In this negative feedback condition only two or three participants engaged the experimenter visually while feedback was given. Because of this, the effects of the negative condition may have been essentially negated.

In the post-hoc analysis the lack of an order effect was promising, though whether or not that was produced by the methodology or the disengagement of participant gaze cannot be determined with the current data. The same holds true for the gender difference analysis, which

could possibly have shown a null result due to this lack of gaze and therefore lack of an overall effect on fluency of the feedback conditions.

Although the data collected painted a picture of consistent fluency in all conditions, the self-reported measures contradicted this finding. Participants believed they were more fluent and looked at the experimenter more while in a positive feedback condition and that they were less fluent and looked away from the experimenter more in the negative feedback condition. This conforms to the hypothesis, but the lack of data supporting it suggests one of two things: that the measures or methodology of the experiment were flawed or individuals are not accurate judges of their own fluency. Because the methodology did have issues, it is possible that the data and measures used did not adequately capture fluency and that it truly is as participants reported – that they are more fluent when given positive feedback and less fluent when given negative feedback.

However the possibility remains that individuals simply are not adequate judges of their fluency. A possible explanation stems from the history of reinforcement for conversations – namely, that in instances of the past when the individual's speech was filled with disfluencies it was accompanied by negative feedback and in instances where the individual was fluent it was accompanied by positive feedback. Experimental evidence shows that disfluencies can be reduced by reinforcement and by extension that they can be produced by withholding reinforcement (Marshall & Cullinan, 1971). Although in this case the feedback given had no relationship to the fluency of the participant, the feedback itself could have essentially 'evoked' this automatic tendency to assume that disfluencies are accompanied by negative feedback and vice versa, since this is how it has always been in the past.

The results from this experiment are fairly explicit, though the interesting find that self-reported measures of fluency do not conform to the actual data could prompt some interesting research. Future experiments should account for differences in gaze and possibly use a wider array of measures to capture participant fluency as well as include more self-report measures to paint a more complete picture on what individuals think about their own speech.

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    Psychology, 121(1), 15-23.

Appendix

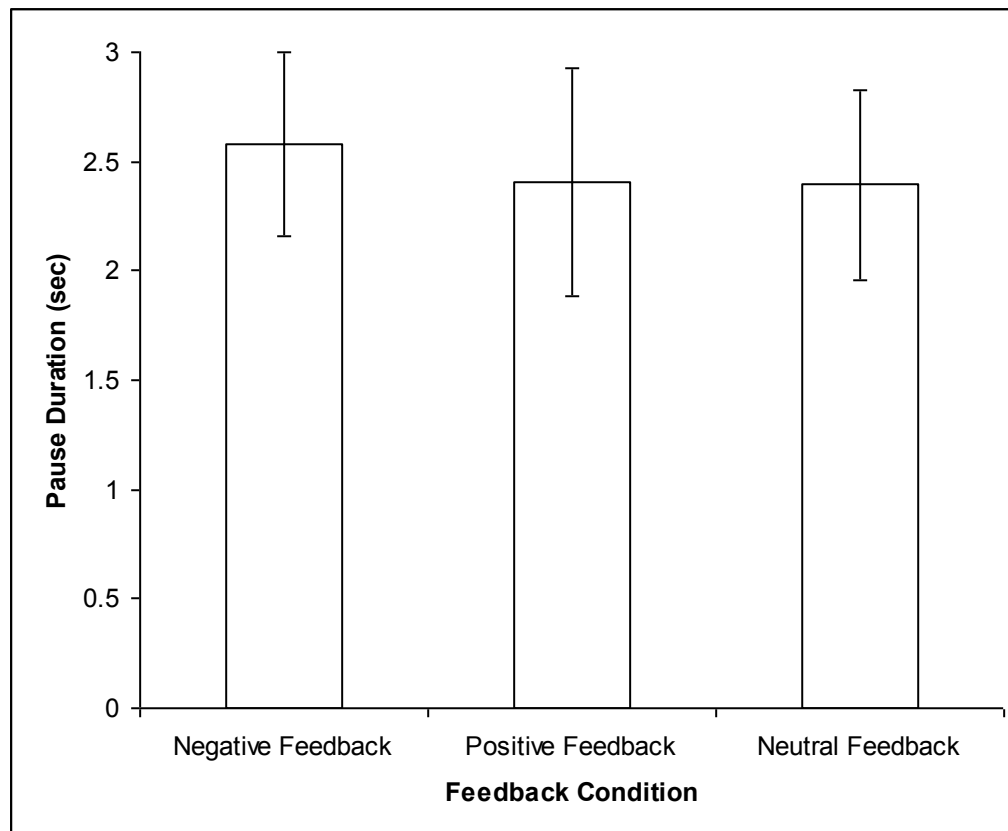Figure 1. Mean pause duration as a function of feedback condition.

Figure 2. Mean syllable count as a function of feedback condition.