NORTHERN ILLINOIS UNIVERSITY

The perceptions of personality as a function of speaking rate

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With University Honors

School of Allied Health and Communicative Disorders

By

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DeKalb, Illinois

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Capstone Approval Page

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Perceptions of personality as a function of speaking rate

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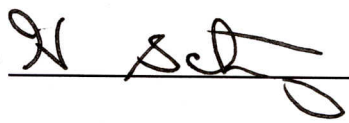
Faculty Approval Signature 

Department of (print or type) Communication Disorders

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ABSTRACT:

The purpose of this study was to determine how listeners judge various attributes of a speaker based upon their perception of the speaker's speaking rate. The characteristics of interest included: intelligence, competence, physical relaxation, emotional relaxation, and employability. Speech samples were recorded for four student volunteers while describing five different pictures using a fast speaking rate, typical speaking rate, and slow speaking rate. The subjects participating in this study were from a large undergraduate class. The recorded audio samples were played to the subjects, and after each recording the subjects answered five questions using a standard scantron. Results indicated that as speaking rate increased the reported positive results for all five attributes generally increased. Findings of this study suggested a potential clinical application for various individuals with communicative disorders who are taught to modify their speaking to improve their ability to communicate (e.g. persons who stutter).

INTRODUCTION

According to researchers, the human voice has been identified as the most significant cue associated with a person's judgments of personality characteristics (McArthur and Robinson, 1981). Characteristics of the human voice can be divided into two sources: verbal and vocal (Apple, Krauss, Streeter, 1979). The verbal portion is associated with the linguistic content while the vocal portion is associated with variations in pitch, speech rate, and loudness (Apple et al., 1979). Because people's perceptions of speakers are associated with these vocal cues, a number of experiments were completed to explore the relationship between vocal characteristics and judgments of personality.

Brown, Strong, and Rencher (1973) found that perceptions of speech rate were associated with the characteristics of benevolence and competence. In their experiment, two male voices were synthesized using a computer program and speaking rates were varied as a function of a typical speaking rate. This experiment revealed that speakers using slower speaking rates resulted in a decrease in the perception of competency and benevolence. When the rate of speech was increased, the primary effect was a decrease in the perception of benevolence but an increase in the perception of competency. Smith, Brown, Strong, and Rencher (1975) wanted to test the validity of Brown et al.'s experiment because this study used a limited number of speaking rates and only used two male voices. Smith et al. (1975) used seven speakers and 54 synthetic speaking rates to create vocal recordings. For each recording, the normal rate of speech was increased and decreased by 12%. The results of this experiment validated the previous study but more importantly demonstrated a substantial increase in the competency rating as speaking rate

increased. As a result of these studies, variations in speaking rate appeared to influence a listener's judgment of the competence and benevolence of speakers.

According to Apple et al. (1979), society has formulated "vocal stereotypes" and associate different speaking rates with different personality types. Although we have reported a few studies that have been conducted in this area, these studies tend to be dated and require replication. In addition, it would be important to identify additional personality characteristics (e.g. employability, physical tension/relaxation, and emotional tension/relaxation) that could be associated with speaking rate with particular regard to speech therapy techniques that are associated with disorders such as stuttering and cluttering.

It is well documented that modification of speaking rate results in improved speech fluency (Costello Ingham, 2003). However, clients are often concerned that learning to slow down their speaking rate will result in a substitution of one pathological behavior for another. Evidence from the present study could help to provide information that would be helpful to a clinician working with adults who stutter. Discussion with the client could focus on the public's perception of individuals based upon the rate of their speech. As a result, the focus of this study was an examination of the relationship between speaking rate and listener's perceptions of the speakers. We would like to ask the following question: does the rate of speech affect the perception of personality characteristics. It is hypothesized that a person will appear more competent, intelligent, and employable with faster speech but that the person will be attributed as physically and emotionally tense.

METHOD

Subjects

One hundred and sixty-four subjects participated in this study. The subjects were students from one large undergraduate class at Northern Illinois University. The subjects were asked to participate during the class period and had the option of not participating without penalty. All subjects completed a consent form prior to taking the survey informing them that they could stop participating at any time. The study was completely anonymous and no personal data was collected to identify the subjects.

Pilot Study

The purpose of the pilot study was to determine how long the listeners needed to make their judgments; if the survey was concise, and if the listeners caught on to what the experiment was focusing on. The speech samples were recorded at two separate occasions. The first recordings of speech samples were used in a pilot study. The pilot study samples were recorded by one Caucasian male graduate student who provided descriptions of five different pictures targeting three different speaking rates: fast, typical, and slow. The recordings were made using the internal MacBook Pro microphone and Audacity recording program. After the pilot study samples were complete, a trial experiment was run and results were analyzed.

The results of the pilot study indicated that listeners were able to make judgments about the speakers based on a ten second sample of their speech. Thus, samples from the three Caucasian male undergraduate students were cut from 40-second to 10-second samples using an audio

editing program (e.g. Audacity). Three of the five samples were chosen from each speaking rate for each male to ensure reliability. This created 9 speech samples in total for each subject.

Preparation of Speech Samples

The experimental speech samples were produced and recorded by three Caucasian male undergraduate students aged 21, 22, and 23. For the purpose of this study, picture descriptions were used to elicit speech samples at three different speaking rates (fast, typical, slow) from the four volunteer participants. The speaking rates that were selected were based on the work of Venkatagiri (1999). The slow speaking rate targeted 83 to 136 words per minute, the typical speaking rate targeted 136 to 171 words per minute, and the fast speaking rate targeted 171 to 195 words per minute. The volunteer speaker described a picture while his voice was recorded by the internal microphone of a MacBook Pro computer. One experimenter monitored the recording of the speech sample and the second experimenter calculated the speaker's speaking rate. If the speaking rate did not fall within the specified target range, the volunteer speaker was asked to speed up or slow down his speech and repeat the task. Five different pictures (Appendix D) were used to elicit speech samples at three different speaking rates.

To create the final stimulus recording, iTunes was used to randomly order each sample and record the introductory statement "Sample number." To help the subjects remain on track during the experiment. When the entire recording was completed, a CD was burned to use for the experiment. To present the speech samples to the subjects, the 27 speech samples were played on a Dell computer using QuickTime software. The sound signal was amplified and broadcast through two large speakers at the front of the lecture hall to play the audio samples. The subjects

listened to the recordings through two larger overhead speakers that were connected to the computer in the large lecture hall.

Survey

A Likert-scale questionnaire was developed (see Appendix B) where the subjects were given a statement "I believe the speaker is intelligent" and they had to indicate whether they agreed, somewhat agreed, disagreed, or strongly disagreed. To avoid the possibility of a lot of neutral responses, the investigators removed a neutral response (no opinion), which forced the subjects to respond either positively or negatively agree/somewhat agree or negative disagree/strongly disagree. The questionnaire contained 10 practice questions (five for each speech sample) and 135 questions (27 speech samples with 5 questions) that were associated with 27 speech samples. The samples were auditorily presented one at a time and after the subjects heard a speech sample they answered five questions pertaining to that question. The survey focused on intelligence/unintelligent, competent/incompetent, physical tension/relaxation, emotional tension/relaxation, and employable/unemployable. The testing process was completed in forty-five minutes.

Data Collection

Data was collected from one large undergraduate class. The subjects were instructed to sign a consent form agreeing to participate in the study (Appendix A). The consent forms were collected and the scantron and survey were passed out. The primary investigator instructed the class to listen to each recorded speech sample and answer the five questions regarding their perception of the speakers. After the experiment was completed, the survey and scantron were

collected and a debriefing (Appendix C) statement was handed out. The scantrons were taken to testing services where the raw data and a summery sheet were put into an Excel format.

Institutional Review Board

Before the experimenters could begin the experiment, approval of the Institutional Review Board (IRB) was required. As the experiment also included a mild form of deception, it was necessary to explain the process to the IRB. If the subjects were informed that speaking rate was a variable, the results might be biased by this information. As a result, the issue regarding speaking rate was not disclosed until the debriefing session following the experiment. All subjects received an informed consent form (see appendix A) at the beginning of the experiment along with a scantron for recording results. Students were advised that they could choose to not participate without penalty. At the conclusion of the experiment the students received a debriefing form (see appendix C) that indicated the nature of the experiment and listed the contact information of the experimenters. IRB approval was received prior to running the experiment.

RESULTS

The raw data was analyzed for each speaking rate and each personality attribute. To initially analyze the data, the results were separated by attribute and then examined as a function of speaking rate. The strongly agree and agree percentages were combined together to designate a positive rating and the strongly disagree and disagree percentages were combined together to designate a negative rating. Looking at the perception results, a general trend occurred across all five attributes. Each attribute, intelligence, competence, employability, physically relaxed and

emotionally relaxed, generated typical responses similar to *figure 1*. With each attribute approximately 48% of the listeners strongly agreed that the speaker sounded intelligent, competent, employable, physically relaxed and emotionally relaxed. While examining slow to typical to fast speaking rates revealed a progressive increase in positive ratings. Each personality attribute exhibited the same pattern where the highest rating was strongly agree. Figure 1 depicts the pattern that each attribute followed.

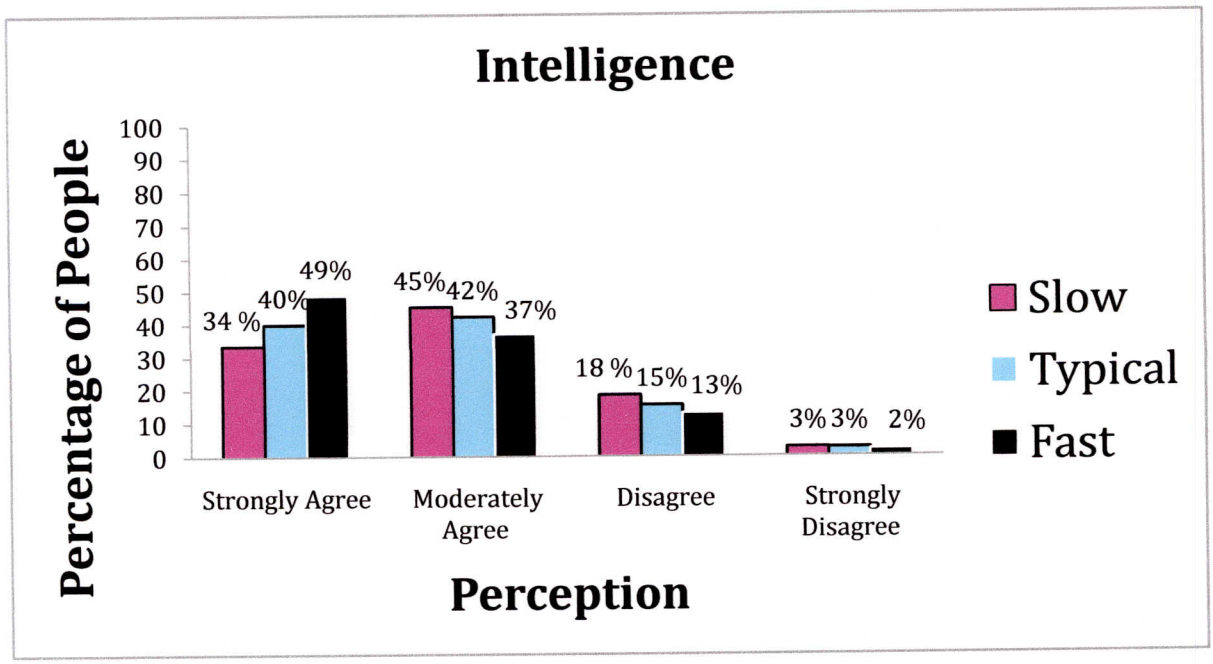

Figure 1: Degree of Agreement for the perception of intelligence

When comparing the positive ratings, strongly agree and moderately agree, to the negative ratings, disagree and strongly disagree, it can be seen (figures 6, 7, 8, 9, 10) that each speaking rate was positively rated for each attribute.

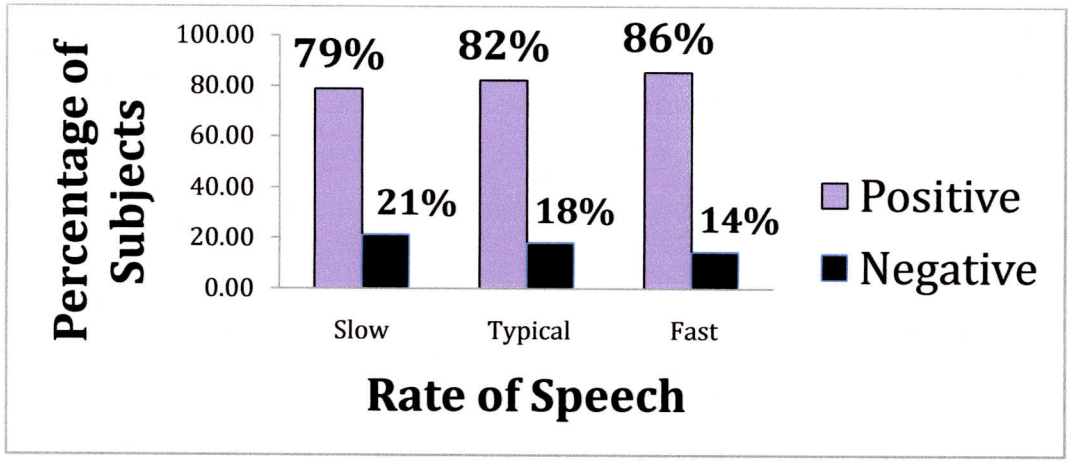

Figure 6: Positive vs. negative ratings of intelligence

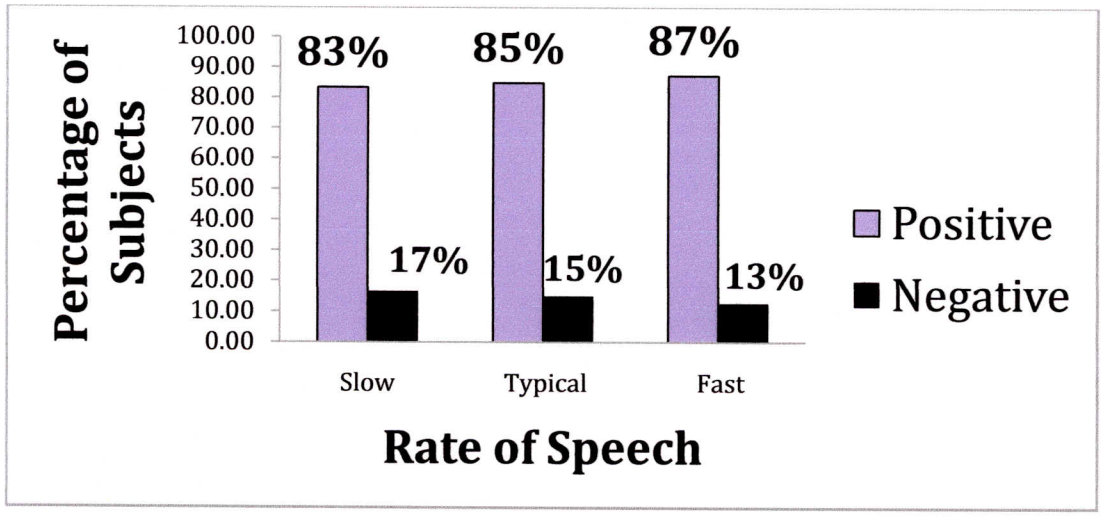

Figure 7: Positive vs. negative ratings of physically relaxed

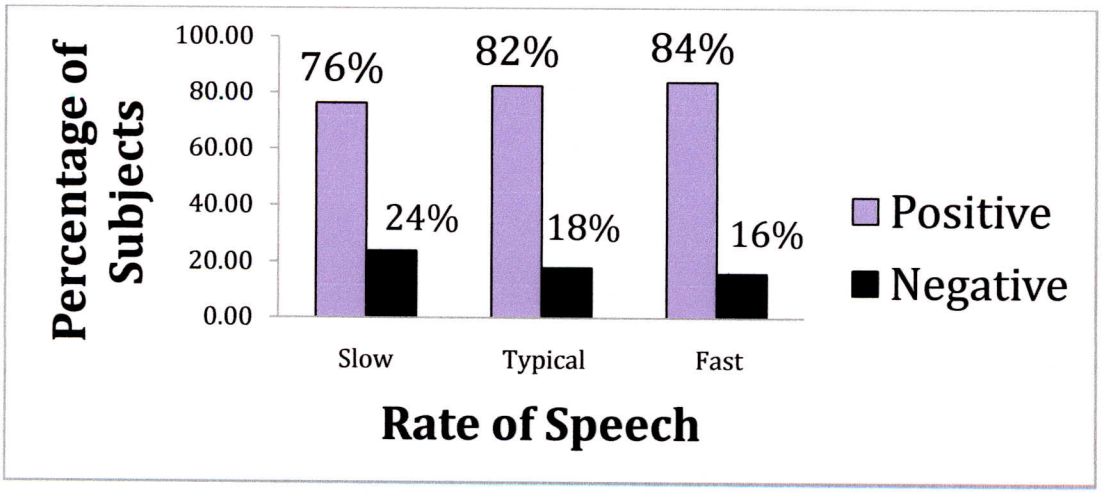

Figure 8: Positive vs. negative ratings of competence

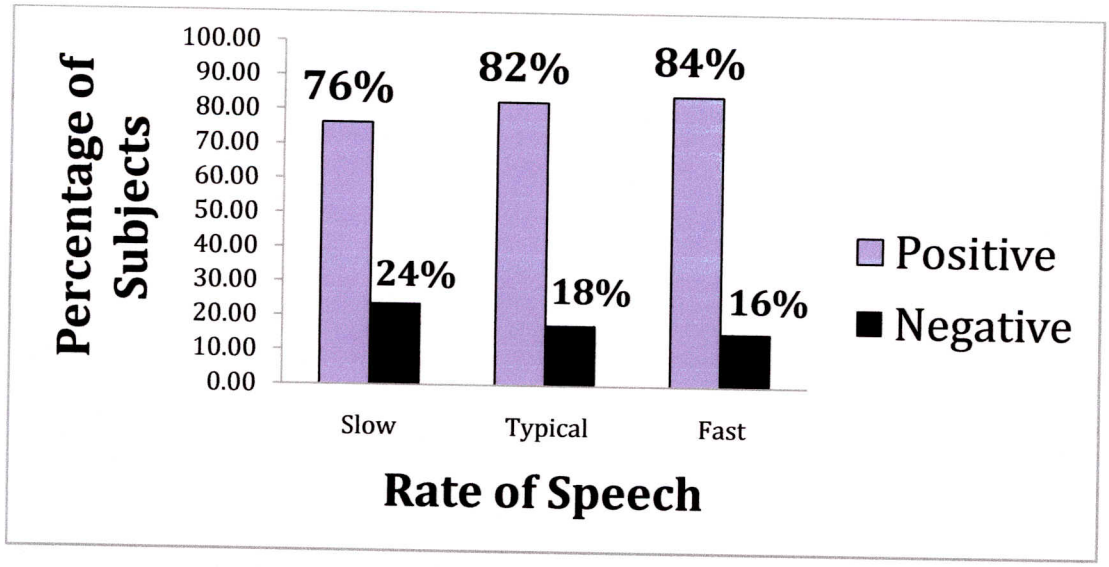

Figure 9: Positive vs. negative ratings of emotionally relaxed

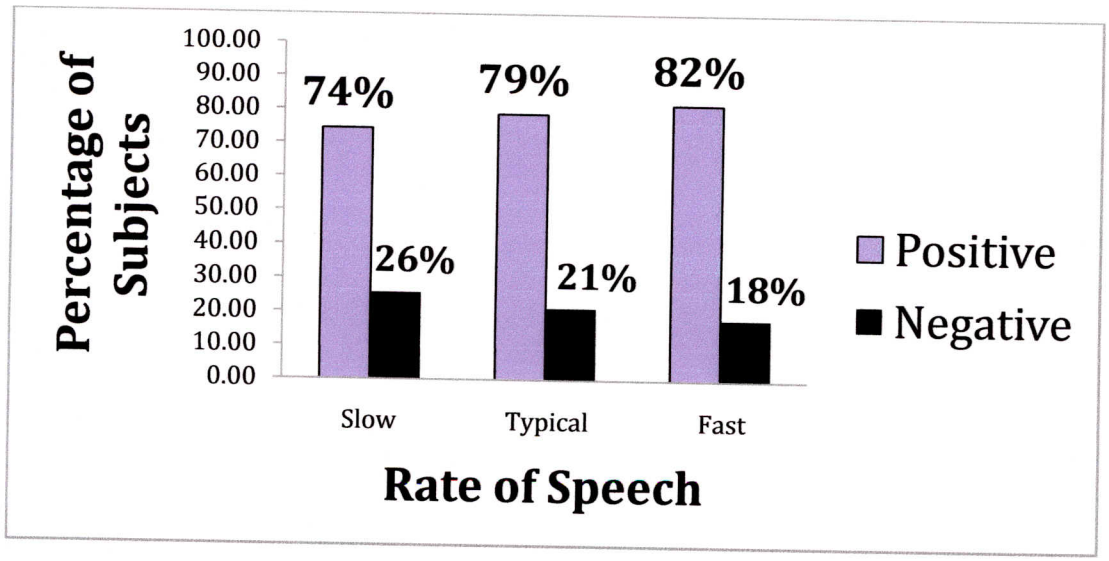

Figure 10: Positive vs. negative ratings of employability

As seen in figure 8, the perception of competence was more positive at all three speaking rates than any of the other judgments. The result for competency was also the closest margin of increase in positive rating between the slowest rate of speech and the fastest rate of speech. In regard to emotionally

relaxed, figure 9, each speaking rate has the greatest margin of increase in positive rating between the slowest rate of speech and the fastest rate of speech. The perception of employability, as seen in figure 10, was the least positive at all three speaking rates than any of the other judgments.

When attempting to quantify the data, the three individual speakers could not be classified as a homogenous group because the results varied. However, when treating the speakers as one, the data proved that speed does have a statistically significant effect on all five aspects of the listener's perception because their p-values is less than .05 (Table 1).

Response	Chi-Square	p-value
Intelligence	24.40	<.0001
Physical relaxation	28.70	<.0001
Competence	13.23	0.0013
Emotional relaxation	23.86	<.0001
Employability	25.41	<.0001

Table 1: Speed vs. Attributes

As seen in *Figures 6 – 10*, the estimated probability of a positive response for each aspect at each speed is can be seen in *Table 3*.

Response	Slow	Medium	Fast
Intelligence	0.7876	0.8196	0.8533
Physical relaxation	0.7598	0.8223	0.8407
Competence	0.8319	0.8464	0.8701
Emotional relaxation	0.7607	0.8211	0.8426
Employability	0.7427	0.7880	0.8167

Table 3: Estimated probability of a positive response

When looking at the pair wise differences between the speeds to determine which pairs are significantly different, the contrasts with p-values less than 0.05 show statistically significant difference (Table 2).

Response	Contrast	Chi-Square	p-value
Intelligence	Slow-Med	6.23	0.0125
	Slow-Fast	24.31	<.0001
	Med-Fast	7.46	0.0063
Physical relaxation	Slow-Med	18.32	<.0001
	Slow-Fast	27.36	<.0001
	Med-Fast	2.15	0.1423
Competence	Slow-Med	1.58	0.2091
	Slow-Fast	12.78	0.0003
	Med-Fast	4.62	0.0315
Emotional Relaxation	Slow-Med	15.07	0.0001
	Slow-Fast	23.11	<.0001
	Med-Fast	2.64	0.1042
Employability	Slow-Med	10.43	0.0012
	Slow-Fast	25.40	<.0001
	Med-Fast	5.34	0.0208

Table 2: Pair wise differences between the speeds

CONCLUSION

We hypothesized that there would be a greater margin in ratings between the speaking rates for each attribute. We also hypothesized that the slower a person spoke the more physically and emotionally relaxed they would be perceived. However, our results would suggest that the faster speaking rate was more positive than the slower rate for all parameters. In general, the typical speaking rate provides a more positive impression than a slower speaking rate, and the fast speaking rate provides a more positive impression than the typical speaking rate. However, with regard to physical and emotional relaxation, the typical speaking rate and fast speaking rate were not statistically different from each other. Similarly, there was not a statistical significance between the slow and typical rates with respect to competence.

Therefore, with this data, clinicians can show clients that although the clients are modifying their speaking rate to improve fluency, for example, they are still considered intelligent, competent, physically relaxed, emotionally relaxed, and employable. With that in mind, after the client is able to improve their fluency, the clinician can work with the client to increase his speaking so that the client sounds more natural and is perceived more positively.

DISCUSSION

Given the variability of results that resulted from using four different speakers, the first issue that needs to be addressed is how to make the speech samples more homogenous for testing. There are two avenues we are considering. The easiest way is to eliminate multiple speakers and only use one speaker. Or, we can control the prosody and pitch by only using one speech sample and then digitally altering the speaking rate by speeding it up and slowing it down.

A potential constraint to the reliability of the study was the proximity of the three different target speaking rates. It might be beneficial to increase the difference between the speaking rates by using the extreme ends of the target speaking rates instead of targeting the median. Another possible constraint is that the subjects were possibly judging the speakers based on other vocal cues associated within the speech samples. A new study could examine what cues the judgments were based on with a questionnaire at the end of the survey that asks questions to understand how the subjects were rating the speech samples whether it was the rhythm, tone, speed or loudness of the voice

Even though the pilot study indicated that a judgment decision was made within the first ten seconds, it would also be interesting to see if the results changed with longer speech samples. After a reliability experiment is run to ensure the reliability of the voices, an experiment could then be run using fewer speech samples.

In all, after more studies are completed with the English language, eventually we would like to focus on comparing and contrasting how the rate of speech affects personality judgments across multiple languages. We want to explore this area because some languages are seen to be faster than others and some cultures value slower speech more than faster speech. This can include an experiment where a

group of native English speaking subjects listen to a series of samples in multiple languages at the three target speaking rates, then a group of Spanish speaking subjects, followed by a group of French speaking subjects and then a group of Mandarin speaking subjects.

REFERENCES

Apple, W., Krauss, R. M., & Streeter, L. A. (1979). Effects of pitch and speech rate on personal attributions. Journal of Personality and Social Psychology, 37(5), 715-727.

Brown, B.L., Strong, W.J. and Rencher, A.L. (1973). Fifty-four voices from two: the effects of simultaneous manipulations of rate, pitch, and variance of intonation on ratings of personality from speech. Journal of the Acoustic Society of America, (55), 213-8.

Brown, B.L. Strong, W.J. and Rancher A.L. (1973) Perceptions of personality from speech: effects of manipulation of acoustical parameters. Journal of the Acoustic Society of America, (54), 29-35.

Costello Ingham, J. (2003). Evidence-based treatment of stuttering: I. Definition and application, Journal of Fluency Disorders, 28, 3, Autumn 2003, Pages 197-207

Smith, B.L., Brown, B.L., Strong, W.J., & Rencher, A.C. (1975). Effects of speech rate on personality perception. Language and Speech, (18), 145-152.

Robinson, J., & McArthur, L.Z. (1981). Impact of salient vocal qualities on causal attribution for a speaker's behavior. Journal of Personality and Social Psychology, 43(2), 236-247

Venkatagiri, H. S. (1999) Clinical measurement of rate of reading and discourse in young adults. Journal of Fluency Disorders, 24, 209-226

Appendix A: Consent Form

Attributes of Speakers

Jessica Braley
Allied Health and Communicative Disorders

Informed Consent

I agree to participate in the research project being conducted by Jessica Braley an undergraduate student at Northern Illinois University under the direction of Dr. Howard Schwartz (Allied Health and Communicative Disorders). I have been informed that the purpose of the study is to determine attributes of speakers based their recorded speech samples.

I understand that if I agree to participate in this study, I will be asked to do the following: listen to 27 ten-second audio recordings and respond to five questions associated with each sample.

I am aware that my participation is voluntary and may be withdrawn at any time without penalty or prejudice. If I choose to not participate, I can sit at my desk and wait until this short experiment is completed. Should I have any additional questions concerning this study, I may contact Jessica Braley: z153544@students.niu.edu or Dr. Howard Schwartz: hschwartz@niu.edu.

I understand that if I wish further information regarding my rights as a research subject, I may contact the Office of Research Compliance at Northern Illinois University at (815) 753-8588.

I understand that all information gathered during this experiment will be anonymous with no identifying measures recorded. Results will be tabulated in a group format and presented at the Illinois Speech-Language Hearing Association convention during February, 2011. Upon completion of data collection and tabulation, data forms and results will be stored in a locked file cabinet.

I understand that my consent to participate in this project does not constitute a waiver of any legal rights or redress I might have as a result of my participation, and I acknowledge that I have received a copy of this consent form.

_____ _____

Signature Date

_____

Print Name

Appendix B: Survey

Instructions: You will hear two Practice Samples and 27 experimental samples. We want you to answer the following five questions regarding **each** of these samples. Please put your answers on the attached scantron.

PRACTICE 1

1. I believe the speaker is intelligent
   A. Agree
   B. Moderately Agree
   C. Disagree
   D. Strongly Disagree

2. The speaker is physically relaxed.
   A. Agree
   B. Moderately Agree
   C. Disagree
   D. Strongly Disagree

3. The speaker is competent individual.
   A. Agree
   B. Moderately Agree
   C. Disagree
   D. Strongly Disagree

4. The speaker is emotionally relaxed.
   A. Agree
   B. Moderately Agree
   C. Disagree
   D. Strongly Disagree

5. I would employ this speaker.
   A. Agree
   B. Moderately Agree
   C. Disagree
   D. Strongly Disagree

Appendix B: Survey (continued)

PRACTICE 2

6. I believe the speaker is intelligent
   A. Agree
   B. Moderately Agree
   C. Disagree
   D. Strongly Disagree

7. The speaker is physically relaxed.
   A. Agree
   B. Moderately Agree
   C. Disagree
   D. Strongly Disagree

8. The speaker is competent individual.
   A. Agree
   B. Moderately Agree
   C. Disagree
   D. Strongly Disagree

9. The speaker is emotionally relaxed.
   A. Agree
   B. Moderately Agree
   C. Disagree
   D. Strongly Disagree

10. I would employ this speaker.
   A. Agree
   B. Moderately Agree
   C. Disagree
   D. Strongly Disagree

Appendix B: Survey (continued)

Samples 1-27

I believe the speaker is intelligent

A. Agree
B. Moderately Agree
C. Disagree
D. Strongly Disagree

The speaker is physically relaxed.

A. Agree
B. Moderately Agree
C. Disagree
D. Strongly Disagree

The speaker is competent individual.

A. Agree
B. Moderately Agree
C. Disagree
D. Strongly Disagree

The speaker is emotionally relaxed.

A. Agree
B. Moderately Agree
C. Disagree
D. Strongly Disagree

I would employ this speaker.

A. Agree
B. Moderately Agree
C. Disagree
D. Strongly Disagree

Appendix C: Debriefing Statement

Attributes of Speakers

Jessica Braley
Allied Health and Communicative Disorders

Debriefing Statement

During the present study we asked you to make judgments about the speakers that you heard. We could not tell you that the real focus was to see whether a speaker's rate of speech affected your decisions regarding the personality characteristics under investigation. We are interested in examining the relationship that exists between speaking rate and listener's perception of personality. Results will be used to examine the relationship between speaking rate and personality characteristics. These results might suggest optimum speaking rates that can be targeted when speech rate modification is required during speech therapy (for example with persons who stutter).

Our objective is to use the results of the study as they relate to speech rate modification approaches for various communicative disorders. Specifically, discussion will focus on how a speech language pathologist should deal with modifications of speaking rate as it relates to clients, their perception of themselves, and listener's perceptions of the speaker.

If you would like to receive a report of this research when it is completed (or a summary of the findings), please contact Jessica Braley (jbraley@niu.edu). If you have any concerns about your speaking rate, you can contact Dr. Schwartz (hschwartz@niu.edu) to discuss this issue with the possibility of being referred for an evaluation at the NIU Speech and Hearing Clinic.

Thank you for your participation.

Appendix D: Images

Image 1

Image 2

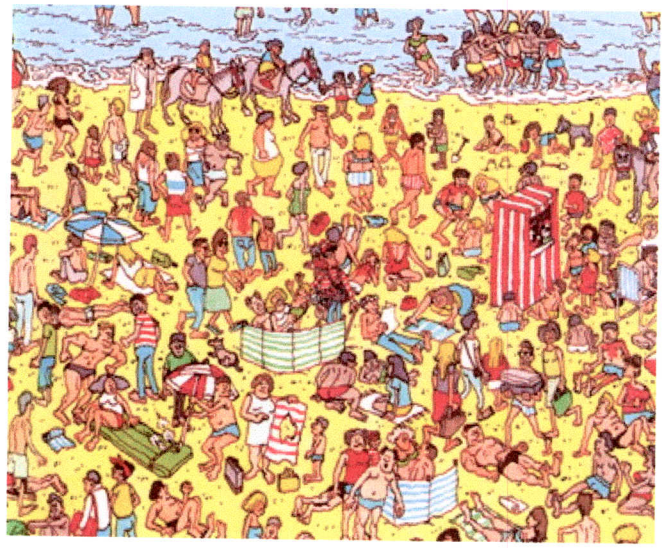

Image 3

Image 4

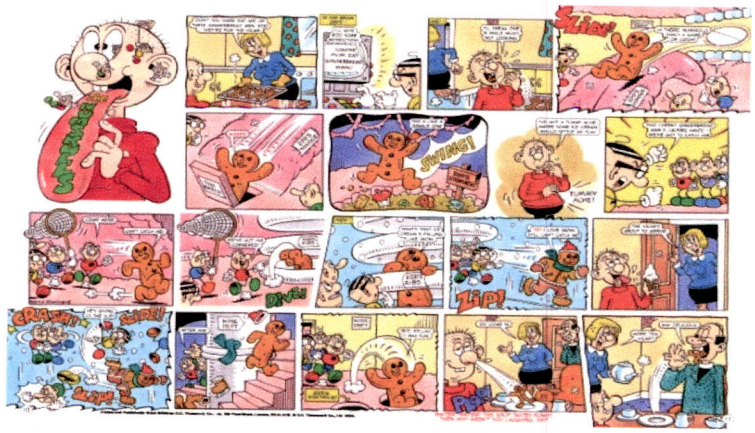

Image 5