

PROCEDURES FOR ANALYSIS AND REPORTING SEGMENTAL FEATURES OF FLUENCY AND SPEAKING RATE

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The following procedures are used in conjunction with the form *Segmental Analysis Summary of Disfluency and Speaking Rate* (Cross, 2003). If an analysis is done for more than one speaking task then a separate summary form should be completed for each sample. If only audio-recorded samples are available be sure to include this information in the context description.

DISFLUENCY INDEX

1. Thoroughly familiarize yourself with the classifications of disfluency used on this form.
2. Fill in the name and age of the client on the analysis form. Identify the speaking task (context) used to obtain the sample and any relevant information about the situation.
3. Play the taped speech sample all the way through at least one time to familiarize yourself with the client's speech patterns and other factors that might influence your analysis. The more familiar you are with the sample the more accurate your analysis is likely to be.
4. Replay the sample and transcribe each word spoken. Include all extraneous words (e.g. "uh", "um" etc.), repeated sounds and words, false starts, etc. in the sample.
5. From the transcription count the number of words "attempted" in the speech sample and write this number in the box next to the heading **TOTAL WORDS ATTEMPTED (TWA)**.

Note: Words "attempted" refers only to the words that would have been spoken if all words were produced fluently. Each word can be counted only once. For example, "I am-am-am going home tonight" would be counted as five words attempted, not seven. Do not count interjections such as "uh", "um", etc. as words attempted, but list them under the categories of "interjections" on your recording sheet. For example, "I um, um, um, want a new bicycle for my birthday" would be counted as eight words attempted with one instance of interjection.

With experience, clinicians can learn to count the number of words attempted while listening to the taped sample. This typically requires stopping and starting the tape several times. This technique, while saving some time, requires considerable practice to increase rater reliability.

6. Listen to the taped sample once again. This time identify and mark the type of each disfluency on the transcript above the word. Be sure to stop and replay disfluencies as often as necessary to make a reliable decision. Continue through the tape until all disfluencies have been marked on the transcript. When satisfied with your results transfer the number of each type of disfluency to the appropriate column of the work sheet.
7. Add the total number of disfluencies for each disfluency type and record the sum in the column marked "**WD**" (for words disfluent) in the appropriate box for each category. When completed, add all of the totals together and place this number in the box marked **Total Words Disfluent (TWD)**.
8. Calculate the overall percent of words disfluent in the sample by dividing the Total Words Disfluent (TWD) by the Total Words Attempted (TWA). Write this value in the last box under the % column. Also transfer this value in the corresponding space under Percent Words Disfluent in the **Summary Data** box.
9. Calculate the percent words disfluent for each type of disfluency by dividing the words disfluent in each column for each disfluency category by the total number of words disfluent in the sample. Be sure not to divide by the total words attempted in the sample or your values will be way off. Write these percents in the appropriate boxes for each disfluency type under the heading percent disfluent (%) on the form. Round up to the nearest whole percent (e.g. 4.6% becomes 5%). To check your work, add all of the percent values under the % column. The sum should equal 100% ($\pm 1\%$).
10. Calculate the approximate duration of disfluencies. It is very difficult and needlessly time consuming to calculate the exact duration of each disfluency. Instead, an approximate range of disfluencies and approximation of the most typical duration is used. First, use a stopwatch to measure the duration to the nearest second for each disfluency in the sample. If the disfluency lasts less than one second use < 1. Identify the duration of the shortest and longest disfluency in the sample and transfer these values to the corresponding spaces in the **SUMMARY DATA** box. Now, determine what you consider the range of the most frequently occurring during in the sample using the values next to the heading Most Typical in the **SUMMARY DATA** box. Write this range in the corresponding space.

SPEAKING RATE

There are many ways to calculate speaking rate, each having specific value and interpretation. You will calculate two different values for speaking rate, Inclusive and Exclusive rate. An inclusive rate reflects the rate of communication that includes all disfluencies, pauses, hesitations, etc. It more reflects the rate at which the speaker communicates his or her intentions to the listener. Exclusive rate is calculated by omitting atypical pauses, durations of disfluencies, hesitations, etc. It provides a more accurate indicator of how rapidly the speaker is actually producing the sounds/movements of speech. It more closely represents the speaking rate if all utterances were naturally fluent. Both have value, but are often quite different in

number and interpretation. All calculations of both inclusive and exclusive speaking rate will be expressed in words per minute (WPM).

Inclusive Speaking Rate

1. Measure the total time in seconds need to complete the entire sample. Use an accurate measurement tool (such as a stop watch). This value is the Total Speaking Time (TST). To calculate Inclusive Speaking Rate divide the Total Words Attempted (TWA) by the Total Speaking Time (in seconds). Multiply this result by 60 to convert the time to words per minute (WPM). Write this value in the appropriate space in the Summary Data box.

The following is an example showing calculation of speaking rate

Total Words Attempted (TWA) = 120
 Total Speaking Time (TST) = 30 seconds
 Inclusive Speaking Rate = $(120/30) \times 60 = 240$ words per minute (WPM)

Exclusive Speaking Rate

1. Begin timing the sample as you did before. Now, stop the stopwatch each time you observe an atypical pause, disfluency, hesitations, or any other atypical break in the flow of ongoing speech. Restart the stopwatch as soon as speech resumes. Because of the inherent physical reaction time of starting and stopping the watch you will probably have difficulty with values less than one second. If the disfluencies or hesitations are less than one second, do not stop the stopwatch. At the end of the sample record the total number of seconds. This is the exclusive speaking time or the **Fluent Speaking Time (FST)**. Calculate exclusive speaking rate in the same way as you did for inclusive speaking rate. Divide the Total Words Attempted (TWA) by the Fluent Speaking Time (FST) in seconds. Then multiply this value by 60 to convert to words per minute. Transfer this value to the corresponding space on the form.

Note, in most cases Exclusive Speaking Rate should be equal to or faster than Inclusive Speaking Rate. If your values are reversed, then an error has been made somewhere along the way.

REPORTING RESULTS OF SEGMENTAL SPEECH ANALYSIS

There are many different ways to report the data from a segmental analysis of fluency and speaking rate. The following is an example template for reporting the results of a segmental analysis on a diagnostic or progress report. The data is from the segmental analysis example provided. A separate paragraph should be

written for each speech sample analyzed. Since this is considered a template you have permission to use this format word-for-word substituting your own data. You also can develop your own template as you wish. It is not necessary to fill out a complete segmental analysis form for all speech samples (e.g. automatic speech such as counting, days of the week, etc.) unless instructed to do so. Merely report the number of disfluencies relative to the words attempted.

It is also important to include at the end of each analysis a statement as to whether this sample is or is not representative of the client's "typical" speaking pattern. If it is not typical provide a brief description of how it differs from the obtained sample.

Segmental Analysis of Fluency and Speaking Rate

"The client exhibited no observable disfluencies when saying the days of the week or months of the year. He exhibited two part-word repetitions when counting from 1-10 and one silent block when counting from 250-260."

"The following segmental speech analysis of fluency and speaking rate is based on a video taped sample of a spontaneous monologue on the topic of career goals, recorded on 2/5/05. Disfluencies were observed on 4.8% of the 520 words attempted during the sample. Proportion of disfluencies by type were word repetitions (20%), sound repetitions (28%), consonant prolongations (8%), vowel prolongations (12%) and silent blocks (32%). Duration of disfluencies ranged from .5 to 15 seconds with the most typical being approximately 2.5 seconds. Inclusive speaking rate was 130 words per minute and exclusive speaking rate during perceptually fluent speech was 190 words per minute.

The client indicated this sample was not an accurate representation of his typical stuttering during spontaneous speech. He indicated that he usually stutters more frequently, especially when under stress. He considered the type and duration of stuttering, however, to be representative of his problem. The clinician noted as well that the client stuttered more often (approximately 12%) during the initial interview. Types of disfluencies were consistent throughout the evaluation."