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A TEST OF THE DISTRACTION EXPLANATION OF DISFLUENCY MODIFICATION IN STUTTERING*

A. H. THOMPSON
Alberta Mental Health Services
Edmonton, Alberta, Canada

The distraction explanation of changes in stuttering rate was examined in the present experiment. Twelve stutterers were compared with 12 nonstutterers who were matched for age, sex, and level of education. Subjects were tested for disfluency production under conditions designed to reflect the dimension of distraction. These conditions were: (a) over attention to speech (counting speaking errors), (b) "normal" conditions (no additional task), and (c) distraction (pursuit tracking of an irregular target). The results showed no effect on stuttering rate that could be attributed to the distraction conditions. However, stutterers rated the difficulty of these conditions in concordance with the distraction theory. It was suggested that, while stutterers' perceptions may account for the popularity of the distraction explanation, evidence supporting the theory is lacking.

INTRODUCTION

The concept of distraction has had a long and varied history as a possible explanation for certain stuttering phenomena. This follows from the belief that if a stutterer attends to something other than his or her speech, fluency will be increased (Bloodstein, 1949, 1950, 1975). Implied in this is that attention to speech will increase disfluencies.

This notion, despite its lack of clarity, has gained widespread and long standing support among a variety of theorists. Cherry and Sayers (1956) report that Sikorski called attention to the importance of "self-awareness" in speech behavior as early as 1892. Since then, a distraction explanation has been couched within various theories. For example, Freund (1966) (psychoanalytic), Bluemel (1935, 1940) (conditioning), Johnson and Rosen (1937) (expectation to stutter and avoidance), and Cherry and Sayers (1956) (disrupted processing of auditory feedback). Although Wingate

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Address correspondence to A.H. Thompson, Alberta Mental Health Services, 4th Floor, South Tower, 10030–107 Street, Edmonton, Alberta, Canada, T5J 3E4.

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(1976) has questioned the usefulness of the concept of distraction, it is still invoked to explain certain stuttering phenomena (Bloodstein, 1975; Overstake, 1979; Stephen and Haggard, 1980; Kamhi and McOsker, 1982). However, the few studies that investigated this area have provided little support for the distraction explanation.

An influential test of the hypothesis was made by Wingate (1959). Wingate instructed stutterers to read under three conditions. In one condition the stutterers were signalled when they made an error. In the second they were interrupted and not allowed to continue until the word was pronounced correctly. The third condition was a control condition, with no attention drawn to speech. Wingate found that the experimental conditions equally reduced stuttering relative to the control condition. Wingate's results are clear in that calling attention to stuttering reduces disfluencies, rather than increasing them as one might expect a distraction hypothesis to predict. However, if it is hypothesized that stutterers already attend too closely to their speech, then an increase in stuttering would not be expected in a study such as Wingate's. However, had he studied nonstutterers, according to a distraction hypothesis, an increase in disfluencies might have been expected.

Fransella and Beech (1965) instructed stutterers to read lists of words under three conditions: (1) pacing their speech with a rhythmic metronome, (2) trying to discern a pattern in an arrhythmic beat while reading, or (3) reading with no metronome. The fewest errors occurred in condition (1), and the investigators concluded that distraction (condition 2) could not explain the metronome effect. However, reading in the presence of an arrhythmic metronome does not require continuous attention to the subsidiary task. Thus, Fransella (1967) repeated the experiment but modified the subsidiary task so that it required more active participation by the subjects. In this case, stutterers were presented with a series of tape recorded numbers, which they wrote down while they read. Stuttering was reduced only in the rhythmic metronome condition. Fransella concludes that there is no evidence for the hypothesis that the metronome effect can be explained by distraction. However, the subsidiary task presented in this study does not appear to require the continuous attention of the stutterers. The numbers were presented at random intervals of 1–4 sec. The subjects would not be involved with the subsidiary task during the intervals between presentations. Further, the subjects were reading from a list of words, leaving open the possibility that they could delay reading a word while attending to the subsidiary task.

A study by Brady (1969) also suggests that distraction is not a factor in the reduction of stuttering. In essence, however, his study was a replication of Fransella's (1967) and is subject to the same criticism.

Azrin, Jones, and Flye (1968) also have demonstrated that speech synchronized with a metronome results in a greatly reduced frequency of stuttering, but that stuttering is not reduced when stutterers speak in the presence of an arrhythmic beat. They also conclude that distraction is not a factor in the reduction of stuttering. However, the subjects were not required to do anything with the arrhythmic beat. It was merely presented while they were speaking. Although the investigators suggest that the arrhythmic beat would be as distracting as the rhythmic beat, one would expect the subjects would not attend to it if there was no reason to do so (Norman, 1969).

Mallard and Webb (1980) used a visual distractor, but also failed to provide evidence in support of the distraction hypothesis. Again, their experimental manipulation (turning a light off and on), did not require the attention or participation of the subjects.

In a recent study, Kamhi and McOsker (1982) found that presentation of a reading comprehension task did not influence stuttering rate when compared with a nontask condition. They did find, however, that the reading comprehension score decrement was greater for stutterers than for nonstutterers. On the assumption that reading aloud for comprehension demands more attention than simply reading aloud, the investigators concluded that stutterers devote more attention to their speech than nonstutterers.

The results of the Kamhi and McOsker study appear to support the distraction hypothesis. However, it should be noted that the conclusion that stutterers devote an inordinate amount of attention to their speech does not imply that diversion of that attention would reduce defluencies. The increased attention may be a result of stuttering, not the cause. Stronger support for the distraction hypothesis would require that the stuttering rate, itself, be altered.

IMPLICATIONS FOR THE PRESENT STUDY

The studies that have tested the distraction hypothesis do not shed a clear light on that explanation, partially because of methodologic problems. The primary methodologic consideration was suggested by Fransella (1967). Her view is that active participation by the subjects in the experimental task is necessary to test the distraction hypothesis. This also has been suggested by Barber (1939), but neither investigator gives a theoretical or empirical reason for the expectation that doing one task will produce a performance decrement in a second. Most people would agree intuitively that this is correct, and there are well known contributions that suggest this is so (Broadbent, 1958; Cherry, 1953). However, a note of caution is in order. It is not necessarily true that the performance of one task will result in a decrement in a second. As Norman (1969, p. 9) indicates:

> The point seems to be that the number of things we can do depends on the difficulty of each task. A well-learned task, such as walking, takes little effort and does not impede us in the performance of another. A more difficult task such as walking along a high, narrow ledge requires more concentration and may completely impede our efforts to hold a conversation.

Empirical support is given to this proposition by the study of Bahrick, Noble, and Fitts (1954). They demonstrated that performance on one task is disrupted to a greater degree by an unpredictable second task than by a predictable second task. A further finding was that practice is also an important variable. Performance on the first task improved over time when the second task was predictable. No such increase was found when the second task was unpredictable.

This has direct and important implications for the study of distraction and stuttering behavior. When studying the effects of a distracting task on stuttering, it is not enough to present a task in which the subject participates. We also must be sure that the task actually requires attention. Operationally, this means that the performance of the distracting task should result in a decrement in the performance of a second task performed simultaneously. Further, in the case of stuttering research, the efficacy of a distractor must be demonstrated on behaviors other than stuttering. The reason for this is that if a distracting task did not reduce stuttering, it might be stated that it did not require enough attention. The tautologic conclusion to this is that those conditions that reduce stuttering do so because they require enough attention.

The present study attempts to address this aspect of the distraction hypothesis. Distraction will hereon mean that the performance of one task (the distractor) results in a decrement of a second simultaneously performed task. This means that the distracting task will have to be validated before it is applied to stutterers.

The purpose of this study is to examine the effects of conditions, which according to a distraction hypothesis, should have some effect on the frequency of the production of speech disfluencies. As has been stated earlier, a distraction hypothesis may take many forms. In this regard, only one facet of distraction will be studied here. This is the belief that the stutterer may attend too closely to his speech, and that any device that does not allow this "attention" to occur, will produce a decrease in disfluencies. Two predictions based on this assumption will be examined. The first is that the presentation of a distracting task will decrease disfluencies in stutterers. The second is that the presentation of instructions that require close attention to speech should result in an increase in disfluencies in those subjects who do not ordinarily devote "too much" attention to their speech (i.e., fluent speakers).

On the basis of these predictions, the following experiment examined the effects of these tasks on the disfluencies of stutterers and nonstutterers. As the kind of speech used in stuttering experiments has been shown to be related to disfluency production, two types were studied. The first is well rehearsed speech, and the second, an approximation of spontaneous speech.

METHOD

Subjects

Twenty-four subjects were used in this experiment. Twelve stutterers and 12 nonstutterers. A stutterer was defined as a person who had seen or was seeing a speech therapist for stuttering, and who considered stuttering to be a problem at the time of the experiment. The nonstuttering group consisted of individuals who had never seen a speech therapist, and who stated that they had never stuttered. Subjects were matched for age and sex, which are variables previously related to stuttering frequency and incidence (Beech and Fransella, 1968). The groups also were matched for level of education to control for general verbal (nonspeech) ability. Data on which the matches were made are presented in Table 1. Each matched pair of subjects (one stutterer and one nonstutterer) is referred to as a subject block.

The stutterers were recruited from speech–therapist referrals, and from responses to a newspaper article.

Measures and Apparatus

Under the distraction conditions, all subjects were required to track a line (as in pursuit-rotor tracking) approximately 1.9 cm in width. The line

Table 1. Normative Data for Subject Blocks

	Stutterers			Nonstutterers		
Block	Sex	Age (yr)	Education (yr)	Sex	Age (yr)	Education (yr)
1	F	20	12	F	23	12
2	M	51	11	M	59	12
3	M	55	10	M	55	12
4	M	29	12	M	28	12
5	M	19	12	M	20	12
6	M	30	14	M	25	16
7	M	17	10	M	16	11
8	M	23	15	M	23	15
9	M	15	10	M	15	9
10	M	47	16	M	47	17
11	M	18	11	M	17	11
12	M	24	14	M	24	16
Means	—	29.0	12.3	—	29.3	12.9

(target) was circumscribed on a metal drum (radius, 19 cm), and followed the form of an aperiodic wave (Fig. 1). The drum was painted with flat black paint and the target with white enamel. The fluctuations of the target covered a span of 18.7 cm. The whole apparatus was placed inside a wooden enclosure. The subjects tracked through a plexiglass window (7 cm × 30 cm) as the drum rotated. The window was directly above the axis, and was placed at a distance that resulted in the tracking stylus being approximately 1.3 cm from the drum during the performance of the task. The stylus was fitted with a photosensitive cell that activated a timer when the top of the wand was above the target. When the wand was off target, the light reflected was not sufficient to activate the switch, and the timer stopped. The experimenter controlled a switch that was connected to this and another timer. Thus, the first timer provided a measure of time on target, and the second, a measure of total tracking time.

The condition designed to produce close attention to one's speech involved the requirement that the subjects would record each speech error that they made. These will be referred to as the "counting errors" (CE) trials.

The distraction and attention conditions were validated in a series of preliminary experiments that will be only briefly described here.

In the first, 13 nonstutterers were tested under conditions of delayed auditory feedback (DAF), which produces speech with some similarity to stuttering (Lee, 1950; 1951). [While the use of DAF is relevant for the purposes of the present study, Neeley (1961) has shown important differences between speech under DAF and stuttering.] Each subject was tested under three experimental conditions. These were, (1) required attention to speech: subjects recorded their disfluencies; (2) no additional task given; and (3) distraction: tracking on a circular pursuit-rotor. The resulting mean percentage of disfluencies for the three conditions were 13.3%, 9.1%, and 6.8%, respectively. An ANOVA showed significance [$F(2,20) = 5.66$, $p < 0.05$], but post-hoc testing showed differences between the attention (CE) task and the remaining two conditions only. That is, the no-task and distraction means were not significantly different. This suggests that counting errors is a useful analogue of the attention component of the distraction hypothesis. However, although the results were in the predicted direction, the conclusion could not be drawn that circular tracking was an effective distractor.

A second experiment tested the effect of circular tracking on the accuracy of speech-monitoring (counting every third word) by nonstutterers speaking "normally." Again, there was no evidence that circular tracking had any effect.

The third experiment used a new tracking device (described above, and shown in Fig. 1). This was based on the assumption that circular tracking may not have been demanding enough for the present purpose. As noted

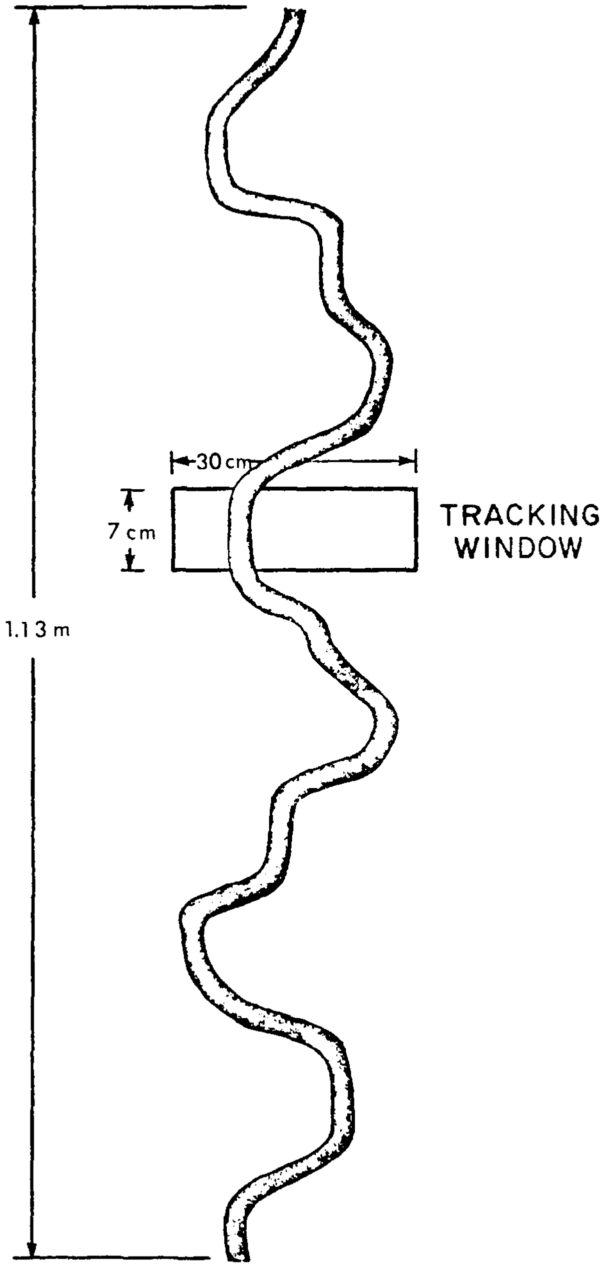

Figure 1. The path of the target used in the tracking task.

above, Bahrick, Noble, and Fitts (1954) indicated that a less predictable task requires greater attention than a predictable one. Twelve nonstutterers speaking normally were tested under three conditions: (1) difficult tracking (drum rotation of 10.6 rpm), (2) easy tracking (5.1 rpm), and (3) no additional task given. In all conditions subjects monitored their speech by recording every third word spoken. Mean percent accuracy of monitoring for the three conditions were 59.3%, 60.3%, and 73.3%, respectively. There was a significant effect [$F(2,22) = 3.71, p < 0.05$], with post-hoc tests showing that easy and difficult tracking did not differ from each other, but both produced poorer monitoring accuracy than the no-task condition.

Based on these studies, it was concluded that CE represents a suitable analogue of overattention to a speech situation, and that tracking an aperiodic wave can be used in a distraction condition in that it has been shown to disrupt a speech monitoring task. Both the easy tracking (ET) and difficult tracking (DT) conditions were used in the present experiment.

The spontaneous speech task was derived by presenting a series of nine TAT cards (Murray, 1943) and requiring the subjects to describe them. One was used in a practice trial, and the remaining eight in the experimental trials. Card 3BM was used in the practice trial. The cards used in the experimental trials were: 2, 1, 6BM, 6GF, 7BM, 7GF, 5, and 4. These particular cards were selected on the advice of two clinical psychologists who felt that these would elicit longer descriptions than the other TAT cards that might have been selected.

Rehearsed speech consisted of recitations of nine well known nursery rhymes (mean length, 27.9 words). One of these was used in a practice trial. The subjects' speech was tape recorded for later analysis.

Procedure

Subjects were tested individually. All were paid for their participation. Each was told that the experiment was designed to compare those who stuttered and those who did not on their ability to perform certain tasks while they spoke.

Following explanations of the experimental conditions, subjects were given one CE trial while reciting the practice rhyme, and were allowed a few seconds to attempt the tracking task. Preparation for the spontaneous speech conditions consisted of instructing the subjects to describe the activity shown in the practice TAT card, and to supplement this with speculations on preceding and subsequent events.

When it became clear that the subject understood the procedures, he or she was given the eight experimental TAT cards and a transcript of the eight experimental rhymes. Subjects were instructed to study the rhymes, and to look at each of the TAT cards and "think about" the description that would be given for each one.

The experiment itself began by testing subjects on a 30-sec trial on the ET task, and 30 sec on the DT task. The subjects were not required to speak during these trials. These nonspeech tracking trials will be referred to as NET and NDT for the easy and difficult tracking conditions, respectively.

One-half of the subject blocks were randomly selected to receive the NET trial first, and the remaining six blocks received the NDT trial first. Total tracking time and time on target was recorded for each trial.

The next phase of the experiment required the subjects to speak in each of the following conditions. Counting errors (CE), easy tracking (ET), difficult tracking (DT), or no additional task (NT). In the case of the spontaneous-speech condition, the subject was told which motor task to perform, and was then briefly shown one of the pictures. The experimenter then removed the card, and the trial began. In the case of the tracking tasks (ET and DT), the subject was requested to commence tracking before beginning the description, and to stop tracking only on its completion.

Each subject was given eight trials on the spontaneous speech condition. The description of one TAT card constituted one trial. All subjects were presented the cards in the same order. Each of the four task conditions was presented twice. One condition was applied to each trial. Presentation order was arranged so that the order of the last four trials was the reverse of the first four. Both members of a given subject block were given the same order of presentation. There are 24 possible presentation orders of the four conditions. Each subject block used two orders. The remaining 12 orders were randomly assigned to the 12 subject blocks. For example, one block received the conditions in the order: CE, NT, ET, DT, DT, ET, NT, and CE.

In the case of the rehearsed speech condition, essentially the same procedure was followed. In this case the subject recited one of the poems in lieu of responding to the TAT cards. Any given subject block received the same treatment presentation order in both speech conditions. Six of the blocks were tested in the spontaneous speech condition first, and in the rehearsed speech condition second. The reverse was true for the remaining six blocks. Of these two groupings, each contained three of the subject blocks who earlier were presented the NET trial first, with the remaining three in each grouping given the NDT trial first.

When this phase of the experiment was terminated, each subject was given a brief questionnaire to complete. The purpose of the questionnaire was to gain a measure of the subject's estimate of the effects of the distraction tasks. Subjects were asked to rank the four distraction conditions in regard to ease of speaking.

Tape recordings of the subject's speech were given to two independent raters for scoring. One was instructed to record the duration and the number of words spoken in each trial for each subject. Both raters recorded disfluencies. The criterion for a disfluency was that of Azrin, Jones, and Flye (1968), that is: hesitations, prolongations, part-word repetitions, and word-phrase repetitions. The raters also were instructed to score undue pauses between words as a disfluency. This last category was deemed necessary in that "silent" blocks would not have otherwise been scored. The raters were instructed to record the frequency of occurrence of disfluencies in each trial, for each subject. The same disfluency on the same word or phoneme was only to be scored once, even though it may have occurred several times. For example, several repetitions of a given word would be counted as one disfluency. However, two or more disfluencies on the same word were to be scored in cases where they were clearly separate. For example, it is possible to repeat one phoneme of a given word, and prolong a later one.

Before the raters were allowed to score the experimental tapes, an estimate was gained of their scoring agreement. A recording of 33 segments of a severe stutterer's speech was prepared. Each segment was of 30-sec duration. Both raters scored the tape recording for disfluencies. The total number of disfluencies in each segment was used to compute interrater reliability. The resulting Pearson product-moment correlation showed high agreement ($r = 0.87$). Both raters were then given further training on different excerpts of stuttered speech. Following this, the raters rescored the test tape. The correlation was 0.93. The mean disfluency rate for one scorer was 31.9% (SD = 31.0), and for the other, 30.6% (SD = 29.0).

In the experiment itself, the total number of disfluencies in each trial for each subject was divided by the number of words spoken during that trial to yield a proportional disfluency score (PDS). Means of the two rater scores were used. The data were analyzed with a mixed three-way analysis of variance (randomized-block design; Kirk, 1968).

RESULTS

Speech Disfluencies

The results of the analysis of variance on PDS data are shown in Table 2. An important finding is that the distraction variable had no demonstrable effect on the proportion of disfluencies. Distraction means are presented in Table 3. The possibility that significance may have been masked by the differential behavior of stutterers and nonstutterers under distraction conditions is negated by the lack of an interaction between "groups" and "distraction".

As expected, stutterers appeared to produce more disfluencies (mean PDS = 8.3%) than nonstutterers (mean PDS = 1.3%). However, an interaction with speech type suggested that this comparison be more closely

Table 2. ANOVA Summary Table for Disfluency Scores

Source	SS	df	MS	F
Blocks	3412.7	11	—	—
Speech type	215.7	1	215.7	4.72
Speech error	502.4	11	45.7	—
Groups	2382.2	1	2382.2	9.01[a]
Groups error	2909.9	11	264.5	—
Distraction	17.3	3	5.8	1.15
Distraction Error	165.3	33	5.0	—
Speech × Groups	216.5	1	216.5	5.37[a]
Error	443.9	11	40.4	—
Speech × Distraction	1.2	3	0.4	0.10
Error	129.6	33	3.9	—
Groups × Distraction	2.1	3	0.7	0.09
Error	268.8	33	8.1	—
Speech × groups × distraction	8.8	3	2.9	0.49
Error	197.4	33	6.0	—
Total	10873.8	191		

[a] $p < 0.05$.

evaluated. A test of the simple main effects (Kirk, 1968) indicated that the two groups differed in the spontaneous speech condition [$F(1,22) = 13.23$, $p < 0.01$], but not in the rehearsed speech condition [$F(1,22) = 3.81$, N.S.].

Viewed another way, the nonstutterers did not vary in their disfluency production over the two types of speech. The mean PDS was 1.3% in both cases. The stutterers, on the other hand, did show a difference. Their mean PDS was 6.2% for rehearsed speech, and 10.5% for spontaneous speech. This is an important finding in that it clearly distinguishes stutterers from nonstutterers. It suggests that the propositionality of a communication affects the disfluency production of stutterers, but not of nonstutterers. However, the two types of speech may differ on factors other than propositionality. For example, speaking rate, length of sentences, and word length.

Speaking Rate

The number of words spoken by each subject in each trial, was divided by the time taken to complete the respective trial. This yielded scores

Table 3. Group PDS Means for the Distraction Conditions

	CE	NT	ET	DT
Stutterers	8.9	7.9	8.4	8.2
Nonstutterers	1.7	1.2	1.2	1.1

representing the number of words spoken per second (W/sec). Mean speaking rate scores were derived for each subject in each condition. Again, the distraction variable produced no change in behavior [$F(3,33) = 1.16$, N.S.]. The mean W/sec for the distraction conditions were: CE = 2.3, NT = 2.4, ET = 2.3, and DT = 2.3.

The results of this analysis indicate that stutterers speak more slowly than nonstutterers [$F(1,11) = 9.57$, $p < 0.05$]. Stutterers spoke at the rate of 2.0 W/sec, and nonstutterers at 2.7 W/sec. Both groups spoke less quickly during spontaneous speech than during rehearsed speech [$F(1,11) = 37.99$ $p < 0.01$]. The stutterers dropped from 2.3 to 1.7 W/sec, and the nonstutterers from 3.0 to 2.3 W/sec. It is interesting that no interaction appeared between "speech type" and "groups" [$F(1,11) = 0.01$, N.S.], although this did occur in the analysis of speech disfluencies. This indicates that a change in the type of speech produced a change in the speaking rate for both groups, but only the stutterers showed a change in disfluency production.

Tracking Accuracy

Tracking accuracy (TA) scores for each condition were calculated by taking the percentage of time on target. These were used to produce values representing the percentage change in TA when a subject moved from tracking without speech to the condition where both speech and tracking were required. For example, the easy tracking calculation formula was (NET – ET/NET). These data were analyzed with a mixed three-way ANOVA (tracking difficulty × speech type × groups).

The most notable result of the analysis is that there are no significant differences among the comparisons. The fact that stutterers and nonstutterers show no difference on TA change [$F(1,11) = 2.03$, N.S.] is important. Had stutterers shown a greater decrement than nonstutterers, this would suggest that stutterers devoted less attention to tracking while speaking than did nonstutterers. Such a result would imply that the lack of effect of tracking on disfluency production might be explained as being due to the fact that the stutterers were not attending to the tracking task. However, the results do not correspond with this explanation.

Observations and Self-Reports

With regard to the ratings of the effects of the four levels of distraction, there appear to be differences between stutterers and nonstutterers. The average ranks are plotted in Figure 2. A χ^2 test done on the sum of the ranks that the subjects assigned to each distraction level indicated that the two groups did differ ($\chi^2 = 9.14$, $p < 0.05$). Of interest is that the highest rank (i.e., speaking was easiest) was assigned to the ET condition

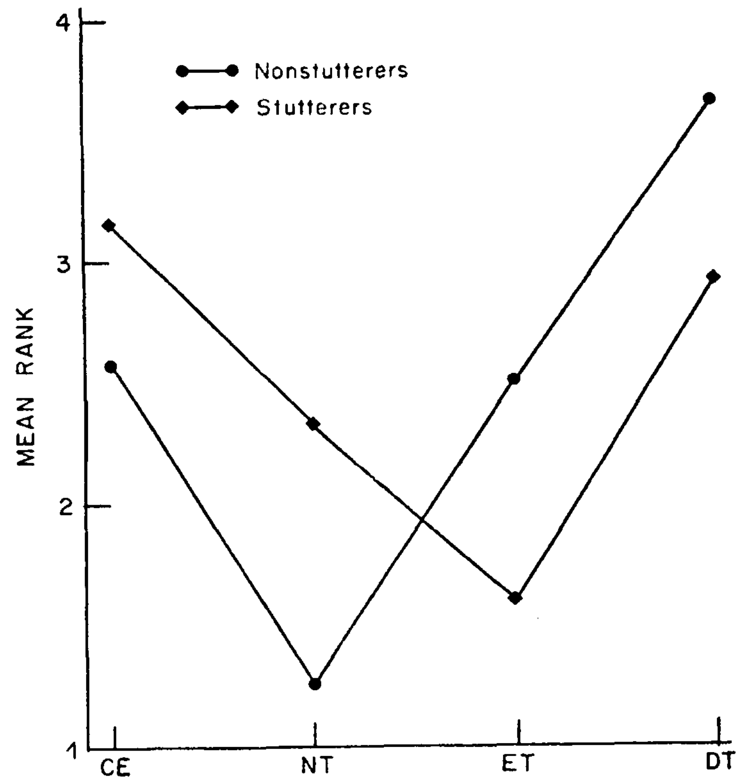

Figure 2. Self-reports of speaking difficulty produced by the four levels of distraction.

by the stutterers. On the other hand, the nonstutterers rated the NT condition easiest to speak in. This corresponds with the distraction hypothesis in that stutterers should find speaking easier when "distracted," and that nonstutterers would find speaking easiest when no additional tasks were performed. A χ^2 test on these data indicated that the groups also differed significantly when only the ET and NT conditions were compared (χ^2 = 6.17, $p < 0.01$).

DISCUSSION

The data from this study clearly indicate that distraction, as defined here, has no measurable effect on the production of disfluencies. The results provide no support for the distraction hypothesis.

That stutterers and nonstutters did not differ in the performance of the distracting task (tracking accuracy) is interesting in light of the results of the Kamhi and McOsker (1982) study. As noted earlier, they also found no differences in disfluences that were attributable to the distractor (reading comprehension task), but that performance on the distraction task was suppressed for stutterers, compared with nonstutterers. This presents an interesting apparent contradiction. The resolution of the issue may very well lie in the fact that the two distractors are quite different. The Kamhi and McOsker task was speech-related and was measured after each experimental trial. The task used in the present study had no obvious verbal content and was measured during the experimental trials. Both tasks appear to have some justification for inclusion in this type of study. Reading for comprehension would require some attention in order to produce adequate performance (although it could be argued that it includes a component of speech monitoring that would run counter to distraction). The tracking task used here, while not containing a verbal or semantic component, showed the capability of disrupting a speech monitoring task. Further research on this matter needs to examine the effects of different types of distractors, and to gain some control over the "amount" of attention they require.

Although the self-reports indicate that the subjects believed that the distraction variable affected their speech, the behavioral measures analyzed earlier showed no differential effect that might be attributed to the various levels of distraction. This discrepancy between self-reports and the actual behavior suggests that caution be used when evaluating a stutterer's opinion of the variables influencing his or her speech. In part, this may explain the tenacity with which stutterers and therapists have adhered to the distraction hypothesis.

Perhaps the conclusion that is best adopted is that the distraction hypothesis is as yet unsupported. This is in line with the view of Wingate (1976), who points out that the theory is logically inconsistent, has little evidence to support it, and may well have arisen from self-reports of stutterers who, in fact, are not accurate judges of their own disfluency rates. However, the results produced by Kamhi and McOsker (1982) suggest that further investigation is warranted.

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