# Disfluency and Anxiety in Stuttering and Non-Stuttering Adolescents

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The disfluent speech behaviours, nonverbal concomitants of the act of speaking, scaled reports of speech and task related anxiety, as well as the psychophysiological arousal responses of 48 young male stutterers and 48 nonstutterers were measured during oral reading. Results showed no significant differences between groups in the frequency of those disfluency types that are commonly considered as normal kinds of nonfluency, whereas the stuttering types of disfluency were not observed in the nonstuttering group. Nonverbal behaviour did not prove to be an essential characteristic of the stutterer. In addition, stutterers did not differ from nonstutterers in autonomic reactivity. Factor analysis of the data, however, revealed that the stutterers showed a relationship between anxiety measures and a specific pattern of disfluency. Moreover, particular disfluent speech behaviours of stutterers were associated with specific nonverbal responses. This was in contrast with the findings of the nonstutterers which indicated that disfluent speech behaviour, nonverbal responses and anxiety measures were separate response classes for this group.

An 48 jungen männlichen Stotterern und an 48 Nicht-Stotterern wurden während bzw. im Hinblick auf Vorlesen eines Textes die folgenden Verhaltensaspekte erfaßt: Sprechunflüssigkeiten, sprachbegleitendes nicht-verbales Verhalten, Sprechangst, aufgabenbezogene Angst und psychophysiologische Maße. Es zeigten sich keine bedeutsamen Unterschiede zwischen den beiden Gruppen in den Häufigkeiten der Sprechunflüssigkeiten, die als normale Unflüssigkeiten betrachtet werden. Sprechunflüssigkeiten, die als typisch für Stotterer gelten, traten jedoch bei den Nicht-Stotterern nicht auf. Es ergaben sich keine charakteristischen nicht-verbalen Verhaltensweisen der Stotterer und es zeigte sich auch kein Unterschied der autonomen Reaktivität zwischen beiden Gruppen. Eine Faktorenanalyse der Daten zeigte jedoch für die Stotterer einen Zusammenhang zwischen den Angstmaßen und spezifischen Mustern von Sprechunflüssigkeit. Zudem waren bei den Stotterern bestimmte Sprechunflüssigkeiten mit spezifischen nicht-verbalen Verhaltensweisen verbunden. Im Gegensatz dazu erwiesen sich für die Nicht-Stotterer Sprechunflüssigkeiten, nicht-verbales Verhalten und Angstmaße als unterschiedliche Reaktionsklassen.

Au cours de la lecture orale d'un texte, les auteurs ont mesuré chez 48 bègues et 48 sujets sans troubles du langage, groupes formés d'adolescents de sexe masculin, les variables suivantes: Le langage non-fluent, les phénomènes concomitants nonverbaux simultanés à la parole, l'anxiété en rapport avec la tâche demandée et les réponses psycho-physiologiques d'activation. Les comparaisons inter-groupes ne montraient pas de différences significatives en ce qui concerne la fréquence de types de langage non-fluent considérés en général comme normaux. Cependant, dans le groupe sans troubles du langage, les auteurs n'ont pas observé des types de langage non-fluent propres au bégaiement. Le comportement non-verbal du bègue ne présentait pas de caractéristiques particulières. De plus, le bègue ne se distinguait pas du sujet sans troubles du langage par sa réaction autonome. L'analyse factorielle des données a pourtant révélé chez le bègue une corrélation positive entre les mesures d'anxiété et un pattern spécifique du bégaiement. Certains comportements verbaux non-fluents du bègue étaient aussi associés à des réponses non-verbales spécifiques. Ces résultats contrastaient avec ceux obtenus chez les sujets sans troubles du langage. Dans leur groupe, le langage non-fluent, les réponses non-verbales et les mesures d'anxiété représentaient séparément des classes de réponses indépendantes.

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All normally fluent speakers are disfluent at certain times. We usually refer to the disruptions in the speech of a normal speaker as normal disfluencies to distinguish them from stuttering. Diagnostically, the identification of stuttering does not seem to be the problem. Objective studies have shown that stuttering behaviour is readily identified by both trained and untrained listeners (MacDonald & Martin, 1973; Curran & Hood, 1977), although there may be some difficulty when stuttering is mild or in its earliest stages. Certain types of disfluency appear to be more characteristic of the nonstuttering speaker, whereas other features, such as tension, fragmentation and speech related struggle, are considered indicative of stuttered speech.

Theoretically, however, the relationship between stuttering and normal disfluency has long been an issue of controversy in stuttering theory. Findings relative to the type of disfluency have shown some overlap in behaviours between stutterers and normally fluent speakers. This similarity in disfluencies has led some authors to hypothesize that stuttering may be the outgrowth of the disfluencies that characterize normal speech, as a result of labeling normal disfluency stuttering or learned through complex schedules of reinforcement (Bloodstein, 1970; Johnson, 1961; Shames & Sherrick, 1963). Other authors questioned the normalcy of normal disfluencies. Brutten and Shoemaker (1967), for instance, argued that fluency is normal and disfluencies regardless of the labels attached to them are deviant. In their concept fear or anxiety is presumed to differentiate the disfluency behaviour of stutterers from that of nonstutterers. Normal speakers when exhibiting disfluencies in their speech are not aware of it, nor do they show any signs of concern about it. For the stutterer, however, negative emotions such as anxiety and frustration, are supposed to be associated with or to precede the disfluencies.

Such a view on stuttering has clear implications for therapy. If anxiety plays a critical role in the development and maintenance of stuttering, clinical approaches using anxiety reduction techniques are indicated. Unfortunately, the therapeutic efficacy of anxiety reduction techniques in stuttering therapy has yet to be demonstrated. There is some evidence of reduced stuttering, but complete fluency is never attained (e.g. Ingham & Andrews, 1973). Although it seems evident, particularly from clinical reports, that stuttering and negative emotions are in some way related, actual research concerning the impact of anxiety on stuttering behaviour is scarce. Particularly, little systematic attention has been directed to the relationship between anxiety and specific types of disfluencies.

The purpose of the present study is first to investigate the differences between stuttering and nonstuttering adolescents in: (a) the type of speech disfluency, (b) the type of speech related nonverbal behaviour, and (c) self-reported and autonomic anxiety in a speech testing situation. And secondly, to explore in both groups the interrelationship between specific speech disfluencies, speech related nonverbal behaviours, and anxiety. For this last purpose a factor analytic design was employed.

## Method

### *Subjects*

The subjects were 48 young male stutterers and 48 male nonstutterers, aged from 13 to 16 years. Mean age of the stuttering group was 14.8 years, while the mean age of the nonstutterers was 13.9 years. The stuttering subjects had been diagnosed as stutters and were selected from the waiting list, none of them was in therapy at the moment of data collection. The nonstuttering subjects were selected from sporting clubs. No subjects included in the nonstuttering group had a history of previous speech disorders.

### *Procedure*

The subject's task consisted of five massed oral readings of a 230 word passage. All oral readings were recorded on a video tape recorder for later analysis. During the whole session skin resistance and heart rate were continuously monitored. Prior to the reading task the subject was requested to remain quietly seated for 10 minutes to allow pretest assessment of physiological measures.

Following each of the oral readings the subject rated his tension state during the performance of the reading on a 5-point scale. At the end of the reading task he completed the Brutten Speech Situation Check List. This list contains 51 real life speech situations for scaled evaluation and provided a score for speech anxiety (Brutten, 1978).

### *Types of Disfluency Behaviour*

Frequency counts of disfluencies were obtained for each subject across the five reading trials. The video recorded samples were replayed as many times as necessary in order to identify all types of disfluent behaviour. The behaviours identified for each subject were classified according to the following categories:

1. Fast sound repetitions including fast repetitions of a phoneme or syllable.
2. Fast word repetitions including fast repetitions of a monosyllabic word.
3. Prolongations including exaggerated audible prolongations of articulatory posture.
4. Tense blocks including pauses before or within a word with unusual stress or tension defined as inappropriate movements or fixations of the face and head.
5. Non-tense blocks including pauses before or within a word without observable stress or tension.
6. Vocalized blocks including audible fixations of articulatory posture.
7. Sound interjections including simple extraneous vocalizations of a phoneme.

8. Fast sound interjections including fast multiple extraneous vocalizations of a phoneme.
9. Word interjections including vocalizations of a word not in the passage.
10. Slow sound repetitions including slow repetitions of a phoneme.
11. Slow syllable repetitions including slow repetitions of a syllable.
12. Slow word repetitions including slow repetitions of a word.
13. Phrase repetitions including repetitions of two or more words.

In addition, reading errors were counted defined as any substitution, omission or inversion of a sound in a word.

Inter-observer and intra-observer reliability were assessed based on the percentage of agreement A/A+D (Sander, 1961) on loci. Interjudge reliability measures were performed on a randomly selected sample of 15 subjects in which 12 different types of disfluency were observed. Reliability scores were: .89 for fast sound repetitions, 1.00 for fast word repetitions, .80 for prolongations, .88 for tense blocks, .82 for non-tense blocks, .33 for sound interjections, 1.00 for word interjections, .64 for slow sound repetitions, .90 for slow syllable repetitions, 1.00 for slow word repetitions, .91 for phrase repetitions, and .88 for reading errors, yielding a mean interjudge reliability value of .83. Intrajudge reliability measures based on a randomly selected sample of 10 subjects were: .91 for fast sound repetitions, 1.00 for fast word repetitions, .91 for prolongations, .92 for tense blocks, .90 for non-tense blocks, .40 for vocalized blocks, .71 for sound interjections, .78 for fast sound interjections, 1.00 for word interjections, .67 for slow sound repetitions, .86 for slow syllable repetitions, .92 for slow word repetitions, 1.00 for phrase repetitions and .92 for reading errors, yielding a mean intrajudge reliability score of .89.

*Types of Speech Related Nonverbal Behaviour*

From the videotapes frequency counts were also made of facial and head movements for each subject. In the stutterer these nonverbal features are ordinarily viewed as indications of struggle in producing speech. The following categories were counted: eye blinking, head movements, breathing irregularities, movements localized in the area of the mouth, the eyelids and the forehead, and a more general category looking away/touching face or hair. Number of nonverbal behaviours per minute was calculated in order to equate differences in the length of the speech samples obtained from the various subjects.

Interjudge reliability measures of the experimenter's ability to count the frequency of each of the nonverbal behaviours were performed on a randomly selected sample of 86 reading trials. Pearson product-moment correlations between the two sets of measures resulted in the following reliability coefficients: .99 for eye blinking, .99 for head movements, .84 for breathing irregularities, .89 for movements in the area of the mouth, .78 for movements in the area of the eyelids, .98 for movements in the area of the forehead, and .97 for looking away/touching face or hair.

*Physiological Responses*

Skin conductance level, spontaneous skin conductance responses and heart rate were employed as physiological measures. All physiological responses were recorded on FM-tape on a Ampex instrumentation tape recorder for later analysis on a PDP-15 computer.

Skin resistance was recorded by means of AG-AGCl electrodes placed on the palmar side of the first phalange of the first and third fingers of the subject's left hand. Raw data were converted to log conductance values per minute by the computer. In addition, number of spontaneous fluctuations were calculated per minute. A spontaneous fluctuation equalizes a change in base level of .5 Kohm minimally.

Heart rate responses were measured by means of AG-AGCl electrodes placed on subject's left leg and right wrist, with an electrode on the subject's right leg serving as ground. Raw data were converted to R-R-intervals by the computer and the interpulse interval data were subsequently converted to rate per minute.

Heart rate and skin conductance responses were sampled during the last 5 minutes of the pretest period and the first minute of the reading task. Autonomic reactivity measures were obtained by computing change scores between pretest period and reading period.

## Results and Discusssion

*Differences between Stutterers and Nonstutterers*

Table 1 presents the means and standard deviations for each category of disfluency, in terms of disfluencies per 230 words, for stutterers and nonstutterers. Differences

| | Stutterers | | Nonstutterers | |
|---|---|---|---|---|
| | Mean | *SD* | Mean | *SD* |
| Fast Sound Repetitions | 9.31 | 17.61 | .13 | .33 |
| Fast Word Repetitions | .67 | 1.58 | 0 | – |
| Sound Prolongations | 9.10 | 12.81 | .06 | 0.32 |
| Tense Blocks | 9.96 | 21.57 | 0 | – |
| Non-Tense Blocks | 6.71 | 10.76 | .90 | 1.61 |
| Vocalized Blocks | .98 | 4.21 | 0 | – |
| Fast Sound Interjections | 2.86 | 9.72 | 0 | – |
| Slow Sound Interjections | 5.10 | 9.76 | 1.13 | 1.08 |
| Slow Word Interjections | 1.27 | 4.23 | 4.85 | 5.49 |
| Slow Sound Repetitions | 2.83 | 3.54 | 1.33 | 2.64 |
| Slow Syllable Repetitions | 2.27 | 2.99 | 1.90 | 2.24 |
| Slow Word Repetitions | 4.58 | 5.14 | 3.38 | 2.33 |
| Phrase Repetitions | 3.23 | 3.75 | 1.63 | 1.66 |
| Reading Errors | 5.63 | 4.20 | 10.50 | 8.25 |

Table 1. Mean frequencies and standard deviations of specific disfluency types for stuttering and nonstuttering boys.

between stutterers and nonstutterers in the frequency of each type were determined by means of Mann Whitney *U* tests. The stutterers exhibit significantly higher frequencies than the nonstutterers for all types of disfluency, except for slow repetition of a syllable, slow interjection of a sound, and phrase repetition. Of special interest is the absence of fast repetitions of a sound or monosyllabic word, prolongations and tense and vocalized blocks in the nonstuttering group. It may be clear from the data presented here that the assumed similarity in behaviour between stutterers and nonstutterers is only partly confirmed. The overlap is limited to behaviours that are characterized by slow repetitions and interjections of sounds, syllables, words or phrases. Typical of stuttered speech appears to be fast repetitions and interjections of one element, prolongations, and blocks that are associated with observable tension.

Earlier studies comparing the disfluency types between stutterers and nonstutterers did not distinguish between fast and slow repetitions. The marked overlap in behaviours found in those studies may be partly attributed to the use of a system of classification in which fragmentation and tension, the essential features of stuttered speech, were not adequately represented.

More difficult to interprete is the significantly higher frequency of occurrence of reading errors in the nonstuttering group. Disfluency behaviour has been found to increase in stuttering children along with an increase in the level of reading passage difficulty (Blood & Hood, 1978). Since the passage used in this study may be considered rather difficult for this age group, it might be possible that the difficulty of the reading material has evoked different linguistic behaviours in stutterers and nonstutterers. In the nonstuttering group subject's struggle with the linguistic content may be reflected in the frequency of reading errors, whereas in the stutterer the greatest effect is an increase in stuttering types of disfluency.

Table 2 presents the mean frequency and standard deviations of each of the seven categories of nonverbal behaviours. As can be seen from the table all categories were noted in both groups, although there was much variation from subject to subject in the behaviours displayed. Only eye blinking, breathing irregularities and movements of the eyelids,occurred more frequently in the stuttering group, as revealed by Mann

| | Stutterers | | Nonstutterers | |
|---|---|---|---|---|
| | Mean | *SD* | Mean | *SD* |
| Eye Blinks | 7.76 | 5.80 | 2.93 | 2.42 |
| Movements Forehead | 4.10 | 6.90 | 2.00 | 2.66 |
| Movements Eyelids | 1.56 | 4.13 | .03 | .14 |
| Movements Head | 2.30 | 3.90 | .91 | 1.21 |
| Movements Mouth | 1.07 | 3.32 | .72 | 1.24 |
| Breathing Irregularities | 1.94 | 4.88 | .10 | .59 |
| Looking Away | .22 | .58 | .22 | .57 |

Table 2. Mean frequencies and standard deviations of specific nonverbal behaviours for stuttering and nonstuttering boys.

| | Stutterers Mean | *SD* | Nonstutterers Mean | *SD* |
|---|---|---|---|---|
| Spontaneous Fluctuations | 3.42 | 3,72 | 2.28 | 2.74 |
| Heartrate | 12.97 | 8.57 | 12.18 | 8.32 |
| Skin Conductance Level | .15 | .11 | .15 | .07 |
| Subjective Speech Anxiety | 2.36 | .57 | 1.69 | .43 |
| Subjective Task Anxiety | 2.81 | 1.08 | 2.10 | .83 |

Table 3. Mean scores and standard deviations on autonomic and self-reported measures of anxiety for stuttering and nonstuttering boys.

Whitney *U* tests. Nevertheless, these data seem to indicate that nonverbal behaviours are not essential characteristics of stuttering, particularly because some stutterers were free of them.

A marked difference between stutterers and nonstutterers was found in the degree of association between disfluency and nonverbal behaviour. Although verbal and nonverbal behaviours were scored independently, an estimate can be made of the percentage of nonverbal behaviour that accompanied the disfluencies. Tense block was defined as a disfluency type associated with an inappropriate movement in the face or with the head. This type of disfluency was not observed in the nonstuttering group. Besides tense blocks 30% of the prolongations were observed to be accompanied by a nonverbal behaviour in the stuttering group. This means that for the stutterer at least 76% of the nonverbal behaviours occurred during a disfluency, whereas in the nonstuttering group nonverbal behaviours were independent of the disfluency emitted.

Table 3 shows the mean scores for stuttering and nonstuttering subjects on autonomic and self-reported measures of anxiety. It can be seen that the stress of the testing situation produced obvious increases in all three psychophysiological measures. Autonomic arousal, however, did not differentiate stuttering and nonstuttering groups. On all three measures changes in autonomic responses were very similar between groups. In addition, no significant difference was found in self-reported task anxiety. Only mean subjective speech anxiety was significantly higher for the stuttering group. These findings seem to indicate that task related fear or anxiety, as measured in this study, is not an integral or determining feature of the stuttering problem.

*Relation between Disfluency, Nonverbal Behaviour and Anxiety*

The second part of the study was designed to examine the interrelationship between disfluent behaviour, speech related nonverbal behaviour and anxiety. For this purpose a principal components factor analysis using the varimax method of rotation was carried out on the basis of Spearman correlations for both the stuttering and nonstuttering group.

Since in the nonstuttering group the frequencies of some of the disfluency types in the first reading trial were too small to permit statistical treatment, the analysis was per-

formed on the combined frequencies of the five trials. This was done for both the nonstuttering and the stuttering group. Twenty-seven variables were included in the analysis for the stutterers, 20 variables for the nonstutterers.

For both stuttering and nonstuttering groups six factors were identified,with eigenvalues greater than 1, accounting for 60 and 65% of the common variance respectively. The factor pattern obtained for the stuttering group differed considerably from that obtained from the nonstuttering group. Table 4 presents the data for the nonstuttering group. As can be seen from this table, disfluent behaviour (factor 1 and 5), speech related nonverbal behaviour (factor 2 and 6), self-reported anxiety (factor 3) and autonomic reactivity (factor 4) appear to be independent response classes for the nonstutterers. In contrast, the factor patterns of the stutterers showed specific relationships between disfluencies, nonverbal behaviours and anxiety. Table 5 shows the data for the stuttering group.

Factor 1 is dominated by disfluency types which have also been shown to be characteristic of normal disfluency, such as slow repetitions of sounds, syllables, words and phrases. Subjective task anxiety and movements in the area of the mouth are also positively loaded on this factor. The total configuration suggests that the production of normal disfluencies in the stutterer may reflect voluntary strategies to avoid or postpone actual stuttering behaviour.

| Variables/Factors | 1 | 2 | 3 | 4 | 5 | 6 | $h^2$ |
|---|---|---|---|---|---|---|---|
| Slow Sound Repetitions | .74 | .23 | –.02 | –.05 | –.03 | .19 | .65 |
| Slow Syllable Repetitions | .78 | –.08 | –.09 | –.22 | .07 | .27 | .74 |
| Slow Word Repetitions | .84 | .13 | –.04 | .01 | .02 | .05 | .72 |
| Phrase Repetitions | .54 | .04 | –.08 | –.01 | .09 | –.11 | .33 |
| Slow Sound Interjections | .62 | .01 | .16 | –.01 | –.07 | –.11 | .43 |
| Slow Word Interjections | .83 | –.06 | .08 | .16 | .10 | .01 | .74 |
| Non-Tense Blocks | .18 | .05 | .22 | –.16 | .65 | –.12 | .54 |
| Reading Errors | .83 | –.01 | .09 | –.06 | .03 | .08 | .71 |
| Eye Blinks | –.15 | .08 | .14 | .03 | .22 | .41 | .27 |
| Movements Forehead | –.08 | .10 | .13 | .10 | .09 | –.49 | .29 |
| Movements Eyelids | .29 | –.13 | .45 | –.17 | –.25 | .06 | .40 |
| Movements Head | –.09 | .09 | .56 | –.30 | .12 | –.18 | .47 |
| Movements Mouth | .04 | .03 | –.07 | –.05 | .51 | .13 | .29 |
| Looking Away | .34 | .06 | .04 | –.04 | .07 | .39 | .28 |
| Spontaneous Fluctuations | .11 | –.11 | .63 | .36 | .09 | .10 | .56 |
| Heartrate | –.11 | –.05 | –.04 | .46 | –.06 | –.07 | .24 |
| Skin Conductance Level | .07 | .12 | .01 | .61 | –.07 | –.04 | .40 |
| Subjective Speech Anxiety | .12 | .70 | –.05 | –.01 | .10 | –.14 | .54 |
| Subjective Task Anxiety | .32 | .38 | –.36 | .01 | –.26 | –.04 | .45 |

Table 4. Rotated-factor matrix for disfluent behaviours, nonverbal behaviours, and autonomic and self-reported measures of anxiety of 48 nonstuttering boys.

Factor 2 is composed of three stuttering behaviours: tense blocks, prolongations and fast sound interjections. The high loadings on this factor of eye blinking, head movements and movements in the area of the eyelids suggest that the common attribute of this factor seems to be a stuttering behaviour in which considerable motor struggle and escape mechanisms are involved.

Factor 3 is defined by the subjective measure of emotional reactions in speech situations. Reading errors are negatively loaded on this factor suggesting that for the stutterer to make errors during reading is not anxiety provoking.

Factor 4 received high positive loadings from fast sound repetitions and fast word repetitions and from two of the autonomic reactivity measures, indicating that anxiety for the stutterer is related to a specific disfluency pattern characterized by fast repetitions.

| Variables/Factors | 1 | 2 | 3 | 4 | 5 | 6 | $h^2$ |
|---|---|---|---|---|---|---|---|
| Fast Sound Repetitions | .28 | .33 | –.04 | .71 | .19 | .10 | .74 |
| Fast Word Repetitions | .19 | .04 | .01 | .60 | –.09 | .13 | .42 |
| Sound Prolongations | –.08 | .63 | .27 | .40 | .19 | –.19 | .70 |
| Tense Blocks | .18 | .21 | .18 | .12 | .61 | –.04 | .50 |
| Non-Tense Blocks | .31 | .69 | .22 | –.02 | .17 | .16 | .68 |
| Vocalized Blocks | .07 | –.02 | .03 | –.05 | .56 | .10 | .33 |
| Fast Sound Interjections | .44 | .43 | .03 | .27 | .24 | .07 | .51 |
| Slow Sound Interjections | .57 | .31 | .15 | .17 | .45 | .19 | .71 |
| Slow Word Interjections | .14 | .33 | .16 | .01 | .06 | .10 | .17 |
| Slow Sound Repetitions | .42 | .39 | .27 | .15 | .19 | .19 | .49 |
| Slow Syllable Repetitions | .69 | .25 | .21 | .12 | –.38 | –.38 | .88 |
| Slow Word Repetitions | .79 | .09 | .34 | .11 | –.07 | –.07 | .77 |
| Phrase Repetitions | .59 | .01 | .10 | .13 | .18 | .06 | .41 |
| Reading Errors | –.01 | –.27 | –.48 | –.04 | –.27 | –.12 | .39 |
| Eye Blinks | .33 | .65 | .18 | –.12 | –.01 | .08 | .59 |
| Movements Forehead | –.27 | .23 | .14 | .10 | .37 | –.17 | .32 |
| Movements Eyelids | –.09 | .41 | –.03 | .09 | .01 | .07 | .19 |
| Movements Head | .28 | .54 | –.01 | –.14 | .06 | –.19 | .43 |
| Movements Mouth | .43 | .28 | .04 | –.07 | .09 | .31 | .37 |
| Breathing Irregularities | .33 | .06 | –.01 | .19 | .34 | –.01 | .26 |
| Looking Away | –.02 | .22 | .07 | .36 | .06 | .85 | .90 |
| Spontaneous Fluctuations | –.04 | –.15 | .03 | .43 | .06 | .09 | .22 |
| Heartrate | .07 | .05 | .23 | .40 | .06 | –.08 | .23 |
| Skin Conductance Level | .08 | .17 | .32 | .14 | –.01 | –.15 | .18 |
| Subjective Speech Anxiety | .23 | .01 | .88 | .06 | .08 | .05 | .83 |
| Subjective Task Anxiety | .62 | .11 | .09 | .07 | .09 | –.05 | .42 |

Table 5. Rotated-factor matrix for disfluent behaviours, nonverbal behaviours, and autonomic and self-reported measures of anxiety of 48 stuttering boys.

Factor 5 is defined by three types of disfluencies: non-tense blocks, vocalized blocks and slow sound interjections. These are disfluency types that have been found to occur also in the non-stuttering group. Two nonverbal behaviours, breathing irregularities and movements in the area of the forehead, also received high loadings on this factor. Since tense blocks are not represented in this factor, nor any of the other types of struggle behaviour, this factor may be indicative of a mild form of stuttering in which a motoric component is involved.

The last factor 6 does not receive any appreciable loadings from any of the disflueny types. The factor is represented by one single variable, the nonverbal behaviour looking away and/or touching hair which may be regarded as a non-speech related behavior.

## General Conclusions

The findings of this study that nonstutterers exhibit marked quantities of slow repetitions and interjections, but do present no disfluency in those categories commonly associated with stuttering, suggest that stuttering may be qualitatively and quantitatively different from the disfluent speaking behaviour of nonstutterers. These results do not support the assumption of the continuity hypothesis which states that the disfluent behaviours of the stutterer and the nonstutterer are distributed along a continuum. The distribution of stuttering and normal disfluencies appears to be more dichotomous than continuous.

Stutterers did not differ from nonstutterers in autonomic reactivity nor did they report higher levels of tension or discomfort in a speech testing situation. So, negative emotions do not seem to be a common feature of stuttering in male adolescents. On the other hand, data from the factor analysis revealed that anxiety is an essential feature for those stutterers whose disfluency behaviour is characterized by a fast repetitive pattern and for those stutterers who manifest a stuttering pattern in which slow repetitions are dominant.

The finding that different dimensions of stuttering emerge from the factor analysis support treatment approaches in which these different stuttering patterns are regarded as relatively distinct. Diagnostically speaking, more attention should be paid to the dominant disfluency pattern of each stutterer in order to be able to formulate appropriate strategies for correcting the observed disruptive behaviours.

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