Development of Japanese Checklist for Possible Cluttering ver.2 to Differentiate Cluttering from Stuttering

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The first aim of this study was to examine the Japanese Checklist for Possible Cluttering ver.2 (JCPC ver.2) for children who stutter (CWS), and to validate the items that construct JCPC ver.2 for the definitive differentiation of stuttering from cluttering. The second aim was to estimate a norm score for distinguishing stuttering and cluttering using JCPC ver.2. The third aim was to propose a draft version of JCPC ver.3, provided any item elimination was suggested through the validation process. In this study, the utility of JCPC ver.2 was examined in 237 CWS. Study results identified three factors including disorganized speech/language output related items, inattention and dyssynchrony related items, and poor language planning related items. These three identified factors were related to the language automatization deficit model (van Zaalen & Reichel, 2015). As four items showed low factor loading that was below 0.30 after a Varimax rotation, they were removed from JCPC ver.3 (draft). A more sensitive version of the JCPC checklist is required in future to differentiate cluttering from stuttering.

Key Words: stuttering, cluttering, differential diagnosis, fluency disorders

Introduction

Definition of Cluttering

Although articles on cluttering have been published for over a century, clinicians are often reluctant to treat people who clutter (PWC). Daly (1986) likened cluttering to “the orphan in the family of speech and language pathology”; and St. Louis and Rustin (1992) provided insight into the reasons behind the substantial anxiety and uncertainty among clinicians caused by cluttering. One salient issue was the lack of consensus-based definitions. The three definitions from the World Health Organization (WHO, 1992), the American Speech-Language-Hearing Association (ASHA, 1999), and the American Psychiatric Association (APA), could not be effectively used by specialists of fluency disorders as these definitions were considered to be lacking in logical consistency. The DSM-III-R (Diagnostic and Statistical Manual of Mental Disorders, Third edition, Revised) (APA, 1987) included the definition of cluttering, whereas the subsequent two revisions did not (APA, 1994, 2013), and cluttering was instead presumably subsumed under the entry for stuttering (Reid & Wise, 1995).

However, Weiss’s definition of cluttering (1964) was influenced by speech-language-hearing pathology, and various symptoms were included in the definition of cluttering, resulting in difficulty in distinguishing core symptoms from associated symptoms. Refinement of definitions by researchers (Daly & Burnett, 1999; St. Louis, 1996) led to a lowest common denominator (LCD) definition by St. Louis and Schulte (2011), whereby the LCD definition stated “Cluttering is a fluency disorder wherein segments of conversation in the speaker’s native language typically are perceived as too fast overall, too irregular, or both. The segments of rapid and/or irregular speech rate must further be accompanied by one or more of the following: (a) excessive ‘normal disfluencies,’ (b) excessive collapsing or deletion of syllables, and/or (c) abnormal pauses, syllable stress, or speech rhythm.” This definition excluded facultative and associated symptoms, and therefore addressed a prior debate on whether the definition of cluttering included poor language organization. Based on this working LCD definition, the primacy
of speech rate in the definition of cluttering was reaffirmed, and language formulation issues were excluded. This working definition formed the basis of St. Louis and Schulte’s (2011) conceptualization of the relationships among the various symptoms and diagnostic categories.

Confusion between cluttering and stuttering has been long standing in the field of speech pathology (Van Riper, 1970). Historically, cluttering and stuttering were considered as the same disorder (Georgieva, 2010; Van Riper, 1970), while several experts from Germany (de Hirsch, 1970) and Austria (Weiss, 1964) expressed the belief that stuttering was caused by cluttering although Daly (1986) stated that it was unclear if one of the disorders typically preceded the other.

The Differential Diagnosis Between Cluttering and Stuttering

Preus (1992) suggested that cluttering and stuttering have not always been differentiated because the two disorders are often found in the same individual, and most clutterers seeking therapy are combination cases. He further suggested that Van Riper’s Track II stutterers that showed delayed language development were a cluttering subgroup which he termed “clutter-type stuttering,” and these comprised 18 percent of stutterers. He also stressed the importance of distinguishing between the stuttering and cluttering component of clutter-type stutterers as the two stuttering subgroups require different therapeutic approaches.

Although cluttering is a fluency disorder similar to and often co-existing with stuttering, it differs in many aspects. A study of differences between stuttering and cluttering suggests that while PWC produce significantly fewer repetitions of sounds and syllables, and fewer prolongations and struggle behaviors than People Who Stutter (PWS), PWC show fluency problems due to a high rate of word and phrase repetitions without tension (St. Louis, Hinzman, & Hull, 1985). Most disfluencies of PWC are ‘normal disfluencies’ (Myers & Bradley, 1992; van Zaalen, Wijnen, & Dejonckere, 2009) that, as a group, are similar in extent to normal speakers. Normal disfluencies, such as interjections, revisions, and word-and phrase repetitions, are produced with mild tension and normal speech rhythm. In the case of different language symptoms, the language characteristics of people with possible clutter tend to be less complete and less complex than normal speakers and stutterers as well (St. Louis, 1992). The formulation difficulties and fast speech rate of cluttering has led to an observation of high frequency of word and phrase repetitions (van Zaalen & Reichel, 2015).

Daly (1981) described the use of a 33-item checklist for differential diagnosis of stuttering and cluttering that comprised presented features that numerous clinical researchers believe are indicative of cluttering (Daly, 1993). This instrument was revised by Daly in 2006 and renamed the Predictive Cluttering Inventory (PCI), but this PCI version was not normed and did not appear to be specific and sensitive enough to detect possible cluttering (van Zaalen, Wijnen, & Dejonckere, 2009). van Zaalen et al. (2009) subsequently revised this PCI checklist, norming it for cluttering signs, and suggested that this revised checklist could aid clinicians in identifying possible cluttering symptoms, and determine if further evaluation using another more in-depth battery was warranted.

Japanese Studies

In Japan, Kamiyama and Nagasawa published a translated and summarized version of Weiss’s 1964 book in 1967. The term “cluttering” was translated to “Hayakuchi-Sho,” meaning “the syndrome of speaking fast.” Preus’s study (1981) was introduced to the Journal of Japanese Society of Logopedics and Phoniatrics by Uchisugawa (1987) as “Various issues on stuttering and cluttering.” Although Japanese clinicians have been using “Hayakuchi-Sho” over the past few decades, some clinicians have suggested that it does not sufficiently explain the symptoms of cluttering. Therefore, the term “kurataring” is now more often used, suggesting that the knowledge of cluttering has spread throughout Japan. Daly’s checklist (Daly, 1993, 2006) was translated to Japanese by Miyamoto, Hayasaka, and Shapiro (2007) and Miyamoto (2011), where the expression of some items were changed in order to apply to the native Japanese speaker. This checklist was defined as the Japanese checklist for possible cluttering (Miyamoto, 2011). Similar to Daly’s checklist, the standard cut-off value to distinguish cluttering from stuttering was a total score of 31 and above. Results of these studies indicated that out of 208 children who stutter (CWS) enrolled in special elementary school classes for children with speech-language disorders, 14.9 percent
corresponded to clutter-type stuttering (cluttering-stuttering). This result was similar to Preus’s results of 18 percent. The prevalence of pure stuttering was only one percent and similar to van Zaalen, Deckers, Driven, Kaiser, van Kemenade, and Terhoeve (2012). This Japanese Checklist for Possible Cluttering ver.1 (JCPC ver.1) was then revised to JCPC ver.2 according to the results of factor analysis. The JCPC ver.1 could be used as a rough screening test as it was not sensitive with ambiguous norms as indicated by van Zaalen and Reichel (2015). As the recent checklists for differentiating stuttering from cluttering are constructed with 33 items (Daly, 1993, 2006; van Zaalen et al., 2012), they are too cumbersome to be used conveniently in the clinic or school setting. The JCPC ver.2 includes 24 items, and this number should be further reduced to a minimum for simple screening. Currently, the 24 items in JCPC ver.2 have not been validated for suitability in differentiating stuttering and cluttering.

Therefore, the first aim of this study was to examine the Japanese Checklist for Possible Cluttering ver.2 (JCPC ver.2) for children who stutter (CWS), and to validate the items that construct JCPC ver.2 for the definitive differentiation of stuttering from cluttering. The second aim was to estimate a norm score for distinguishing stuttering and cluttering using JCPC ver.2. The third aim was to propose a draft version of JCPC ver.3, provided any item elimination was needed after validation.

Method

Participants

Requests for the dissemination of JCPC ver.2 were sent to 300 special classes for elementary school children with speech/language disability who had been randomly selected from 581 classes in Kanto area by mail. In Japan, almost all elementary school children who stutter are provided special classes for speech/language disorders, while infants, youth, adults, and a few schoolchildren are served by Speech-Language-Therapists. These teachers in elementary school are not speech therapists, but some such teachers study speech/language disorders during university, while others begin training after they are assigned to a special class. The accuracy of teachers’ responses can be influenced by their professional preparation or career.

The request comprised an agreement to respond to the JCPC ver.2 regarding their students. After 135 classroom teachers agreed to provide responses for the JCPC ver.2, eighty classroom teachers responded actually.

The Japanese Checklist for Possible Cluttering ver.2 (JCPC ver.2)

Miyamoto (2011) first translated Daly’s checklist (Daly, 1993, 2006) into Japanese, and the expression of some items were changed for application to a native Japanese speaker. The JCPC ver.1 was conducted on 208 elementary school children from a special elementary school class for children with speech/language disability. After omitting items that were not significantly different between stuttering and cluttering children, 24 of 33 items remained. The JCPC ver.2 therefore comprised these 24 items, and involved four scales including development, language planning, speech-motor, and attentiveness, where the latter three scales were founded by factor analysis (Miyamoto, 2011) (Table1). Participants were asked to respond to the questionnaire using a three-point scale (0: never; 1: frequent; 2: always). Although JCPC ver.1 has a standard cut-off value of 31 points and above to distinguish cluttering from stuttering, this cut-off value is currently unavailable for JCPC ver.2. While it may be difficult to differentiate cluttering from stuttering in JCPC ver.2, the possibility of a cluttering classification increases with increasing total points. Consequently, the standards for diagnosing cluttering should then be estimated using data from previous cluttering prevalence studies. Table 2 illustrates the results of three previous studies, in which subjects were children or pre-adolescents. With reference to these three results, 12.0% (Van Riper, 1973) to 17.7% (Howell & Davis, 2011) of children with fluency problems have cluttering. In this study, a tentative JCPC ver.2 standards score based on the above three studies will be used for screening children with cluttering.

Statistical Analyses

Descriptive data analyses were first employed for the JCPC ver.2 total score. Total scores were compared between gender and grade level. The chi-square test was conducted to compare results between gender and grade level. Factor analysis was then conducted for the extraction of factors to confirm factor
structure. IBM SPSS Statistics 22 was used for all statistical analyses.

Results

Distribution of Total Score of JCPC ver.2

The response rate was 59.3%. A total of 237 students in 80 classrooms were described in the teachers’ responses. The data included 178 boys, 57 girls and two unknowns, and this gender ratio was similar to previous data (Bloodstein, 1995). Figure 1 shows the distribution of the total JCPC ver.2 score of the 237 students surveyed. The median was 9, the average was 10, and standard deviation was 7. The highest total score was 35, and the lowest score was 0. The average total JCPC ver.2 scores of males were significantly higher than that of females ($\chi^2=7.49$, $df=1$, $p<.01$). Data rank comparison of average scores using kruskal–Wallis test showed no significant difference between each grade (from 1st grade to 6th grades) ($\chi^2=4.79$, $df=5$, $p=.44$). If the previous data of 12.0% (Van riper, 1973), 14.9% (Miyamoto et al., 2007), and 17.7% (Howell & Davis, 2011) for prevalence of cluttering (Table 2) is applied, then 28, 35, and 41, respectively, of the 237 children with fluency problems would also be clutterers (Fig. 1). As a higher total JCPC ver.2 scores associated with an increased probability of cluttering, the scores acquired from

| Table 2 Previous Study of Cluttering Prevalence in Children and Pre-adolescents |
| Study | Rate of cluttering | Type of population | N |
|-------|-------------------|--------------------|---|
| Van Riper in USA (1973) | 12% | Children with fluency disorders | 256 |
| Miyamoto, Hayasaka, and Shapiro in Japan (2006) | 14.9% | Children with fluency disorders in special classes for children between 6–12 years of age | 208 |
| Howell and Davis in England (2011) | 17.7% | Pre-adolescents with fluency disorders at 2 different times | 96 |
these 28 to 41 children may represent a distinction between stuttering and cluttering (inclusive of cluttering-stuttering and pure cluttering). According to the above assumptions, the standard JCPC ver.2 score to distinguish stuttering and cluttering (inclusive of cluttering-stuttering and pure cluttering) may range from 18 to 20 points based on the data shown in Figure 1, where the grey area represents possible cluttering.

The Validity of Items That Construct JCPC ver.2

Factor analysis with a Varimax rotation on the cluttering item identified three factors with an eigen value above 1 explaining 81.05% of the variance sums of squared loadings: Factor 1 included seven disorganized speech/language output related items (loading: 0.33–0.83); factor 2 included eight inattention and dyssynchrony related items (loading: 0.33–0.77); factor 3 included three poor language planning related items (loading: 0.44–0.77) (Table 3). Item 22 shows 0.089 of low communality after factor extraction. Items 2, 3, 9, and 22 showed low factor loading that was below 0.30 after a Varimax rotation.

The $\alpha$ coefficient of each subscale calculated to examine the internal consistency was 0.85 for “rapid and disorganized speech/language output,” 0.70 for “inattention and dyssynchrony,” and 0.66 for “poor language planning.” Table 4 shows the inter-subscale correlation in JCPC ver.2, with three subscales showing a significant positive correlation with each other. The items indicating low factor loading (items 2, 3, 9, and 22) were removed from JCPC ver.3 (draft) (Table 5) due to inclusion difficulty. Distribution of the total JCPC ver.3 (draft) score of the 237 students after factor analysis is presented in Figure 2.

Discussion

JCPC ver.2

In the present study, 24 items of JCPC ver.2 that were a subset of the 33 items of JCPC ver.1 developed by Miyamoto (2011), were distributed to teachers of special classes for children with speech-language disorders, and responses for 237 students who were trained as children who stutter were collected. The distribution of total scores in all students who stutter are shown in Figure 1, and numbers in six points were highest with the number of students decreasing with increasing total scores. As JCPC ver.1 was developed to select students who exhibit cluttering among children who stutter, it is highly possible for students with higher total scores to exhibit cluttering. The results of JCPC ver.1 and ver.2 are therefore not normally distributed. Based on previous studies, a score of 18 to 21 in JCPC ver.2 may indicate the borderline between stuttering and cluttering.

JCPC ver.3 (Draft)

Factor analysis with a Varimax rotation on the cluttering item identified three factors, and five items from JCPC ver.2 showing low communality and low factor loading were subsequently excluded from
A rightward shift of the graph was observed when the results of JCPC ver.2 were applied to JCPC ver.3 (draft) (Fig. 2). Considering the incidence data of the previous studies, the possibility that children with a score of 16 and higher can exhibit cluttering is inferred. As total scores increase, the number of students with those scores are reduced (Fig. 2). If a higher total score represents a progressive shift towards pure cluttering, Figure 2 then represents the relationship between stuttering and cluttering. Ward (2011) delineated advantages in taking a spectrum approach to the definition of cluttering where cluttering-like symptoms appear on a spectrum ranging from mild to extreme. At the extreme end, the speech language output would be readily regarded as “cluttering,” but along the spectrum lie behaviors that might be regarded as cluttering-like, with uncertainty in a definite diagnosis. If cluttering-like symptoms appear on a spectrum in both normal speaker and those with disorders, the distribution shown in Figure 2 would appear to be more adequate.

Language Automatization Deficit Model

Three factors identified from a factor analysis were “disorganized speech/language output related items,”
Table 5  Japanese Checklist of Possible Cuttering ver.3 (Draft)

Poor language planning related items
16  Silent gaps and hesitations common; interjections; many “filler” words
17  Stops before saying initial vowel, no tension; drawn-out vowels
18  Slurred articulation (omits sounds or unstressed syllables)
19  Fluency disruptions started early; no remissions; never very fluent
20  Difficulty following directions; impatient/uninterested listener

Inattention and dyssynchrony related items
8  Clumsy and uncoordinated; motor activities accelerated and impulsive
9  Improper stress patterns of speech; poor melodic accenting of syllables
10  Respiratory dysrhythmia; jerky breathing pattern
11  Rapid rate (speaks too fast); tachylalia; speak in spurts
12  Appears younger than age; small and/or immature
13  Story-telling difficulty; (trouble sequencing events)
14  Extrovert; high verbal output; compulsive talker
15  Distractible; attention span problems; poor concentration

Disorganized speech/language output related items
1  Writing includes omission or transposition of letters and words
2  Improper language structure; poor grammar and syntax
3  Untidy, careless, hasty, impulsive or forgetful
4  Speech better under pressure; e.g., during short periods of heightened attention
5  Seems to think faster than he can talk or write
6  Disintegrated and fractionated writing; poor motor control
7  Left-right confusion; delayed hard preference

Fig. 2  Distribution of the Total ver.3 (Draft) Score in 237 Students After Factor Analysis

Note.  The highest and lowest total scores were 31 and 0, respectively. The median was 6. If the previous three data of 12.0% 14.9%, and 17.7% for prevalence of cluttering is applied, then the above grey region representing 41 children with stuttering would also possibly be children with cluttering. It can be inferred that the cutoff value for distinguishing between stuttering and cluttering is between 15 and 18. The gray diagonal line shows a linear approximation curve, indicating that those with high scores tended to consistently decrease (R²=.8).
“inattention and dyssynchrony related items,” and “poor language planning related items.” Cluttering is a speech fluency disorder in which people are not able to adjust their speech rate to the syntactic (grammar) or phonological (word structure) demands of the moment (van Zaalen & Reichel, 2015). To explain the nature of the disfluencies and speech intelligibility problems in cluttering, it is important to understand the processes of language formulation before the moment of language production. van Zaalen and Reichel (2015) utilized Levelt’s model of language production to explain the underlying processes of cluttering, and referred to her version as a language automatization deficit model.

According to Levelt (1993), idea expression is a three-step process. The first step after communicative intention involves planning of the idea or message, and monitoring of the appropriate moment for its expression. The second step is the formulation of the message in correct grammatical sentence structures. The sentences in such messages are built with words that are gathered from the lexicons of the respective speakers. When the sentences and words are planned and a motor plan is ready, the third step of thought expression is then carried out. When the three factors in this study are considered in context of a language automatization deficit model of cluttering, these three components are very reasonable checklist construction factors for identifying clutterers. Amongst the three factors in this study, “poor language planning” is considered to be a primary problem for CWC, “inattention and dyssynchrony” as a secondary problem, and the third problem of “disorganized speech/language output” as a consequence of the former two problems. van Zaalen and Reichel (2015) explained that the language formulation processes of clutterers are not in synchrony with language production, such that the sentence or word structure has not been planned or completed within the available time leading to errors in language production. If this dyssynchrony with language production is the primary problem of CWC, then CWC require more time to make sentences, find words, and order correct sounds. As normal disfluencies are explained by a time gaining effect (Howell, 2008), cluttering-like disfluencies may be explained by this phenomena. This is the most important difference between stuttering-like disfluencies and cluttering-like disfluencies, where stuttering-like disfluencies refer to disfluencies characterized by a feeling of loss of control, such as sound repetitions (e.g., “bo-bo-boku”), prolongations (e.g., “a-a-a-a-a-ashita”), or breaks (e.g., “wa….tashiwa”), and can be accompanied by physical and/or emotional tension. While differences in dysfluency types are important in distinguishing stuttering from cluttering, JCPC ver.2 does not consider certain symptoms of dysfluencies such as repetition. Although repetition without tension is considered as a core characteristic of CWC, the item of “repetition with no tension” could not distinguish between cluttering and stuttering in JCPC ver.1 and was thus excluded from JCPC ver.2. As excessive repetition without tension is an important symptom of cluttering, this symptom is identified for detailed examination by specialists, after conducting a check using JCPC ver.2.

**Limitation and Directions for Future Research**

Some items in JCPC ver.2 and ver.3 are subject to ambiguous interpretation when scoring. For example, setting of an objective criteria is required for item 12, “Rapid rate (speaks too fast),” and item 21 “Seems to think faster than he can talk or write” is an evaluation of behaviors that cannot be verified externally. Therefore, determination may be difficult in these instances. In addition, the reliability and validity of JCPC ver.2 and ver.3 needs to be verified in future. There is concern that the ambiguity of the content represented by such items may decrease reliability. Therefore, after confirming the content indicated by the item, its reliability should be considered. Moreover, the cutoff value for distinguishing stuttering from cluttering obtained in this study is a provisional criterion. It is necessary to collect case reports of children who were extracted by applying JCPC ver.2 and ver.3. Finally, JCPC ver.2 and ver.3 should be compared for their ability to detect children with cluttering, and for their effectiveness when used in educational situations.

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