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# CJSLPA | RCOA

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## From the Editor

Elizabeth Fitzpatrick

## Production of Word-Initial Consonant Sequences by Francophone Preschoolers with a Developmental Phonological Disorder

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## The Language Profile of School-Aged Children with Fetal Alcohol Spectrum Disorder (FASD)

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## La r p tition de phrases en vietnamien – un marqueur des troubles du langage oral et des troubles du comportement

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Pascal Lefebvre

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The Canadian Association of Speech-Language Pathologists and Audiologists (CASLPA) is the only national body that supports and represents the professional needs of speech-language pathologists, audiologists and supportive personnel inclusively within one organization. Through this support, CASLPA champions the needs of people with communications disorders. The association was founded in 1964 and incorporated under federal charter in 1975. CASLPA's periodical publications program began in 1973.

The purpose of the Canadian Journal of Speech-Language Pathology and Audiology (CJSLPA) is to disseminate contemporary knowledge pertaining to normal human communication and related disorders of communication that influence speech, language, and hearing processes. The scope of the Journal is broadly defined so as to provide the most inclusive venue for work in human communication and its disorders. CJSLPA publishes both applied and basic research, reports of clinical and laboratory inquiry, as well as educational articles related to normal and disordered speech, language, and hearing in all age groups. Classes of manuscripts suitable for publication consideration in CJSLPA include tutorials; traditional research or review articles; clinical, field, and brief reports; research notes; and letters to the editor (see Information to Contributors). CJSLPA seeks to publish articles that reflect the broad range of interests in speech-language pathology and audiology, speech sciences, hearing science, and that of related professions. The Journal also publishes book reviews, as well as independent reviews of commercially available clinical materials and resources.

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### Mission

The Canadian Association of Speech-Language Pathologists and Audiologists ...supporting and empowering our members to maximize the communication and hearing potential of the people of Canada.



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L'Association canadienne des orthophonistes et audiologistes (ACOA) est l'association professionnelle nationale reconnue des orthophonistes et des audiologistes du Canada. L'Association a été fondée en 1964 et incorporée en vertu de la charte fédérale en 1975. L'Association s'engage à favoriser la meilleure qualité de services aux personnes atteintes de troubles de la communication et à leurs familles. Dans ce but, l'Association entend, entre autres, contribuer au corpus de connaissances dans le domaine des communications humaines et des troubles qui s'y rapportent. L'Association a mis sur pied son programme de publications en 1973.

L'objet de la Revue canadienne d'orthophonie et d'audiologie (RCOA) est de diffuser des connaissances relatives à la communication humaine et aux troubles de la communication qui influencent la parole, le langage et l'audition. La portée de la Revue est plutôt générale de manière à offrir un véhicule des plus compréhensifs pour la recherche effectuée sur la communication humaine et les troubles qui s'y rapportent. La RCOA publie à la fois les ouvrages de recherche appliquée et fondamentale, les comptes rendus de recherche clinique et en laboratoire, ainsi que des articles éducatifs portant sur la parole, le langage et l'audition normaux ou désordonnés pour tous les groupes d'âge. Les catégories de manuscrits susceptibles d'être publiés dans la RCOA comprennent les tutoriels, les articles de recherche conventionnelle ou de synthèse, les comptes rendus cliniques, pratiques et sommaires, les notes de recherche, et les courriers des lecteurs (voir Renseignements à l'intention des collaborateurs). La RCOA cherche à publier des articles qui reflètent une vaste gamme d'intérêts en orthophonie et en audiologie, en sciences de la parole, en science de l'audition et en diverses professions connexes. La Revue publie également des critiques de livres ainsi que des critiques indépendantes de matériel et de ressources cliniques offerts commercialement.

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### Vision

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### Mission

L'Association canadienne des orthophonistes et audiologistes appuie et habilite ses membres en vue de maximiser le potentiel en communication et en audition de la population canadienne.

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# From the Editor

## WINTER ISSUE



This issue of CJSPLA provides readers with a total of four papers, the first three related to clinical areas of interest in pediatric speech-language pathology and the fourth addressing interprofessional collaboration in speech-language services.

In the first article, Rvachew and colleagues report findings from a pilot study that aimed to describe patterns of word initial consonant sequence errors produced by francophone children who were undergoing therapy for phonological disorders. Based on their results for 50 children, the authors highlight that intervention in phonology needs to take into account language-specific developmental norms for phonemes and prosodic structures.

Proven and colleagues examined the language abilities of 124 children diagnosed with Fetal Alcohol Spectrum Disorder (FASD). The results for receptive and expressive language abilities suggested that language development is negatively affected in these children with prenatal alcohol exposure. The authors propose that an improved understanding of language abilities in this population of children may lead to better planning in language interventions.

In the third paper, Hoàng and colleagues present a research report in French from a study conducted in Vietnam. The research examined whether a sentence repetition task in Vietnamese could differentiate between children with specific language impairment (SLI) and typically developing children. They also examined whether children with SLI, those with externalizing behaviour disorders (EB) and a third group with a combination of the two disorders would show similar profiles on the task. The authors provide details on the profiles of these three groups of children.

The fourth article of this issue provides an insightful look at graduate level education in speech-language pathology. Suleman and colleagues report the findings from an exploratory study that sought to examine the effect of interprofessional education on students' knowledge and application of specialized service delivery models in schools. The authors concluded that the educational experience positively impacted students' awareness and ability to apply specialized service delivery models to address communication needs in school settings.

We welcome your manuscripts in 2014 from all areas of Speech-Language Pathology and Audiology. As an open-access journal, CJSPLA is able to provide superb exposure for your work. The current manuscript submission system continues to present some challenges and CJSPLA hopes to move to implement a new system in the coming months. In the meantime, please do not hesitate to contact CJSPLA technical support at [support@coverpage.ca](mailto:support@coverpage.ca) if you encounter difficulties during the submission or review process and please contact me ([elizabeth.fitzpatrick@uottawa.ca](mailto:elizabeth.fitzpatrick@uottawa.ca)) if you have any questions or concerns when tracking your manuscripts through the online system.

I would like to thank our team of Associate Editors for their tremendous contribution to making CJSPLA a success. I am immensely grateful to all the reviewers who responded to our invitations to review in the past year. The timeliness of manuscript reviews and the quality of the articles we publish is highly dependent on the ease with which we can find external experts so please consider reviewing for CJSPLA. Please register at [www.cjspla.coverpage.ca](http://www.cjspla.coverpage.ca) or alternatively send us an email to let us know your areas of interest.

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# Mot de la rédactrice en chef

NUMÉRO D'HIVER



Ce numéro du CJSPLPA offre à ses lecteurs et lectrices quatre communications au total, les trois premières ayant trait à des domaines d'intérêt en orthophonie pédiatrique et la quatrième traitant de la collaboration interprofessionnelle dans les services d'orthophonie.

Dans le premier article, Rvachew et ses collègues rapportent des conclusions tirées d'une étude pilote qui visait à décrire des schémas d'erreurs de séquences consonantiques à l'initiale des mots produits par des enfants francophones en thérapie pour des troubles phonologiques. Sur la base des résultats obtenus pour 50 enfants, les auteurs soulignent que l'intervention en phonologie doit tenir compte de normes de développement propres à la langue, pour les phonèmes et les structures prosodiques.

Proven et ses collègues ont examiné les habiletés langagières de 124 enfants chez qui un trouble du spectre de l'alcoolisme foetal a été diagnostiqué. Les résultats, pour les habiletés langagières réceptives et expressives, suggèrent que le développement du langage est affecté négativement par l'exposition prénatale à l'alcool chez ces enfants. Les auteurs suggèrent qu'une amélioration de la compréhension des habiletés langagières de cette population d'enfants mène à une meilleure planification d'interventions langagières.

Dans la troisième communication, Hoang et collègues présentent un rapport en français d'une recherche effectuée au Vietnam. La recherche tentait de déterminer si par une tâche de répétition de phrases en vietnamien il était possible de différencier entre des enfants ayant un trouble spécifique du langage et des enfants en développement typique. Les auteurs ont aussi examiné si les enfants ayant ce trouble, ceux ayant des troubles du comportement d'extériorisation et ceux ayant une combinaison des deux troubles montreraient des profils similaires sur la tâche. Les auteurs donnent des détails sur les profils de ces trois groupes d'enfants.

Le quatrième article de ce numéro présente une réflexion de fond sur l'enseignement de niveau supérieur en orthophonie. Suleman et collègues rapportent les conclusions d'une étude exploratoire qui cherchait à examiner l'effet de l'enseignement interprofessionnel sur les connaissances des étudiants et l'application de modèles de prestation de services spécialisés dans les écoles. Les auteurs concluent que l'expérience éducative a eu un impact positif sur la sensibilisation des étudiants et sur leur capacité d'appliquer des modèles de prestation de services spécialisés pour répondre aux besoins en milieu scolaire.

En 2014, nous serons heureux de recevoir vos manuscrits dans tous les domaines de l'orthophonie et de l'audiologie. Comme revue à accès ouvert, CJSPLPA est capable d'offrir une superbe exposition pour vos travaux. Le système actuel de soumission de manuscrits occasionne des difficultés et CJSPLPA espère implanter un nouveau système dans les prochains mois. Entre temps, n'hésitez pas à contacter le soutien technique de CJSPLPA à l'adresse [support@coverpage.ca](mailto:support@coverpage.ca) si vous vous butez à des difficultés pendant la soumission ou le processus de révision et communiquez avec moi ([elizabeth.fitzpatrick@uottawa.ca](mailto:elizabeth.fitzpatrick@uottawa.ca)) si vous avez des questions ou des préoccupations quand vous essayez de retracer vos manuscrits avec le système en ligne.

J'aimerais remercier notre équipe de rédacteurs adjoints pour leur immense contribution au succès du CJSPLPA. Je suis immensément reconnaissante envers tous les évaluateurs qui ont répondu à nos invitations pendant la dernière année. La célérité avec laquelle les évaluations des manuscrits sont complétées et la qualité des articles que nous publions sont très fortement influencées par la facilité avec laquelle nous pouvons recruter des spécialistes externes ; donc nous vous prions d'envisager devenir évaluateur pour CJSPLPA. Vous pouvez vous inscrire à l'adresse [www.cjslpa.coverpage.ca](http://www.cjslpa.coverpage.ca) ou bien nous envoyer un courriel pour nous informer de vos domaines d'intérêt.

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## KEY WORDS

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CONSONANT CLUSTERS

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# Production of Word-Initial Consonant Sequences by Francophone Preschoolers with a Developmental Phonological Disorder

## Séquences de consonnes en position initiale de mot produites par des enfants francophones d'âge préscolaire ayant un trouble phonologique

Susan Rvachew  
Émilie Leroux  
Françoise Brosseau-Lapré

### Abstract

*Purpose:* The purpose of this pilot study is to describe patterns of word initial consonant sequence errors as produced by 50 francophone children, age 46 to 69 months, who were receiving treatment for a developmental phonological disorder (DPD) in Québec.

*Method:* The children's productions of consonant sequences on a single-word test of articulation were coded as correct or incorrect and each error type was classified in relation to the 17 types of error described by Chin and Dinnsen (1992) for English-speaking children. Errors were also described in relation to types of consonant sequences as represented in French phonology.

*Results:* The description of consonant sequence errors by francophone children revealed similarities and differences in comparison to English-speaking children. A high degree of variability was observed across words and participants.

*Conclusion:* The need to take into account language-specific developmental norms for phonemes and prosodic structures when planning phonology intervention is highlighted in this study.

### Abstré

*But :* L'objectif de cette étude pilote était de décrire les patrons d'erreurs de production de séquences de consonnes de 50 enfants francophones du Québec, âgés de 46 à 69 mois, suivis en orthophonie pour un trouble phonologique.

*Méthodologie :* Les productions de séquences de consonnes en position initiale de mot ont été obtenues à l'aide d'un test d'articulation de mots. Elles ont été codées correctes ou incorrectes et chaque erreur a été classifiée selon les 17 types d'erreurs décrites par Chin et Dinnsen (1992) pour les enfants anglophones. Les erreurs ont également été décrites par rapport aux types de séquences de consonnes présentes dans la phonologie du français.

*Résultats :* La description d'erreurs de séquences de consonnes commises par les enfants francophones a révélé des ressemblances et des différences en comparaison aux enfants anglophones. Une grande variabilité a été observée entre les mots et entre les participants.

*Conclusion :* L'étude a mis en évidence l'importance de tenir compte des normes développementales spécifiques au français pour les phonèmes et les structures prosodiques lors de la planification de l'intervention orthophonique.

English speaking children are known to have difficulty with the accurate production of consonant sequences early in life regardless of whether their speech is developing within the expected time frame or following a delayed trajectory (McLeod, Van Doorn, & Reed, 1997, 2001b). Given the frequency of occurrence and the great variety of consonant sequences that English phonotactics allow, misarticulations of these sequences can pose a significant challenge to the intelligibility of child speech; therefore it is not surprising that consonant sequences are a frequent speech therapy target (Hodson, 2007; Hodson & Paden, 1981). A large literature on normal and delayed speech development exists to support clinical decision making in the treatment of consonant sequence errors in English-speaking children with a developmental phonological disorder (DPD). When evaluating and treating French-speaking children with delayed speech development however the empirical basis for clinical decision making is impoverished. Diagnostic and treatment planning decisions in phonology sometimes depend in part on a judgment about whether the child's error patterns are typical or atypical (Dodd, 2011). In the francophone context, how does the speech-language pathologist (S-LP) know whether a given consonant sequence error is relatively frequent or rather unusual in comparison to errors produced by other children of the same age? Determining whether a given child should be a high priority candidate for treatment on the basis of atypical error patterns is a clinical decision that requires a greater body of descriptive evidence about speech development in French-speaking children. In this paper we begin with a description of the phonological structure of word-initial consonant sequences and follow with a brief review of consonant sequence production by English- and French-speaking children covering both normal and atypical development. This introduction forms the background for the presentation of new data describing word initial consonant sequence production by 50 francophone children who were receiving treatment for a DPD in Québec.

### Phonological Structure of Word Initial Consonant Sequences

Although there are some small differences in the phonotactics of these sequences (see Table 1), French and English both allow words to begin with two or three consonants in addition to null and singleton onsets (Locke, 1983). Generally a word initial sequence of consonants is not considered to be a cluster unless all consonants are contained within the onset of the syllable. The phonological structure of a consonant sequence depends upon the phonetic content and sonority profile of the sequence. Sequences composed of a true consonant followed by a liquid do not violate the Sonority Sequencing Principle

(SSP) and are unambiguously true clusters with a branching onset structure as illustrated in Figure 1a. In French, a sequence of a stop followed by a fricative, specifically /ps/, also forms a permitted true cluster although these types of clusters are admittedly low frequency, both within French itself and cross-linguistically (Syrika, Nicolaidis, Edwards, & Beckman, 2011). In English, examples of words that are consistent with the SSP are 'brick', 'play', 'dress' and 'glue' because sonority rises from the first to the second consonant in the sequence with a further rise into the nucleus of the syllable. In French, examples of words that begin with true clusters are 'psychologue' → [psikɔlɔg], 'grosse' → [ɡʁos], and 'glace' → [glas]. Figure 1a diagrams these French and English words with both members of the initial consonant sequence branching within the onset.

In French and English, two- or three-element sequences involving [s] followed by a stop violate the SSP. Various phonological representations have been proposed for these sequences including the possibility that the /s/ is an adjunct, linked directly to the syllable tier, bypassing the onset itself (Barlow, 2001). This adjunct structure as diagramed in Figure 1b is a possible representation for words such as 'spit' → [sptɪ] and 'splash' → [splæʃ] in English and 'stade' → [stad] and 'stress' → [stʁɛs] in French. Some linguists propose that the /s/ is an adjunct in all cases regardless of rising, falling, or flat sonority within the sequence (Jongstra, 2003) in which case words such as 'snow' → [snɔw] and 'sleep' → [slɪp] in English would also be represented as shown in Figure 1b (French examples are loan words).

Glide clusters do not violate the SSP; indeed they are interesting by virtue of the large increase in sonority ranking between the first and second consonant in the sequence which reportedly facilitates accurate production (Yavaş & McLeod, 2010). The similarity of the glide to the vowel in the nucleus relative to the obstruent in the onset leaves some ambiguity as to the syllable position of the glide. This is especially true for French which does not have diphthongs and thus the nucleus may be particularly likely to capture the glide (Rose & Wauquier-Gravelines, 2007). Figure 1c shows a representation that would be appropriate for the French word 'doigt' → [dwa]. Although the glide in these sequences may be a rising diphthong within the nucleus in French, various representations have been proposed for English and may be word specific. For example, Kehoe, Hilaire-Debove, Demuth, & Lleó (2008) proposed a true branching onset structure for words such as 'twin' but simultaneous linkage of the glide to the onset and nucleus in words such as 'pew'.

In summary there are a large number of different consonant sequences permitted in both languages. The attendant variety in phonetic content and complexity in underlying phonological representation ensures that the



Table 1. Permitted Word Initial Consonant Sequences by Type in English and French

| Sequence Type   | English   | French  |
|---|---|---|
| True cluster: (Figure 1a)                               |   |   |
| Stop+Fricative  |   | [ps]  |
| Stop+Liquid <sup>a</sup>                                | [pl] [pɹ] [bl] [bɹ] [tɹ] [dɹ] [kl] [kɹ] [gl] [gɹ] | [pl] [pʁ] [bl] [bʁ] [tʁ] [dʁ] [kl] [kʁ] [gl] [gʁ] |
| Fricative+Nasal   | [sm] [sn]   |   |
| Fricative+Liquid  | [fl] [fɹ] [θɹ] [sɹ] [ʃɹ]                          | [fl] [fʁ] [vʁ]                                    |
| Adjunct /s/: (Figure 1b)                                |   |   |
| Fricative+Stop  | [sp] [st] [sk]                                    | [sp] [st] [sk]                                    |
| Fricative+Stop+Liquid                                   | [spl] [spɹ] [stu] [sku]                           | [spl] [spʁ] [stʁ] [skl] [sku]                     |
| Either true cluster or rising diphthong:<br>(Figure 1c) |   |   |
| Stop+Glide  | [pw] [pj] [bj] [tw] [tj] [dw] [dj] [kw] [kj] [gw] | [pw] [pj] [pu] [bw] [tw] [dw] [tj] [dj] [ku]      |
| Nasal+Glide   | [mj] [nj]   | [mw] [mj] [nj]                                    |
| Fricative+Glide   | [fj] [vj] [θw] [sw] [ʃw]                          | [sw] [sj] [ʃw] [ʃj] [hu]                          |
| Stop+Liquid+Glide                                       |   | [bʁu] [tʁw] [dʁw]                                 |

Note: The lists are not exhaustive as the reader will be able to add additional possibilities representing loan words, onomatopoeic words, or optional sequences (e.g., in English [zl] in 'zloty', [vɹ] in 'vroom' or [lj] in 'lewd'). Some unusual Fricative+Fricative sequences are also excluded from the table (sphinx, svelte) as they represent a flat sonorancy hierarchy although they could be added to the Adjunct /s/ category for both languages. Sources for the data in the table include *Le grand Robert de la langue française* (version électronique, 2012), Locke (1983), McLeod, Van Doorn, & Reed (2001b), Oxford English Dictionary Online (2013), Rose & Wauquier-Gravelines (2007), Smit (2007), and Walker (1984).

<sup>a</sup>The French consonant [ʁ] is phonetically a uvular fricative but is often classed as a rhotic liquid phonologically (e.g., Dell, 1995).

acquisition patterns for consonant sequences will be far from straightforward and subject to individual differences within and across language groups. We turn now to a brief overview of the developmental literature.

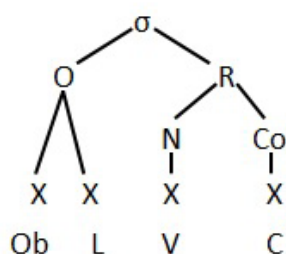
### Acquisition of Word Initial Consonant Sequences in English

Acquisition of consonant sequences is constrained by the child's ability to reproduce the prosodic structure and the phonetic content involved. Most two-year-olds can produce some two element clusters in word-initial and word-final positions although the segments will often be misarticulated (Stoel-Gammon, 1987). In an extensive review of the literature, McLeod et al. (2001b) generalized that the normal and gradual developmental progression toward mastery in English begins with omission of one or two segments leaving only one segment in the surface

form (i.e., cluster reduction), followed by inclusion of all segments but with one or more being misarticulated (i.e., simplification), culminating in correct articulation of the required segments. Mastery comes earlier for word-final than word-initial clusters, two-element than three-element clusters, and stop than fricative clusters in English. Notwithstanding these generalizations, McLeod, Van Doorn, and Reed (2001a) observed considerable individual variation and many "reversals and revisions" in the developmental trajectories of toddlers observed longitudinally. Smit, Hand, Freilinger, Bernthal, and Bird (1990) reported that the 90% age of mastery for the /s/ and /ɹ/ clusters was between 7;0 and 9;0 reflecting the likelihood of distortion errors for these late developing segments into school age. In a detailed description of error types in a cross-sectional study, reduction to null occurred rarely for all word initial consonant sequences (Smit, 1993). Reduction of two- and

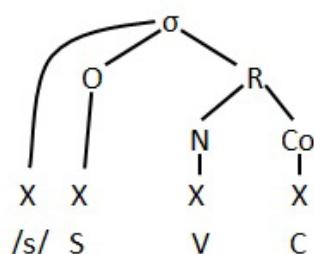
### 1a. True consonant cluster with branching onset

[bɹɪk] 'brick' (Eng)  
 [glas] 'glace' (Fr)  
 [smɛl] 'smell' (Eng)  
 [flœʁ] 'fleur' (Fr)

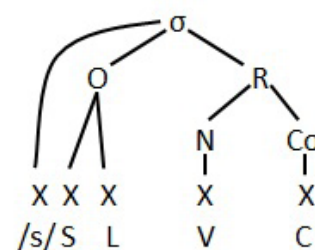


### 1b. Consonant sequence with /s/ as adjunct

[spɪt] 'spit' (Eng)  
 [stad] 'stade' (Fr)



[stɹɪŋ] 'string' (Eng)  
 [splæʃ] 'splash' (Eng)  
 [stʁɛs] 'stress' (Fr)



### 1c. Rising diphthong (glide in the nucleus)

[dwa] 'doigt' (Fr)  
 [swa] 'sois' (Fr)  
 [ʃjɛ] 'chien' (Fr)

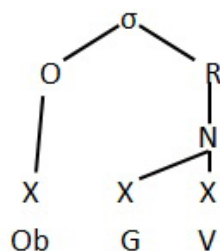


Figure 1. Alternate phonological representations for word initial consonant sequences in English and in French: (1a) True clusters with a branching onset in which the elements in the onset increase in sonority from left to right; (1b) /s/ represented as an adjunct that links directly to the syllable tier, bypassing the onset, due to the violation of the Sonority Sequencing Principle in the consonant sequence; and (1c) glide represented as part of a branching nucleus. Abbreviations:  $\sigma$  = syllable, O = onset, N = nucleus, R = rime, Co = coda, X = time unit for a segment, Ob = obstruent, S = stop, L = liquid, V = vowel, and C = any consonant, Eng = English and Fr = French.

three-element sequences to a single segment occurred no more than 15% of the time in children older than 3;0, with the exception of certain /s/ clusters. Porter and Hodson (2001) also reported a marked decline in the reduction of consonant sequences after age 3;0. Occasional instances of cluster reduction persist through age 5;0 however (Cahill Haelsig & Madison, 1986) and omissions of segments from consonant sequences in complex words persist into school age (James, van Doorn, McLeod, & Esterman, 2008).

Chin and Dinnsen (1992) described children's underlying phonological representations for word-initial consonant sequences in a study in which 47 preschoolers with speech

delay produced 49 different stop and fricative clusters. They observed 17 different patterns of error at the surface level including complete omission of the sequence, reduction, simplification, epenthesis, and coalescence. The authors subsequently described the emergence of these patterns in terms of interactions between the feature and prosodic levels of the phonological hierarchy in the children's phonological systems. For example, coalescence can occur when the child's system is constrained to single element onsets in the output but the features of both elements are represented underlyingly: spreading of a feature from one segment to another within an onset followed by delinking

of one segment results in coalescence errors such as 'sweet' → [fit]. Coalescence occurs when a marked feature from one segment spreads to a segment that is unmarked; in the 'sweet' example, /w/ is marked by virtue of [Labial] place whereas /s/ is unmarked for place which explains the vulnerability of /s/ clusters in English to spreading and coalescence errors. Other clusters in which both segments have marked place features (e.g., /gɹ/) are theoretically invulnerable to these types of errors. However it is necessary to take the child's underlying representations for the given segments into account. If the child's system lacks dorsal stops and the child's underlying representation for the second segment is /w/ a coalescence error may occur on this sequence resulting in 'growing' → [bowɪn] (Barlow, 1996).

### Acquisition of Word Initial Consonant Sequences in French

Considerably less information is available regarding the normal acquisition of consonant sequences by French speaking children. In the only large sample investigation of children speaking Québec French, MacLeod, Sutton, Trudeau, and Thordardottir (2011) probed production of 10 consonant sequences. The participants were 156 francophone children aged 20 to 53 months. The consonant sequences included six sequences comprising Obstruent+Liquid (/l/ or /ʁ/), 1 three-element sequence with an /s/ adjunct, and 3 rising diphthongs. Acquisition age by 75% of the sample was noted for each sequence. Although these consonant sequences were acquired later than consonant singletons, all except word final /bʁ/ were acquired before 48 months of age. Word initial /l/ clusters were the earliest sequences to be acquired.

Rose (2000) reported on the basis of data from two children that early development of true clusters in French always begins with reduction to a single consonant with the obstruent retained and the liquid deleted from the surface form. Inclusion of the liquid emerges earlier in stressed than unstressed syllables. Kehoe et al. (2008) reported that acquisition order for branching onsets and rising diphthongs was complex with much individual variation and segmental content of the sequences playing a large role. Many of the 14 toddlers in their sample acquired Obstruent+/l/ sequences before rising diphthongs and showed the longest acquisition trajectory for Obstruent+ /ʁ/ sequences. Rising diphthongs with /w/ were often although not always acquired earlier than those with /j/.

Thus far investigations of consonant sequence production by francophone children have been few, typically involving small samples of participants with normally developing speech. The studies have tended to focus on linguistic controversies regarding the representation of consonants and consonant sequences in word final position. Very little

is known about typical and atypical patterns of error with respect to word initial consonant sequences in French, which are, in contrast to English, learned first (Demuth & Kehoe, 2006; Demuth & McCullough, 2008). The purpose of this pilot study was to describe patterns of word initial consonant sequence error as produced by 50 francophone children who were receiving treatment for a DPD in Québec. The errors will be described in relation to what is known about patterns of error in the speech of English-speaking children as described by Chin and Dinnsen (1992) and in relation to types of consonant sequences as represented in French phonology (Rose, 2000).

## Method

### Participants

The participants were 50 French-speaking children who were referred by Speech-Language Pathologists (SLPs) at the Montreal Children's Hospital for participation in a study investigating the effectiveness of interventions to improve the phonological skills of children with DPD. The children were assessed by the third author, a certified S-LP, or by graduate S-LP students under the supervision of the third author. The assessment sessions took place either in a quiet room at McGill University or in a testing room at the Montreal Children's Hospital. The selection criteria were as follows: age 4;0 to 5;11, French-speaking with no more than 25% exposure to another language as determined by parent report, standard score of at least 80 on measures of non-verbal intelligence and receptive vocabulary, normal hearing as documented prior to referral to the study, and primary diagnosis of DPD. Exclusionary criteria included the presence of sensory-neural hearing loss, cleft palate, global developmental delay, autism spectrum disorder, or other medical conditions that could lead to a secondary DPD. Children with suspected childhood apraxia of speech or concomitant receptive and/or expressive language impairments were not excluded from the study. The first 50 children who were referred and who completed the assessment were selected for inclusion in this study. These children were aged 46 to 69 months with a mean age of approximately 54 months (4;6). The socio-economic status of the families varied with maternal education in years ranging from 10 to 18. The children were recruited from the Montréal area of Quebec, which (according to the 2006 census, Statistics Canada, 2009) can be partitioned into 66% francophones, 12% anglophones and 13% allophones. Not only is the majority language French, school attendance in French is required by law for most children and low-cost public daycare is provided in French by the provincial government to families regardless of family income and the vocational status of the child's parents. Within the sample recruited for this study, 72% were reported to have only French exposure while the remaining children were exposed

to one or more additional languages in the home up to 25% of the time. The children also attended daycare which, with one exception, provided 100% exposure to French.

## Procedures

The children participated in an intake assessment lasting approximately 90 minutes during which time a number of standardized and unstandardized tests were administered and the accompanying parent completed several questionnaires about the child's development and the home literacy environment. Four to six weeks after the intake assessment a conversational speech sample was recorded. Data from four assessment procedures will be described in this report. Specifically, the nonverbal subtest of the Kaufman Brief Intelligence Test (Kaufman & Kaufman, 2004) was administered to ensure eligibility for participation in the study. The Échelles de Vocabulaire en Images de Peabody (Dunn, Theriault-Whalen, & Dunn, 1993) was administered as a normed Canadian-French measure of receptive vocabulary. Percent Consonants Correct in conversation (Shriberg & Kwiatkowski, 1982) was derived from language samples obtained using the wordless book *Good dog, Carl* by Alexandra Day.

The Test Francophone de Phonologie (TFP; Paul & Rvachew, unpublished), as described in Paul (2009), was used to assess accuracy of consonant production. This test contains 54 target words selected to be representative of the distribution of phonemes, syllable shapes, and word lengths characteristic of Québec French. Although a total of 161 consonants and 107 vowels are targeted with the full 54 word sample, only a subset of words is considered in the analyses reported here. Specifically, the children's productions of words containing word initial consonant sequences were selected for further analysis: 'clown', 'glissade', 'fleur', 'brun', 'train', 'traîneau', 'crayon', 'graffigner', 'framboise', 'doigt', 'cuisine', 'spectacle'. Spontaneous productions of the targets were elicited using photographs and carrier phrases; delayed or direct imitation was used when necessary to collect full data sets from each participant.

Each assessment was videorecorded with a JVC Everio GZ-MG360 or a Sony Handycam HDR-XR520 videocamera (Dolby digital 5.1 sound recording systems). Audio files were extracted from the video recordings and saved as .wav files. Narrow phonetic transcriptions of the participants' responses on the TFP were completed by the third author, who reviewed each file at least three times. If a child produced the same target more than once, the clearer recording was transcribed; if productions of the same target were equally clear the first one was transcribed. One graduate student in speech-language pathology and one undergraduate student in linguistics each completed

narrow phonetic transcriptions of 16% of the TFP samples independently. Transcription agreement with the third author for narrow transcription of the target consonants on the TFP was 94% (range = 89% to 97%). Subsequently the second author coded each consonant sequence production as correct or incorrect and classified each error type in relation to the 17 types of error described by Chin and Dinnsen (1992) for English-speaking children.

## Results

### Summary of Test Results

The results of the intake assessments are shown in Table 2 and confirm that the children presented with age appropriate nonverbal intelligence and receptive vocabulary skills. On average their mean length of utterance was 4.40 (ranging from 2 to 10), which can be compared to an expected range of 3.85 to 6.45 for normally developing francophone children of this age (Thordardottir, Keheyia, Lessard, Sutton, & Trudeau, 2010). A normative reference for the two measures of articulatory accuracy is lacking but their performance in conversation and while naming pictures indicated that all of the children produced numerous consonant misarticulations that explained the speech intelligibility problems that led to their referral for speech therapy. Percent Consonants Correct was somewhat higher in conversation (77%) than on the picture naming test (70%), reflecting the self-selection of easier words by the children in conversation versus sampling of multisyllabic words by the formal test. Percent Vowels Correct (93%) was high while picture naming.

### Summary of Consonant Sequence Accuracy by Word

The children's responses to each item are shown in the Appendix. Figure 2 represents the percentage of correct responses for each word for the monolingual and multilingual subsamples. This figure reveals a tendency toward a greater number of correctly produced sequences for the multilingual subsample ( $M = 8.47$ ,  $SD = 3.02$ ) in comparison to the Monolingual subsample ( $M = 6.20$ ,  $SD = 3.64$ ), a result that is intriguing and worthy of further investigation with larger and more balanced samples of language groups. The overall profile of responses across words is roughly similar for the two language subsamples however and a nonparametric comparison of the median scores for these two subsamples revealed nonsignificant differences (monolingual exposure median = 5, bilingual exposure median = 7,  $p = .32$ ).

When considering the full sample of 50 children, every child misarticulated at least one sequence with a mean of 5.52 ( $SD = 3.55$ ) sequences misarticulated. Table 3 summarizes overall accuracy of production for each of the consonant sequences in the 12 words selected from the TFP, organized

Table 2. Summary of Intake Test Scores

| Test   | Minimum | Maximum | Mean   | SD    |
|--|---------|---------|--------|-------|
| Kaufman Brief Intelligence Test (Nonverbal)  | 86.00   | 127.00  | 104.66 | 10.55 |
| Échelles de Vocabulaire en Images de Peabody | 80.00   | 131.00  | 100.66 | 19.65 |
| Mean Length of Utterance                     | 2.00    | 10.00   | 4.40   | 1.54  |
| Percent Consonants Correct in Conversation   | 44.86   | 96.49   | 76.96  | 10.12 |
| Test Francophone de Phonologie - PCC         | 42.80   | 86.30   | 70.29  | 11.58 |
| Test Francophone de Phonologie - PVC         | 74.80   | 100.00  | 93.13  | 5.76  |

Note: PCC is percent consonants correct and PVC is percent vowels correct.

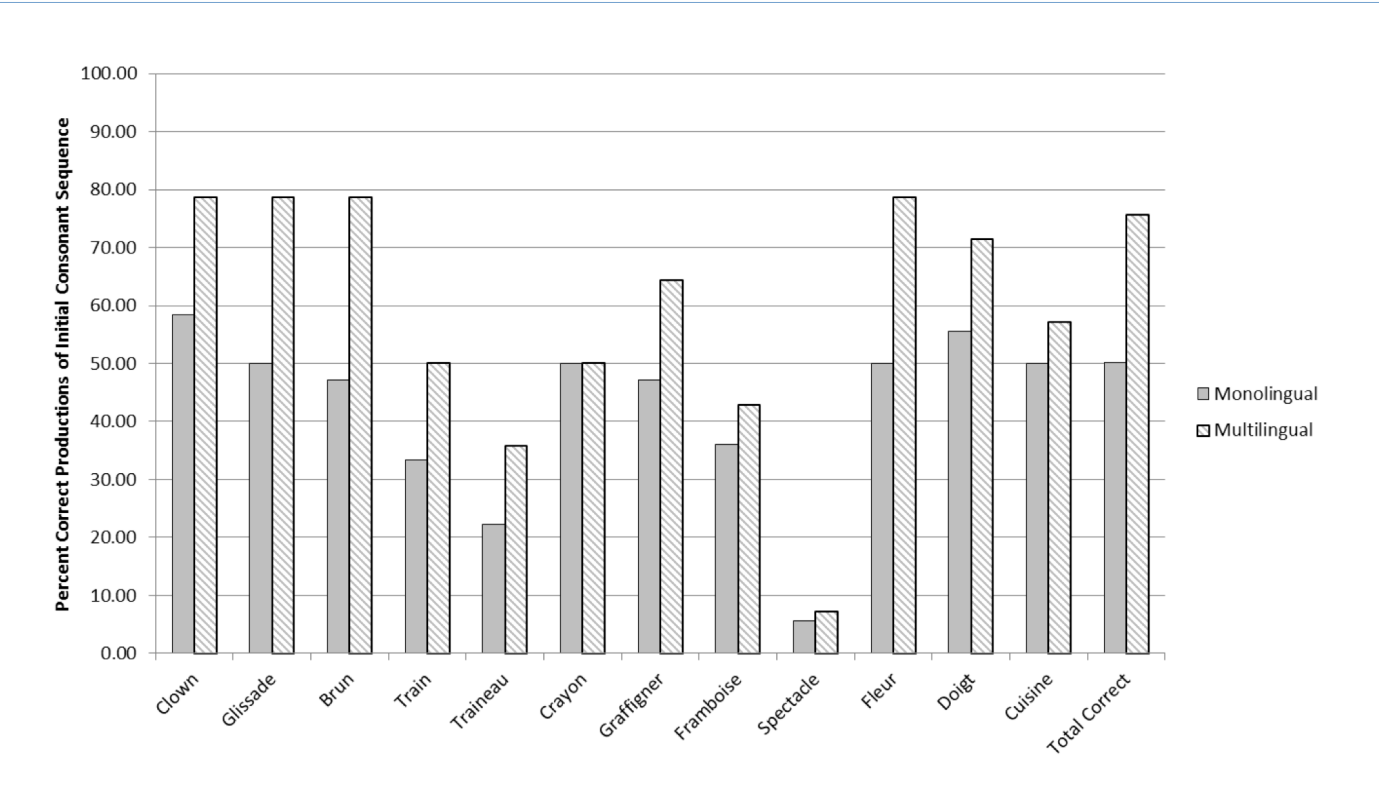


Figure 2. Percent correct production of word initial consonant sequences by word and total as a function of language exposure, specifically Monolingual (only French exposure, grey bars) versus Multilingual (primarily French but 5 to 25% exposure to one or more other languages at home, hashed bars).



Table 3. Number and Percent Correct Production of Word Initial Consonant Sequences by Type

| Word                              | Number Correct | Percent Correct | Subtotal |
|-----------------------------------|----------------|-----------------|----------|
| Branching Onset–Obstruent+ /l/    |                |                 |          |
| Clown [ˈklun] (clown)             | 31             | 62              | 59       |
| Glissade [gliˈsad] (slide)        | 29             | 58              |          |
| Fleur [ˈflœʁ] (flower)            | 29             | 58              |          |
| Subtotal                          |                |                 |          |
| Branching Onset–Obstruent+ /ʁ/    |                |                 |          |
| Brun [ˈbrʁœ̃n] (brown)            | 28             | 56              | 43       |
| Train [ˈtʁɛ̃] (train)             | 17             | 34              |          |
| Traineau [tʁɛ̃ˈno] (sled)         | 13             | 26              |          |
| Crayon [kʁɛˈjɔ̃] (crayon)         | 26             | 52              |          |
| Graffigner [gʁafiˈɲe] (scratch)   | 26             | 52              |          |
| Framboise [fʁɑ̃ˈbwaz] (raspberry) | 19             | 38              |          |
| Subtotal                          |                |                 |          |
| Adjunct /s/                       |                |                 |          |
| Spectacle [spekˈtakl] (show)      | 2              | 4               | 4        |
| Subtotal                          |                |                 |          |
| Rising Diphthong                  |                |                 |          |
| Doigt [ˈdwa] (finger)             | 30             | 60              | 56       |
| Cuisine [kɥiˈzin](kitchen)        | 26             | 52              |          |
| Subtotal                          |                |                 |          |
| Total Correct                     |                | 46              |          |

Note: PCC is percent consonants correct and PVC is percent vowels correct.

according to type of sequence. Aggregating across children and targets, 46% of the consonant sequence targets were articulated correctly. Percent accuracy was highest for the three items beginning with an obstruent + /l/ sequence ('clown', 'glissade', 'fleur') and the two items involving a rising diphthong ('doigt', 'cuisine'). Variability was high within the group of obstruent + /ʁ/ items with scores ranging from a low of 26% for 'traineau' to a high of 56% for 'brun'. All but two children were unable to produce the /sp/ sequence correctly in the word 'spectacle'. Table 2 presents the data

separately for the children who experienced mono- versus multilingual language exposure but there is no evidence of differential responding for these two subsamples. Nonparametric testing to assess differences in median scores indicated no differences for numbers of correct responses to /l/-clusters (2 vs. 3,  $p = .24$ ), /ʁ/-clusters (3 vs. 3,  $p = .79$ ), and glide-sequences (1 vs. 1,  $p = .95$ ) with medians shown for the mono- versus multi-lingual exposure subsamples respectively. Overall there is some evidence of an effect of either word length or syllable prominence as

accuracy is higher for word initial consonant sequences in single-syllable (54%) compared to two-syllable (40%) words; the difference in accuracy for the /tʁ/ sequence in 'train' versus 'traineau' is particularly suggestive of a syllable prominence effect. Further investigation with word medial sequences is required to confirm this impression.

### Percent Occurrence of Error Types

When describing the productions of English-speaking children with DPD, Chin and Dinnsen (1992) identified 17 types of errors involving consonant sequences with a stop or a fricative in the first position of two element sequences.

Table 4 reports the percent occurrence in this francophone sample for the same error types in comparison to the percent occurrence reported in Chin and Dinnsen. It is not possible to match our subjects to Chin and Dinnsen's sample specifically because the English sample was not identified according to severity levels using any normed procedures and no normed procedures exist to objectively describe the speech delay of the children described in this report. However, both samples represent a moderately large sample of preschool aged children receiving treatment for primary speech delay with fairly broad and overlapping age range and thus the comparison of the overall pattern of error

Table 4. Percentage Occurrence of Error Types for Francophone Children Compared to Anglophone Children

| C1 Target | C1 | C2   | French Example         | % Occurrence (French/<br>Mono/Multi) |      |      | English Example          | % Occurrence (English) |
|-----------|----|------|------------------------|--------------------------------------|------|------|--------------------------|------------------------|
| S         | ✓  | ✓    | [gʁafɛjɛ] "graffigner" | 39.1                                 | 35.9 | 44.1 | [prei] "pray"            | 10.1                   |
| S         | ✓  | Ø    | [kun] "clown"          | 14.8                                 | 17.1 | 7.7  | [pei] "play"             | 13.5                   |
| F         | ✓  | ✓    | [floɛʁ] "fleur"        | 8.7                                  | 7.6  | 10.7 | [stov] "stove"           | 6.1                    |
| F         | Ø  | ✓    | [pɛstak] "spectacle"   | 8.3                                  | 8.1  | 8.1  | [pun] "spoon"            | 7.6                    |
| S         | ×  | ✓    | [kʁɛ] "train"          | 6.0                                  | 6.0  | 5.4  | [droin] "growing"        | 2.4                    |
| S         | ✓  | ×    | [twɛno] "traineau"     | 5.4                                  | 5.6  | 4.8  | [pwei] "pray"            | 13.2                   |
| S         | Ø  | ×    | [joɛ] "brun"           | 5.1                                  | 5.6  | 4.8  | [fu] "pew"               | 9.4                    |
| F         | ✓  | Ø    | [foɛʁ] "fleur"         | 3.2                                  | 3.7  | 1.8  | [sip] "sleep"            | 4.8                    |
| S         | Ø  | ✓    | [lun] "clown"          | 3.2                                  | 2.3  | 5.4  | [rei] "pray"             | 0.7                    |
| S         | ×  | ×    | [twɛjɔ] "crayon"       | 2.2                                  | 2.1  | 2.4  | [fwihaus]<br>"treehouse" | 3.1                    |
| F         | Ø  | ×    | [bābwaz] "framboise"   | 1.9                                  | 1.4  | 3.0  | [fɪm] "swim"             | 13.9                   |
| F         | ×  | ✓    | [ʒla] "fleur"          | 1.5                                  | 1.9  | 0.6  | [θta] "star"             | 6.3                    |
| F         | ✓  | ×    | [fwoew] "fleur"        | 1.2                                  | 1.6  | 0.0  | [stai] "sky"             | 2.1                    |
| S         | Ø  | Ø    | [isad] "glissade"      | 0.9                                  | 0.9  | 0.6  | [ei] "play"              | 0.4                    |
| F         | Ø  | Ø    | [ābwaz] "framboise"    | 0.5                                  | 0.5  | 0.6  | [un] "spoon"             | 0.9                    |
| F         | ×  | ×    | [kwābjaz] "framboise"  | 0.2                                  | 0.2  | 0.0  | [fwip] "sleep"           | 4.4                    |
| S         | ✓  | V+ ✓ | No examples            | 0.0                                  | 0.0  | 0.0  | [gewin] "queen"          | 0.1                    |

Note: French data derived from the children described in this report, shown first for all 50 children, then the 36 monolingual children and then the 14 children with multilingual exposure. English data extracted from Chin and Dinnsen (1992) which describes production of consonant sequences by 47 anglophone children with speech delay. Abbreviations in the table are S = any stop consonant, F = any fricative consonant, C1 = the first segment in a 2-element consonant sequence, C2 = the second segment in a 2-element consonant sequence, Ø = deletion of the consonant, ✓ = correct production of the consonant, and × = misarticulation of the consonant

types seems reasonable although close attention to specific percentages of errors is probably not prudent.

The table is organized in descending order of occurrence for the French sample. In French and in English the most frequently occurring production pattern is correct articulation of stop clusters although these sequences were produced correctly with four times greater frequency in French than the English group, reflecting greater frequency of liquid gliding among English-speaking children. In both groups, reduction of stop clusters to the stop in C1 position was the second most frequently occurring pattern. With respect to fricative clusters, correct production ties for fourth place although there is a strong tendency to reduce these clusters to the C2 segment in both language groups. Reduction to a single segment was a common pattern in both language groups; in general however, this error pattern occurred more frequently in the English study than among our francophone sample. The remaining patterns occurred in low frequencies in both language groups although there are two differences that will receive further attention in the discussion: a different distribution of spreading errors across targets by language group, and the complete absence of epenthesis in the French group.

### Discussion

Correct production of consonant sequences is challenging for children whose speech is developing at a normal or delayed rate. None-the-less, two-element consonant sequences (with the possible exception of /θɹ/) are achieved by 75% or more of English-speaking children between the ages of 3;6 and 6;0 (Smit et al., 1990). Word-initial two-element consonant sequences are acquired by 75% or more of French-speaking children between the ages of 30 and 47 months (MacLeod et al., 2011). Furthermore, smaller sample studies have shown that word-initial sequences are acquired earlier than word-final sequences by French-speaking children, opposite to the developmental pattern for English (Demuth & Kehoe, 2006; Demuth & McCullough, 2008). In contrast to these findings for children with typical speech, Hodson and Paden (1981) reported pervasive cluster reduction among English-speaking children with unintelligible speech; in fact, 100% of their sample aged 3- to 8-years reduced clusters in an object naming task. The French-speaking children in this study produced only 46% of consonant sequences correctly and all 50 children misarticulated at least one word initial consonant sequence. Patterns of consonant sequence production by the francophone children observed in this study share similarities and differences with patterns described in other reports for English-speaking children.

It is commonly reported that cluster reduction is the most frequent error pattern produced by English-speaking

children with DPD when attempting consonant sequences (Chin & Dinnsen, 1992; Hodson & Paden, 1981; Yavaş & McLeod, 2010). In Table 4 it can be seen that reductions to a single segment occurred 50% of the time in Chin and Dinnsen's anglophone sample and 37% of the time in our francophone sample. The French-speaking children produced a higher proportion of consonant sequences completely correctly, reflecting earlier acquisition ages for the constituent segments. Even among children with moderate to severe DPD we have found that francophone children have complete phonetic repertoires and are capable of articulating phonemes such as /s/, /k/, /l/ and /ʁ/ correctly (Brosseau-Lapr  and Rvachew, 2013).

Yavaş and McLeod (2010) reported that /sp/ was the most difficult consonant sequence for their English-speaking sample to produce correctly, a finding that is mirrored in our results although our finding must be considered with some caution given that we only sampled it in one word with a difficult word shape, 'spectacle'. None-the-less, this was the only sequence that was almost always reduced with 48/50 children producing this sequence as /p/. In another similarity to children speaking English and other languages, reductions most frequently involved deletion of the most sonorant segment in the sequence. However, retention of the least sonorant segment was not consistent and there was variability within and across words and children. For example, for the word 'klun' → [klun], nine children reduced the word initial sequence to a stop whereas a tenth child reduced the sequence to [l]; on the other hand, for the word 'train' → [tʁɛ̃], six children produced the word with a stop in the onset, five produced it with [ʁ] in the onset and one began with the glide [j]. Looking at individual children, approximately one fifth of the children were inconsistent in their choice of segment to retain while the remainder of the children retained the least sonorant segment (no child retained the most sonorant segment on a consistent basis). These kinds of individual differences have been attributed to developmental changes in the prosodification of individual words with the prosodic structure of different sequences and the nature of the individual segments in the word playing a role in the child's changing phonological representations with age (Jongstra, 2003).

Another reduction pattern that is very common in English data is substitution of a third segment for the target segments in the sequence. This pattern, which occurred 23% of the time in Chin and Dinnsen (1992), was attributed in most cases to coalescence. A related pattern occurs when features from the second segment are spread to the first but no segments are deleted. Altogether these two patterns were somewhat common in our sample but not as frequently occurring as in English with a combined total of 14%. Smit (1993) observed occasional instances of

coalescence and spreading errors for /s/+stop sequences among normally developing children through age 5;0. Yavaş and McLeod reported rates of coalescence for sequences involving /s/ by English speaking children with DPD. Reduction was most often observed for /sp/ sequences and coalescence was observed for approximately one-third of the reductions. In contrast, our francophone sample did not produce any coalescence or spreading errors for the /sp/ sequence that was sampled in this study. The only word sampling /sp/ was a particularly difficult word however ('spectacle' → [spɛktakl]). Further sampling with additional /s/ sequences in less difficult words may reveal instances of coalescence in French.

In English, /w/-clusters tend to be acquired relatively early but when they are misarticulated they show particular vulnerability to spreading and coalescence errors among children with normally developing and delayed speech (Smit, 1993; Yavaş & McLeod, 2010). We observed spreading or coalescence errors on 18% of the 'doigt' productions, constituting one-third of all the errors. These errors involved spreading of Labial in four cases (e.g., [pa], [fwa]) and spreading of Dorsal in the remaining five instances (e.g., [ga], [gwa]), reflecting the dual place features for the glide. However, we observed an even higher rate of coalescence and spreading errors on the stop + rhotic cluster /tʁ/ in the words 'train' and 'traineau', specifically 37% of all productions of these words. In every single case, these errors involved spreading of Dorsal from the second segment to the first within the cluster, even for those few children who substituted [w] for /ʁ/. Surprisingly, spreading occurred for the /fʁ/ cluster as well despite the Labial fricative in the first segment position; again it was the place feature Dorsal that spread yielding [gābwaz] in one instance, [kwābjaz] in another, and seven productions of [kʁābwaz]. This finding suggests that these children uniformly represent the /ʁ/ as having Dorsal place. Rose (2000) described one child whose /ʁ/ segments were subject to spreading and another whose /ʁ/ segments triggered spreading. Rose asserted that /ʁ/ is placeless in Québec French and concluded that the second child, "mislead by the uvularity of target [ʁ], incorrectly assigns a Dorsal specification to this consonant" (p.24). However, spreading of Dorsal from /ʁ/ to /t/ by 80% of the children in our sample suggests that Dorsal is the preferred specification.

Overall the most striking characteristic of the error patterns observed in the data set is the degree of variability across words and subjects in the production of the consonant sequences. Rvachew and Brosseau-Lapré (2012) describe phonological development in terms of increasing linkages between and self-organization of accumulating representations in the acoustic-phonetic and articulatory-phonetic domains. When phonology is seen as an emergent

property of the child's experience with the phonetic properties of the language, word-specific variation and gradual change that includes "reversals and revisions" is to be expected. Adult perception and production of second language consonant sequences has also been described as arising from "language specific phonetic knowledge" (Davidson & Shaw, 2012) that results in very specific patterns of confusion that depend on the segmental content of a given consonant sequence. Phonological, acoustic, and articulatory influences will be considered as explanations for the patterns of consonant sequence articulation observed in this sample of francophone children.

In terms of phonological influences, these largely manifested themselves at the prosodic level in that the clearest indication of a predictable pattern occurred for the /sp/ sequence in the word 'spectacle'. Almost invariably the children reduced this sequence to the least sonorant segment [p] and production accuracy was extremely low relative to the other words elicited. This error pattern has been described as the most common realization of the /s/+stop sequences in the word initial position in English (Smit, 1993) and in Greek (Syrika, et al., 2011). There are a number of proposals suggesting that children may change the underlying prosodification of consonant sequences with development and that sonority profile plays a role in the order in which different clusters achieve adult prosodic structure (see for example, Jongstra, 2003; Rose, 2000). It appears that all of the children described in this report represent 'spectacle' with the /p/ as the head of the first syllable and the /s/ not prosodified. This conclusion is supported by consistent reduction and a complete lack of coalescence for this sequence. The qualitative and quantitative differences in production pattern for this sequence relative to the others support the hypothesis that the /sp/ sequence is not represented as a true cluster.

On the other hand, there was no evidence of qualitative or quantitative differences in the treatment of the /l/-clusters, /ʁ/-clusters, or glide-clusters by these children. All of these sequences were subject to reduction or simplification with spreading between segments occurring with noticeable frequency. The lack of marked differences in production patterns for these sequences may or may not have any bearing on the question of whether the glide sequences should be represented as rising diphthongs. In Rose (2000) this argument was made on the basis of longitudinal data and different time courses for the acquisition of true clusters versus the rising diphthong. In this report we have not presented longitudinal data.

A final issue that pertains to phonological representations for prosodic structure is the complete absence of epenthesis in the francophone sample. Although rare in Chin and Dinnsen (1992), productions such as 'queen' → [gəwin] did

occur with 1% frequency. In our sample these constructions were not attested and indeed not expected since vowel epenthesis would, in French, require creation of a second syllable of approximately equal length to the final stressed syllable, an output that would be very dissimilar to the input. Kehoe et al. (2008) did observe rare instances of epenthesis in rising diphthongs among their sample of 1- and 2-year-old children speaking Continental French. The example they provided was 'avion' [a.<sup>h</sup>vjɔ̃] → [avi.<sup>h</sup>ɔ̃]. In our study, involving older children albeit with delayed speech development, the rising diphthongs were generally the easier items and epenthesis was not observed. For clinical purposes, epenthesis can be considered to be an atypical error in English and French but in French even more so.

Spreading and coalescence errors may reflect the child's perceptual knowledge of /w/ and /ʋ/ in stop+glide and stop+rhotic sequences. It is well established that children weight dynamic cues more heavily than static cues when identifying place of articulation for consonants in simple and complex onsets (Nitttrouer, Crowther, & Miller, 1998). The acoustic-phonetic features of the second segment in sequences such as /tʋ/, /fʋ/, and /dw/ are likely to be particularly salient to the child listener. Furthermore, coarticulation of the segments obscures some of the cues to the first segment (Byrd, 1996; Davidson & Shaw, 2012) which further supports assimilation of features of the second segment to the first segment in the sequence.

With respect to the influence of articulatory knowledge, the greatest accuracy was observed for clusters consisting of segments that were well established in the children's repertoire. The /l/ clusters, especially in the word 'clown', and the glide sequences were well articulated, as also observed for French-speaking toddlers by Kehoe et al. (2008). The earlier acquisition of all of the segments involved in general explains the higher accuracy rate for consonant sequences for French-speaking children with DPD compared to English-speaking children with DPD in previously published reports. Sequences involving fricatives and the rhotic /ʋ/ were subject to higher error rates in comparison to sequences involving /l/ and /w/ in the responses of our French-speaking children.

### Clinical Implications

When considering these data in view of previously published data on the acquisition of consonants in French, some recommendations for clinical practice can be made. First, and most importantly, cluster reduction is a natural process in speech but francophone children are expected to master consonant sequences at an early age, especially in word initial position. According to MacLeod et al. (2011), mastery of the /l/ clusters can be expected by age 36 months and the /w/ clusters by 42 months. Although

the /s/ and /ʋ/ segments are relatively late developing in French, they are mastered by 48 months as are the /s/ and /ʋ/ clusters. Therefore, children such as those described in this report, who continue to misarticulate these clusters past the age of 48 months, are most likely in need of speech therapy and targeting these clusters with the expectation of phonological and phonetic mastery is an appropriate therapeutic goal. Even in the case of simplification errors, there is no need to wait until age 7 to 9 before addressing these errors as one might when treating English-speaking children who produce /s/ and /ɹ/ clusters with phonetically incorrect segments.

Second, the error pattern involving spreading of dorsal within /ʋ/ and /w/ clusters appears to be typical in French-speaking children. This pattern of spreading results in errors that might be called "backing", i.e., 'train' → [kʁɛ̃] and 'doigt' → [gwa], which, in English, would be considered to be highly atypical and might trigger the selection of approaches to speech therapy that are directed at motor or phonological planning rather than phonological knowledge. However, in these francophone children this common error arises from spreading of a phonological feature between segments rather than an issue with lingual control specifically.

Third, French prosody should be taken into account when targeting clusters in therapy (for overview, see Demuth & Johnson, 2003). Wauquier and Yamaguchi (in press) present evidence that French prosody is organized at the level of the phrase, with primary stress falling on the last syllable and a counter stress falling on the first syllable of the phrase; these two syllables form the pillars of an 'accentual arc' that encloses varying numbers of unstressed syllables. When conducting speech therapy in French, it may be most efficient to focus practice on the word initial position of two syllable words (i.e., syllables with less stress), practicing those words in a phrase composed at least of a determiner plus the target word. If the child can learn to produce the target phoneme in this context, it is expected that spontaneous generalization to easier contexts (single syllable words and the stressed final syllable of multisyllable words) will occur. For example, practice of the [fʋ] cluster in phrases such as 'une framboise' (in which the cluster occurs in the unstressed syllable) may promote generalization to the stressed syllable in phrases such as 'des fraises' and 'l'Afrique'. If the child is struggling to master the target, systematic practice in all of these prosodic contexts will be necessary. Further to the issue of prosody, it is advisable to avoid modeling the target forms with epenthesis as a strategy for promoting inclusion of both segments (e.g., 'une fraise' → [yn fʁɛz] or 'traîneau' → [œ tʁɛ̃no]). This strategy is common in English speech therapy sessions but epenthesis appears to occur rarely in French-speaking children and violates French prosody.



## Limitations

Before concluding, we point out again that these data were collected in the context of a randomized controlled trial of interventions for the remediation of speech delay in francophone children. The speech sampling procedure was not specifically designed to investigate consonant sequence acquisition and the data reported here involve target words taken from a larger diagnostic test protocol. Therefore, the interpretation of the findings is subject to some cautions stemming from the weaknesses in the research design. First, a word list that sampled the three types of sequence (true cluster, adjunct /s/, and rising diphthong) with greater balance and depth is obviously required in follow-up studies. Second, a broader age range would be desirable in future studies so that epenthesis could be studied among younger children with speech delay and the resolution of these error patterns among older children might be described. Third, the differences observed between the monolingual and multilingual subsamples in this report require further investigation. In this study, the multilingual sample was relatively small and the finding of greater accuracy among these children may well have been due to sampling error. In another study involving normally developing kindergarten and grade one children we found no statistically significant differences in articulation accuracy between children who were monolingual speakers of French compared to those who spoke other languages at home (Rvachew et al., 2013). However, no clear conclusions can be drawn about the development of speech articulation accuracy among children with speech delay who have varying language exposures without considerably more study of this population.

In conclusion, our description of consonant sequence errors by francophone children reveals similarities and differences in comparison to English-speaking children that must be taken into account when planning phonology intervention for French-speaking children with DPD. The data presented in this paper provide a picture of error patterns that are typical among francophone children with DPD that will help when deciding if a given child should be a high priority for intervention.

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## Appendix A

| Child | Clown | Glissade | Brun | Train | Traineau | Crayon | Graffigner | Framboise | Spectacle | Fleur | Doigt | Cuisine |
|-------|-------|----------|------|-------|----------|--------|------------|-----------|-----------|-------|-------|---------|
| 1101  | klun  | liad     | joë  | jɛ    | jɛno     | ɛjɔ    | aiɲe       | äbwaz     | pɛtak     | loɛɤ  | wa    | ɥin     |
| 1102  | kun   | gisad    | bʁoë | kɛ    | kɛno     | kɛjɔ   | gaifɲe     | fäbaz     | pɛktak    | poɛɤ  | da    | kizin   |
| 1103  | klun  | glisad   | bʁoë | tʁɛ   | tʁɛno    | kʁɛjɔ  | gʁafɲe     | fäbwaz    | pɛstak    | floew | dwa   | kɥizin  |
| 1104  | klun  | giʒad    | bʁoë | kʁɛ   | tʁɛno    | kʁɛjɔ  | gafɲe      | fäbwaz    | pɛktak    | fwoeɣ | dwa   | kɥizɪn  |
| 1105  | klun  | glisad   | bʁoë | tʁɛ   | twɛno    | kʁɛjɔ  | gʁafɲe     | fäbɤaz    | pɛtak     | fwoew | dwa   | kɥizin  |
| 1106  | lun   | gisa     | boë  | kʁɛ   | kʁɛno    | tʁɛjɔ  | gasɲe      | fäbwaz    | pɛstak    | fwoɛɤ | da    | tizin   |
| 1107  | kun   | gisad    | bʁoë | kʁɛ   | kɛno     | kʁajɔ  | gʁafɲe     | bäbwaz    | pɛktak    | foɛɤ  | dwa   | kɥizin  |
| 1108  | kɥun  | isad     | bʁoë | tʁɛ   | kʁɛno    | ɛjɔ    | ɤate       | babwaz    | ɛtak      | fwa   | bwa   | bɥizin  |
| 1109  | kun   | gisad    | boë  | tɛ    | tɛno     | kʁɛjɔ  | gʁafɲe     | täbwaz    | pɛtak     | foɛɤ  | da    | kizin   |
| 1110  | kun   | gwiʒad   | boë  | tɛ    | tɛno     | kʁɛjɔ  | gafɲe      | fäbaz     | pɛstak    | faw   | ga    | kasin   |
| 1111  | klun  | glisad   | bʁoë | tʁɛ   | teno     | kʁɛjɔ  | gafɲe      | fäbwoiz   | spɛstak   | floɛɤ | dwa   | kɥizin  |
| 1112  | klun  | gwita    | bwə  | kɥɛ   | kɥɛno    | kɔɣlɔ  | gɣafi      | fäbwa     | pita      | ɣla   | ja    | tizin   |
| 1113  | klun  | glisad   | bʁoë | kʁɛ   | kʁɛno    | kʁɛjɔ  | gʁafɲe     | fäbwaz    | pɛstak    | floɛɤ | dwa   | kɥizin  |
| 2102  | klun  | glisad   | bʁoë | ʁë    | tɛno     | ʁɛjɔ   | gʁafɲe     | fäbwaz    | pɛstak    | floɛɤ | dwa   | kɥizɪn  |
| 2103  | klun  | glisad   | bʁoë | tʁë   | tʁɛno    | kʁɛjɔ  | gʁafɲe     | fɤabwaz   | pɛstak    | floɛɤ | dwa   | kɥizin  |
| 2104  | klun  | iɣlad    | bʁoë | tʁa   | nɛno     | najɔ   | laɲe       | näbwa     | nɛta      | loe   | dwa   | nani    |
| 2105  | klun  | glisad   | bʁoë | tʁë   | tʁɛno    | tʁɛjɔ  | gefɲe      | fɤɛbwaz   | pɛstak    | loɛɤ  | gwa   | kwizin  |
| 2106  | klun  | glisad   | bʁoë | kʁë   | kʁɛno    | kʁɛjɔ  | gʁafɲe     | äbbwaz    | pɛtak     | floɛɤ | dwa   | kɥizin  |
| 2107  | klun  | glisad   | bʁoë | tʁë   | tʁɛ      | kʁɛjɔ  | gʁafɲe     | fäbwaz    | pɛstak    | floɛɤ | dwa   | kɥizin  |
| 2108  | kun   | gjisad   | bjoë | kje   | kɥɛno    | kɥɛjɔ  | gɣafɲe     | kwäbjaz   | pɛtak     | fjoe  | gwa   | kɥizin  |
| 2109  | tun   | disa     | boë  | të    | teno     | kɛjɔ   | gʁafɲi     | fäbɤaz    | pɛtak     | floew | wa    | tizin   |
| 2110  | klun  | glizäd   | bʁoë | tʁë   | klɛno    | kʁɛjɔ  | gʁafɲe     | fäbɤaz    | spɛktakl  | floɛɤ | gwa   | kwizin  |
| 2111  | klun  | glisad   | bʁoë | kʁë   | tʁɛno    | kʁɛjɔ  | gʁafɲe     | fäbwaz    | pɛtak     | floew | dwa   | kɥizin  |
| 3101  | klun  | glisad   | boë  | kʁë   | tɛno     | kɛjɔ   | gʁafɲe     | fäwaz     | pɛtak     | floɛɤ | dwa   | kwizin  |
| 3102  | klun  | glifad   | bʁoë | ʁë    | kʁɛno    | kɛjɔ   | gʁafɲe     | fäbɤaz    | pɛstak    | floɛɤ | dwa   | kɥizin  |
| 3103  | klun  | glisad   | boë  | të    | kɛno     | kɛjɔ   | gafɲe      | fäbwaz    | pɛktak    | floɛɤ | gwa   | kɥizid  |
| 3104  | ku    | gwisa    | bwä  | fwë   | tɛno     | kɛjɔ   | gamize     | säbwa     | spɛta     | fwoe  | bwa   | kizi    |
| 3105  | kənu  | gisa     | bö   | kjë   | tɛno     | tɛjɔ   | gafɲe      | säbwaz    | pɛstak    | fjoe  | dwa   | kizin   |

Table continues on the next page

## Appendix A (continued)

| Child       | Clown | Glissade | Brun | Train | Traineau | Crayon | Graffigner | Framboise | Spectacle | Fleur | Doigt | Cuisine |
|-------------|-------|----------|------|-------|----------|--------|------------|-----------|-----------|-------|-------|---------|
| <b>3106</b> | klun  | glisad   | bʁœ  | tʁɛ   | tʁeno    | kʁɛjɔ̃ | ɡʁafijne   | fʁɑ̃bwaz  | fɛstak    | floɛʁ | dwa   | kɥizin  |
| 3107        | tun   | glisa    | ʁœ   | ʁɛ    | ʁeno     | kejɔ̃  | egatine    | ʁɑ̃bwa    | pɛtak     | fœʁ   | wa    | tizin   |
| 3108        | kʁun  | ɡiʁad    | bœ   | kʁɛ   | tɛno     | kejɔ̃  | mafijne    | fɑ̃bwaz   | pɛtak     | fɛʁ   | dwa   | kɥizin  |
| 3109        | klun  | ɡwisad   | kʁœ  | kʁɛ   | kʁeno    | kʁɛjɔ̃ | ɡʁafijne   | kʁɑ̃bwaz  | pɛstak    | floɛʁ | dwa   | kizin   |
| <b>3110</b> | klun  | glisad   | bʁoɛ | kʁɛ   | kʁeno    | kʁɛjɔ̃ | ɡʁafijne   | fɑ̃bwaz   | pɛstak    | floɛʁ | dwa   | kɥizin  |
| 3111        | klun  | glisad   | bʁœ  | kʁɛ   | tiʁo     | kʁɛjɔ̃ | ɡʁafijne   | fʁɑ̃bwaz  | pɛstak    | floɛʁ | dwa   | kɥizin  |
| 3112        | kun   | ɡlistad  | bʁoɛ | kɛ    | kʁeno    | kʁɛjɔ̃ | ɡʁafijne   | kʁɑ̃bwatz | pɛstak    | floɛʁ | dwa   | kyzin   |
| <b>3113</b> | klun  | glisad   | bloɛ | tʁɛ   | tʁeno    | kejɔ̃  | ɡafijne    | ɡɑ̃bwaz   | pɛtak     | floɛʁ | dwa   | kɥizin  |
| 3114        | kun   | glisad   | bʁoɛ | tʁɛ   | tʁeno    | tejɔ̃  | ɡafijne    | kʁɑ̃bwaz  | pɛstak    | koɛʁ  | dwa   | kɥizi   |
| <b>4101</b> | kʁun  | ɡlisad   | bjoɛ | kwɛ   | kwɛno    | kʁɛjɔ̃ | ʁawijne    | kʁɑ̃bwaz  | pɛtak     | floew | bwa   | kɥizin  |
| 4102        | tlun  | ɡjisad   | bwoɛ | tʁɛ   | tɛno     | kejɔ̃  | ɡanine     | fɑ̃baz    | pɛstak    | floɛʁ | dwa   | kɥizin  |
| 4103        | klun  | glisad   | bʁoɛ | tʁɛ   | tʁeno    | tʁɛjɔ̃ | ɡʁafijne   | kʁɑ̃bwaz  | pistak    | floɛʁ | dwa   | kɥizin  |
| 4104        | klun  | ɡwisad   | bʁoɛ | tʁɛ   | kʁeno    | kʁɛjɔ̃ | ɡʁafijne   | fʁɑ̃bʁaz  | pɛstak    | floɛʁ | dwa   | kɥizin  |
| 4105        | klun  | glisad   | bʁoɛ | tʁɛ   | tʁeno    | kwejɔ̃ | fanejne    | fʁɑ̃bwaz  | pɛtak     | floɛʁ | dwa   | kwizin  |
| 4106        | klun  | glisad   | bʁoɛ | ʁɛ    | tʁeno    | kʁɛjɔ̃ | ɡwafijne   | fʁɑ̃baz   | pɛtak     | floɛʁ | fwa   | kwisin  |
| 4108        | klun  | glisabɔ̃ | bʁoɛ | kʁɛ   | kʁɛno    | kʁɛjɔ̃ | ɡʁatijne   | kʁɑ̃bwaz  | pɛstak    | floɛʁ | dwa   | kɥizin  |
| 5101        | tu    | ɡiʁad    | bu   | ti    | tɛno     | tejo   | ɡafine     | fɑ̃baz    | pitat     | fa    | pa    | pijin   |
| <b>5102</b> | klun  | glisad   | bʁoɛ | tʁɛ   | tʁeno    | kʁɛjɔ̃ | ɡʁafijne   | fɑ̃bwaz   | pɛtak     | floɛʁ | dwa   | kyzin   |
| 5103        | klun  | glisad   | boɛ  | tʁɛ   | tejo     | kʁɛjɔ̃ | ɡʁafijne   | fʁɑ̃bwaz  | pɛstak    | floɛʁ | bʁa   | kɥizin  |
| <b>5104</b> | kʁun  | lisa     | ʁœ   | ʁɛ    | ʁeno     | kejn   | ɡlafijne   | ɑ̃bwa     | pɛkak     | ʁœʁ   | dɑ̃   | lizin   |
| 5105        | klun  | gisad    | bʁoɛ | tʁɛ   | kʁeno    | kejɔ̃  | ɡʁafijne   | kʁɑ̃bwaz  | pɛskak    | floɛʁ | dwa   | kɥizin  |
| 5106        | klun  | ɡliʁad   | bʁoɛ | kʁɛ   | kʁeno    | kʁɛjɔ̃ | ɡʁafijne   | fʁɑ̃bwaz  | pɛtak     | ʁloɛʁ | da    | kizin   |

Note: **Bolded participant numbers** denote children who were reportedly exposed to a language other than French. Exposures ranged from 1% to 25% of the time at home, with 4 children receiving 5% or less second language exposure, 4 children receiving 20% or more second language exposure and the remainder being in between these extremes. Second languages were English, Spanish, Arabic, Algerian, Cambodian, and Lingala.

## KEY WORDS

FETAL ALCOHOL SPECTRUM  
DISORDER (FASD)

PARTIAL FETAL ALCOHOL  
SYNDROME (PFAS)

ALCOHOL RELATED  
NEURODEVELOPMENTAL  
DISORDER (ARND)

PRENATAL ALCOHOL  
EXPOSURE

LANGUAGE DEVELOPMENT

LANGUAGE DISORDERS

CLINICAL EVALUATION OF  
LANGUAGE FUNDAMENTALS-  
4<sup>TH</sup> EDITION (CELF-4)

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# CCC The Language Profile of School-Aged Children with Fetal Alcohol Spectrum Disorder (FASD)

# CCC Le profil linguistique d'enfants d'âge scolaire ayant un trouble du spectre de l'alcoolisation foétale (SAF)

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## Abstract

A population-based study of school age children diagnosed with FASD was conducted to evaluate the language abilities of these children and describe their language strengths and weaknesses. A retrospective chart review methodology was applied to examine language abilities of children diagnosed with FASD. Secondary data from 124 children aged 5 to 18 years, who were diagnosed with FASD between January 2005 and October 2010, were included in the study. Results from the CELF-4 language assessment tool were analyzed to compare the language abilities of these children. This study revealed globally poor performance across expressive and receptive language abilities, suggesting that language development is significantly affected by prenatal alcohol exposure. The Core Language Index Scores (total test scores) showed almost 70% of the participants received a language rating of "severe" (indicating significant communication impairments). About 20% had a rating of either "moderate" or "mild", and fewer than 15% had a rating of "average". Approximately 85% of the sample experienced mild to severe language delays in the index categories. The 5 to 8 year old age group had the highest average scores in all index categories, whereas the 9 year-olds consistently had the lowest average scores. The changing profile by age group is significant with important ramifications on longitudinal language testing and programming. A better understanding of language abilities in children with prenatal alcohol exposure may lead to improved planning for language interventions.

## Abrégé

Une étude d'une population d'enfants d'âge scolaire ayant un diagnostic de SAF a été faite afin d'évaluer les habiletés langagières de ces enfants et de décrire leurs forces et leurs faiblesses au plan du langage. Une méthodologie d'examen rétrospectif des dossiers fut appliquée. Des données secondaires de 124 enfants âgés de 5 à 18 ans ayant le diagnostic de SAF, recueillies entre janvier 2005 et octobre 2010, furent incluses dans l'étude. Les résultats de l'outil d'évaluation langagière CELF-4 ont été analysés pour comparer les habiletés linguistiques de ces enfants. Cette étude a révélé une performance généralement pauvre pour les habiletés langagières expressives et réceptives, ce qui suggère que le développement langagier est affecté de façon significative par l'exposition prénatale à l'alcool. Les scores de base des indices langagiers (CLIS) (résultat total des tests) démontrent que presque 70 % des participants ont reçu une cote « sévère » (indiquant des troubles importants de communication). Environ 20 % ont reçu une cote de degré « modéré » ou « léger » et moins de 15 % ont reçu une cote de degré « moyen ». Environ 85 % des participants accusaient un retard de langage de léger à sévère dans les catégories d'indices. Le groupe des cinq à huit ans avait les taux moyens les plus élevés dans toutes les catégories d'indices, alors que les enfants de neuf ans avaient constamment les taux moyens les plus bas. Le changement de profil selon le groupe d'âge est significatif, ce qui a des ramifications importantes sur l'évaluation et la programmation longitudinale du langage. Une meilleure compréhension des habiletés langagières des enfants exposés à l'alcool en période prénatale pourra contribuer à l'amélioration des interventions dans le domaine du langage.



## Introduction

Fetal Alcohol Spectrum Disorder (FASD) is an umbrella term that encompasses three specific medical diagnoses resulting from prenatal exposure to alcohol: Fetal Alcohol Syndrome (FAS), Partial Fetal Alcohol Syndrome (pFAS) and Alcohol Related Neurodevelopmental Disorder (ARND). FAS describes those individuals with a characteristic pattern of physical and neurological birth defects, including facial dysmorphology, growth deficiency, and neurobehavioural abnormalities; pFAS refers to those with facial dysmorphology and neurobehavioural abnormalities but no evidence of growth deficiency; ARND pertains to those individuals who have characteristic neurodevelopmental abnormalities but no dysmorphology or growth retardation. The spectrum of brain differences with FASD varies by individual and may cause different learning, behavioural and daily living challenges for each (Chudley et al., 2005). An estimated 9 in 1000 babies born in Canada are affected by FASD (Public Health Agency of Canada, 2005). Although there has been a substantial body of literature examining behavioural, psychosocial and cognitive impairments of FASD, there is a scarcity of research on prenatal alcohol exposure (PAE) and its effect on language development. Large-scale language and communication deficiencies have been described in individuals with FASD yet no consistent or conclusive pattern of deficits has been identified. Therefore, the objectives of this study were to: 1) examine the language abilities of school age children who have a formal diagnosis of either pFAS or ARND; and 2) describe the language strengths and weaknesses in this population. The present study will contribute relevant and unique information to the growing body of research about the language abilities of children with FASD. A better understanding of the language profiles of school aged children with FASD can assist the FASD diagnostic teams in assessing communication abilities and improve the services offered by speech-language pathologists (S-LPs).

## Background

*Making an FASD Diagnosis in Canada.* The procedures used to diagnose a disorder due to prenatal alcohol exposure and determine an alcohol related diagnosis have changed considerably since FAS was first described by Jones and Smith (1973). The first Canadian Guidelines for the Diagnosis of FASD and its related disabilities were published in 2005 and were established to assist Canadian diagnostic teams in providing a consistent and objective diagnosis (Chudley et al., 2005). The Canadian Guidelines were harmonized with other international protocols resulting in a four digit diagnostic code now widely used in Canada (Chudley et al., 2005). This code addresses the severity of the four key diagnostic features of FASD in the following areas: growth

deficiency; the facial phenotype; central nervous system damage or dysfunction; and gestational exposure to alcohol.

The following nine domains of the central nervous system receive neurobehavioural assessments: 1) communication; 2) hard and soft neurological signs including sensory motor deficits; 3) brain structure; 4) cognition; 5) academic achievement; 6) memory; 7) executive functioning; 8) attention; and 9) adaptive behaviour. A central nervous system domain, commonly referred to as a “brain domain” in clinical practice, is considered to be impaired when standardized scores are either two or more standard deviations below the mean or where there is a discrepancy of at least one standard deviation between subtests within domains. The Canadian Guidelines require impairment in three different domains before a diagnosis can be considered. Over the years, there has been an improved understanding of each of the brain domains through research. Without exception, research has improved our understanding and assessment of the relationships between various language components.

*Assessing the Communication Brain Domain.* Since FASD was first documented, a connection between prenatal alcohol exposure (PAE) and impaired language development has been considered. Early on, researchers theorized a connection between PAE and language, suggesting the need for special education services such as speech and language interventions (Streissguth, Herman, & Smith, 1978). Shortly thereafter, Sparks (1984) was among the first S-LPs to query if a specific relationship between PAE and language difficulties existed. Her formative work identified a stronger link between FASD and speech and language problems in children than had previously been reported. In the late 90s, further support came from Church & Kaltenbach (1997) who posited FAS may be the leading cause of hearing, speech, and language difficulties in children. Since then, studies examining deficiencies in children with FASD have described a number of communication deficiencies encompassing language areas such as: naming (Mattson, Riley, Gramling, Delis, & Jones, 1998); verbal fluency (Mattson & Riley, 1999; Schoenfeld, Mattson, Lang, Delis & Riley, 2001); grammar comprehension (Kodituwakku, 2009); central processing (Church & Kaltenbach, 1997); narrative discourse (Thorne, Coggins, Carmichael Olson, & Astley, 2007); and inappropriate use of social language (Coggins, Timler, & Olswang, 2007). The results of these studies, however, have not been consistent. Several studies have shown a significant correlation between global language development and PAE (Becker, Warr-Leeper & Leeper, 1990; Carney & Chermak, 1991) while others have not (Greene, Earnhart, Martier, Sokol, & Ager, 1990; Fried, O’Connell & Watkinson, 1992). Limitations such as small sample sizes,

low doses of prenatal alcohol consumption, and large age ranges, may have contributed to the inconclusive findings.

The literature examining language development in children with FASD has not used consistent methodologies or instruments, nor have the existing studies applied consistent methods of diagnosing FASD (there is variation between and sometimes within countries). As the field can still be considered to be in its infancy, inconsistencies should be expected. Even so, language deficits in children with FASD are regularly reported. Several different language tests (e.g. Test of Language Development-Primary-4<sup>th</sup> edition, (Newcomer & Hammill, 2008) and Comprehensive Receptive Expressive Vocabulary Test-2<sup>nd</sup> edition (Wallace & Hammill, 2002)) have been utilized in studies and it is unclear how comparable those results are to the CELF-4 (Adnams et al., 2007; Aragon, et al., 2008; Carney & Chermak, 1991; Coggins et al., 2007; Kodituwakku et al., 2006; Wyper & Rasmussen, 2011). Assuming a broad level of similarity, it is not surprising that the literature indicates a widespread range of language and communication deficiencies in children with FASD. Knowing that language will likely be an issue for a child with FASD means that the role of S-LP in assessing and developing individual programming is critical. Improved identification of language strengths and limitations through yearly assessments using a standard protocol will allow for a strengths-based approach for a child with FASD. To encourage greater consistency in evaluation of language and communication abilities, Pan Canadian consultations were held to identify standardized tools and diagnostic categories.

In 2007, Pan Canadian consultations resulted in a list of standard tools appropriate for the assessment of children between 4 to 18 years of age when an FASD diagnosis is being considered. The four tools identified for evaluating language and communication for children aged 6 to 11 years included: 1) the Clinical Evaluation of Language Fundamentals -4<sup>th</sup> edition (CELF-4) (Semel, Wiig, & Secord, 2003); 2) the Test of Narrative Language (Gillam & Pearson, 2004); 3) the Test of Problem Solving 3 Elementary -3rd edition (Bowers, Huisinigh, & LoGiudice, 2005); and 4) the Pragmatics Profile subtest from the CELF-4. For children ages 12 to 18 years, the three standard set of core language tests included: 1) the CELF-4; 2) Test of Problem Solving 2 Adolescents (Bowers, Huisinigh, & LoGiudice, 2007); and 3) the CELF-4 Pragmatics Profile (Canada NorthWest FASD Research Group, 2009). Although the CELF-4 does have certain limitations in that it does not assess social language, problem solving or written language abilities, the Pan Canadian consultations with other S-LPs working in FASD diagnostic clinics determined that the CELF-4 was acceptable and appropriate to effectively test the communication domain (Canada NorthWest FASD Research

Group, 2009). As a collective, the Manitoba FASD Centre<sup>1</sup> selected the CELF-4 as one of the assessment tools to evaluate language and communication.

### Current Study

The specific goals of this research study were to: 1) determine if there are significant differences across age groups for the different measures derived from the CELF-4; 2) examine if there are significant difference in diagnosis for the different measures derived from the CELF-4; and 3) to analyze if there are significant differences in sex for the different measures derived from the CELF-4.

### Methods

*Procedures.* A retrospective chart review was conducted of 124 children between the ages of 5 and 18 years that had been assessed over a five and a half year period (January 2005 to October 2010) at the Manitoba FASD Centre. The Manitoba FASD Centre assessments adhere to the Canadian guidelines for FASD diagnosis (Chudley et. al., 2005) and all participants were administered the CELF-4 as part of the communication domain assessment. A diagnosis was only made collectively following the completion of assessments from a multidisciplinary team including an S-LP, occupational therapist, psychologist, developmental pediatrician, and a geneticist. This is not a “blind” approach as clinicians are aware that they are assessing a child who may have FASD. However, having multiple members contribute to the final decision increases objectivity. The subjects of this chart review were all assessed by the same S-LP. Ethics approval was obtained for this study by the Health Research Ethics Board, University of Manitoba.

*Participants.* A database was created by the S-LP team at the Manitoba FASD Centre in 2005, consisting of demographic information and scores of various language assessment instruments. Individuals assessed between January 2005 and October 2010 were extracted for the study by the principal investigator. To be included in the sample, participants needed to: a) be aged 5 to 18 years, b) have the language portion of CELF-4 completed, c) be English speaking, d) have been assessed by the same S-LP, and e) have received an FASD diagnosis based on the Canadian Guidelines. If data were missing from any component of the CELF-4 language assessment, the individual was excluded from the study. Of the 1078 children evaluated by the S-LP, 124 (11.83%), met the inclusion criteria.

Of the 124 children that met the criteria for the chart review, 23 (18.5%) had a diagnosis of pFAS and 101 (81.5%) had a diagnosis of ARND. No participants had a diagnosis of FAS. Of the total group, 78 (62.9%) of the subjects were male and 46 (37.1%) were female. Two-thirds of the sample (n=83) was based in an urban setting and one-third (n=41) had some

form of intervention (e.g., consultation or direct therapy) with S-LP services prior to the assessment. With regards to alcohol use, 47 (39.7%) of the biological mothers used *alcohol only*, 15 (12.1%) used a *combination of alcohol and tobacco*, and 62 (50.0%) reported using *alcohol and other substances* such as cocaine or marijuana. Family structure varied; half of the participants lived in foster care ( $n=63$ ; 50.8%) with the remainder of the sample living with: 1) biological parent(s) ( $n=25$ ; 20.2%); 2) an extended family member ( $n=27$ ; 21.7%); or 3) an adoptive family ( $n=9$ ; 7.3%). All of individuals in the sample spoke English as their first language, with a small proportion also speaking a second language (7.3%) (see Table 1). The demographics of the sample were consistent with the population seen at the Manitoba FASD Centre.

**Measure.** The CELF-4 is the third revision of The Clinical Evaluation of Language Fundamentals that was originally published in 1980 (Semel, Wiig, & Secord, 2003). It is an individually administered clinical tool used in the identification, diagnosis and follow-up evaluation of language and communication disorders in individuals 5 to 21 years old. Two separate test forms are used for individuals aged 5 to 8 and 9 to 21 years. These test forms are then differentiated by a variety of sub-tests which lead to further divisions in the age groupings: 1) 5 to 8 years; 2) 9 years; 3) 10 to 12 years; and 4) 13 to 21 years (See Table 2). Following the test administration, there are two important score categories. The first is the 'Core Language Score', which is a measure of the general language ability that quantifies a child's overall language performance. The second important category includes the 'language indices'. There are five language indices that provide additional details on language and communication and are calculated using 15 sub-test scaled scores (see Table 3).

The CELF-4 classifies language delay using the following severity rating scale: severe (standard scores < 70); moderate (standard scores between 71- 77); mild (standard scores between 78-85); average (standard scores between 86-114); and above average (standard scores >114) (Semel, Wiig, & Secord, 2003). As stated earlier, the Canadian Guidelines require impairment in three different domains before a diagnosis can be considered. The "communication brain domain" would be considered impaired if children receive a rating of severe, in that it is two standard deviations below the mean. For example, when using the CELF-4, a severity rating below a standard score of 70 indicates a severe impairment, and thus the communication domain would be identified as a significant deficit when considering for an FASD diagnosis. While internal consistency reliability estimates for the CELF-4 vary depending on the age group and subtest ( $\alpha$  ranges from 0.77 to 0.92) they have shown adequate stability across time for all age bands (Semel, Wiig, & Secord, 2003).

**Analysis.** The CELF-4 data were analyzed using SPSS (v.11.0). Frequency distributions were examined to identify and address potential outliers. In order to address the first objective of this study, the evaluation of language abilities, cross-tabulations were completed to provide the results by age group, including the core language score (total test score), and indices measuring receptive language, expressive language, language content, language structure, and language memory. Parametric tests ( $t$ -tests and ANOVAs) were conducted to assess the significance of between group differences. For example, it was important to determine if scores differed significantly by sex of participant as well as by age of participant. The second objective of the study was to describe strengths and limitations based on the CELF-4 total and index scores. To address this objective, age group results were plotted to determine performance differences among age groups and to compare each age group in the diagnosed sample to results for the general population. For all statistical tests, a level of significance of  $p<0.05$  was chosen.

## Results

The CELF-4's Core Language Index Score provides a broad assessment of an individual's overall language performance. No significant differences were found based on age of the participants (see Table 3). In this sample, two-thirds of the participants ( $n= 84$ ; 67.7%) received a severity rating of *severe*. Approximately 10% of the sample ( $n=12$ ; 9.7%) received a severity rating of *moderate*, 11 (8.9%) received a severity rating of *mild*, and 17 (13.7%) received a severity rating of *average*. The "communication brain domain" would be considered impaired if children receive a rating of severe, in that it is two standard deviations below the mean or there is a discrepancy of at least one standard deviation between subtests with domains. Although there was slight variation by indices, the trend was that the majority of the sample had some level of language delay with the greatest proportion being severely delayed.

When examining chi-square results by age groups and index categories, the Receptive Language Index Scores varied significantly by age group ( $p<0.01$ ) as did the Language Structure Index Scores ( $p=0.02$ ). The 5 to 8-year-olds had the highest average scores (higher scores indicates lower severity) in all three index categories yet the scores still indicated moderate to severe language difficulties. The average scores across all age groups and indices ranged from 60.2 to 76.6, again indicating severe language issues. There appears to be a complex pattern emerging. The highest scores, indicating better performance, were seen in the youngest group. In the 9 year-olds, there is a dip in scores which is followed by somewhat higher measures for the older group (see Table 4).



As the sample contained participants who could be classified into dichotomous groups, *t*-tests were used to determine if there were differences in scores by diagnosis. Although the scores for the pFAS sample ( $n=23$ ) were consistently lower in all indices than those of the ARND population ( $n=101$ ), these differences were not statistically significant (Table 5).

Finally, the test scores were also not statistically significant for differences by sex for all sub-groups. It also means that language scores did not vary a great deal when comparing children with different diagnoses. For example, a female with pFAS was not likely to have a significantly higher or lower score than a male with ARND.

### Discussion

This study examined the use of a standardized comprehensive language assessment tool, the CELF-4, for evaluation of the language *abilities* in children diagnosed with FASD between the years 2005 and 2010. It is the first study to comprehensively examine language development in a large cohort of school age children formally diagnosed with FASD and using the Canadian guidelines. As such, it represents an important contribution to what is known about FASD, communication, and language measurement. Although it has been the perception that individuals with FASD have higher expressive language skills relative to their receptive language skills, this study did not support this perception. One key finding was that the majority of the clinical sample had language deficiencies: over 65% of the sample showed severe impairment and an additional 16% of the sample demonstrated a core language deficit that ranged from mild to moderate. Another key finding was that age seemed to be an important factor in some indices of the CELF-4: the Receptive and Expressive Language Index Scores showed significant difference by age as did Language Structure Index Scores. The youngest group consistently had the strongest results in all three subtests. A third key finding was that there were no significant differences in language scores when comparing children diagnosed with pFAS and ARND. This is a critical finding that warrants more investigation, particularly with a sample that includes children with FAS. In addition to profiling the language scores of FASD children, this study identified several interesting findings that warrant further discussion.

First, a particularly troubling finding was that approximately 85% of the sample had some level of language impairment with almost 70% presenting with severe language deficits. However, we found that only 33% of the entire sample had previously received some form of speech and language intervention. This lack of service provision may be the result of individuals involved with the child not recognizing the significance of their

communication impairment as the focus is on the child's other areas of difficulties (ie. poor attention span, sleep difficulties, behavioural issues, etc.). The results from this study clearly suggest that language services need to be viewed as a necessity given the needs of the population. For example, a child who has access to language services prior to the assessment may not receive a different diagnosis but could have improvements in his or her language capabilities overall.

Second, a factor linked to lower scores on the CELF-4 was age. Our sample indicated that younger children scored better than older children. The literature, however, is not clear on whether language performance changes over time, the direction of the change, or if language remains stable. Davies et al. (2011) did note a consistent performance decrease in language testing over time. Wyper & Rasmussen (2011) cites literature differentiating language deficits in both older and younger children; older children with FAS showed deficits most specifically in syntax whereas younger children have more global language deficits. The concern is that language testing does not happen frequently enough to ascertain changes in language development. In addition, it is unclear what factors, if any, may be impacting language development. If there is a common trajectory, is it a product of environment, the nature of FASD, or a unique combination as Coggins and his colleagues suggest (2007). For the S-LP, these factors should be considered, giving way to annual testing and documentation on social environmental factors. Future research, including longitudinal studies, could further impact our understanding if comparisons would be made between the developmental trajectories of typically developing children to those with FASD in similar social environments.

Third, a small proportion (13.7%) of the clinical sample was considered "typical" based on this language assessment, a finding that warrants further examination. Other researchers have noted similar findings and have reported no significant differences in controls and FASD cases (Kodituwakku et al., 2006). One study reported one-third of their clinical sample achieved language scores within the expected range of language performance (Coggins et al., 2007). However, it should be noted that the limitations of the CELF-4 may not have captured weaknesses in written language or social language use. Future research should include an examination into the proportion of FASD children who have typical language development. It may be that certain protective factors are common in that particular population. Streissguth (2003) has posited that at least six protective factors are associated with lower rates of secondary disabilities in the FASD population: living in a stable nurturing home of good quality, not having frequent changes of household, not being a victim

of violence, having received disability services, and having been diagnosed before the age of 6 years. Measuring those factors could implicate practice. Knowing what contributes to typical development would both assist in determining deficiencies in social environments and improve models of assessment and diagnosis. It also highlights the importance of large scale data collection for each clinical assessment, to enable research to conduct multi-factorial studies to better understand both strengths and challenges as well as promote evidence informed best practice for S-LPs.

Since none of the children in the present sample had FAS, we became differently focused on the ARND and pFAS scores in order to better understand if differences by diagnosis were apparent. We found that there were few differences between the scores of participants with either ARND or pFAS; language and communication seemed similar regardless of diagnosis. To the best of our understanding, prior research has not explored language by specific diagnosis which makes this result novel and worthy of further exploration. It also has pragmatic implications for assessment and therapy. Dysmorphology in FASD is a contributor to the diagnosis of FAS and pFAS. Having the physical traits of FAS and pFAS can provide outward evidence of the brain disorder; children with FAS and pFAS may be differently supported as their disability is more recognizable. Because children with ARND appear “typical”, there may be an assumption that language and communication also follow along a “typical” trajectory. If children with ARND are not being recognized by parents and teachers as having language difficulties, they are at greater risk for being misunderstood in both the classroom and home environment. Given the severity of the language impairment in the non-dysmorphic diagnostic categories, there is no question that the non-dysmorphic population needs the same level of support as those who are dysmorphic.

*Limitations.* This study contributes to the examination of language abilities and general language profile of school age children with an FASD. The sample size of 124, collected over a five and a half year period, was appropriate to measure significant differences. The CELF-4 is a validated tool and useful in measuring communication capability. For the scope of this study, it was a valuable tool in that it provided detailed data by age group pertaining to language strengths and limitations in those children being assessed for FASD. One limitation, however, was that very few research studies have utilized the CELF-4 instrument in analyses, making comparisons limited in their specificity. This limitation impacts the study’s generalizability and applicability to populations outside of Canada. Additionally, none of the children in the present sample had a diagnosis of FAS. While FAS is not a common diagnosis with the Canadian

Guidelines—only about 10% of any clinical sample will be diagnosed with FAS (Coggins et al., 2007)—having the diagnosed population limited to children with either ARND or pFAS was limiting. It may be that due to the more prominent dysmorphia present in children with FAS, diagnoses occur before five years of age. Expanding the inclusion criteria to include pre-school children may have captured FAS children differently. Additional limitations were that the study was unable to determine impact of co-morbid diagnoses (such as ADHD), social-economic backgrounds, or home/family environment (e.g., adopted, foster homes, etc). It also would have been useful to complete a multi-factorial analysis that incorporates the impact of socioeconomic status. The information on family type is useful in that regard but not a direct proxy. At the time of the study, however, the Manitoba FASD Centre did not collect data on socioeconomic status. Finally, the study did not have a typical control group of children from similar socio-economic backgrounds.

*Directions for Future Research.* Future research on the language abilities of children with FASD would require more in-depth data pertaining to the language services children received. This data would allow for greater clarity on the role of S-LP in providing intervention. In addition, future studies should target children with FAS. Future research has many potential avenues. A longitudinal methodology would be useful to understand changes over time, the possible role or impact of environment, as well as the implications of socioeconomic status within a changing demographic. Exploring language abilities as opposed to deficiencies based on results of the subtest scores on the CELF-4 would also be an interest direction with clinical application. Employing a qualitative analysis of children with typical communication behaviours would be an excellent way to explore less tangible variables that may impact language in a child with FASD. In depth diagnostic assessment of multiple language areas is central to understanding the behavioural phenotype of school aged children with FASD. Given that prenatal alcohol ingestion is often paired with other teratogens, future research should explore if language and communication outcomes vary by types of prenatal exposures.

## Conclusion

This study contributes to the emerging literature pertaining to language and communication abilities in children with FASD. This study revealed that children with FASD had globally poor performances across expressive and receptive language abilities, suggesting that language development is significantly affected by prenatal alcohol exposure. The Core Language Index Scores of the CELF-4 showed almost 70% of the participants received a language rating of “severe” (indicating significant communication impairments), about



20% were rated as “mild”, and fewer than 15% had a rating of “average”. In addition, we found that language abilities changed with age: The five to eight year old age group had the highest average scores in all index categories, whereas the nine year olds consistently had the lowest average scores. If we understand this finding to describe a change over time, the clinical ramifications are the need for frequent language testing over time coupled with programming consistent with a child's changing needs. The small proportion of our sample that exhibited average language development was a significant finding and one that requires further investigation. It is imperative that we better understand drivers of success, whether they relate to a child's context, resilience, or to other factors. This research contributes to the development of evidence-informed practice for providing specific S-LP services as well as comprehensive rehabilitation services. Strategies to support children with FASD must target language and communication as part of a multidisciplinary collaborative community and educational supports for affected children and their families. With the proper services in place, individuals with FASD can communicate to their fullest potential.

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Table 1: Demographic Overview by Age Group

|   | 5-8 Years |      | 9 Years |      | 10-12 Years |      | 13-18 Years |      | TOTAL |      |
|---|-----------|------|---------|------|-------------|------|-------------|------|-------|------|
|   | n=54      | %    | n=19    | %    | n=28        | %    | n=23        | %    | N=124 | %    |
| Diagnosis   |           |      |         |      |             |      |             |      |       |      |
| pFAS  | 15        | 27.8 | 3       | 15.8 | 3           | 10.7 | 2           | 8.7  | 23    | 18.5 |
| ARND  | 39        | 72.2 | 16      | 84.2 | 25          | 89.3 | 21          | 91.3 | 101   | 81.5 |
| Sex   |           |      |         |      |             |      |             |      |       |      |
| Male  | 38        | 70.4 | 11      | 57.9 | 18          | 64.3 | 11          | 47.8 | 78    | 62.9 |
| Female  | 16        | 29.6 | 7       | 36.8 | 10          | 35.7 | 12          | 52.2 | 45    | 36.3 |
| Location  |           |      |         |      |             |      |             |      |       |      |
| Urban   | 36        | 66.7 | 12      | 63.2 | 18          | 64.3 | 15          | 65.2 | 81    | 65.3 |
| Rural   | 18        | 33.3 | 6       | 31.6 | 9           | 32.1 | 8           | 34.8 | 41    | 33.1 |
| Previous Involvement with S-LP                      |           |      |         |      |             |      |             |      |       |      |
| Yes   | 15        | 27.8 | 9       | 47.4 | 13          | 46.4 | 5           | 21.7 | 42    | 33.9 |
| No  | 39        | 72.2 | 9       | 47.4 | 14          | 50.0 | 18          | 78.3 | 80    | 64.5 |
| Alcohol Use   |           |      |         |      |             |      |             |      |       |      |
| Alcohol only  | 21        | 38.9 | 5       | 26.3 | 11          | 39.3 | 9           | 39.1 | 46    | 37.1 |
| Alcohol and tobacco                                 | 28        | 51.9 | 3       | 15.8 | 6           | 21.4 | 1           | 4.3  | 38    | 30.6 |
| Alcohol and other substances                        | 4         | 7.4  | 8       | 42.1 | 10          | 35.7 | 13          | 56.5 | 35    | 28.2 |
| Family Type   |           |      |         |      |             |      |             |      |       |      |
| Biological Parent                                   | 15        | 27.8 | 2       | 10.5 | 5           | 17.9 | 2           | 8.7  | 24    | 19.4 |
| Extended Family                                     | 15        | 27.8 | 4       | 21.1 | 5           | 17.9 | 3           | 13.0 | 27    | 21.8 |
| Adopted   | 2         | 3.7  | 3       | 15.8 | 2           | 7.1  | 1           | 4.3  | 8     | 6.5  |
| Foster Care   | 22        | 40.7 | 8       | 42.1 | 14          | 50.0 | 17          | 73.9 | 61    | 49.2 |
| Language  |           |      |         |      |             |      |             |      |       |      |
| English Only  | 49        | 90.7 | 16      | 84.2 | 26          | 92.9 | 22          | 95.7 | 113   | 91.1 |
| Preferred Language English (other languages spoken) | 5         | 9.3  | 2       | 10.5 | 1           | 3.6  | 1           | 4.3  | 9     | 7.3  |

Table 2: CELF-4 Breakdown of Subtests for Each Age Group

|                                   | 5-8 Years | 9 Years | 10-12 Years | 13-18 Years |
|-----------------------------------|-----------|---------|-------------|-------------|
| <b>Core Language Scores</b>       |           |         |             |             |
| Concepts and Following Directions | X         | X       | X           |             |
| Word Structure                    | X         |         |             |             |
| Recalling Sentences               | X         | X       | X           | X           |
| Formulated Sentences              | X         | X       | X           | X           |
| Word Classes- Total               |           | X       | X           | X           |
| Word Definitions                  |           |         |             | X           |
| <b>Receptive Language Index</b>   |           |         |             |             |
| Concepts and Following Directions | X         | X       | X           |             |
| Word Classes- Receptive           | X         | X       | X           | X           |
| Sentence Structure                | X         |         |             |             |
| Semantic Relationships            |           |         |             | X           |
| Understanding Spoken Paragraphs   |           |         |             | X           |
| <b>Expressive Language Index</b>  |           |         |             |             |
| Word Structure                    | X         |         |             |             |
| Recalling Sentences               | X         | X       | X           | X           |
| Formulated Sentences              | X         | X       | X           | X           |
| Word Classes- Expressive          |           | X       | X           | X           |
| <b>Language Content Index</b>     |           |         |             |             |
| Concepts and Following Directions | X         |         |             |             |
| Word Classes-Total                | X         | X       | X           |             |
| Expressive Vocabulary             | X         | X       |             |             |
| Word Definitions                  |           |         | X           | X           |
| Sentence Assembly                 |           |         |             | X           |
| Understanding spoken paragraphs   |           | X       | X           | X           |

| Language Structure Index          |   |   |   |   |
|-----------------------------------|---|---|---|---|
| Word Structure                    | X |   |   |   |
| Recalling Sentences               | X |   |   |   |
| Formulated Sentences              | X |   |   |   |
| Sentence Structure                | X |   |   |   |
| Language Content Index            |   |   |   |   |
| Recalling Sentences               |   | X | X | X |
| Concepts and Following Directions |   | X | X |   |
| Formulated Sentences              |   | X | X | X |
| Semantic Relationships            |   |   |   | X |

Table 3: CELF-4 Clinical Tool Overview (Semel, Wiig &amp; Secord, 2003)

|  | Test Form A   | Test Form B |  |             |
|--|---|-------------|--|-------------|
|  | 5-8 Years   | 9 Years     | 10-12 Years  | 13-18 Years |
| Core Language Index (total test score)         | measures general language ability and quantifies a student's overall language performance. Each Composite Index Score consists of a different compilation of subtests to yield the standardized scores  |             |  |             |
| Receptive Language Index                       | measures overall ability to listen to and comprehend information  |             |  |             |
| Expressive Language Index                      | measures overall production of language and the ability to express thoughts, ideas and feelings   |             |  |             |
| Language Content Index                         | measures various aspects of semantic development, including vocabulary, concept and category development, comprehension of associations and relationships among words, interpretation of factual and inferential information orally presented and the ability to create meaningful semantically and syntactically correct sentences |             |  |             |
| Language Structure (LS) & Language Memory (LM) | LS: measures the receptive and expressive components of interpreting and producing sentence structures  |             | LM: measures the ability to recall spoken directions, formulate sentences with given words, and identify semantic relationships. It also provides a measure of the ability to apply working memory to linguistic content and structure |             |

Table 4: Mean Standard Scores by Index Category and Age Group

| Index Category                 | Age Group | Mean Standard Score | Standard Deviation | Confidence Interval | p-value |
|--------------------------------|-----------|---------------------|--------------------|---------------------|---------|
| Core Language Index Score      | 5-8       | 69.4                | 14.1               | 65.5 to 73.3        | 0.19    |
|                                | 9         | 60.3                | 11.4               | 54.8 to 65.8        |         |
|                                | 10-12     | 64.3                | 17.4               | 57.6 to 71.1        |         |
|                                | 13-18     | 65.8                | 20.9               | 56.8 to 74.8        |         |
|                                | total     | 66.0                | 16.1               | 63.2 to 68.9        |         |
| Receptive Index Score          | 5-8       | 76.6                | 12.5               | 73.2 to 80.0        | <0.01   |
|                                | 9         | 65.0                | 10.6               | 59.8 to 70.0        |         |
|                                | 10-12     | 67.8                | 13.0               | 62.7 to 72.8        |         |
|                                | 13-18     | 65.5                | 18.4               | 57.5 to 73.4        |         |
|                                | total     | 70.5                | 14.5               | 67.9 to 73.1        |         |
| Expressive Index Score         | 5-8       | 71.6                | 14.2               | 67.7 to 75.5        | 0.15    |
|                                | 9         | 62.4                | 12.4               | 56.5 to 68.4        |         |
|                                | 10-12     | 67.3                | 17.1               | 60.7 to 73.9        |         |
|                                | 13-18     | 65.1                | 18.4               | 57.2 to 73.1        |         |
|                                | total     | 67.9                | 15.7               | 65.1 to 70.7        |         |
| Language Structure Index Score | 5-8       | 74.0                | 14.1               | 70.1 to 77.9        | 0.02    |
|                                | 9         | 60.2                | 10.2               | 55.3 to 65.2        |         |
|                                | 10-12     | 65.5                | 16.9               | 59.0 to 72.1        |         |
|                                | 13-18     | 67.6                | 24.4               | 57.0 to 78.2        |         |
|                                | total     | 68.7                | 17.2               | 65.6 to 71.2        |         |
| Language Content Index Score   | 5-8       | 74.1                | 11.6               | 71.0 to 77.3        | 0.20    |
|                                | 9         | 68.0                | 12.4               | 62.0 to 74.0        |         |
|                                | 10-12     | 71.1                | 13.6               | 65.9 to 76.4        |         |
|                                | 13-18     | 69.0                | 21.9               | 59.5 to 78.5        |         |
|                                | total     | 71.3                | 14.7               | 68.7 to 74.0        |         |



Table 5: T-test scores by Diagnosis and Index Category

| Index Category                 | Diagnosis | Mean Standard Score | Standard Deviation | Confidence Interval | p-value (2-tailed) |
|--------------------------------|-----------|---------------------|--------------------|---------------------|--------------------|
| Core Language Index Score      | pFAS      | 65.2                | 13.1               | 59.6 to 70.8        | 0.80               |
|                                | ARND      | 66.2                | 16.9               | 62.9 to 69.5        |                    |
| Receptive Index Score          | pFAS      | 67.9                | 11.2               | 63.0 to 72.7        | 0.33               |
|                                | ARND      | 71.1                | 15.2               | 68.1 to 74.1        |                    |
| Expressive Index Score         | pFAS      | 67.1                | 13.7               | 61.2 to 73.0        | 0.79               |
|                                | ARND      | 68.1                | 16.2               | 64.9 to 71.2        |                    |
| Language Content Index Score   | pFAS      | 69.7                | 12.6               | 64.3 to 75.2        | 0.56               |
|                                | ARND      | 71.7                | 15.2               | 68.7 to 74.7        |                    |
| Language Structure Index Score | pFAS      | 68.7                | 11.8               | 63.6 to 73.8        | 0.99               |
|                                | ARND      | 68.6                | 18.3               | 65.0 to 72.2        |                    |

### End Notes

<sup>1</sup>The Manitoba FASD Centre (formerly the Clinic for Alcohol and Drug Exposed Children-CADEC) in Winnipeg Manitoba was founded in 1999 and has been assessing and diagnosing children with FASD for over 12 years. To date, the clinic has assessed approximately 2300 children and diagnosed over 1200 individuals with FASD. Although the Centre has many functions, its primary purpose is to provide comprehensive multidisciplinary assessments, diagnosis and follow-up services to individuals who have had prenatal alcohol exposure (PAE).

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## MOTS-CLÉS

RÉPÉTITION DE PHRASES

TROUBLE GRAMMATICAL

TROUBLES DU LANGAGE  
ORALTROUBLES EXTERNALISÉS  
DU COMPORTEMENT

VIETNAMINIEN

# La répétition de phrases en vietnamien – un marqueur des troubles du langage oral et des troubles du comportement

## Sentence repetition in Vietnamese - a marker of oral language and behavioral difficulties

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### Abrégé

La difficulté à répéter correctement des phrases présentées à l'oral est considérée comme un des marqueurs les plus pertinents pour l'identification des troubles spécifiques du développement du langage oral (TSL), du moins dans les langues flexionnelles occidentales. Dans le cadre de cette étude, nous avons cherché à savoir si une tâche de répétition de phrases en vietnamien permettrait de distinguer des enfants présentant un TSL par rapport à des enfants témoins (objectif 1). Ensuite, nous avons testé l'hypothèse selon laquelle cette tâche permettrait de mettre en évidence des profils similaires chez les enfants présentant un TSL ainsi que chez ceux présentant des troubles externalisés du comportement (TEC), ce qui suggérerait un déficit sous-jacent commun (objectif 2) : un TSL est en effet régulièrement observé dans le cas où il y aurait un TEC associé. Enfin, dans la lignée de l'objectif 2, nous avons voulu voir si le profil de comorbidité (COM) des enfants atteints à la fois de TSL et de TEC correspondrait ou non à l'addition de profils séparés (objectif 3).

Une épreuve de répétition de phrases, ainsi qu'une épreuve de mémoire verbale immédiate et d'attention auditive, ont été administrées à de jeunes enfants vietnamiens (âgés de 4;6 à 7;8 ans) répartis en un groupe témoin (TM) et en trois groupes cliniques: TSL, TEC et COM, de même âge chronologique que le groupe TM. Les résultats obtenus révèlent (1) une bonne sensibilité à l'épreuve de répétition de phrases dans la mise en évidence des difficultés des enfants présentant un TSL en langue vietnamienne, une langue morphologiquement simple; (2) un profil en répétition de phrases, mémoire immédiate et attention auditive différent chez les enfants ayant des TSL et ceux ayant des TEC, ce qui suggère un déficit sous-jacent en grande partie de nature différente; (3) pour les enfants qui cumulent un TSL et un TEC, un profil sur le plan quantitatif et qualitatif qui semble correspondre à l'addition des profils du groupe TSL d'un côté et du groupe TEC de l'autre. Les différences entre ces trois profils permettent de montrer l'importance de différencier les enfants présentant les deux types de trouble de ceux qui n'en présentent qu'un seul tant pour la recherche que pour la clinique.

### Abstract

Difficulties in correctly repeating sentences presented orally are considered as one of the most relevant markers to identify specific language impairment (SLI), particularly in Western inflecting languages. In the present study, we investigated whether a sentence repetition task in Vietnamese allows to distinguish SLI children from typically developing (TD) children (*objective 1*). We also wanted to verify whether this task highlighted similar profiles in children with SLI and in children with externalizing behaviour disorders (EB), which would suggest a common underlying deficit (*objective 2*). Finally, we investigated whether the profile of children suffering from comorbidity i.e., from both types of disorders (COM) corresponded to the addition of separate profiles (*objective 3*).

A sentence repetition task, an immediate memory task and an auditory attention task were administered to four groups of Vietnamese children (aged 4;6 - 7;8 years): a control group (TD) and 3 clinical groups (SLI, EB and COM). Results first demonstrated a good sensibility of the sentence repetition task in Vietnamese, a morphologically simple language, to identify difficulties in children with SLI; secondly they showed a different profile in sentence repetition, immediate memory and auditory attention in case of SLI vs. EB, suggesting that the underlying deficit is mainly different; thirdly, the quantitative and qualitative analysis of COM children's data reveal a profile that matches the addition of SLI and EB profiles. The differences highlight the need to distinguish between children presenting both types of disorders and those who only display one, both for research and clinical intervention.

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## Introduction

Des troubles du développement du langage oral peuvent survenir chez des enfants qui ne présentent par ailleurs aucune autre difficulté: on observe chez ces enfants un retard significatif dans l'acquisition du langage oral qui ne peut pas être expliqué par une déficience sensorielle ou motrice, une atteinte neurologique, une déficience intellectuelle, des troubles psycho-affectifs sévères ou des carences graves liées à l'environnement ou à l'éducation (Leonard, 1998). Il s'agit donc de troubles spécifiques du développement du langage oral. Les enfants atteints de ce type de déficit langagier présentent en général principalement des difficultés touchant la phonologie et la grammaire, difficultés qui vont alors affecter le développement des compétences sémantiques et pragmatiques (Schelstraete, 2011; van der Lely, Payne, & McClelland, 2011).

Parmi les nombreuses recherches réalisées sur cette pathologie, une série d'études a montré que la performance à une tâche de répétition de phrases présentées oralement est un marqueur clinique fiable pour repérer les enfants souffrant d'un trouble spécifique du langage oral (par ex., Conti-Ramsden, Botting, & Faragher, 2001; Devescovi & Caselli, 2007; Maillart, Leclercq, & Quemart, 2012; Stokes, Wong, Fletcher, & Leonard, 2006; van der Lely et al., 2011). Par exemple, van der Lely et al. (2011) ont montré que la tâche de répétition de phrases qu'ils ont mise au point pour dépister les troubles phonologiques et grammaticaux chez l'enfant (*Grammar and Phonology Screening*, GAPS) permettait de distinguer les enfants présentant des troubles spécifiques du développement du langage oral (TSL) de ceux qui n'en présentent pas. Plus précisément, dans le cadre de la validation du GAPS, van der Lely et al. (2011) ont testé 3 groupes d'enfants. Le premier groupe était âgé entre 3;6 et 6;6 ans et ne présentait aucun trouble langagier. Le second groupe comprenait des enfants de même âge mais présentant un TSL<sup>1</sup> (jeunes enfants avec trouble langagier, ci-après J-TSL). Le troisième groupe était composé d'enfants plus âgés (entre 6;9 et 8;11 ans) présentant également un TSL (A-TSL, pour enfants plus âgés avec trouble langagier). Les résultats de cette étude montrent que le test GAPS est très sensible pour différencier les enfants atteints de TSL de ceux qui n'en présentent pas, tout particulièrement pour le groupe J-TSL. Cette sensibilité est en effet plus modérée chez les plus âgés. Concernant l'épreuve de répétition de phrases, 90% des enfants J-TSL et 70% des A-TSL obtiennent ainsi un score inférieur au 5e rang centile. La tâche de répétition de phrases du GAPS semble donc une épreuve prédictive pour mettre en évidence des difficultés langagières et ce, particulièrement chez les enfants de moins de 7 ans.

Une telle tâche est également régulièrement proposée au sein des batteries de tests standardisés qui évaluent

les compétences linguistiques expressives de l'enfant (par ex., L2MA-2 de Chevrie-Muller, Maillart, Simon et Fournier, 2010; N-EEL de Chevrie-Muller et Plaza, 2001; ELO de Khomsi, 2001; TOLD de Newcomer et Hammill, 1991, 1997). Cette épreuve constitue en effet un élément crucial dans l'évaluation du langage des enfants présentant en particulier des troubles grammaticaux. C'est ce qui apparaît notamment dans l'étude de Maillart et al. (2012). Ces auteurs ont évalué la validité prédictive de la tâche de répétition de phrases de la batterie L2MA-2 (Chevrie-Muller et al., 2010) pour l'identification des troubles du langage chez des enfants francophones d'âge scolaire (7-12 ans). Cette tâche a été proposée à 22 enfants atteints de TSL et 22 enfants témoins<sup>2</sup>. Les résultats indiquent que l'épreuve de répétition de phrases permet clairement de distinguer les enfants présentant un trouble du langage des enfants témoins : sur les 22 enfants du groupe TSL, 21 présentaient en effet des scores très faibles (inférieurs à -1,33 écart-types) à cette épreuve. Notons que ces résultats viennent relativiser ceux rapportés par van der Lely et al. (2011), en montrant que la répétition de phrases peut également être sensible chez des enfants plus âgés.

L'épreuve de répétition de phrases est donc une tâche fréquemment utilisée pour mettre en évidence un trouble spécifique du développement du langage oral chez l'enfant. Toutefois, la plupart des études utilisant cette épreuve de répétition de phrases (ou des épreuves de phrases à compléter) ont été effectuées dans des langues caractérisées par une morphologie relativement riche: en anglais (Conti-Ramsden et al., 2001; Gardner, Froud, McClelland, & van der Lely, 2006; Seeff-Gabriel, Chiat, & Dodd, 2010); en français (Maillart et al., 2012); en italien (Devescovi & Caselli, 2007); en néerlandais (Rispen, 2004) en hongrois (Marton, Schwartz, Farkas & Katsnelson, 2006) ou encore en farsi (iranien – Hasanati, Agharasouli, Bakhtiyari et Kamali, 2011). Les chercheurs voulaient dans ce cas mettre en évidence la présence de difficultés morphosyntaxiques expressives chez les enfants atteints de difficultés langagières. Dans ces langues, de nombreux éléments morphologiques doivent être maîtrisés (par ex., flexions nominales, pronominales et verbales). Par contre, dans certaines langues asiatiques monosyllabiques comme le vietnamien ou le chinois, la grande majorité des mots ont une forme unique qui ne peut donc pas être modifiée par la dérivation ou la flexion. Il est par conséquent intéressant de se demander si la tâche de répétition de phrases peut également permettre d'identifier de manière aussi claire les difficultés langagières chez l'enfant dont la langue d'origine est le vietnamien. Le premier objectif de la présente étude a pour but de répondre à cette question.

Une étude de Stokes et al. (2006) apporte des informations pertinentes vis-à-vis de ce premier objectif, étant donné

qu'elle a été réalisée en cantonais<sup>3</sup>. Il n'existe pas en effet de conjugaisons ou de déclinaisons en cantonais comme nous pourrions en trouver dans les langues dites à flexion. La grammaire cantonaise est essentiellement fondée sur l'ordre des mots, vu que ceux-ci sont invariables. Un mot dans la langue cantonaise peut changer de sens ou de fonction grammaticale en fonction de sa place dans la phrase ou selon le contexte dans lequel il est utilisé. Ces caractéristiques linguistiques sont également présentes en langue vietnamienne. Un des objectifs majeurs de l'étude de Stokes et al. (2006) était de voir s'il était possible d'identifier à l'aide d'une épreuve de répétition de phrases les enfants d'âge préscolaire présentant un TSL en les comparant à des enfants témoins (TM) soit de même âge chronologique (âgés de 4;2 à 5;7 ans; A-TM), soit plus jeunes (âgés de 2;11 à 3;6 ans) de même niveau de langage (J-TM). Les résultats permettent aux auteurs de conclure que la répétition de phrases peut être considérée comme un marqueur clinique du TSL dans la langue cantonaise: les performances présentées à cette tâche par le groupe TSL étaient inférieures à celles du groupe A-TM et comparables à celles du groupe J-TM. Sur la base de cette étude, nous pouvons donc raisonnablement prédire qu'une tâche de répétition de phrases en vietnamien devrait s'avérer également sensible pour identifier les enfants présentant un TSL.

Par ailleurs, il est aussi important de constater que des difficultés à l'épreuve de répétition de phrases ont également été observées chez des enfants présentant des troubles externalisés du comportement (Iwanaga, Ozawa, Kawasaki & Tsuchida, 2006; Kim & Kaiser, 2000; Redmond, 2005). Ces troubles se manifestent par de l'agitation ou de l'impulsivité, par un manque d'obéissance ou de respect des limites, voire par une certaine agressivité; ces différents symptômes peuvent être considérés comme des prédicteurs pour les troubles du déficit de l'attention avec ou sans hyperactivité à l'âge scolaire (Roskam, Kinoo & Nassogne, 2007). L'étude d'Iwanaga et al. (2006) montre par exemple que des enfants préscolaires (âgés entre 45 et 72 mois) qui présentaient des troubles externalisés du comportement (TEC) touchant l'attention et l'impulsivité avaient, en comparaison à des enfants de même âge, des performances faibles dans une tâche de compréhension de consignes mais aussi dans une tâche de répétition de phrases; en revanche, les deux groupes d'enfants ne se différenciaient pas dans une tâche de rappel de chiffres. Ces résultats sont compatibles avec ceux obtenus précédemment par Kim et Kaiser (2000) qui ont également utilisé une épreuve de répétition de phrases (TOLD-P2, Newcomer & Hammill, 1991) chez des enfants plus âgés (de 6 à 8 ans) présentant des TEC (de type hyperactivité et inattention). Ce groupe clinique était comparé à un groupe de même âge sans hyperactivité ni problème d'attention sur les compétences syntaxiques et sémantiques à la fois réceptives et expressives. Les résultats

montrent des performances significativement plus faibles chez les enfants présentant des TEC aux épreuves de répétition de phrases et d'articulation de mots.

Dans le même ordre d'idées, Redmond (2005) a utilisé une épreuve de répétition de phrases (TOLD-P3; Newcomer & Hammill, 1997) pour voir si celle-ci permettait de différencier trois groupes d'enfants (âgés de 5 à 8 ans): un groupe d'enfants présentant des TEC de type hyperactivité-inattention, un groupe d'enfants présentant un TSL et un groupe d'enfants sans trouble de même âge. Les résultats indiquent que les groupes cliniques (TEC et TSL) obtiennent des résultats plus faibles que le groupe témoin. Cet auteur suggère que certaines similarités dans le dysfonctionnement pourraient exister entre le TSL et les TEC dans les domaines de la mémoire de travail et du traitement de l'information verbale. Ces résultats permettent également de suggérer que les difficultés dans la tâche de répétition de phrases seraient une caractéristique commune aux deux groupes cliniques. Cependant, le groupe TEC se distingue du groupe TSL par des performances supérieures à cette épreuve. Il semble donc que les enfants du groupe TSL aient plus de difficultés que les enfants du groupe TEC en répétition de phrases.

En se basant sur ces différentes études – et tout particulièrement sur celle de Redmond (2005), il semble légitime de se demander si les difficultés dans la tâche de répétition de phrases sont de même nature en cas de TSL qu'en cas de TEC. Deux grandes catégories de théories s'opposent aujourd'hui pour expliquer les difficultés langagières des enfants présentant un TSL, notamment leurs difficultés grammaticales (Leclercq & Leroy, 2012). D'une part, les théories linguistiques expliquent ces difficultés en termes de compétences linguistiques. Elles proposent que le TSL résulterait d'un déficit de la connaissance linguistique par exemple une «cécité aux traits grammaticaux» comme le suggère Gopnik (1990) ou une difficulté à identifier les relations de dépendance entre deux éléments d'une phrase (par ex., un pronom relatif et son antécédent) – comme le proposent van der Lely et Stoolwerck (1997). La difficulté à répéter des phrases s'expliquerait selon ces auteurs par un déficit spécifiquement grammatical. D'autre part, les théories relevant du traitement de l'information avancent que les enfants présentant un TSL ont des déficits dans des mécanismes cognitifs plus généraux: perception auditive (Tallal, 1990), vitesse de traitement (Leclercq, Kattus et Maillart, 2009), inhibition (Marton, Kelmenson & Pinkhasova, 2007), attention ou encore mémoire de travail (Barkley, 1997; Tannock & Schachar, 1996). En effet, certains auteurs soulignent l'impact des mécanismes non linguistiques de traitement de l'information dans le traitement langagier. Ils émettent l'hypothèse

qu'une atteinte de ces mécanismes pourrait limiter les performances langagières des enfants présentant un TSL (Im-Bolter, Johnson & Pascual-Leone, 2006). Ce serait tout particulièrement le cas pour les traitements langagiers complexes, qui nécessitent de coordonner rapidement les informations relevant des processus de stockage; ceci est par exemple requis dans des tâches de compréhension ou de production de phrases qui s'avèrent dès lors trop complexes pour l'enfant présentant un TSL (Bishop, North & Donlan, 1996; Marton & Schwartz, 2003; Montgomery, 2000). Ainsi, ce serait à cause de difficultés générales de traitement qu'un enfant atteint d'un TSL rencontrerait des difficultés à l'épreuve de répétition de phrases, tâche dans laquelle il doit traiter l'information linguistique, la maintenir en mémoire immédiate puis répéter exactement la phrase. Ce débat entre les théories linguistiques et cognitives reste toujours ouvert à l'heure actuelle.

Pour la question qui nous occupe, il est intéressant de relever que des difficultés générales de traitement de l'information ont également été avancées pour expliquer les troubles externalisés du comportement. Certaines hypothèses suggèrent ainsi que les problèmes de comportement seraient liés à un déficit des fonctions exécutives chez les enfants présentant un TEC (Barkley, 1997; Pennington & Ozonoff, 1996). En effet, ces études suggèrent que des dysfonctionnements exécutifs – trouble de la planification, de l'inhibition et/ou de la mémoire de travail – seraient la cause des troubles du comportement. De plus, ces dysfonctionnements expliqueraient les difficultés langagières fréquemment rencontrées chez les enfants présentant des TEC (Cohen et al., 2000; Tannock & Schachar, 1996). Ce serait donc les problèmes d'inhibition, de planification, d'inattention, et/ou de mémoire qui influenceraient négativement les performances dans la tâche de répétition de phrases.

Dans ce contexte, il semble alors particulièrement pertinent d'utiliser l'épreuve de répétition de phrases pour comparer *qualitativement* les profils grammaticaux des enfants présentant un TSL ou des TEC. À notre connaissance, cette comparaison n'a pas été encore effectuée, les études présentant des analyses uniquement quantitatives. Or, elle permettrait de poser des hypothèses sur le trouble sous-jacent aux difficultés de répétition de phrases. Si le déficit cognitif, général, est un facteur important dans la capacité à répéter des phrases, on peut s'attendre à observer un profil similaire dans les deux groupes (TEC et TSL). Par contre, si c'est le déficit linguistique qui joue un rôle chez les enfants avec un TSL, les profils en répétition de phrases devraient être différents de ceux observés en cas de TEC, les erreurs n'étant pas de même nature. Le deuxième objectif de la présente étude est de tester cette hypothèse, en comparant dans une analyse qualitative les erreurs en répétition de

phrases chez des enfants présentant un TSL et des enfants de même âge présentant des TEC.

Dans la même perspective, il nous a de plus semblé intéressant de distinguer parmi les enfants présentant des TEC ceux qui présentent un trouble avéré du langage de ceux qui en sont exempts, et ce, afin de mieux comprendre la relation entre ces deux troubles. En effet, ainsi que nous l'avons déjà mentionné, la littérature montre qu'on observe fréquemment une association entre ces deux types de troubles, qui dépasse ce à quoi on pourrait s'attendre si cette association était simplement due au hasard, mais la nature de cette relation reste peu explorée et mal comprise (Beitchman, Peterson, & Clegg, 1988; Cohen, Davine, Horodezky, Lipsett & Isaacson, 1993; van Schendel, Schelstraete, & Roskam, 2013). Un troisième objectif consiste donc à répondre à la question de savoir si le profil des enfants présentant un trouble comorbide (TSL+TEC) est une simple addition des profils séparés des TEC et du TSL – du moins dans le cas où ces derniers diffèrent dans notre étude – ou si ce profil s'avère au contraire plus complexe.

Pour résumer, le premier objectif de l'étude est de savoir si une tâche de répétition de phrases permet de distinguer en langue vietnamienne des enfants présentant un trouble spécifique du développement du langage oral par rapport à des enfants témoins. Le deuxième objectif est de savoir si cette tâche permet de mettre en évidence des profils différents chez les enfants présentant un trouble spécifique du développement du langage oral et chez ceux présentant des troubles externalisés du comportement et enfin, de savoir si le profil d'enfants souffrant des deux types de troubles correspond ou non à l'addition des profils séparés. Avant d'aborder ces points, il est nécessaire de présenter les principales caractéristiques de la langue vietnamienne pertinentes pour notre recherche.

### Présentation générale de la langue vietnamienne

Parmi les langues tonales d'Asie, le vietnamien est la langue la plus importante après le chinois commun (Malherbe, 1997). L'origine du vietnamien reste néanmoins obscure. Il appartient au groupe Viêt-Muong, branche Mon-Khmer de la famille Austro-Asiatique. Cette classification de l'origine du vietnamien est dérivée de l'hypothèse d'Haudricourt (1953, cité par Nguyễn Thị Minh Huyền, 2006), qui est, à l'heure actuelle, l'hypothèse la plus acceptée. Selon cet auteur, le vietnamien a été fortement influencé par des langues non toniques du groupe Mon-Khmer. Le caractère tonique du vietnamien fut ajouté ultérieurement suite aux échanges culturels dus au voisinage avec le thaï (Haudricourt, 1954, cité par Nguyễn Thị Minh Huyền, 2006). Pendant un millénaire, jusqu'au X<sup>e</sup> siècle, c'est-à-dire durant la période de domination chinoise, le vietnamien



a été enrichi par un nombre important de mots chinois prononcés « à la vietnamienne » et appelés des mots « sino-vietnamiens ».

Il est à noter que le vietnamien est une langue monosyllabique riche. D'après Nguyễn Quang Hồng (1994), le vietnamien possède en théorie approximativement 19520 syllabes mais dont seulement 5890 syllabes environ sont utilisées. Ce nombre est toutefois non négligeable et requiert donc que l'enfant développe un lexique de taille relativement importante pour la communication orale. Par ailleurs, ainsi que nous l'avons souligné, la grammaire du vietnamien est assez pauvre sur le plan morphologique. Les deux processus de base de la grammaire vietnamienne sont l'utilisation de l'ordre des mots et l'utilisation de mots fonctionnels. Il n'y a, par exemple, pas de conjugaison des verbes comme en français. Nous développons ci-dessous les principales caractéristiques de la grammaire vietnamienne, en distinguant la syntaxe et la morphologie.

### Syntaxe

Le vietnamien appartient au type linguistique "SVO" – Sujet – Verbe – Objet, ainsi qu'illustré en (1).

(1) *Charles lái máy bay trực thăng.*

S V O

\*Charles piloter hélicoptère (Charles pilote un hélicoptère)

L'ordre des mots joue un rôle important en vietnamien.

Il permet de marquer les différents rapports entre les constituants d'une phrase. Si cet ordre change, la valeur grammaticale et le sens du message changeront aussi. Les deux exemples suivants illustrent ce point par (2) une phrase indicative et (3) une phrase négative:

(2) *Tối nay, anh ăn cơm không.*

\*Soir ce, tu manger riz nul (Ce soir, tu ne manges que du riz)

(3) *Tối nay, anh<sup>5</sup> không ăn cơm.*

\*Soir ce, je ne pas manger riz

(Ce soir, je ne mange pas de riz ou ce soir, je ne soupe pas)

En vietnamien, les verbes ne sont pas conjugués, mais on peut ajouter dans la phrase des mots fonctionnels pour exprimer les relations syntaxiques, ce qui permet de véhiculer des sens différents: par exemple, ces termes permettent de marquer le temps, la voix passive ou la négation. De plus certains termes sont également utilisés comme les conjonctions (ex., mặc dù, nếu...thì..., vì, do, etc.) pour relier les propositions principale et subordonnée afin

de traduire une condition, un but, une cause-conséquence (4), etc.

(4) *Do thời tiết xấu, (nên) chuyến bay bị hoãn lại.*

\*A cause du temps mauvais, (alors) le vol (passif) retardé

(A cause du mauvais temps, (alors) le vol a été retardé)

### Morphologie

Sur le plan de la morphologie flexionnelle, la grammaire vietnamienne, rappelons-le, peut être considérée comme plus simple que celle de langues occidentales comme l'anglais, le français ou l'italien. En effet, le vietnamien est une langue isolante: la morphologie de chaque mot reste intacte malgré les changements syntaxiques, c'est-à-dire qu'il n'y a ni conjugaison des verbes, ni accord des noms, adjectifs, etc. Les exemples (5) et (6) illustrent cette caractéristique.

(5) *Tôi đã đi dạo. Je me suis promené (e).*

(6) *Bà tôi đã đi dạo. Ma grand-mère s'est promenée.*

Ainsi, tous les mots vietnamiens sont invariables, même s'ils assurent des fonctions syntaxiques différentes comme illustré en (7) et (8). Dans ce cas, comme indiqué plus haut, c'est l'ordre des mots qui vient pallier l'absence d'information morphologique.

(7) *Màu xanh của nước biển Le bleu de la mer*

(8) *Cô bé mặc áo đầm màu xanh La petite fille porte une robe bleue*

D'autres procédés que la morphologie sont donc utilisés pour assurer le rôle joué par la morphologie dans les langues flexionnelles. Par exemple, pour exprimer le nombre des noms communs, un second «article» est placé avant le nom, que ce soit pour le singulier (9) ou pour le pluriel (10).

(9) *mỗi thành viên* (chaque membre) ; *từng người* (chacun)

(10) *những cuốn sách* (les livres) ; *các em bé* (les bébés) ; *những nghệ sĩ* (plusieurs artistes) ; *tất cả gia đình* (toutes les familles)

Il faut également préciser que le nom en vietnamien est combiné avec une série d'«articles» différents (11). Ces articles sont toujours mis avant le nom. Il n'y a cependant pas de règle explicite pour choisir le bon article. Ainsi, l'enfant doit développer un lexique important pour utiliser correctement les mots, avec le bon article.

(11) *Con mèo* (le chat) ; *con dao* (le couteau) ; *con mắt* (l'œil)

**Cái nhà** (la maison) ; **cái giường** (le lit) ; **cái mũi** (le nez)

**Cuốn sách** (le livre) ; **chiếc nhẫn** (la bague) ; **đôi mắt** (les yeux)

**Dòng sông** (la rivière) ; **ngọn núi** (la montagne) ; **cánh đồng** (le champ)

**Bầu trời** (le ciel) ; **ban ngày** (le jour) ; **buổi tối** (le soir)

Finalement, le vietnamien pratique le redoublement des mots, notamment des adjectifs pour marquer l'intensité (12).

(12) **xanh xanh** (verdâtre, bleuâtre) ; **tím tím** (violacé)

**nhỏ nhỏ** (assez petit) ; **nhỏ nhắn** (petit) ; **khe khẽ** (à voix basse)

De nos jours, nous ne disposons, du moins à notre connaissance, d'aucune recherche publiée sur le développement grammatical de l'enfant vietnamien. Par conséquent, nous manquons de points de repère sur le développement grammatical de l'enfant vietnamien. Nous avons donc été amenés à créer une tâche de répétition de phrases en langue vietnamienne pour pouvoir évaluer la capacité grammaticale chez l'enfant parlant cette langue. Notre intention était de développer une épreuve qui tienne compte des caractéristiques de la grammaire vietnamienne et qui soit suffisamment sensible pour mettre en évidence des troubles grammaticaux chez les enfants présentant des déficiences langagières mais également, le cas échéant, chez les enfants présentant des TEC. Pour cette raison, nous avons comparé les performances d'enfants témoins à celles d'enfants de même âge chronologique présentant soit un trouble spécifique du langage oral (TSL), soit un trouble du comportement externalisé (TEC), soit les deux (COM, pour comorbide), en procédant à une comparaison tant sur le plan quantitatif que qualitatif.

## Méthodologie

### Participants

Quatre groupes d'enfants âgés de 4;6 à 7;8 ans (N = 93) ont participé à cette étude: (1) trois groupes cliniques composés soit d'enfants présentant des troubles spécifiques du langage (groupe TSL, N = 14), soit d'enfants présentant des troubles externalisés du comportement (groupe TEC, N = 17), soit d'enfants présentant des troubles comorbides TEC+TSL (groupe COM, N = 15) et (2) un groupe témoin des enfants tout-venant de même âge que les enfants des groupes cliniques (groupe TM, N = 47).

Les enfants du groupe TM sont originaires des écoles maternelles et primaires d'Hô Chi Minh-Ville et ne présentent, selon leurs parents et leurs enseignants, ni de difficulté langagière ni de problème comportemental.

Les enfants des trois groupes cliniques (TSL, TEC et COM) ont été recrutés au Viêt Nam dans les services psychologiques et pédopsychiatriques des hôpitaux ou dans des centres de rééducation à Hô Chi Minh-Ville, sur base de la plainte initiale ayant motivé la consultation (cf. Bishop et Edmundson, 1987 pour une procédure similaire). Dans le cadre de cette étude, les problèmes de comportement (hyperactivité, impulsivité, opposition, agressivité, désobéissance) et/ou troubles de l'attention ont été confirmés à l'aide des critères du DSM-IV et en utilisant une adaptation vietnamienne que nous avons effectuée de l'échelle *Problèmes externalisés* du questionnaire *Social Competence and Behaviour Evaluation* (SCBE-30, LaFreniere & Dumas, 1996)<sup>6</sup>. Les difficultés langagières des enfants ont été objectivées à l'aide de 4 épreuves: une épreuve de *discrimination phonologique* (évaluant la phonologie en réception), une épreuve de *dénomination d'images* (évaluant le lexique expressif), une épreuve de *désignation d'images* (évaluant le lexique réceptif) et une épreuve de *compréhension d'énoncés* (évaluant la compréhension grammaticale). Les trois premières épreuves ont été créées dans le cadre de cette présente recherche et la quatrième est une adaptation vietnamienne de l'ECOSSE en version raccourcie (Trần Quốc Duy et al., 2007). Etant donné l'absence de normes, les données du groupe témoin ont été utilisées pour confirmer les problèmes de langage des enfants du groupe TSL et du groupe COM et l'absence de tels problèmes dans le groupe TEC. Pour ce faire, le groupe TM a été d'abord divisé en 3 sous-groupes, par tranche d'âge (5 ans, N=14 ; 6 ans, N= 15 ; 7 ans, N=18). Ensuite, le score de chaque enfant des groupes cliniques a été comparé pour chacune des 4 épreuves à son groupe d'âge de référence. Ainsi qu'il est d'usage actuellement dans le domaine, l'enfant a été considéré comme présentant un trouble du langage s'il obtenait au moins 3 scores inférieurs à moins 1.65 écart-types par rapport à son groupe d'âge de référence. Tous les enfants des groupes TSL et COM répondaient à ce critère alors que ce n'était le cas pour aucun enfant du groupe TEC.

Tous les enfants ont été sélectionnés selon les critères suivants : absence d'un déficit neurologique, moteur, sensoriel, cognitif ou d'un trouble envahissant du développement ou trouble du spectre autistique. De plus, l'absence d'un problème intellectuel a été objectivée par la réussite à deux sous-tests d'intelligence non verbale issus du K-ABC 1 (Kaufman et Kaufman, 1993) : *les Triangles* et *les Matrices analogiques*. Les parents ont également répondu à un questionnaire d'anamnèse, permettant notamment de s'assurer qu'ils étaient unilingues vietnamiens. Les enfants proviennent de milieux socioculturels moyens, tels que déterminés par l'arrondissement où ils habitent à Hô Chi Minh-Ville.

Le Tableau 1 montre qu'il n'y a pas de différence significative ni pour ce qui est de l'âge moyen des enfants du groupe

témoin et des trois groupes cliniques ( $F < 1$ ) ni au sous-test non verbal *Triangles* ( $F(3,89) = 2,16$ ;  $p = 0.86$ ). Cependant, le groupe COM a obtenu des performances plus faibles que celles des groupes TEC ( $F(1,30) = 8,36$ ;  $p = 0.007$ ) et TM ( $F(1,60) = 6,87$ ;  $p = 0.01$ ) au sous-test *Matrices analogiques*, ce qui s'explique probablement par les problèmes langagiers et comportementaux de ces enfants (cf. infra).

auditive, nous avons développé une tâche, «*Sons & Histoire*», qui est effectuée dans 2 conditions différentes. Dans la condition simple (*Sons*), l'enfant doit taper sur la table dès qu'il entend /a/ parmi d'autres noms de lettres (par ex. B (/be/), D (/de/), A (/a/), M (/ɛm/), G (/ʒe/), etc.). Dans la condition complexe (*Sons & Histoire*), la même consigne est donnée mais cette fois, l'enfant entend deux enregistrements de

Tableau 1. Moyenne, écart-type (ET) et résultats de l'ANOVA pour l'âge et aux épreuves d'intelligence non verbale pour chaque groupe d'enfants :

|                                | TEC             | TSL            | COM              | TM               | ANOVA  |
|--------------------------------|-----------------|----------------|------------------|------------------|--|
| Âge (mois)                     | 71.53<br>(9.34) | 71<br>(10.32)  | 70.53<br>(11.32) | 72.74<br>(10.59) | $F < 1$ ; $p = 0.88$                             |
| Triangles (K-BC)               | 11.76<br>(3.21) | 9.71<br>(2.05) | 10.07<br>(2.58)  | 11.32<br>(2.76)  | $F(3,89) = 2.16$ ; $p = 0.86$                    |
| Matrices analogique<br>(K-ABC) | 9.82<br>(2.7)   | 8<br>(2.76)    | 6.47<br>(3.34)   | 9.43<br>(3.8)    | $F(3,89) = 4.11$ ; $p < 0.01$<br>COM < [TEC, TM] |

### Procédure et matériel

Chaque participant a complété le protocole d'évaluation suivant<sup>7</sup>: (a) une anamnèse remplie par un des deux parents relative au développement de l'enfant; (b) le questionnaire SCBE-30 mentionné ci-dessus (LaFreniere, & Dumas, 1996) complété par un parent; (c) un jeu truqué de la communication référentielle<sup>8</sup> destiné à objectiver les problèmes externalisés du comportement et à recueillir un échantillon de langage spontané; (d) les épreuves d'intelligence non verbale citées ci-dessus (Sous-tests *Triangles* et *Matrices analogiques* du K-ABC 1); (e) un bilan du langage oral comprenant, outre les 4 épreuves citées ci-dessus, une tâche de narration d'histoire sur images (*Frog, where are you ?*; Mayer, 1969), une grille d'évaluation des compétences conversationnelles (adaptation vietnamienne, par nos soins, de la CCC-2 de Bishop (2003)), ainsi que l'épreuve de répétition de phrases qui fait l'objet de la présente étude; (f) un bilan neuropsychologique des fonctions exécutives (planification, inhibition motrice/cognitive, attention visuelle/auditive, mémoire verbale immédiate).

Dans cet article, nous présenterons les résultats obtenus à l'épreuve de répétition de phrases ainsi que deux autres mesures contrôles particulièrement pertinentes pour l'analyse des performances à cette épreuve, à savoir les performances obtenues à une épreuve d'évaluation de l'attention sélective auditive et à une épreuve de mémoire immédiate de chiffres. Pour mesurer l'attention sélective

deux voix, présentés de façon simultanée : l'un émet des noms de lettres comme dans la condition simple et l'autre raconte une histoire. Dans la condition simple comme dans la condition complexe, l'enfant doit réagir à la lettre cible «A» (/a/) qui apparaît 20 fois parmi 180 distracteurs. Chaque cible «A» (/a/) est séparée de la cible suivante par 4 à 12 distracteurs. Les noms de lettre sont produits au rythme de un par seconde. Les stimuli ont été enregistrés et présentés à l'enfant via un haut-parleur. Les nombre de réponses correctes, d'omissions et d'erreurs sont notés. Notons que dans cet article, nous n'analysons que le score de réponse correcte. Avant de réaliser l'épreuve à proprement parler, l'enfant reçoit un entraînement où sont présentés 20 noms de lettres dans lesquels la cible «A» (/a/) apparaît 3 fois. L'épreuve de *Mémoire immédiate de chiffres* est reprise au test K-ABC 1 (Kaufman et Kaufman, 1993), test fréquemment utilisé pour évaluer la mémoire verbale à court terme de l'enfant. Dans ce sous-test, l'enfant doit répéter, dans l'ordre, des séries de chiffres donnés verbalement par l'examineur en nombre croissant (on commence par deux chiffres et on augmente progressivement jusqu'à 8 chiffres). Dans ce sous-test, l'enfant a été entraîné par un item (par ex., 2-3). Le score utilisé dans cette présente étude est le nombre d'items répétés correctement.

La tâche de *Répétition de phrases* a été créée dans le cadre de cette étude. Elle comprend 15 phrases en vietnamien de longueur et de complexité grammaticale variable (de 6 à 10

mots monosyllabiques) et 2 phrases d'entraînement (voir ANNEXE). Ces phrases sont caractérisées par une structure syntaxique simple ou complexe et un contenu sémantique familier pour les enfants, les mots utilisés étant fréquents. Afin de limiter l'influence de la mémoire de travail sur la capacité de répétition, les phrases sont composées d'un maximum 10 mots. De manière à introduire une certaine variété sur le plan grammatical, différentes structures sont utilisées: phrase *simple* (item 1), phrase avec *coordination* (item 2), phrase *comparative* (item 3), phrase *passive* (item 4), phrase avec *condition* (items 5 et 10), phrase avec pronom *relatif* (item 6), phrase avec *opposition* (items 7 et 8), phrase avec *cause-conséquence* (item 9), phrase contenant une *double négation* (item 11), phrase avec *expression d'un but* (items 12 et 13), phrase avec *concession* (item 14), phrase avec *verbe complexe* (item 15) (voir ANNEXE).

Les phrases ont été enregistrées à l'aide du logiciel *Sony Sound Forge Pro 10* par une jeune femme dont le vietnamien est la langue maternelle. Une vitesse de locution normale ainsi qu'une prosodie adéquate ont été respectées. La tâche est administrée de manière individuelle dans une salle calme. Les phrases sont présentées successivement par haut-parleurs à l'aide du programme PowerPoint sur un ordinateur fonctionnant sous Windows 7. Sur l'écran, l'enfant ne voit que le symbole du haut-parleur. La consigne est simple : «Tu vas écouter des phrases qui sont dites par l'ordinateur. Il faut écouter attentivement et lorsque la phrase est terminée, tu dois la répéter correctement. Essaie de dire exactement la même chose que ce que tu entends, sans rien changer». Afin de faciliter la correction ultérieure, les productions des enfants ont été enregistrées pour chaque phrase. De plus, l'expérimentatrice a noté directement les productions de l'enfant sur un protocole prévu à cet effet.

L'objectif de cette épreuve est d'examiner la production exacte d'une phrase après la présentation d'un modèle. Chaque item est noté 2, 1 ou 0. Lorsque la phrase est répétée correctement à la fois sur le plan grammatical et sémantique, un score de 2 est attribué. Lorsqu'elle est répétée correctement uniquement soit au niveau grammatical soit au niveau sémantique, on accorde 1 point. Dans les autres cas, le score est de 0. Le score maximal est de 30 points et est donc composé d'un score grammatical (max. = 15) et d'un score sémantique (max. = 15). Plus précisément, la cotation grammaticale suit les critères suivants : 1) la phrase répétée doit respecter l'ordre des mots et 2) contenir les mots fonctionnels exprimant les relations grammaticales présentes dans la phrase initialement présentée. Pour la cotation sémantique, la phrase répétée doit avoir un contenu identique à celle présentée, même si le terme exact n'est pas respecté (par ex., l'enfant change le mot «*nên*» (il faut) par «*cần*» ou «*phải*» (il doit) ou si l'enfant utilise une substitution lexicale acceptable (par ex., «*dọn nhà*»

(nettoyer) au lieu de «*việc nhà*» (faire le ménage) ou s'il produit une erreur phonologique mineure (par ex., «*Minh*» au lieu de «*Minh*» : erreur de ton). Le score total est obtenu par l'addition du score grammatical et du score sémantique.

## Résultats

Nous avons effectué tout d'abord une analyse quantitative des performances aux trois épreuves qui font l'objet de la présente étude. Ensuite, nous avons effectué une analyse qualitative des erreurs observées en répétition de phrases.

### Analyse quantitative

Sur le plan statistique, une analyse de la variance (ANOVA) a été effectuée pour chacune des variables dépendantes (scores moyens aux épreuves de répétition de phrases, d'attention sélective auditive, et de mémoire immédiate de chiffres) avec le facteur Groupe (4 niveaux : TEC, TSL, COM et TM) comme variable indépendante et avec l'âge en covariée. Le niveau de signification 0.05 a été utilisé pour interpréter les résultats. Pour l'épreuve de répétition de phrases, nous avons d'abord analysé séparément les scores grammaticaux et sémantiques pour chaque groupe d'enfants. Cependant, étant donné que les analyses donnaient les mêmes résultats (Tableau 2), nous avons ensuite utilisé uniquement le score total pour la suite des analyses.

Le tableau 2 présente la moyenne (M), l'écart-type (ET) et les scores minimum et maximum des 4 groupes ainsi que les résultats de l'ANOVA pour chacune des trois épreuves, à savoir la répétition de phrases (score total, grammatical et sémantique), la tâche d'attention auditive et l'épreuve de mémoire immédiate. Notons que pour les données de l'épreuve d'attention auditive, nous avons dû éliminer 11 enfants faisant partie des groupes cliniques (5 TSL, 2 TEC et 4 COM) parce que, malgré l'entraînement, ils ne sont pas arrivés à bien comprendre la consigne (soit ils tapaient en répétant presque tous les sons présentés, soit ils n'ont pas choisi la bonne cible).

Les résultats indiquent un effet significatif du facteur Groupe pour les diverses épreuves. L'analyse des contrastes réalisée par un test de Bonferroni montre que, pour la répétition de phrases et la tâche de mémoire immédiate de chiffres, les enfants présentant un trouble du langage (groupes TSL et COM) obtiennent des performances significativement plus faibles que celles des enfants des groupes TEC et TM (pour la répétition de phrases, TSL vs TEC :  $t(89) = -6.87, p < 0.001$ ; TSL vs TM :  $t(89) = -11.51, p < 0.001$ ; COM vs TEC :  $t(89) = -7.66, p < 0.001$ ; COM vs TM :  $t(89) = -12.64, p < 0.001$ ; pour la mémoire immédiate, TSL vs TEC :  $t(89) = -4.60, p < 0.001$ ; TSL vs TM :  $t(89) = -6.82, p < 0.001$ ; COM vs TEC :  $t(89) = -4.50, p < 0.001$ ; COM vs TM :  $t(89) = -6.78, p < 0.001$ ). Les enfants présentant des TEC

Tableau 2. Moyenne (M), écart-type (ET), scores minimum (Min) et maximum (Max) et résultats de l'ANOVA aux différentes épreuves pour chaque groupe d'enfants :

|                                     | TEC    | TSL    | COM    | TM     | ANOVA                  |
|-------------------------------------|--------|--------|--------|--------|------------------------|
|                                     | M      | M      | M      | M      | test de Bonferroni     |
|                                     | (ET)   | (ET)   | (ET)   | (ET)   |                        |
|                                     | Min    | Min    | Min    | Min    |                        |
|                                     | Max    | Max    | Max    | Max    |                        |
| <b>Répétition de phrases (RdP)</b>  | 20.18  | 8.64   | 7.73   | 25.06  |                        |
| <i>(score total, max = 30)</i>      | (4.79) | (5.39) | (6.08) | (4.16) | F(3,89) = 79.23***     |
|                                     | 10     | 1      | 0      | 20     | [TSL, COM] < TEC < TM  |
|                                     | 29     | 20     | 12     | 30     |                        |
| <b>RdP - score grammatical</b>      | 10.12  | 4.36   | 4      | 12.28  |                        |
| <i>(max = 15)</i>                   | (2.57) | (2.53) | (3.29) | (2.46) | F(3,89) = 63.82***     |
|                                     | 4      | 0      | 0      | 6      | [TSL, COM] < TEC < TM  |
|                                     | 15     | 9      | 10     | 15     |                        |
| <b>RdP - score sémantique</b>       | 10.06  | 4.28   | 3.73   | 12.78  |                        |
| <i>(max = 15)</i>                   | (2.44) | (2.92) | (3.17) | (2.03) | F(3,89) = 79.41***     |
|                                     | 6      | 1      | 0      | 6      | [TSL, COM] < TEC < TM  |
|                                     | 14     | 11     | 10     | 15     |                        |
| <b>Attention sélective auditive</b> | 27.40  | 21.22  | 24.55  | 29.28  |                        |
| <i>(max = 40)</i>                   | (6.8)  | (6.12) | (8.43) | (7.19) | F(3,78) = 4.62***      |
|                                     | 13     | 10     | 14     | 9      | TSL < TM               |
|                                     | 37     | 28     | 40     | 39     |                        |
| <b>Mémoire immédiate</b>            | 14.65  | 11.43  | 11.6   | 15.49  |                        |
| <b>de chiffres - K-ABC</b>          | (1.12) | (2.38) | (3.02) | (1.55) | F(3,89) = 79.23***     |
| <i>(max = 19)</i>                   | 13     | 7      | 6      | 12     | [TSL, COM] < [TEC, TM] |
|                                     | 18     | 15     | 16     | 19     |                        |

\*\* $p < .01$  ; \*\*\* $p < .001$



se différencient des enfants TM par une performance inférieure à l'épreuve de répétition de phrases ( $t(89) = -3.67$ ,  $p < 0.005$ ) alors que ces deux groupes sont comparables pour ce qui est de leurs résultats en mémoire immédiate de chiffres ( $p = 0.84$ ). À la tâche d'attention auditive, seul le groupe TSL se différencie du groupe TM ( $t(78) = -3.32$ ,  $p < 0.01$ ) alors que les deux groupes TEC et COM ne se distinguent ni du groupe TSL (TEC vs COM :  $p = 1$ ; TEC vs TSL :  $p = .17$ ; COM vs TSL :  $p = 1$ ) ni du groupe TM (TEC vs TM :  $p = 1$ ; COM vs TM :  $p = 1$ ).

Il apparaît donc que les enfants du groupe TEC présentent des difficultés – plus légères que celles des deux autres groupes cliniques – en répétition de phrases, et ce en l'absence de problèmes d'attention auditive ou de mémoire à court terme verbale. Par contre, les enfants du groupe TSL cumulent des difficultés dans les trois épreuves et les enfants du groupe COM présentent des difficultés conjointes de répétition de phrases et de mémoire verbale en l'absence de problèmes d'attention auditive. Les résultats pour l'attention auditive sont toutefois à prendre avec précaution en raison des données qui ont dû être éliminées.

Un des objectifs de notre étude étant d'identifier les enfants présentant des performances pathologiques, nous avons transformé les scores bruts pour chaque enfant en score  $z$ , en utilisant la moyenne du groupe d'âge de référence de l'échantillon TM, à l'aide de la formule suivante :  $(\text{score brut de l'enfant} - \text{moyenne du groupe d'âge de référence}) / \text{écart-type du groupe d'âge de référence}$  (Maillart et al., 2012). Les données de scores calibrés ainsi obtenues s'expriment en écart-type, il est alors possible de quantifier l'écart à la norme et de comptabiliser le nombre d'enfants en difficulté significative. La Figure 1 montre que les trois groupes cliniques ont des scores  $z$  moyens en dessous de la moyenne dans les trois épreuves. Par contre, le groupe présentant un TEC obtient des scores  $z$  à ces évaluations proches de zéro alors que les deux groupes présentant un trouble du langage (TSL et COM) obtiennent des scores  $z$  vraiment inférieur à zéro. De plus, en considérant les scores  $z$  individuels, il apparaît que les résultats obtenus confirment la sensibilité de l'épreuve de répétition de phrases pour dépister les enfants atteints de déficiences langagières. En effet, 96 % (28/29) des enfants présentant un trouble du langage (groupes TSL et COM) ont un score inférieur à -1,65

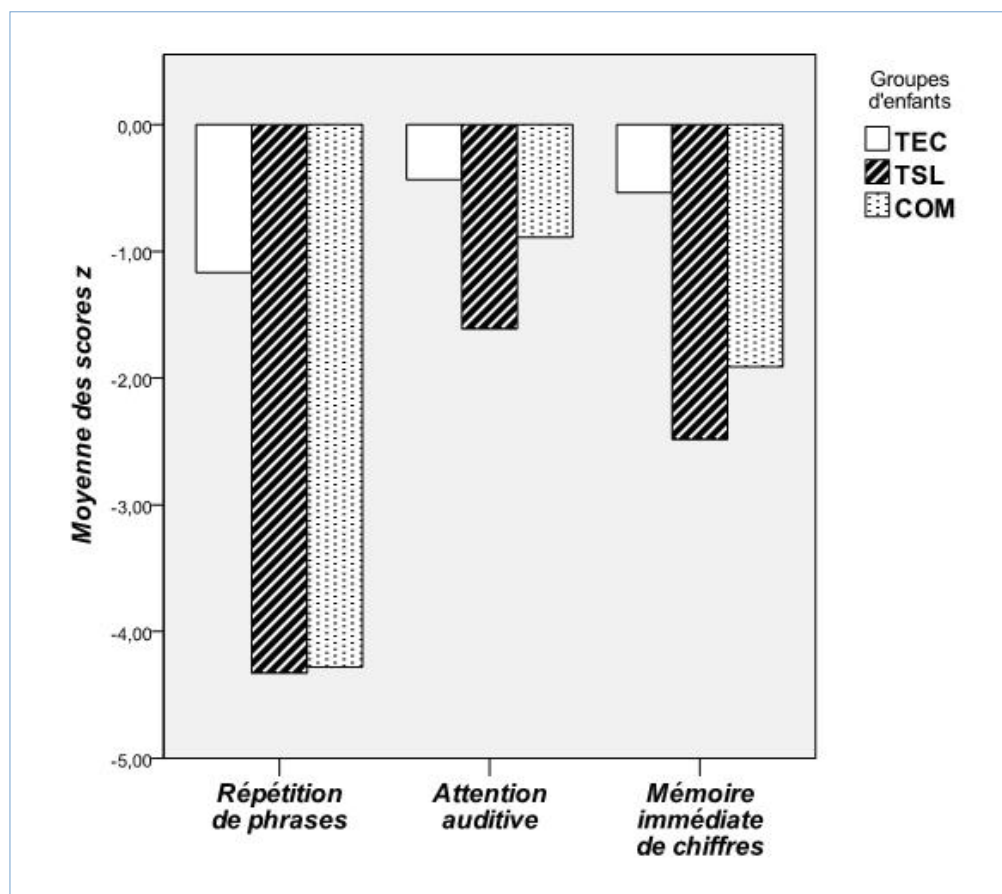


Figure 1. Moyenne des scores standardisés (scores  $z$ ) aux épreuves de répétition de phrases, d'attention auditive et de mémoire immédiate de chiffres par groupe d'enfants (TEC, TSL, COM).

écart-types (c'est-à-dire inférieur au 5e rang centile) à cette épreuve contre seulement 23% (4/17) des enfants présentant un TEC et 4% (2/47) des enfants TM.

### Analyse qualitative

Nous avons ensuite analysé plus en détail les productions verbales des trois groupes cliniques (TEC, TSL et COM) et du groupe témoin afin de voir si, outre les différences quantitatives observées entre les groupes, des différences qualitatives émergeaient aussi de l'analyse des erreurs. Nous détaillons ci-dessous les erreurs produites (voir Tableau 3 pour des exemples) en distinguant, d'un côté, les erreurs portant sur la grammaire et, d'un autre côté, les erreurs d'ordre sémantique. Nous y avons ajouté les erreurs de nature phonologique, étant donné qu'elles nous semblaient également intéressantes pour comparer les groupes sur le plan qualitatif, même si ces erreurs n'interviennent pas dans la cotation de l'épreuve.

Concernant l'évaluation **de la grammaire**, nous avons catégorisé les erreurs comme suit :

1. L'enfant ne respecte pas l'ordre des mots.
2. Le sujet de la phrase est omis.
3. Des mots fonctionnels sont supprimés ou substitués par d'autres mots inappropriés.
4. L'enfant omet des mots (autres que le sujet ou des mots fonctionnels).

Concernant l'évaluation **de la sémantique**, nous avons distingué les éléments suivants :

5. La phrase répétée conserve son sens général malgré une répétition non littérale.
6. Une substitution sémantique est observée (par ex. canard au lieu de poule).
7. L'enfant ajoute des mots ou des idées, des commentaires personnels.
8. L'enfant répète un groupe de mots ou d'idées deux fois ou plus.
9. Le sens de la phrase est complètement modifié.

En plus de ces erreurs grammaticales et sémantiques, des erreurs **phonologiques** ont également été répertoriées :

10. L'enfant produit un mot qui n'existe pas : la déformation phonologique conduit à la production d'un non-mot.

11. Des mots de la phrase sont remplacés par des mots phonologiquement proches (par ex., *đi lăm* (va au travail) au lieu de *đi lặc* (perdu le chemin)).
12. Une partie de la phrase est inintelligible.

L'analyse non-paramétrique de type Chi-2 est utilisée dans cette partie. Le Tableau 3 présente les différentes erreurs caractéristiques de la répétition de phrases et les pourcentages d'enfants qui ont commis au moins 2 fois ces différentes erreurs, par groupe. Une tolérance de 1 erreur par catégorie et par enfant a en effet été appliquée, de manière à obtenir des données discriminantes.

Dans cette analyse qualitative, une erreur est considérée comme caractéristique d'un groupe si elle est produite par au moins 30% des enfants du même groupe. En utilisant ce critère, on observe tout d'abord qu'une seule erreur grammaticale – 3 : *l'omission des mots fonctionnels* – caractérise les quatre groupes d'enfants. La plupart des enfants cliniques sont touchés par cette erreur, notamment les enfants présentant un trouble du langage (TSL et COM), mais la moitié des enfants témoins la commettent également ( $\chi^2(3) = 34.77, p < 0.001$ ). De plus, une erreur sémantique, concernant le lexique (6 : *substitutions sémantiques*) ne semble pas non plus très discriminante puisqu'elle caractérise les enfants présentant un TEC de même que les enfants de deux groupes TM et COM ( $\chi^2(3) = 1.85, p = 0.603$ ).

Ensuite, si on s'arrête aux erreurs commises par plus de 30% des enfants uniquement dans les groupes cliniques alors que les enfants du groupe témoin n'atteignent pas ce critère, on voit apparaître à la fois des similarités et des différences entre les 3 groupes cliniques sur le plan qualitatif. Globalement, les deux groupes présentant un trouble du langage (TSL et COM) ont commis plus d'erreurs que le groupe présentant des TEC à la fois en ce qui concerne la grammaticale et la sémantique, ce qui est logique eu égard à ce que nous avons observé dans l'analyse quantitative. Les deux groupes TSL et COM produisent également plus d'erreurs phonologiques, ce qui est aussi cohérent en regard de leurs difficultés langagières.

Plus précisément, on note premièrement qu'une erreur grammaticale (2 : *omission du sujet*), une erreur sémantique (9 : *changement du contenu*) et une erreur phonologique (11 : *remplacement par des mots phonologiquement proches*) sont commises par les trois groupes cliniques ( $\chi^2(3) = 34.26, p < 0.001, \chi^2(3) = 28.07, p < 0.001$  et  $\chi^2(3) = 17.57, p < 0.005$ , respectivement). Ces erreurs semblent caractériser tant le TEC que le TSL, même si, pour les deux dernières erreurs (9 et 11), deux fois plus d'enfants présentant un trouble du langage (TSL et COM) sont touchés par comparaison avec le groupe TEC. Deuxièmement, on observe que trois

Tableau 3. Pourcentages d'enfants ayant commis au moins 2 fois une erreur, par type d'erreur et par groupe (en gras, pourcentages supérieurs à 30%).

|                              | TEC<br>%  | TSL<br>%   | COM<br>%   | TM<br>%   | Exemples   |
|------------------------------|-----------|------------|------------|-----------|--|
| <b>Erreurs grammaticales</b> |           |            |            |           |  |
| (1)                          | 12        | <b>50</b>  | <b>47</b>  | 6         | (1) <i>Điều mà không no gió thì khó bay cao.</i><br>→ Điều không bay gió thì nó không cao.   |
| (2)                          | <b>41</b> | <b>57</b>  | <b>67</b>  | 4         | (2) <i>Cứ đi với mẹ là <u>Xiu</u> thấy vui.</i><br>→ đi với mẹ thì thấy vui.   |
| (3)                          | <b>88</b> | <b>100</b> | <b>100</b> | <b>47</b> | (3) <i>Trái bưởi to <u>hơn</u> trái cam.</i><br>→ Trái bưởi to <del>hơn</del> trái cam.  |
| (4)                          | 12        | <b>93</b>  | <b>93</b>  | 9         | (4) <i>Đêm khuya, Huy thường nghĩ về bà ngoại.</i><br>Đêm khuya bà ngoại.  |
| <b>Erreurs sémantiques</b>   |           |            |            |           |  |
| (5)                          | <b>35</b> | 0          | <b>33</b>  | 0         | (5) <i>Điều mà không no gió thì khó bay cao.</i><br>(S'il n'y a pas suffisamment de vent, le cerf-volant ne peut pas monter haut).<br>→ Điều mà không có gió thì không bay cao.<br>(S'il n'y a pas de vent, le cerf-volant ne monte pas haut). |
| (6)                          | <b>35</b> | 14         | 27         | 26        | (6) <i><u>Gà</u> không biết bơi cũng chẳng biết hát.</i><br>(La poule ne sait ni nager ni chanter).<br>→ <u>Vịt</u> không biết bơi cũng chẳng không biết hát.<br>*(Le canard ne sait ni nager ni pas chanter).                                 |
| (7)                          | <b>59</b> | 21         | <b>53</b>  | 9         | (7) <i>Quyên được cô giáo tặng quà.</i><br>(Un cadeau a été offert à Quyên par son enseignante).<br>→ Quyên được cô giáo tặng quà <u>thật là đẹp</u> .<br>(Un cadeau <u>vraiment beau</u> a été offert à Quyên par son enseignante).           |
| (8)                          | <b>35</b> | 21         | <b>47</b>  | 13        | (8) <i>Gà không biết bơi cũng chẳng biết hát.</i><br>(La poule ne sait ni nager ni chanter).<br>→ Gà <u>biết bơi biết bơi</u> biết hát.<br>(La poule sait nager sait nager sait chanter).  |

|                       |    |    |    |    |   |
|-----------------------|----|----|----|----|---|
| (9)                   | 35 | 79 | 87 | 23 | <p>(9) Chó sủa còn voi thì rống.</p> <p><i>Le chien aboie mais l'éléphant rugit.</i></p> <p>→ Chó sủa con voi.</p> <p>(Le chien aboie sur l'éléphant).</p>  |
| Erreurs phonologiques |    |    |    |    |   |
| (10)                  | 0  | 7  | 27 | 0  | <p>(10) Sáng sớm, chim hót líu lo.</p> <p><i>(Le matin, les oiseaux gazouillent).</i></p> <p>→ Sáng <u>hom</u>, chim hót <u>lèn</u> xanh.</p> <p>(Matin <u>hom</u> les oiseaux chantent <u>lèn</u> vert).</p>                                   |
| (11)                  | 35 | 71 | 67 | 21 | <p>(11) Người bố đổ mồ hôi <u>mặc</u> dù trời không nóng.</p> <p><i>(Le corps de papa transpirait bien qu'il ne fasse pas chaud).</i></p> <p>→ Người bố đổ mồ hôi <u>mất</u> trời nóng.</p> <p>(Le corps de papa transpirait soleil chaud).</p> |
| (12)                  | 12 | 57 | 53 | 2  | <p>(12) Dù còn nhỏ tuổi, Bích đã giỏi việc nhà.</p> <p><i>(Malgré son jeune âge, Bích sait bien faire le ménage).</i></p> <p>→ Dù X nhỏ, X X X việc nhà.</p> <p>(Malgré X jeune, X X X le ménage).</p>  |

erreurs sémantiques (5, 7 et 8 : *répétition du contenu de la phrase plutôt que de la phrase exacte, ajouts et répétitions d'une partie de la phrase*) sont par contre spécifiques aux enfants présentant un TEC (groupes TEC et COM) ( $\chi^2(3) = 26.44, p < 0.001, \chi^2(3) = 22.59, p < 0.001$  et  $\chi^2(3) = 8.51, p < 0.05$ , respectivement). Ces types d'erreurs sont en effet moins souvent observés en cas de TSL. Troisièmement, deux erreurs grammaticales (1 et 4 : *non-respect de l'ordre de mots et omission de mots*) et une erreur phonologique (12 : *productions inintelligibles*) semblent caractéristiques des enfants présentant un trouble du langage (groupe TSL et COM) ( $\chi^2(3) = 19.41, p < 0.001, \chi^2(3) = 70.21, p < 0.001$  et  $\chi^2(3) = 32.33, p < 0.001$ , respectivement). Enfin, une seule erreur phonologique (10 : *utilisation de mots dénués de sens*) semble caractériser uniquement le groupe COM, même si le critère de 30% n'est pas atteint : 27% d'entre eux produisent des mots qui n'existent pas, alors que cette erreur est très rare, voire inexistante dans les trois autres groupes ( $\chi^2(3) = 14.36, p < 0.005$ ). Autrement dit, les résultats obtenus par le test Chi-2 montrent que le type d'erreurs commises (sauf pour l'erreur 6 : *substitutions sémantiques*) diffère selon le groupe d'appartenance.

## Discussion

En résumé, les résultats obtenus indiquent tout d'abord qu'une épreuve de répétition de phrases de différentes structures permet de mettre en évidence les difficultés des enfants présentant un trouble du langage oral en langue vietnamienne, une langue morphologiquement simple (*objectif 1*). Ensuite, il apparaît que des fragilités en répétition de phrases sont également présentes chez des enfants présentant des troubles externalisés du comportement sans plainte et/ou suivi pour troubles du langage oral. Toutefois, il ne s'agit pas de difficultés franches et certains enfants s'en sortent d'ailleurs très bien. Ces fragilités surviennent de plus en l'absence de difficultés en mémoire immédiate ou d'attention auditive alors que de telles difficultés sont observées en cas de TSL. Les erreurs produites en cas de TEC ne sont, en outre, pas toutes de même nature qu'en cas de TSL. Le profil en répétition de phrases s'avère ainsi différent dans les deux groupes tant sur le plan quantitatif que qualitatif, ce qui suggère un déficit sous-jacent en grande partie de nature différente (*objectif 2*). Enfin, les enfants qui cumulent un TSL et un

TEC montrent un profil sur le plan quantitatif et qualitatif qui correspond majoritairement à l'addition des profils des TSL d'un côté et des TEC de l'autre, ce qui suggère un profil de comorbidité (*objectif 3*). Nous discutons ci-dessous ces différents résultats.

En premier lieu, concernant la capacité d'identifier les enfants atteints de difficultés langagières par le biais de l'épreuve de répétition de phrases, nous avons pu mettre en évidence que les enfants présentant un trouble du langage obtenaient des scores très faibles à cette épreuve. Conformément à nos attentes, les résultats obtenus nous permettent de clairement différencier les enfants présentant un trouble du langage (TSL et COM) des enfants témoins et ce, que l'on utilise un score purement grammatical ou un score qui tient compte également de la sémantique. Cette étude confirme donc les résultats d'autres recherches montrant que l'épreuve de répétition de phrases est un des marqueurs les plus pertinents pour dépister rapidement et efficacement les enfants atteints de troubles du langage oral. La plupart de ces études ont été réalisées, rappelons-le, dans des langues relativement riches sur le plan morphologique. Nos données viennent donc compléter ces résultats, en montrant la bonne sensibilité de l'épreuve de répétition de phrases pour identifier un trouble langagier chez l'enfant dans une langue à la morphologie très simple. Ces résultats sont ainsi compatibles avec ceux de l'étude de Stokes et al. (2006) qui ont utilisé cette même épreuve chez des enfants parlant le cantonais, une langue tonale monosyllabique de même niveau de complexité grammaticale que le vietnamien. De plus, nos résultats montrent également que les difficultés en répétition de phrases chez les enfants vietnamiens présentant un TSL s'accompagnent de difficultés en mémoire verbale immédiate et, semble-t-il, de fragilités en attention auditive.

En deuxième lieu, alors que l'étude de Stokes et ses collaborateurs n'incluait que des enfants préscolaires présentant ou non des difficultés langagières, nous nous sommes également intéressés aux problèmes de comportement. Le deuxième objectif de cette étude était en effet de comparer le profil langagier des enfants présentant des TEC et des enfants présentant un TSL, avec l'hypothèse qu'un déficit cognitif général peut être à l'origine des troubles du langage dans les deux pathologies. Trois résultats principaux ont été mis en évidence :

(1) Premièrement, nos résultats indiquent l'existence de fragilités grammaticales en expression chez certains enfants présentant des TEC (Iwanaga et al., 2006; van Schendel, Schelstraete, Regaert, & Roskam, 2009) alors que les enfants présentant un TSL sont clairement en difficulté. En effet, les enfants du groupe TEC montrent des scores standardisés autour de zéro alors que ceux des deux groupes présentant un trouble du langage (TSL et COM)

se situent en dessous de la moyenne. Le profil des TEC est donc quantitativement différent de celui des TSL : seule une minorité d'enfants de ce groupe présente des scores que l'on peut qualifier de pathologique, la majorité des enfants présentant des scores faibles.

(2) Deuxièmement, on observe que ce profil est également *qualitativement* différent : la plupart des erreurs observées en cas de TEC vs de TSL ne sont pas les mêmes. On observe toutefois des erreurs communes. Certaines d'entre elles traduisent probablement des difficultés/fragilités grammaticales puisqu'elles touchent des composantes importantes de la grammaire vietnamienne, à savoir le sujet de la phrase et les mots fonctionnels. Elles montrent également que des problèmes phonologiques sont présents dans les 3 groupes, tous commettant des erreurs de substitution phonologique. La modification complète de la phrase, dernière erreur observée également dans les 3 groupes, pourrait être interprétée en termes de stratégie : l'enfant ayant oublié la phrase produirait un énoncé pour ne pas rester sans répondre, afin de respecter au mieux la consigne qui lui a été donnée. Concernant les erreurs spécifiques à chaque type de trouble, il apparaît que des erreurs sémantiques sont principalement caractéristiques des enfants présentant des troubles du comportement (groupes TEC et COM). En effet, ces enfants ont tendance à répéter le contenu de la phrase plutôt que la phrase exacte, à ajouter des mots ou d'autres idées ainsi qu'à répéter des parties de phrase. De telles erreurs affectent en fait surtout le contenu de la phrase cible plus que sa structure. Par contre, les phrases répétées par les enfants atteints d'un trouble du langage (groupes TSL et COM) s'avèrent souvent être incomplètes ou incompréhensibles car elles sont entachées soit par l'omission d'une partie significative de la phrase, soit par le non-respect de l'ordre de mots, soit encore par des productions inintelligibles. Ces erreurs affectent ainsi plus la structure de la phrase, ses aspects formels, que les erreurs spécifiques des enfants présentant des TEC. Enfin, le groupe COM semble pouvoir être caractérisé par l'addition des erreurs commises par les deux autres groupes, ainsi que par la présence de mots dénués de sens. Aucun type d'erreur ne caractérise en particulier le groupe d'enfants présentant un TSL ou un TEC.

(3) Le fait que le profil du groupe TSL soit différent de celui du groupe TEC sur le plan quantitatif et en grande partie sur le plan qualitatif suggère que le déficit sous-jacent n'est probablement pas de même nature, pour l'essentiel du moins. Ainsi, pour les TEC, on peut se demander si ce ne sont pas principalement l'hyperactivité, l'impulsivité ou la distraction qui ont entravé les performances en répétition de phrases, c-à-d des difficultés d'ordre cognitif et comportemental. Cette hypothèse est confortée par les observations effectuées lors de la passation de la tâche: nous



avons pu observer que les enfants présentant des TEC ont tendance à répondre rapidement et de manière impulsive, sans toujours consacrer l'attention et la concentration nécessaires pour bien encoder la phrase. Leurs productions seraient caractérisées par une impulsivité marquée par des intrusions, des dysfluidités, des modifications de la syntaxe ou de la sémantique voire de l'intonation de la phrase. Ce serait donc les caractéristiques cognitives et comportementales liées aux TEC qui expliqueraient le profil en répétition. Pour les TSL, vu la nature des erreurs, on peut par contre supposer que ce sont majoritairement les problèmes linguistiques qui sont à la source des erreurs observées en répétition de phrases: des problèmes de perception et de compréhension à l'encodage, des troubles phonologiques expressifs, des difficultés d'accès lexical, une tendance à faire des ruptures syntaxiques pourraient être à l'origine des erreurs commises par les enfants présentant un déficit langagier (Bragard, & Schelstraete, 2007; Maillart, Schelstraete, & Hupet, 2004; Schelstraete, 2011; van der Lely et al., 2011). Ceci expliquerait pourquoi c'est surtout la structure de la phrase et la phonologie qui sont altérées par les erreurs produites. Néanmoins, il n'est pas exclu que ces difficultés soient peut-être majorées par un déficit cognitif plus général de traitement : on observe, en effet, que les enfants présentant un TSL ont aussi des difficultés en mémoire verbale immédiate et, pour certains d'entre eux, en attention auditive, ce qui est compatible avec l'hypothèse d'un déficit non linguistique (Baddeley, 2003; Im-Bolter et al., 2006; Leclercq, & Leroy, 2012; Marton et al., 2007; Redmond, 2005). Nos données ne permettent donc pas de départager les deux types d'hypothèses avancées pour rendre compte des difficultés grammaticales en cas de TSL. Elles semblent néanmoins suggérer que tant des compétences linguistiques spécifiques que des mécanismes généraux interviennent dans les difficultés des enfants présentant un TSL lorsqu'ils doivent répéter des phrases. Plutôt que d'opposer les deux courants théoriques, il serait ainsi peut-être plus intéressant d'essayer de comprendre comment les deux types de contraintes – linguistiques vs générales – interagissent en cas de troubles du langage. Dans cette optique, il pourrait par exemple être intéressant de manipuler la complexité grammaticale indépendamment de la longueur, ou de la complexité lexicale, et aussi d'essayer de différencier les difficultés qui relèvent de l'encodage de celles qui surviennent lors du rappel.

En dernier lieu, les résultats montrent que le profil des COM correspond globalement à une addition du profil des TSL et des TEC, à l'exception toutefois du fait qu'ils semblent exempts de difficultés en attention auditive. De plus, il semble que les enfants présentant des troubles du comportement et un TSL se distinguent par la production de mots dénués de sens. Ces derniers résultats sont toutefois à prendre avec précaution et mériteraient d'être répliqués

avant d'aller plus loin dans l'interprétation. Nos données corroborent donc les études supportant l'association de problèmes langagiers chez les enfants présentant des TEC (Cohen et al., 2000; Kim & Kaiser, 2000; Redmond, 2005; Tannock, & Schachar, 1996; van Schendel, Schelstraete, Regaert & Roskam, 2009). Elles montrent de plus qu'il est important de ne pas mélanger dans les échantillons des enfants présentant les deux types de troubles et les enfants qui n'en présentent qu'un des deux, ce que les études ne font en général pas (cf. van Schendel et al., 2013). Cela semble d'autant plus important lorsqu'on s'intéresse aux difficultés langagières des enfants présentant des TEC et qu'on cherche à les expliquer : notre étude montre que les enfants présentant des TEC sans trouble du langage n'ont pas les mêmes difficultés que ceux qui cumulent les deux types de trouble. Le même déficit sous-jacent ne pourrait pas expliquer à lui seul les difficultés de ces deux groupes d'enfants. Nos données suggèrent qu'en cas de TEC isolé, ce sont principalement les problèmes de comportement et les problèmes cognitifs (hyperactivité, impulsivité, inattention) qui expliquent les performances alors qu'en cas de profil comorbide, viendraient s'ajouter un déficit linguistique et éventuellement un déficit de ressources de traitement.

En conclusion, sur le plan de l'intervention clinique, la présente étude confirme l'utilité de l'épreuve de répétition de phrases en tant que marqueur clinique pertinent pour l'évaluation des capacités langagières, particulièrement pour l'axe grammatical, tant pour les enfants présentant un TSL que pour les enfants présentant des TEC. Elle confirme également l'importance de ne pas se contenter d'un score global mais de procéder aussi à une analyse qualitative ainsi que de veiller à évaluer des compétences cognitives telles que la mémoire verbale et l'attention pour mieux déterminer le profil de l'enfant. Elle montre que les enfants présentant des troubles du comportement sont des enfants clairement à risque de présenter des fragilités langagières, voire de réelles difficultés, même en l'absence de plaintes. Enfin, concernant le traitement, nos résultats invitent le clinicien à prendre en compte tant les aspects linguistiques que cognitifs dans le choix de ses stratégies d'intervention et à ne pas proposer le même type de prise en charge des difficultés langagières à un enfant qui présente un TSL et à un enfant qui présente en plus des troubles du comportement, leurs profils langagiers respectif s'avérant différents.

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## Notes marginales

<sup>1</sup>Les enfants étaient considérés comme atteints de TSL s'ils obtenaient des scores standardisés inférieurs à -1,3 écart-types à une série de tests évaluant le langage réceptif et expressif et si leur profil respectait les critères d'exclusion (i.e., pas de retard mental, de troubles psychoaffectifs, sensoriels, etc.).

<sup>2</sup>Tous les participants présentaient un score de raisonnement non verbal dans la norme (Echelle Non Verbale d'Intelligence de Wechsler, Wechsler & Naglieri, 2009). Les enfants diagnostiqués comme TSL présentaient des performances inférieures à -1,25 écart-types de la norme dans au moins deux des domaines langagiers

évalués (production phonologique, compréhension et production lexicale, compréhension et production morphosyntaxique) et des scores déficitaires en répétition de pseudo-mots (L2MA 2, Chevrie-Muller et al., 2010). Les enfants témoins, quant à eux, présentaient des performances normales à l'ensemble des épreuves langagières.

<sup>3</sup>Le cantonais est un dialecte chinois, parlé particulièrement dans le sud de la Chine, dans les provinces du Guangdong et du Guanxi, à Hong Kong, Ma Cao. Cette langue comprend 7 tons différents (Malherbe, 1997).

<sup>4</sup>Par contre, il n'y a pas de différence significative entre les deux groupes aux autres sous-tests langagiers du TOLD-P2 (désignation et dénomination d'images, compréhension et complétion d'énoncés, et discrimination de mots).

<sup>5</sup>«anh» est un pronom personnel qu'un homme utilise en parlant avec une femme plus jeune (frère-sœur) ou qui est utilisé entre mari-femme.

<sup>6</sup>Il s'agit d'une version raccourcie du Profil Socio-Affectif (LaFreniere, Dubeau, Janosz et Capuano, 1990). L'adaptation vietnamienne a été validée par nos soins sur 364 enfants.

<sup>7</sup>La procédure suivie respecte les recommandations de la commission «Ethique» de l'Institut de recherche en sciences psychologiques de l'Université catholique de Louvain, à savoir l'application des règles de l'A.P.A.

<sup>8</sup>Ce jeu a été créé dans le cadre de notre étude pour évaluer les comportements externalisés ainsi que les compétences pragmatiques dans un contexte de communication référentielle. L'enfant doit choisir une image parmi 3 qui sont identiques mais il ne le sait pas. Puis il doit décrire son image pour que l'examineur puisse retrouver celle-ci parmi 3 images qui sont cachées sous une planche. L'image correcte n'est choisie qu'en troisième choix de l'examineur.

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ANNEXE 1: Epreuve *Répétition de phrases*

Exemple 1 : Hôm nay, bầu trời trong xanh.

Aujourd'hui, le ciel est bleu.

Exemple 2 : Con rùa thắng cuộc vì nó đã cố gắng.

La tortue a gagné **parce qu'**elle s'est efforcée.

- (1) Sáng sớm, chim hót líu lo.  
Le matin, les oiseaux gazouillent.
- (2) Chó sủa **còn** voi *thì* rống.  
Le chien aboie **mais** l'éléphant rugit.
- (3) Trái bưởi to **hơn** trái cam.  
Le pamplemousse est **plus** grand **que** l'orange.
- (4) Quyên **được** cô giáo tặng quà.  
Un cadeau **a été offert** à Quyên par son enseignante.
- (5) **Cứ** đi với mẹ **là** Xíu thấy vui.  
Quand elle se promène avec sa mère, Xíu se sent toujours joyeuse.
- (6) Căn nhà **mà** cửa màu tím là nhà của Minh.  
La maison **dont** la porte est violette est celle de Minh.
- (7) **Chưa** đến giờ ăn, Tuấn **đã** đói bụng.  
Bien qu'il ne soit **pas encore** l'heure de manger, Tuấn a **déjà** faim.
- (8) **Dù** còn nhỏ tuổi, Bích đã giỏi việc nhà.  
**Malgré** son jeune âge, Bích sait bien faire le ménage.
- (9) Yến đi lạc **vì** không vâng lời cha.  
Yến s'est égarée **parce qu'**elle n'a pas écouté son papa.
- (10) Diều **mà** không no gió **thì** khó bay cao.  
**S'**il n'y a pas suffisamment de vent, le cerf-volant ne peut pas monter haut.
- (11) Gà **không** biết bơi **cũng chẳng** biết hót.  
La poule **ne** sait **ni** nager **ni** chanter.
- (12) **Để** cha mẹ vui lòng, con phải ngoan ngoãn.  
**Pour que** les parents soient contents, l'enfant doit être sage.
- (13) **Muốn** có sức khỏe tốt, **nên** ăn uống điều độ.  
**Pour** avoir une bonne santé, **il faut** manger équilibré.
- (14) Người bố đổ mồ hôi **mặc dù** trời không nóng.  
Le corps de papa transpirait **bien qu'**il ne fasse pas chaud.
- (15) Đêm khuya, Huy thường **nghĩ về** bà ngoại.  
Pendant la nuit, Huy **pensait** souvent **à** sa grand-mère.

## KEY WORDS

CLASSROOM-BASED

COLLABORATION

CONSULTATION

DISCIPLINE-SPECIFIC  
TERMINOLOGY

EDUCATION

INTERPROFESSIONAL  
EDUCATION (IPE)

JARGON

PRE-PROFESSIONAL

PROFESSIONAL  
VOCABULARY

PULL-OUT

SPECIALIZED SERVICE  
DELIVERYSPEECH-LANGUAGE  
PATHOLOGIST (SLP)

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Collaboration: More than "Working Together"  
An exploratory study to determine effect of  
interprofessional education on awareness and  
application of models of specialized service  
delivery by student speech-language pathologists  
and teachers

Collaboration : Plus que « Working Together »,  
il s'agit d'une étude exploratoire pour déterminer  
les effets d'un enseignement interprofessionnel  
sur les connaissances et la mise en pratique de  
modèles de prestation de services spécialisés  
par des étudiants en orthophonie et des  
apprentis enseignants.

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## Abstract

In spring 2011, the University of Alberta in Edmonton, Alberta, Canada, implemented an interprofessional education (IPE) experience for student speech-language pathologists (S-LPs) and student teachers. One of the constructs addressed and assessed through the IPE experience was related to knowledge and application of models of specialized service delivery in schools. Directed content analysis methods were used to analyze participant responses on surveys before and after the IPE experience. Results from the surveys showed that after the IPE experience students were able to describe more models of specialized service delivery. The IPE experience also included a collaborative case study that asked small mixed-discipline groups of students to develop an intervention plan for a hypothetical classroom. Analysis of group responses on the case studies showed that students applied a variety of models of service delivery to address student and classroom speech, language, and communication needs.

## Abrégé

Au printemps 2011, l'Université de l'Alberta à Edmonton (Alberta, Canada), a mis en oeuvre une expérience d'enseignement interprofessionnel pour les étudiants en orthophonie et pour des étudiants en éducation. Un des éléments étudiés et évalués par cette expérience touchait à la connaissance et à l'application de modèles de prestation de services spécialisés dans les écoles. Des méthodes d'analyse dirigée de contenu ont été utilisées pour analyser les réponses des participants avant et après l'expérience. Les résultats de l'étude ont démontré qu'après l'expérience, les étudiants étaient capables de décrire plus de modèles de prestation de services spécialisés. L'expérience comprenait aussi une étude de cas collaborative qui demandait à de petits groupes multidisciplinaires d'étudiants de développer un plan d'intervention pour une classe hypothétique. L'analyse des réponses de groupe à des études de cas démontre que les étudiants mettaient en oeuvre divers modèles de prestation de services pour répondre aux besoins de parole, de langage et de communication des élèves et des classes.



## Background Information

**Introduction.** In 1991, the American Speech and Hearing Association (ASHA) issued a statement that applied to both speech-language pathologists (S-LPs) and teachers; "...no one professional has an adequate knowledge base or expertise to execute all the functions associated with providing educational services for students". When surveyed, teachers and S-LPs recognized the complexity of child development and that fostering development is not the responsibility of only one profession (Hartas, 2004). In 1996, Wright found that both S-LPs and teachers showed a commitment to collaborate for the benefit of the children being served. Collaboration is generally accepted as a necessary component of effective service delivery, yet there is limited information regarding the quality and quantity of interprofessional collaboration in Canadian schools.

**Promotion of collaboration through legislation and policy.** The Inclusion movement, considered the best practice in special education, brought students with disabilities into the mainstream classroom (Nochajski, 2001). As a result, schools are challenged to work with diverse populations that require additional support beyond traditional teaching. This movement necessitated that specialized services be structured to ensure the needs of all students are met (Bronstein, 2003; Nochajski, 2001). Accordingly, collaboration between professionals has been enshrined in government policy and legislation supporting inclusive education. For example, in June 2010, the Government of Alberta accepted the Action to Inclusion document (Government of Alberta, 2012). In doing so, collaboration was formally recognized as the primary method to achieve an inclusive education system (Government of Alberta, 2012).

In 2010, an ASHA Ad Hoc Committee on the Roles and Responsibilities of the School-Based S-LP developed a professional issues and practice statement regarding the roles and responsibilities of S-LPs in schools. In this document, collaboration with teachers and other professionals is repeatedly described as a responsibility of S-LPs in providing services to children in schools (ASHA 2010b). S-LPs are also encouraged to provide services within the classroom context. Thus the collaboration between teachers and S-LPs is described as crucial to effective service delivery in the areas of literacy, curriculum and response to intervention (ASHA 2010b). However, translation of such policies and guidelines into practice is predicated on the capacity of professionals to carry them out, in other words, to effectively collaborate. In order to determine the best approaches to moving policies related to collaboration into practice it is important to consider the current experiences of S-LPs in schools.

**S-LPs in schools.** The American Speech-Hearing Association estimates that fifty-seven percent of S-LPs in the United States of America are working in the school system (ASHA,

2012). S-LPs may be based in one school and only serve that school's population, or may visit multiple schools to provide services (Wright, 1996; Hartas, 2004). In the latter situation, S-LPs are often viewed as 'visitors' and members of a "non-educational profession" (Hartas, 2004, p. 38). This perception of S-LPs as external to the school community may hinder collaboration. School-based S-LPs typically provide intervention for oral language development in a pull-out model (Ukrainetz & Fresquez, 2003). The 2010 American annual report on speech and language services in schools indicated that S-LPs in schools spent over 70% of their time in the traditional pull-out model (ASHA, 2010a).

**Models of service delivery.** Although S-LPs and teachers are being encouraged to engage in collaboration, S-LPs continue to spend the majority of their time working in isolation, using a pull-out model. Given the recent changes in legislation and policy related to the provision of speech-language pathology services in schools, professionals are being asked to employ a variety of service delivery models to provide services to students and their families. In general, models of specialized service delivery can be grouped into four categories ranked from least integrative to most integrative (Hall & Weaver, 2001; Hartas, 2004): Multidisciplinary; Consultation; Interdisciplinary; and Transdisciplinary. The multidisciplinary approach to service delivery is hallmarked by a distinction between professionals with little to no communication between professionals, even though they are working directly with the same population. The pull-out model is an application of a multidisciplinary model. Consultation refers to a model where there is a referral system and experts are called in to comment on and make recommendations on a case (Hartas, 2004). Consultation may take the form of 'modeling' where the intervention agent has the opportunity to observe the expert completing a task, 'coaching' where the consultant offers support and hints to the intervention agent, 'scaffolding' where there is a dialogue between both professionals, and 'fading' where the expert withdraws support as the intervention agent become more confident in his or her abilities (Hartas, 2004). The interdisciplinary model refers to when professionals work together and engage in two-way communication, but each profession maintains their own distinct role (Hall & Weaver, 2001). In the classroom, the interdisciplinary model could be realized through multiple configurations such as, one-teach/one-drift (i.e., one professional assumes primary teaching responsibilities, while the other assists individual students), one-teach/one-observe, station teaching (i.e., each professional instructs at a separate center), remedial teaching (i.e., one professional re-teaches previously taught material), and supplemental teaching (i.e., one professional teaches the same material but in a new way and with new materials) (Friend, 2010 as cited in Flynn, 2010). The transdisciplinary model is defined by having a large amount

of professional overlap and professionals sharing roles and responsibilities (Hall & Weaver, 2001). A transdisciplinary approach requires extensive communication as professionals are expected to assume the roles of professionals belonging to other disciplines (Hall & Weaver, 2001; Hartas, 2004). Transdisciplinary approaches include parallel, team or co-teaching (Flynn, 2010).

Figure 1 summarizes this synthesis of theoretical models of service delivery and applications or specific configurations in and out of the classroom. The isolated units of information presented in Figure 1 are not novel and are found in previously published literature (Flynn, 2010; Hall & Weaver, 2001; Hartas, 2004). However, this synthesis of information about service delivery and collaboration is novel. This unique synthesis of service delivery models for school-based S-LPs and teachers was achieved by combining information about service delivery location (i.e., in the classroom/outside of the classroom) and specific classroom configurations with general models of collaboration (i.e., the parallel or co-teaching configuration as an example of the transdisciplinary model).

Knowing different models and configurations of service delivery is valuable in planning and implementing services for children. It is important that professionals use the models of service delivery strategically in order to address the needs of students throughout the intervention period. Each model of service delivery has strengths and weaknesses and therefore it is the responsibility of professionals to determine when to use each model. For example, a child who only had an articulation delay might initially benefit the most from a multidisciplinary approach to intervention where the S-LP works with the child in pull-out sessions to elicit the correct articulation of a sound. Once the child is able to produce the sound consistently, perhaps an interdisciplinary approach to service delivery would be appropriate where the S-LP would be drifting throughout the classroom while the children are engaged in a partner work, occasionally assisting the child with the articulation delay to correctly produce the target sound. In this manifestation of the interdisciplinary model, the teacher would be responsible for designing the classroom activity and for the education of all the students in the classroom and the S-LP would be responsible for

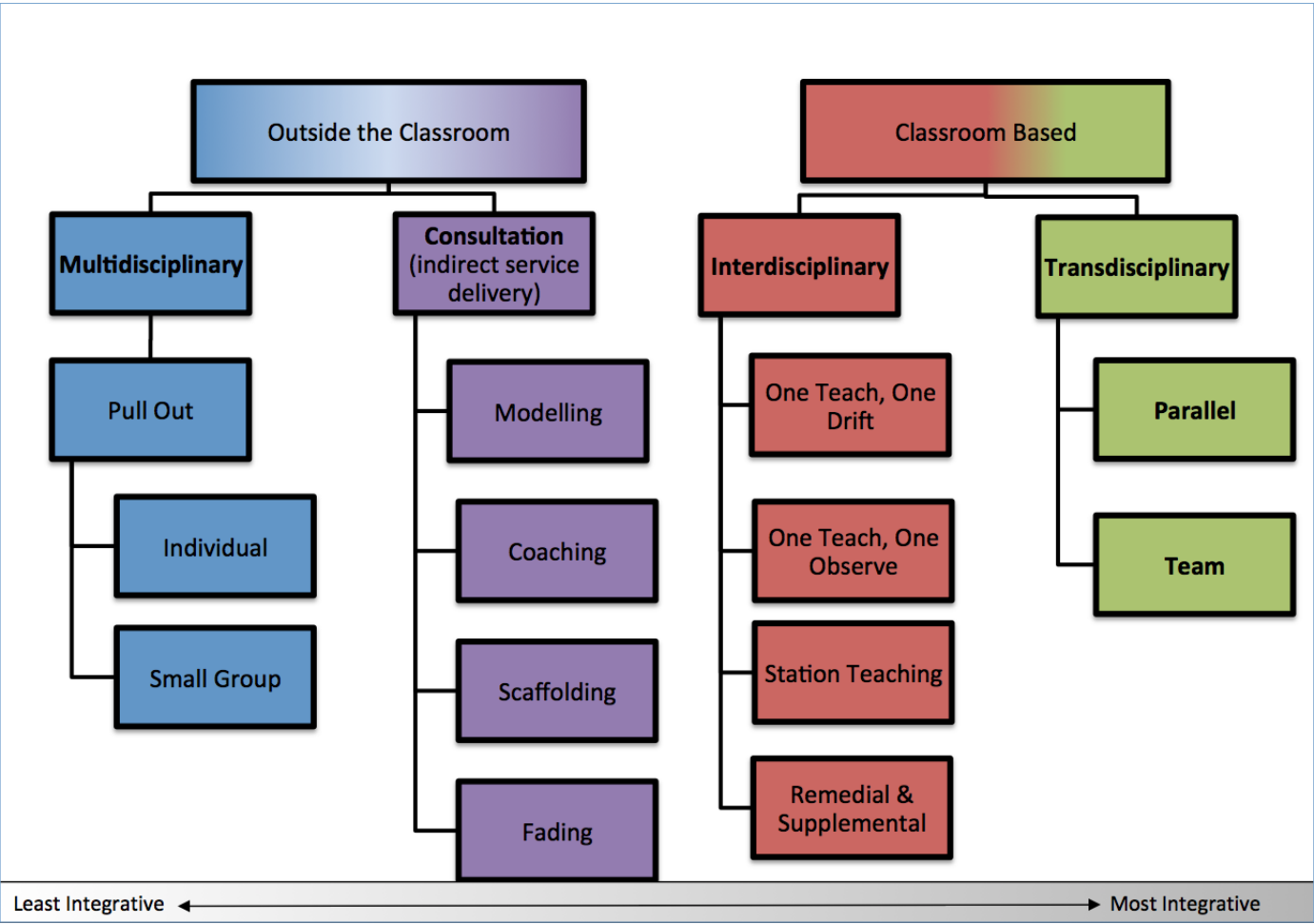


Figure 1. Synthesis of Theoretical Models of Service Delivery and Applications in Schools

ensuring the child with the articulation delay is transferring their newly acquired sound to the classroom setting. The S-LP and teacher would communicate regarding the task the children will be completing and that the S-LP will be drifting to provide necessary support. Next, the S-LP might consult with the teacher to provide the teacher with strategies to elicit the correct sound when the student may be unable to. Perhaps the teacher will observe while the S-LP models elicitation techniques during the classroom activity and then the S-LP will scaffold the teacher's learning of elicitation techniques with the child. Finally, the teacher will be able to elicit the correct sound when necessary without the S-LP's support, thus assuming the role of the S-LP, consistent with a transdisciplinary model. As illustrated, models of service delivery should be used to effectively provide services to children given the goals of the intervention program and the needs of the child at a given point in time.

### University of Alberta Interprofessional Education Experience

Interprofessional education (IPE) involves experiences that not only bring together professionals or pre-professionals from different disciplines, but also provide an opportunity for them to learn together (Hammick, Freeth, Koppel, Reeves & Barr, 2007). The University of Alberta Departments of Speech-Pathology and Audiology and Elementary Education designed and implemented an IPE experience for student S-LPs and student teachers in Spring 2011. The 3-hour IPE experience was embedded in two undergraduate education courses and one graduate speech-language pathology course.

This IPE experience consisted of four components that are depicted in Figure 2. All students individually completed online reflective surveys before and after direct interaction between student S-LPs and teachers. For research purposes these surveys could be conceptualized as pre-post measures to assess the efficacy of the IPE experience. The surveys also served as an opportunity for students to reflect on their knowledge, skills, and attitudes related to interprofessional collaboration. Students from both disciplines came together for an interactive seminar, based on a foundational metaphor that described schools as existing on a mainland and S-LPs existing on an island approximately a kilometer off the coast. The seminar consisted of brief periods of instruction followed by opportunities for students to work in pairs through a series of activities. The final component was the collaborative case study. For this, the students worked in small mixed-discipline groups to design an intervention plan for a hypothetical classroom.

This IPE experience addressed four constructs of collaboration: knowledge and understanding of professional roles; communication skills; personal reflection; and knowledge and application of models of specialized service

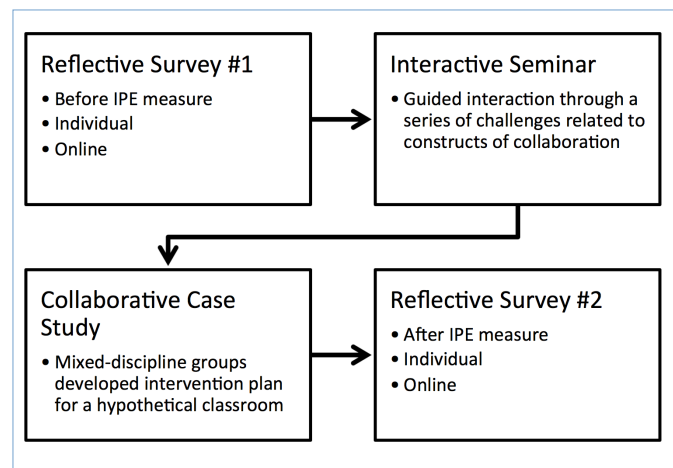


Figure 2. Summary of University of Alberta Interprofessional Education Experience

delivery. The analysis and results presented in this paper only pertain to the models of specialized service delivery construct of this IPE experience. The decision to include information on the specialized service delivery models available for S-LPs and teachers was supported in the understanding that IPE needed to be customized and reflect "appropriate and relevant service delivery settings" (Hammick et al., 2007, p. 748). Given the recent interest in provision of speech and language services in the classroom (ASHA 2010b; Cirrin et al., 2010; Hartas, 2004), the IPE experience was an appropriate way to provide pre-professionals with some knowledge of these changes and the potential configurations for collaboration when they enter the workforce. The seminar included explicit instruction in theoretical knowledge of service delivery and an overview of models of service delivery as found in Figure 1. Students also engaged in authentic (i.e., practical) opportunities to analyze and describe the way in which they would configure service delivery. Whenever applicable, this IPE experience focussed on literacy, as literacy is an area of education where S-LPs and teachers overlap in roles and responsibilities.

### Purpose

The data and analysis presented in this paper were designed to determine the effects of this IPE experience on student S-LPs' and teachers' awareness and understanding of models of specialized service delivery in schools. Effects were determined by analysis of student application of models of specialized service delivery in hypothetical school-based scenarios.

### Methods

**Participants.** Ninety-five percent of students enrolled in the three selected courses gave consent for their materials to be used for research purposes. Thus, information was gathered and analyzed from fifty-five student S-LPs, and

fifty-two student teachers. The IPE experience occurred before the student S-LPs had engaged in any clinical experience. However, over ninety-five percent of the student teachers had completed a five-week introductory practicum placement in a classroom. For the collaborative case study, random assignment was used to organize equal distribution of student S-LPs and student teachers into groups of four-to six students.

**Materials.** Data related to the models of service delivery construct were gathered from student responses on the online reflective surveys and group responses on the collaborative case studies. As part of the online reflective survey, students were asked to describe configurations for a service delivery given a classroom description. Students responded to the following item before and after the jointly attended sessions (i.e., the interactive seminar and collaborative case study):

*Sheila is a speech-language pathologist who has been assigned to provide support to Janine's classroom. Janine's classroom is inclusive and therefore has students with varying abilities and a few with special needs. Explain to Sheila and Janine the different ways their professional contributions can be structured to meet student needs*

On the collaborative case study, student groups were required to describe interventions based on classroom needs, but also describe the way in which the interventions would be structured (i.e., the model of service delivery that would be implemented to address the needs). Students were asked to choose a model of service delivery for every aspect of their intervention plan. For example, if student groups identified a need for a bullying intervention program they were also asked to describe how the intervention was going to be structured (i.e., the teacher and S-LP would co-teach the session using a transdisciplinary approach).

Analysis Methods

**Coding.** A directed content analysis approach was used to code responses to items on the reflective survey and collaborative case study. This deductive approach to analysis uses pre-existing knowledge to develop a coding structure before the analysis begins (Hsieh & Shannon, 2005). In this study the coding structure was derived from the synthesis of models of service delivery and application of these models in schools found in Figure 1. The codes for the analysis were Multidisciplinary, Interdisciplinary, Transdisciplinary, and Consultation. All codes had operational definitions, as presented in the coding structure found in Figure 3 (Hsieh & Shannon, 2005; Potter & Levine-Donnerstein, 1999). A default

Figure 3: Coding structure and operational definitions used in directed content analysis

| General Models   | Application of Models   |
|--|---|
| <b>Multidisciplinary</b> <ul style="list-style-type: none"><li>Professionals work directly with same population</li><li>No communication between S-LPs and Teachers</li><li>Distinct roles and responsibilities</li></ul>  | Pull Out  |
| <b>Consultation</b> <ul style="list-style-type: none"><li>Indicates one-way transfer of information</li><li>One professional is the expert providing information to the other</li><li>One professional may not work directly with the population</li></ul>                         |   |
| <b>Interdisciplinary*</b> <ul style="list-style-type: none"><li>Professionals work directly with the same population</li><li>Communication between S-LPs &amp; Teachers (2-way transfer of information)</li><li>Distinct roles and responsibilities</li></ul>                      | One teach, One drift<br>One teach, One observe<br>Station<br>Remedial<br>Supplemental |
| <b>Transdisciplinary (Trans)</b> <ul style="list-style-type: none"><li>Professionals work directly with the same population</li><li>Communication between S-LPs &amp; Teachers (2-way transfer of information)</li><li>Overlapping and shared roles and responsibilities</li></ul> | Parallel<br>Team or Co-teach  |

Notes: Default code marked with an asterisk (\*)



code was established such that any general statement of 'working together' was categorized as an interdisciplinary model. Finally, if a participant described an application of service delivery models, the general category code was applied (e.g., if a participant made reference to the pull-out model, the Multidisciplinary code was applied).

**Collaborative case study.** Groups of students were asked to describe the models of specialized service delivery that would be applied in their intervention plan. Group descriptions were structured to include several ways that the teacher and speech-language pathologist could serve the target population. We documented the most integrative model service delivery described by groups using the previously described coding structure. For this analysis, Multidisciplinary models were the least integrative and Transdisciplinary models were the most integrative (Figure 1). We also documented whether groups described some aspect of their intervention plan that included classroom-based services, pull-out services or consultative services.

**Reliability.** The first two authors developed the coding structure. The first author coded all student responses and a second author was responsible for coding a randomly selected 20% of the responses on the online reflective surveys and collaborative case studies. The reliability measure was determined by dividing the number of identical codes per response by the highest number of codes recorded by either author as being included in the response. For example, for one response the first author may have coded Multidisciplinary and Interdisciplinary while the second author coded Interdisciplinary. Agreement would be one out of two (i.e., 50%) for this response. A minimum overall agreement of 80% was sought. If 80% agreement was not achieved, the two authors met to discuss the responses they both coded in order to align their understanding and application of the coding structure. Then both authors re-coded with the new calibration (i.e., another 20% of responses were randomly selected for the second author to analyze). Eighty percent agreement was achieved before the transformation phase of analysis was conducted.

**Transformation.** In order to provide general comparisons of student responses on the online reflective surveys, transformation of codes was employed. Transformation of codes involves the application of numerical values to non-numerical data (Sandelowski, Voils & Knafl, 2009). On the online reflective survey students were allowed to describe more than one model of service delivery. As such the number of times a code was used was divided by the total number of responses analyzed, which typically equalled the number of participants. The use of number of responses instead of number of participants allowed analysis to be accurate even in instances where data was missing (i.e., a participant

failed to answer a question). The calculation resulted in a percentage of responses or students that included each code as part of their responses. More than one code was permitted for each response in order to ensure the coding process accurately reflected all components of a response.

On the collaborative case study, researchers documented the most integrative model described by groups. The number of times a code was recorded as the most integrative model was divided by the total number of groups resulting in a percentage of groups that identified each model as the most integrative model. Also, the number of groups that described some form of classroom-based services, pull-out services, and consultative services were divided by the total number of groups.

## Results

**Reflective surveys.** Table 1 and Figure 4 present the percentage of S-LP students that included each of the general models of service delivery before and after the IPE experience. Before the IPE experience, 55% of student S-LPs' responses were coded as Interdisciplinary. Student responses often made a general statement indicating 'working together' without any specific reference to a model, which was coded as Interdisciplinary. Before the IPE experience 29% of student S-LPs described a Multidisciplinary model of service delivery and 16% described a Transdisciplinary model of service delivery. After the IPE experience, similar proportions of student S-LP responses described the Multidisciplinary, Interdisciplinary, and Transdisciplinary models (32%, 42%, and 32% respectively). Before the IPE experience, 39% of student S-LPs referred to Consultation as a model of service delivery and, after the IPE experience, 17% of student responses referred to Consultation.

Table 1 and Figure 5 present the percentage of student teacher responses that included each of the general models of service delivery before and after the IPE experience. Before the IPE experience, 27% of student teachers described an Interdisciplinary model of service delivery, usually coded as such due to a general statement about 'working together'. Before the IPE experience, 17% and 2% of student teacher responses were coded Multidisciplinary and Transdisciplinary, respectively. After the IPE experience, 72% of student teacher responses included an Interdisciplinary code. After the IPE experience, 31% and 33% of student teacher responses included Multidisciplinary and Transdisciplinary codes. Before the IPE experience, 13% of student teacher responses described Consultation. After the IPE experience, 14% of responses described Consultation.

**Collaborative case study.** Table 2 reports the percentages of groups that identified one of Multidisciplinary, Interdisciplinary, and Transdisciplinary as the most integrative general model of service delivery in the



Table 1: Percentages of student responses that made reference to models of service delivery

|                   | S-LP Pre-IPE | S-LP Post-IPE | Teacher Pre-IPE | Teacher Post-IPE |
|-------------------|--------------|---------------|-----------------|------------------|
| Multidisciplinary | 29%          | 32%           | 17%             | 31%              |
| Interdisciplinary | 55%          | 42%           | 27%             | 72%              |
| Transdisciplinary | 16%          | 32%           | 2%              | 33%              |
| Consultation      | 39%          | 17%           | 13%             | 14%              |

Notes: S-LP = student speech-language pathologists, IPE = Interprofessional education,

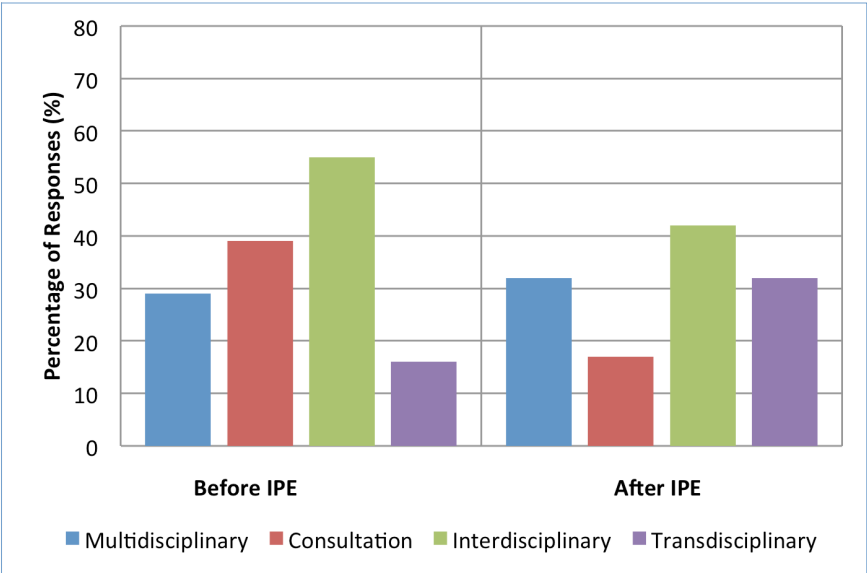


Figure 4. Percentages of student S-LP responses that applied general models of specialized service delivery before and after IPE

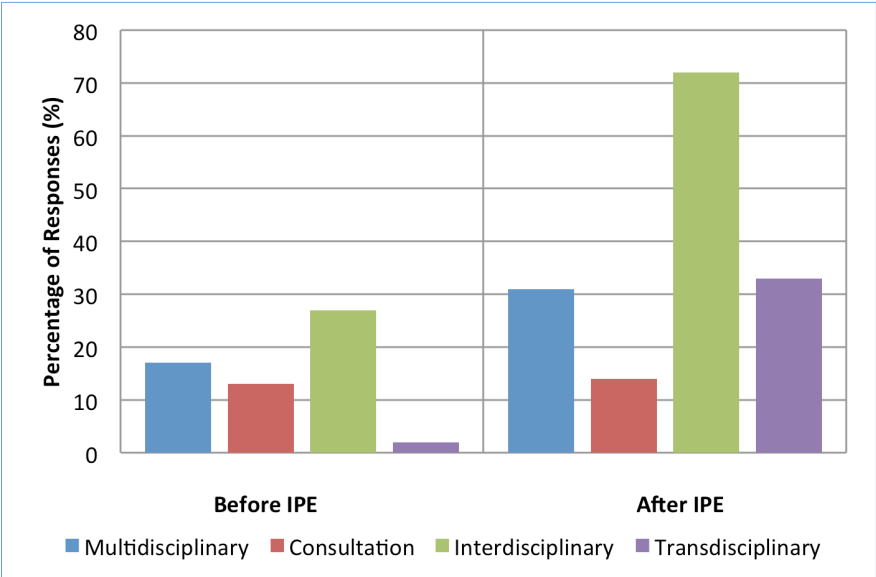


Figure 5. Percentages of student teacher responses that applied general models of specialized service delivery before and after IPE

Table 2: Percentages of groups and the most integrated model of service delivery identified in their intervention plan

|  | Most Collaborative Model of Service Delivery Included |                   |                   |
|--|---|-------------------|-------------------|
|  | Multidisciplinary                                     | Interdisciplinary | Transdisciplinary |
| Percentage of groups that described models | -   | 17%               | 83%               |

Table 3: Percentages of groups that identified general categories of service delivery applications

|  | Application of Service Delivery |            |              |
|--|---------------------------------|------------|--------------|
|  | In the Classroom                | Pull – Out | Consultation |
| Percentage of groups that applied service delivery | 100%                            | 91%        | 43%          |

group's intervention plan. Most groups (83%) referenced a Transdisciplinary model of service delivery. Table 3 shows percentages of groups that used classroom-based services, pull-out services, and consultative services. All groups indicated that they wanted to design an intervention program that included the speech-language pathologist working within the classroom. Almost all the groups identified the need for additional pull-out programming for children with exceptional needs (91%). Almost half of the groups utilized some form of a consultative model (43%) in their intervention plan.

### Discussion

**Student S-LPs before and after the IPE experience.** For student S-LPs there was an equalization effect such that after the IPE experience student S-LPs were describing features of models of specialized service delivery with similar frequencies in lieu of making general statements related to 'working together'. Thus, student S-LPs were able to describe service delivery beyond a general idea of collaboration after the IPE experience. Student S-LPs reported consultation with less frequency after the IPE experience, aligning them more with a more integrative approach to service delivery. This shift toward a more integrative approach is consistent with current shifts taking place in schools towards a more collaborative service delivery approach (ASHA 2010b).

**Student teachers before and after the IPE experience.** Before the IPE experience, less than a third of student teachers made any general statements related to collaboration and even fewer made reference to any particular model of specialized service delivery. Perhaps this finding showed

that in general student teachers are unaware of their role in collaboration with other professionals. Interestingly, the vast majority of student teachers had some practical experience in the schools. This finding might also be a result of a lack of exposure to collaboration with other professionals when student teachers were in the schools. Finally, this finding could also be explained by a lack of understanding of the question on the survey. After the IPE experience, student teachers regularly reported Interdisciplinary as a method of service delivery. Furthermore, student teachers described specific features of models of collaboration with greater frequency after the IPE experience. Approximately the same number of student teacher responses described consultation before and after the IPE experience. For student teachers, the IPE experience improved general awareness of collaboration between speech-language pathologists and teachers and improved the ability of student teachers to describe specific models of service delivery. This IPE experience seemed to shift and hone the knowledge of student teachers to align with the currently emphasized models of specialized service delivery.

**Comparing student S-LPs and student teachers before and after the IPE experience.** Before the IPE experience, fewer student teachers described all models of service delivery than student S-LPs. After the IPE experience, comparable percentages of student S-LPs and teachers reported Multidisciplinary, Transdisciplinary, and Consultative models of service delivery. One outstanding difference after the IPE experience is the relative high frequency with which student teachers reported Interdisciplinary models of collaboration (72%). This mimics the pattern observed in student S-LPs

before the IPE experience. Perhaps student S-LPs were more aware of the need for collaboration before the IPE experience, while student teachers developed an understanding of this through the IPE experience, along with knowledge of different models of collaboration.

**Collaborative case study.** Groups of students working in mixed-discipline teams consistently created intervention plans that included S-LPs working in the classroom. Over 80% of the groups used some form of transdisciplinary collaboration when designing an intervention plan. This showed that interprofessional education not only exposed pre-professionals to the possibility of sharing roles, but that student S-LPs and student teachers were overwhelmingly willing to engage in sharing roles and responsibilities. Before the IPE experience only 16% of student S-LPs and 2% of student teachers described any aspect of transdisciplinary configurations of service delivery. Given this result, it would be unlikely that students would have designed intervention plans that included integrative models of service delivery without the theoretical exposure in the interactive seminar. Therefore it is likely that the theoretical knowledge which students applied in the case study was acquired through the IPE experience. Interestingly, over 90% of groups continued to identify pull-out programming as an option for children with specific speech or articulation needs who required individual attention. While all groups indicated a desire to engage in classroom-based service delivery, the vast majority of groups also believed that for some children, individual pull-out therapy was a valuable component of their intervention plan. This finding demonstrates that this IPE experience helped to align student understanding with current policies and legislation which, involves matching service delivery with student needs by using a variety of service delivery models (ASHA, 2010b).

Overall, the results of this study show that after this IPE experience more student teachers and student S-LPs were able to describe different models of service delivery in schools. After the IPE experience students applied and advocated for more integrative models of service delivery. Students from both disciplines were better able to describe characteristics of models of service delivery that extended beyond merely mentioning 'working together'. Regardless of discipline, the IPE experience provided practical information to participants regarding models of specialized service delivery.

### Limitations & Future Research

This preliminary study demonstrated that participation in this IPE experience increased the variety of service delivery models that student S-LPs and teachers were able to describe and apply to address student needs. In doing so, this IPE experience helped prepare these students to participate in a collaborative workplace upon graduation. The authors encourage other universities in Canada develop

and engage student S-LPs and student teachers in IPE. The findings from this study show that explicit instruction in and opportunities to apply knowledge of models of service delivery helped students consider service delivery as another facet to collaboration. This IPE experience provided student S-LPs and student teachers an accurate survey of the current trends in the schools and prepared them for entrance into the collaborative work force in Canada. Future studies could determine the efficacy of other IPE modules as this study only looked at one specific IPE experience. Other IPE experiences could be designed to focus on other constructs of collaboration (i.e., conflict resolution) or even other content areas, such as response to intervention (ASHA, 2010b).

The descriptive content analysis used in this study provided preliminary evidence for the efficacy of the IPE experience. Future studies could use either a quantitative or qualitative approaches to build upon these findings. Interviews with students could provide more insight into their perceptions of the different models of service delivery while quantitative approaches can substantiate the changes effected by the IPE experience itself. Furthermore, responses on the case study could be analyzed for appropriate matching of model of service delivery to student need.

The student S-LPs in this study did not have any clinical experience while the student teachers had completed a practical experience. This discrepancy in workplace experience may have influenced the results of this study. Perhaps if this study had included student S-LPs with some clinical experience this group may have had more awareness of service delivery models. On the other hand, perhaps the practical experiences of student teachers provided these participants with an authentic understanding that collaboration with other professionals is not an important component of day-to-day life in schools. A future study could include student S-LPs and student teachers with various levels of practical experience and determine the influence of these experiences on knowledge and understanding of models of service delivery.

Finally, the effects of the interprofessional education experience could be substantiated longitudinally, and student S-LPs and student teachers could be followed in their clinical and practical experiences and their initial employment after graduation. This study provides a launching point for many more theoretical and practical investigations into service delivery in schools.

### Conclusion

S-LPs and teachers have the potential to work together in a variety of configurations to implement effective specialized services for school-aged children with speech, language and communication needs. Models of service delivery

should be configured to best meet the child's needs. After participating in this IPE experience student teachers and S-LPs demonstrated knowledge of and willingness to apply different models of service delivery.

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## Authors' Note

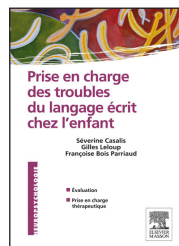
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# Book Review

## Évaluation de Livre



**Titre :** Prise en charge des troubles du langage écrit chez l'enfant

**Éditeur :** Elsevier-Masson

**Auteurs :** Séverine Casalis, Gilles Leloup et Françoise Bois Parriaud

**Coût :** \$63.00

**ISBN:** 9782294711299

**Réviseur :** Pascal Lefebvre, Université d'Ottawa

**Description du contenu.** Le livre intitulé « Prise en charge des troubles du langage écrit » a été écrit par trois auteurs de la France : Séverine Casalis, professeure de psychologie à l'Université Lille 3 – Charles-de-Gaule, Gilles Leloup, orthophoniste en pratique privée et attaché de consultation au centre hospitalier Courbevoie-Neuilly-Puteaux, et Françoise Bois Parriaud, orthophoniste en pratique privée à Levallois. Publié en 2013, ce livre comporte cinq chapitres. Le premier porte sur l'apprentissage de la lecture et les troubles spécifiques de la lecture. Il aborde l'analyse des sources de difficultés de la lecture, les difficultés de lecture d'enfants présentant des troubles du langage oral, le modèle de base de reconnaissance de mots, les modèles d'apprentissage de la lecture, ainsi que les critères diagnostiques et les classifications des dyslexies. Le second chapitre parle des déficits associés aux troubles de la lecture. Plus précisément, il aborde les déficits phonologiques, visuels, auditifs et moteurs. On y discute aussi du cerveau dyslexique et des théories explicatives de la dyslexie. Le troisième chapitre est consacré à l'histoire des orientations théoriques et rééducatives de la dyslexie en France. On y aborde les courants organiciste, instrumental, cognitiviste, psychoaffectif et psychoanalytique. Le quatrième chapitre porte sur l'évaluation des troubles du langage écrit et du dépistage des enfants à risque. Le dernier chapitre est consacré à la rééducation. On y parle des études en lien avec les entraînements dans les domaines phonologique, visuel, auditif, auditivo-visuel, articulatoire, moteur, proprioceptif et attentionnel. Ensuite, on y discute des études portant sur les méthodes de compensations par entraînement à la fluidité, à la morphologie et à l'utilisation de stratégie métacognitives. On aborde aussi la question des outils informatisés de remédiation et d'aide

à la lecture. On y propose finalement des lignes directrices pour la remédiation en pratique orthophonique et les aménagements pédagogiques en classe.

**Objectifs.** L'objectif de ce livre est de fournir une synthèse des études qui ont évalué les prises en charge des enfants présentant des troubles du langage écrit.

**Public cible.** Ce livre s'adresse aux orthophonistes, rééducateurs et psychologues principalement de la France. Cependant, il peut aussi intéresser les chercheurs, les orthophonistes, psychologues et orthopédagogues qui travaillent au Canada.

**Qualités générales et organisation.** La première partie qui comprend les deux premiers chapitres de cet ouvrage permet au lecteur de faire le tour des connaissances récentes en lien avec l'apprentissage et les troubles de la lecture, et ce, sous l'angle de plusieurs modèles et théories qui abordent les multiples facettes de ces troubles. Ainsi, les questions entourant le lien entre les troubles du langage oral et écrit ainsi que les déficits sensoriels et moteurs souvent observés chez les enfants dyslexiques y sont abordées de façon systématique et critique, ce que peu d'ouvrages a réussi à faire jusqu'à maintenant. Cette première partie jette les bases pour mieux comprendre la deuxième partie du livre qui aborde directement la question de la prise en charge des troubles de la lecture, incluant le dépistage, l'évaluation et l'intervention. Dans cette deuxième partie, les auteurs présentent à la fois l'histoire des pratiques de prises en charge cliniques actuelles et une synthèse des études empiriques menées en lien avec l'efficacité des interventions en lecture, ce qui permet de jeter des ponts entre ce que la clinique et la recherche proposent. À partir de ces informations, les auteurs proposent des lignes directrices permettant de guider les intervenants dans leurs décisions concernant les approches d'intervention en thérapie et les adaptations pédagogiques en classe à privilégier selon les profils des jeunes aux prises avec des troubles de la lecture. Il est important de souligner que cet ouvrage innove aussi en abordant les outils technologiques au service de la remédiation et de la compensation des troubles de la lecture.

**Évaluation.** *Forces.* Les forces principales de cet ouvrage résident tout d'abord dans l'exhaustivité des sujets couverts en lien avec la dyslexie. Bien que la recherche soit largement dominée par les aspects phonologiques de la dyslexie,



les auteurs abordent les aspects sensoriels, moteurs et attentionnels qui sont souvent observés en clinique, mais sur lesquels moins de recherche est effectuée. Entre autres, ce livre démystifie les nombreuses composantes visuelles sur lesquelles quelques travaux ont été effectués en lien avec les troubles de la lecture. De plus, cet ouvrage se démarque par la rigueur avec laquelle les études sont présentées et critiquées quant à leur niveau d'évidence scientifique. Ainsi, le contenu de ce livre repose donc sur des bases théoriques et empiriques solides. Finalement, tout au long du livre, des exemples de cas d'enfants, d'outils d'évaluation, de programme d'intervention et d'outils informatisés sont présentés aux lecteurs, ce qui permet de mieux outiller les intervenants.

*Faiblesses.* Malgré le fait que le livre ait été publié en 2013, cet ouvrage passe presque sous le silence l'un des aspects les plus actuels entourant la prise en charge des troubles du langage écrit en Amérique du Nord : le modèle réponse à l'intervention (RAI) dans les écoles. En effet, avec l'avènement de l'obligation d'implanter la RAI dans les écoles américaines et la récente publication du DSM-V, la résistance à des interventions en classe fondées sur des données probantes constitue un élément central sur lequel repose l'évaluation diagnostique des troubles d'apprentissage. De plus, la RAI devient incontournable lorsqu'il s'agit d'aborder la question du dépistage et de l'intervention. Ainsi, les critères diagnostiques qui sont énoncés dans cet ouvrage ne tiennent pas compte des percées récentes en lien avec la résistance à l'intervention. On y propose aussi une approche d'évaluation et d'intervention plutôt médicale (référence – évaluation approfondie – diagnostic – intervention) peu intégrée au milieu scolaire en excluant les intervenants de première ligne tels que les enseignants. Ce type d'approche s'est avérée très coûteuse et ayant une faible applicabilité à long terme dans les milieux scolaires. Une autre faiblesse du livre tient du fait qu'il porte essentiellement sur la dyslexie, malgré le fait que son titre évoque les troubles du langage écrit; on y parle très rarement de l'écriture (incluant la calligraphie, l'orthographe et la production de textes) et la compréhension en lecture est très peu approfondie. Pourtant, depuis les 10 dernières années, une éclosion d'études sur l'écriture et la compréhension en lecture a vu le jour et le présent livre en tient très peu compte. De plus, la dyslexie n'apparaît plus comme un diagnostic pertinent au DSM-V, laissant plutôt la place aux troubles d'apprentissage spécifiques dont il faut préciser la nature (p.ex. : affectant l'identification de mots en lecture). Finalement, quelques aspects du livre (terminologie et abréviations utilisées, organisation des services, outils d'évaluation ou informatisés proposés) ne sont pas représentatifs, appropriés ou pertinents pour la pratique nord-américaine.

*Atteinte des objectifs.* Le livre atteint donc en partie son objectif de fournir une synthèse des études qui ont évalué

les prises en charge des enfants présentant des troubles du langage écrit. Il omet des éléments essentiels en lien avec, entre autres, la RAI, la compréhension en lecture et l'écriture.

**Recommandations.** Ce livre constitue un livre très approprié pour les intervenants nord-américains qui désirent approfondir leurs connaissances en lien avec la dyslexie, surtout concernant les aspects non phonologiques qui y seraient associés. Il offre des lignes directrices intéressantes concernant l'intervention. Cependant, cet ouvrage est peu adapté à la réalité des écoles nord-américaines et gagnerait à être plus tard mis en jour en concordance avec le DSM-V et la RAI.

## Information for Contributors

The Canadian Journal of Speech-Language Pathology and Audiology (CJSLPA) welcomes submissions of scholarly manuscripts related to human communication and its disorders broadly defined. This includes submissions relating to normal and disordered processes of speech, language, and hearing. Manuscripts that have not been published previously are invited in English and French. Manuscripts may be tutorial, theoretical, integrative, practical, pedagogic, or empirical. All manuscripts will be evaluated on the basis of the timeliness, importance, and applicability of the submission to the interests of speech-language pathology and audiology as professions, and to communication sciences and disorders as a discipline. Consequently, all manuscripts are assessed in relation to the potential impact of the work on improving our understanding of human communication and its disorders. All categories of manuscripts submitted will undergo peer-review to determine the suitability of the submission for publication in CJSLPA. The Journal has established multiple categories of manuscript submission that will permit the broadest opportunity for dissemination of information related to human communication and its disorders. The categories for manuscript submission include:

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*Articles:* Traditional manuscripts addressing applied or basic experimental research on issues related to speech, language, and/or hearing with human participants or animals.

*Clinical Reports:* Reports of new clinical procedures, protocols, or methods with specific focus on direct application to identification, assessment and/or treatment concerns in speech, language, and/or hearing.

*Brief Reports:* Similar to research notes, brief communications concerning preliminary findings, either clinical or experimental (applied or basic), that may lead to additional and more comprehensive study in the future. These reports are typically based on small “n” or pilot studies and must address disordered participant populations.

*Research Notes:* Brief communications that focus on experimental work conducted in laboratory settings. These reports will typically address methodological concerns and/or modifications of existing tools or instruments with either normal or disordered populations.

*Field Reports:* Reports that outline the provision of services that are conducted in unique, atypical, or nonstandard settings; manuscripts in this category may include screening, assessment, and/or treatment reports.

*Letters to the Editor:* A forum for presentation of scholarly/clinical differences of opinion concerning work previously published in the Journal. Letters to the Editor may influence our thinking about design considerations, methodological confounds, data analysis, and/or data interpretation, etc. As with other categories of submissions, this communication forum is contingent upon peer-review. However, in contrast to other categories of submission, rebuttal from the author(s) will be solicited upon acceptance of a letter to the editor.

## Submission of Manuscripts

Contributors should use the electronic CJSLPA manuscript submission system at [www.cjslpa.coverpage.ca](http://www.cjslpa.coverpage.ca) to submit articles. If you are unable to use the electronic system, please send a file containing the manuscript, including all tables, figures or illustrations, and references in Word via e-mail to the editor at [cjslpa.rcoa@caslpa.ca](mailto:cjslpa.rcoa@caslpa.ca).

Along with copies of the manuscript, a cover letter indicating that the manuscript is being submitted for publication consideration should be included. The cover letter must explicitly state that the manuscript is original work, that it has not been published previously, and that it is not currently under review elsewhere. Manuscripts are received and peer-reviewed contingent upon this understanding.

The author(s) must also provide appropriate confirmation that work conducted with humans or animals has received ethical review and approval. Failure to provide information on ethical approval will delay the review process. Finally, the cover letter should also indicate the category of submission (i.e., tutorial, clinical report, etc.). If the editorial staff determines that the

manuscript should be considered within another category, the contact author will be notified.

All submissions should conform to the publication guidelines of the Publication Manual of the American Psychological Association (APA), 6th Edition. A confirmation of receipt for all manuscripts will be provided to the contact author prior to distribution for peer review. CJSLPA seeks to conduct the review process and respond to authors regarding the outcome of the review within 90 days of receipt. If a manuscript is judged as suitable for publication in CJSLPA, authors will have 30 days to make necessary revisions prior to a secondary review.

The author is responsible for all statements made in his or her manuscript, including changes made by the editorial and/or production staff. Upon final acceptance of a manuscript and immediately prior to publication, the contact author will be permitted to review galley proofs and verify its content to the publication office within 72 hours of receipt of galley proofs.

## Organization of the Manuscript

All copies should be typed, double-spaced, with a standard typeface (12 point, non-compressed font) on 8 ½ x 11 paper size. All margins should be at least one (1) inch. An electronic copy of the manuscript should be submitted directly to the editor. Author identification for the review process is optional; if blind-review is desired, the documents should be prepared accordingly (cover page and acknowledgments blinded). Responsibility for removing all potential identifying information rests solely with the author(s). All submissions should conform to the publication guidelines of the most current edition of the Publication Manual of the American Psychological Association (APA). The APA manual is available from most university and commercial bookstores. Generally, the following sections should be submitted in the order specified.

**Title Page:** This page should include the full title of the manuscript, the full names of the author(s) with academic degrees, each author's affiliation, and a complete mailing address for the contact author. An electronic mail address also is recommended.

**Abstract:** On a separate sheet of paper, a brief yet informative abstract that does not exceed one page is required. The abstract should include the purpose of the work along with pertinent information relative to the specific manuscript category for which it was submitted.

**Key Words:** Following the abstract and on the same page, the author(s) should supply a list of key words for indexing purposes.

**Tables:** Each table included in the manuscript must be typed, double-spaced and placed at the end of the document. Tables should be numbered consecutively beginning with Table 1. Each table must have a descriptive caption. Tables should serve to expand the information provided in the text of the manuscript, not to duplicate information.

**Illustrations:** All illustrations to be included as part of the manuscript must also be submitted in their original file format separate from the manuscript. High resolution (at least 300 dpi) files in any of the following formats must be submitted for each graphic and image: JPEG, TIFF, AI, PSD, GIF, EPS or PDF. For other types of computerized illustrations, it is recommended that CJSPLA production staff be consulted prior to preparation and submission of the manuscript and associated figures/illustrations.

**Legends for Illustrations:** Legends for all figures and illustrations should be typewritten (double-spaced) on a separate page with numbers corresponding to the order in which figures/illustrations appear in the manuscript.

**Page Numbering and Running Head:** The text of the manuscript should be prepared with each page numbered, including tables, figures/illustrations, references, and appendices. A short (30 characters or less) descriptive running title should appear at the top right hand margin of each page of the manuscript.

**Acknowledgments:** Acknowledgments should be typewritten (double-spaced) on a separate page. Appropriate acknowledgment for any type of sponsorship, donations, grants, technical assistance, and to professional colleagues who contributed to the work, but are not listed as authors, should be noted.

**References:** References are to be listed consecutively in alphabetical order, then chronologically for each author. Authors should consult the most current edition of the APA publication manual for methods of citing varied sources of information. Journal names and appropriate volume number should be spelled out and italicized. All literature, tests and assessment tools, and standards (ANSI and ISO) must be listed in the references. All references should be double-spaced.

## Potential Conflicts of Interest and Dual Commitment

As part of the submission process, the author(s) must explicitly identify if any potential conflict of interest or dual commitment exists relative to the manuscript and its author(s). Such disclosure is requested so as to inform CJSPLA that the author or authors have the potential to benefit from publication of the manuscript. Such benefits may be either direct or indirect and may involve financial and/or other nonfinancial benefit(s) to the author(s). Disclosure of potential conflicts of interest or dual commitment may be provided to editorial consultants if it is believed that such a conflict of interest or dual commitment may have had the potential to influence the information provided in the submission or compromise the design, conduct, data collection or analysis, and/or interpretation of the data obtained and reported in the manuscript submitted for review. If the manuscript is accepted for publication, editorial acknowledgement of such potential conflict of interest or dual commitment may occur within the publication.

## Participants in Research Humans and Animals

Each manuscript submitted to CJSPLA for peer-review that is based on work conducted with humans or animals must acknowledge appropriate ethical approval. In instances where humans or animals have been used for research, a statement indicating that the research was approved by an institutional review board or other appropriate ethical evaluation body or agency must clearly appear along with the name and affiliation of the research ethics and the ethical approval number. The review process will not begin until this information is formally provided to the Editor.

Similar to research involving human participants, CJSPLA requires that work conducted with animals state that such work has met with ethical evaluation and approval. This includes identification of the name and affiliation of the research ethics evaluation body or agency and the ethical approval number. A statement that all research animals were used and cared for in an established and ethically approved manner is also required. The review process will not begin until this information is formally provided to the Editor.

## Renseignements à l'intention des collaborateurs

La Revue canadienne d'orthophonie et d'audiologie (RCOA) est heureuse de se voir soumettre des manuscrits de recherche portant sur la communication humaine et sur les troubles qui s'y rapportent, dans leur sens large. Cela comprend les manuscrits portant sur les processus normaux et désordonnés de la parole, du langage et de l'audition. Nous recherchons des manuscrits qui n'ont jamais été publiés, en français ou en anglais. Les manuscrits peuvent être tutoriels, théoriques, synthétiques, pratiques, pédagogiques ou empiriques. Tous les manuscrits seront évalués en fonction de leur signification, de leur opportunité et de leur applicabilité aux intérêts de l'orthophonie et de l'audiologie comme professions, et aux sciences et aux troubles de la communication en tant que disciplines. Par conséquent, tous les manuscrits sont évalués en fonction de leur incidence possible sur l'amélioration de notre compréhension de la communication humaine et des troubles qui s'y rapportent. Peu importe la catégorie, tous les manuscrits présentés seront soumis à une révision par des collègues afin de déterminer s'ils peuvent être publiés dans la RCOA. La Revue a établi plusieurs catégories de manuscrits afin de permettre la meilleure diffusion possible de l'information portant sur la communication humaine et les troubles s'y rapportant. Les catégories de manuscrits comprennent :

*Tutoriels* : Rapports de synthèse, traités ou exposés de position portant sur un sujet particulier dans un cadre théorique ou clinique.

*Articles* : Manuscrits conventionnels traitant de recherche appliquée ou expérimentale de base sur les questions se rapportant à la parole, au langage ou à l'audition et faisant intervenir des participants humains ou animaux.

*Comptes rendus cliniques* : Comptes rendus de nouvelles procédures ou méthodes ou de nouveaux protocoles cliniques portant particulièrement sur une application directe par rapport

aux questions d'identification, d'évaluation et de traitement relativement à la parole, au langage et à l'audition.

*Comptes rendus sommaires* : Semblables aux notes de recherche, brèves communications portant sur des conclusions préliminaires, soit cliniques soit expérimentales (appliquées ou fondamentales), pouvant mener à une étude plus poussée dans l'avenir. Ces comptes rendus se fondent typiquement sur des études à petit « n » ou pilotes et doivent traiter de populations désordonnées.

*Notes de recherche* : Brèves communications traitant spécifiquement de travaux expérimentaux menés en laboratoire. Ces comptes rendus portent typiquement sur des questions de méthodologie ou des modifications apportées à des outils existants utilisés auprès de populations normales ou désordonnées.

*Comptes rendus d'expérience* : Comptes rendus décrivant sommairement la prestation de services offerts en situations uniques, atypiques ou particulières; les manuscrits de cette catégorie peuvent comprendre des comptes rendus de dépistage, d'évaluation ou de traitement.

*Courrier des lecteurs* : Forum de présentation de divergences de vues scientifiques ou cliniques concernant des ouvrages déjà publiés dans la Revue. Le courrier des lecteurs peut avoir un effet sur notre façon de penser par rapport aux facteurs de conception, aux confusions méthodologiques, à l'analyse ou l'interprétation des données, etc. Comme c'est le cas pour d'autres catégories de présentation, ce forum de communication est soumis à une révision par des collègues. Cependant, contrairement aux autres catégories, on recherchera la réaction des auteurs sur acceptation d'une lettre.

## Présentation de manuscrits

Pour soumettre un article, les auteurs doivent utiliser le système de soumission électronique de l'ACOA à l'adresse [www.cjslpa.coverpage.ca](http://www.cjslpa.coverpage.ca). Si vous ne pouvez pas utiliser le système électronique, veuillez envoyer par courriel un fichier Word contenant le manuscrit, y compris tous les tableaux, les figures ou illustrations et la bibliographie. Adressez le courriel au rédacteur en chef à l'adresse [cjslpa.rcoa@caslpa.ca](mailto:cjslpa.rcoa@caslpa.ca).

On doit joindre aux exemplaires du manuscrit une lettre d'envoi qui indiquera que le manuscrit est présenté en vue de sa publication. La lettre d'envoi doit préciser que le manuscrit est une œuvre originale, qu'il n'a pas déjà été publié et qu'il ne fait pas actuellement l'objet d'un autre examen en vue d'être publié. Les manuscrits sont reçus et examinés sur acceptation de ces conditions. L'auteur (les auteurs) doit (doivent) aussi fournir une attestation en bonne et due forme que toute recherche impliquant des êtres humains ou des animaux a fait l'objet de l'agrément d'un comité de révision déontologique. L'absence d'un tel agrément retardera le processus de révision. Enfin, la lettre d'envoi doit également préciser la catégorie de la présentation (i.e. tutoriel, rapport clinique, etc.). Si l'équipe d'examen juge que

le manuscrit devrait passer sous une autre catégorie, l'auteur-contact en sera avisé.

Toutes les présentations doivent se conformer aux lignes de conduite présentées dans le publication Manual of the American Psychological Association (APA), 6e Édition. Un accusé de réception de chaque manuscrit sera envoyé à l'auteur-contact avant la distribution des exemplaires en vue de la révision. La RCOA cherche à effectuer cette révision et à informer les auteurs des résultats de cette révision dans les 90 jours de la réception. Lorsqu'on juge que le manuscrit convient à la RCOA, on donnera 30 jours aux auteurs pour effectuer les changements nécessaires avant l'examen secondaire.

L'auteur est responsable de toutes les affirmations formulées dans son manuscrit, y compris toutes les modifications effectuées par les rédacteurs et réviseurs. Sur acceptation définitive du manuscrit et immédiatement avant sa publication, on donnera l'occasion à l'auteur-contact de revoir les épreuves et il devra signifier la vérification du contenu dans les 72 heures suivant réception de ces épreuves.

## Organisation du manuscrit

Tous les textes doivent être écrits à double interligne, en caractère standard (police de caractères 12 points, non comprimée) et sur papier 8 1/2" X 11" de qualité. Toutes les marges doivent être d'au moins un (1) pouce. Un fichier électronique du manuscrit doit être présenté directement au rédacteur en chef. L'identification de l'auteur est facultative pour le processus d'examen : si l'auteur souhaite ne pas être identifié à ce stade, il devra préparer un fichier électronique dont la page couverture et les remerciements seront voilés. Seuls les auteurs sont responsables de retirer toute information identificatrice éventuelle. Tous les manuscrits doivent être rédigés en conformité aux lignes de conduite les plus récentes de l'APA. Ce manuel est disponible dans la plupart des bibliothèques universitaires et commerciales. En général, les sections qui suivent doivent être présentées dans l'ordre chronologique précisé.

**Page titre :** Cette page doit contenir le titre complet du manuscrit, les noms complets des auteurs, y compris les diplômes et affiliations, l'adresse complète de l'auteur-contact et l'adresse de courriel de l'auteur contact.

**Abrégé :** Sur une page distincte, produire un abrégé bref mais informateur ne dépassant pas une page. L'abrégé doit indiquer l'objet du travail ainsi que toute information pertinente portant sur la catégorie du manuscrit.

**Mots clés :** Immédiatement suivant l'abrégé et sur la même page, les auteurs doivent présenter une liste de mots clés aux fins de constitution d'un index.

**Tableaux :** Tous les tableaux compris dans un même manuscrit doivent être écrits à double interligne sur une page distincte. Les tableaux doivent être numérotés consécutivement, en commençant par le Tableau 1. Chaque tableau doit être accompagné d'une légende et doit servir à compléter les renseignements fournis dans le texte du manuscrit plutôt qu'à reprendre l'information contenue dans le texte ou dans les tableaux.

**Illustrations :** Toutes les illustrations faisant partie du manuscrit doivent être annexer avec chaque exemplaire du manuscrit. Chaque manuscrit doit être accompagné d'un fichier électronique

pour chaque image et graphique en format JPEG, TIFF, AI, PSD, GIF, EPS ou PDF, compression minimale 300 ppp. Pour les autres types d'illustrations informatisées, il est recommandé de consulter le personnel de production de la RCOA avant la préparation et la présentation du manuscrit et des figures et illustrations s'y rattachant.

**Légendes des illustrations :** Les légendes accompagnant chaque figure et illustration doivent être écrits à double interligne sur une page distincte et identifiées à l'aide d'un numéro qui correspond à la séquence de parution des figures et illustrations dans le manuscrit.

**Numérotation des pages et titre courant :** Chaque page du manuscrit doit être numérotée, y compris les tableaux, figures, illustrations, références et, le cas échéant, les annexes. Un bref (30 caractères ou moins) titre courant descriptif doit apparaître dans la marge supérieure droite de chaque page du manuscrit.

**Remerciements :** Les remerciements doivent être écrits à double interligne sur une page distincte. L'auteur doit reconnaître toute forme de parrainage, don, bourse ou d'aide technique, ainsi que tout collègue professionnel qui ont contribué à l'ouvrage mais qui n'est pas cité à titre d'auteur.

**Références :** Les références sont énumérées les unes après les autres, en ordre alphabétique, suivi de l'ordre chronologique sous le nom de chaque auteur. Les auteurs doivent consulter le manuel de l'APA le plus récent pour obtenir la façon exacte de rédiger une citation. Les noms de revues scientifiques et autres doivent être rédigés au long et imprimés en italiques. Tous les ouvrages, outils d'essais et d'évaluation ainsi que les normes (ANSI et ISO) doivent figurer dans la liste de références. Les références doivent être écrits à double interligne.

## Participants à la recherche – êtres humains et animaux

Chaque manuscrit présenté à la RCOA en vue d'un examen par des pairs et qui se fonde sur une recherche effectuée avec la participation d'êtres humains ou d'animaux doit faire état d'un agrément déontologique approprié. Dans les cas où des êtres humains ou des animaux ont servi à des fins de recherche, on doit joindre une attestation indiquant que la recherche a été approuvée par un comité d'examen reconnu ou par tout autre organisme d'évaluation déontologique, comportant le nom et l'affiliation de l'éthique de recherche ainsi que le numéro de l'approbation. Le processus d'examen ne sera pas amorcé avant que cette information ne soit formellement fournie au rédacteur en chef.

Tout comme pour la recherche effectuée avec la participation d'êtres humains, la RCOA exige que toute recherche effectuée avec des animaux soit accompagnée d'une attestation à l'effet que cette recherche a été évaluée et approuvée par les autorités déontologiques compétentes. Cela comporte le nom et l'affiliation de l'organisme d'évaluation de l'éthique en recherche ainsi que le numéro de l'approbation correspondante. On exige également une attestation à l'effet que tous les animaux de recherche ont été utilisés et soignés d'une manière reconnue et éthique. Le processus d'examen ne sera pas amorcé avant que cette information ne soit formellement fournie au rédacteur en chef.

## Conflits d'intérêts possibles et engagement double

Dans le processus de présentation, les auteurs doivent déclarer clairement l'existence de tout conflit d'intérêts possibles ou engagement double relativement au manuscrit et de ses auteurs. Cette déclaration est nécessaire afin d'informer la RCOA que l'auteur ou les auteurs peuvent tirer avantage de la publication du manuscrit. Ces avantages pour les auteurs, directs ou indirects, peuvent être de nature financière ou non financière. La déclaration de conflit d'intérêts possibles ou d'engagement double peut être transmise à des conseillers en matière de publication lorsqu'on estime qu'un tel conflit d'intérêts ou engagement double aurait pu influencer l'information fournie dans la présentation ou compromettre la conception, la conduite, la collecte ou l'analyse des données, ou l'interprétation des données recueillies et présentées dans le manuscrit soumis à l'examen. Si le manuscrit est accepté en vue de sa publication, la rédaction se réserve le droit de reconnaître l'existence possible d'un tel conflit d'intérêts ou engagement double.





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