CANADIAN JOURNAL OF SPEECH-LANGUAGE PATHOLOGY AND AUDIOLOGY

CJSLPA | RCOA

REVUE CANADIENNE D'ORTHOPHONIE ET D'AUDIOLOGIE

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CASLPA | ACOA

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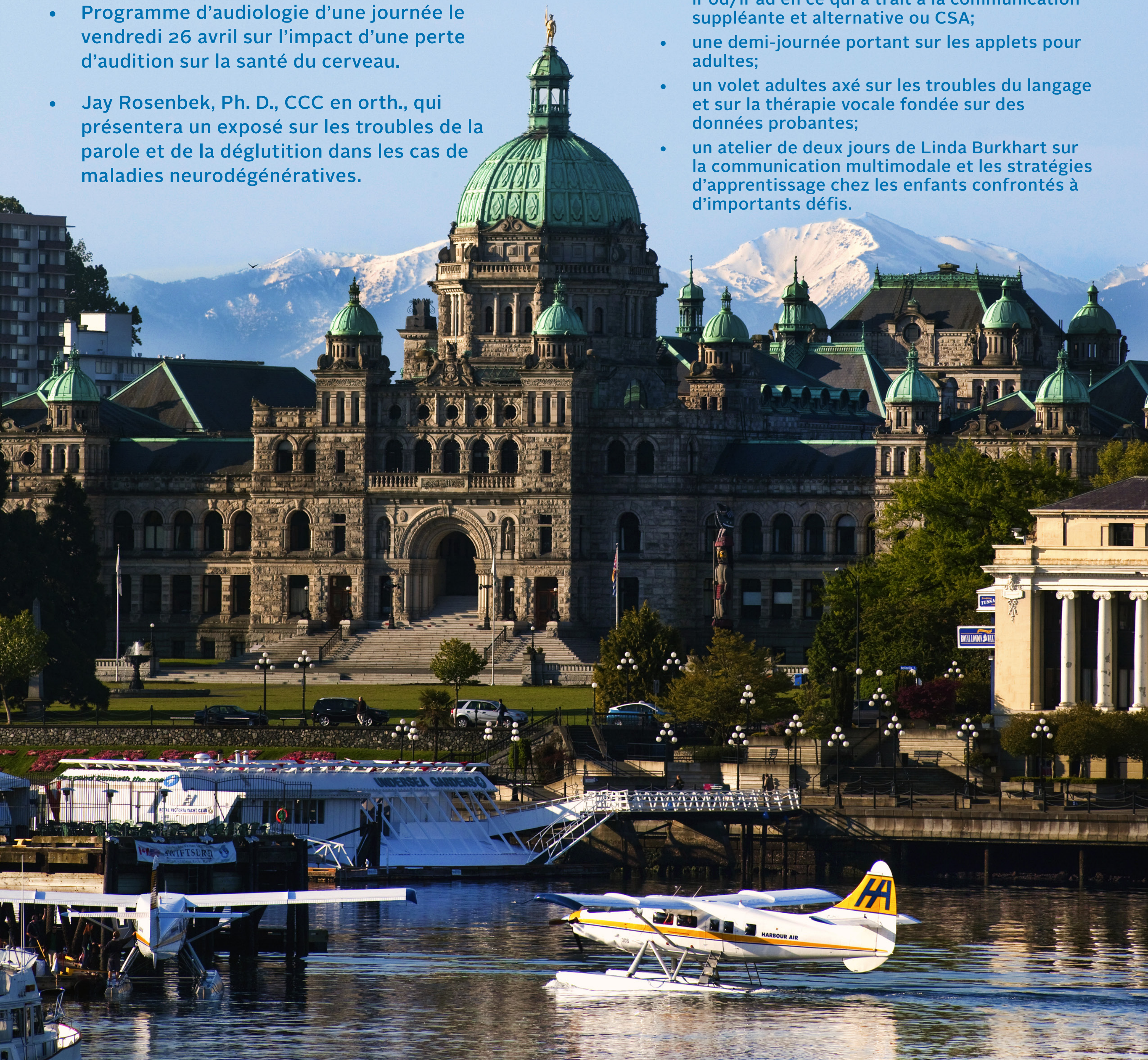
- Geraldine Wallach présentera l'atelier pré-congrès sur l'intervention en littératie langagière du niveau préscolaire au niveau secondaire.
- Programme d'audiologie d'une journée le vendredi 26 avril sur l'impact d'une perte d'audition sur la santé du cerveau.
- Jay Rosenbek, Ph. D., CCC en orth., qui présentera un exposé sur les troubles de la parole et de la déglutition dans les cas de maladies neurodégénératives.

Les autres sujets traités comprendront ce qui suit :

- l'apraxie de la parole et les autres troubles sonores de la parole;
- l'autisme;
- une demi-journée portant sur les appareils iPod/iPad en ce qui a trait à la communication suppléante et alternative ou CSA;
- une demi-journée portant sur les applets pour adultes;
- un volet adultes axé sur les troubles du langage et sur la thérapie vocale fondée sur des données probantes;
- un atelier de deux jours de Linda Burkhart sur la communication multimodale et les stratégies d'apprentissage chez les enfants confrontés à d'importants défis.



CANADIAN JOURNAL OF SPEECH-LANGUAGE PATHOLOGY AND AUDIOLOGY

Purpose and Scope

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.

The Canadian Journal of Speech-Language Pathology and Audiology is supported by a grant in Aid to Scholarly Journals, provided by the Canadian Social Sciences and Humanities Research Council (grant # 651-2008-0062), for the period January 2009 to December 2011.

CASLPA Vision and Mission

Vision

The Canadian Association of Speech-Language Pathologists and Audiologists ...the national voice and recognized resource for speech-language pathology and audiology.

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.

Indexing

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REVUE CANADIENNE D'ORTHOPHONIE ET D'AUDIOLOGIE

Objet et Portée

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

La Revue canadienne d'orthophonie et d'audiologie est appuyée par une subvention d'Aide aux revues savantes accordée par le Conseil de recherches en sciences humaines du Canada (subvention no. 651-2008-0062), pour la période de janvier 2009 à décembre 2011.

ACOA : Vision et Mission

Vision

L'Association canadienne des orthophonistes et audiologistes : porte-parole national et ressource reconnue dans le domaine de l'orthophonie et de l'audiologie.

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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Les articles et les archives de la RCOA sont maintenant disponibles au publique à www.cjslpa.ca

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Toutes les demandes visant à faire paraître de la publicité dans la RCOA doivent être adressées au Bureau national. L'acceptation d'une annonce publicitaire ne signifie absolument pas que l'ACOA fait la promotion du produit, du service ou de la compagnie. L'ACOA se réserve le droit de rejeter une annonce si le message, l'organisation, le produit ou le service n'est pas compatible avec la mission, la vision ou les valeurs de l'ACOA. L'ACOA n'assume pas la responsabilité de l'exactitude des déclarations des annonceurs.

Réviseurs de la RCOA 2011

Mridula Sharma, Dave Moore, Piers Dawes, Patricia Cleave, May Bernhardt, Megan Hodge, Tara Whitehill, Rodney Gabel, Kara Beck, Susan Felsenfeld, Tim Saltuklaroglu, Laura Plexico, Tony Leroux, Prudence Allan, Jessica Ball, Diane Pesco, Sharla Peltier, Carla Johnson, Catherine Dench, Suzanne Urbanczyk, Alexandra D'Arcy, Jill Weeres, Bradley McPherson, Margaret Cheesman, JB Orange, Guylaine Le Dorze, Isabelle Barrière, Pascal Lefebvre, Heather Clark, Gary McCullough, Johanna-Pascale Roy, Lucie Ménard, Andrea MacLeod, Pam Millett, Josée Lagacé, Mary Ann Evans, Rena Krakow, Michael Kiefte, Lorienne Jenstad, Linda Garcia, Chantal Laroche, Rachel Caissie, Liz Smith, Joanne Cleland.

Droit d'auteur

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Faire parvenir tout changement à l'ACOA au courriel pubs@caslpa.ca ou à l'adresse indiquée ci-dessus.

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From the Editor

FALL ISSUE

Welcome to the fall issue of CJSLPA, which brings readers a series of six articles. Thanks once again to a dedicated group of Associate Editors who help ensure the scientific quality of the journal. Congratulations are extended to Associate Editor, Andrea MacLeod on the birth of a beautiful baby girl. Thanks are also due to the CASLPA office, particularly Olga Novoa and Mallory Penney, who directly support the journal and keep everything running on time.

The journal is now accepting all submissions through the online system at www.cjslpa.coverpage.ca. I thank the authors and associate editors for their patience during the transition to online submissions and reviews. Please do not hesitate to contact us for support and to make us aware of any glitches when using the system. We also welcome new reviewers and I invite our current and new reviewers to register with the web-based system.

In addition to the regular serial issues, CJSLPA publishes informative special issues, typically once a year focused on topical or emerging issues in audition and communication. These issues provide an opportunity to present in-depth information on a topic that is not generally found in a single source. Dr. J. B. Orange from Western University is guest editor for the next special issue which will focus on the important topic of dementia. The issues will assemble papers from Canadian investigators on research in the areas of cognitive communication and dementia as well as related caregiver issues.

The current CJSLPA issue contains six papers on diverse topics in speech-language pathology and audiology. Two articles report studies that were supported in part by the CASLPA Clinical Research Awards Program. Through case studies, Carson et al. examined changes in speech production in children with autism after the use of the Picture Exchange Communication System. Chasin investigated hearing aid gain requirements for soft-level speech inputs in 102 individuals who use languages that have less intensity at the end of a sentence. In the third manuscript, von Tilling describes the expectations of 106 people who stuttered about how different ways of speaking are perceived by listeners. Washington et al. apply a qualitative research approach to explore the perspectives of parents of children with communication disorders about the child-speech-language pathologist relationship and about their children's functional communication. Gill and colleagues present a preliminary analysis of a new criterion-referenced instrument, the *Test of Following Oral Directions* (TOFOD). The final paper by Talbot and colleagues also addresses an area of interest in pediatric work. The authors share the results of a school-based hearing screening program with four to six year olds in Ottawa.

I hope you enjoy this issue and as always, I invite you to share your research nationally and internationally through a contribution to CJSLPA.

Elizabeth Fitzpatrick, Ph.D.
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Mot de la rédactrice en chef

NUMÉRO D'AUTOMNE

Bienvenue au numéro d'automne du *CJSLPA*, qui apporte à ses lecteurs une série de six articles. Merci encore une fois à un groupe dévoué de rédacteurs et rédactrices associés qui contribuent à assurer la qualité scientifique de la revue. Félicitations à la rédactrice associée Andrea MacLeod qui a donné naissance à une belle petite fille. Nos remerciements vont aussi au bureau de l'ACOA, et particulièrement à Olga Novoa et à Mallory Penney, qui soutiennent directement la revue et maintiennent le rythme pour que tout soit à temps.

La revue accepte maintenant toutes les communications à travers le système en ligne, au www.cjslpa.coverpage.ca. Je remercie les auteur(e)s et les rédacteurs et rédactrices associés pour leur patience pendant la transition vers les communications et les comptes-rendus en ligne. N'hésitez pas à nous contacter pour du soutien et pour nous informer de tous les pépins qui peuvent survenir lors de l'utilisation du système. Nous sommes aussi heureux d'accueillir les nouveaux chroniqueurs et nous invitons les chroniqueurs actuels et nouveaux à s'inscrire au système sur le Web.

En plus des numéros de la série régulière, *CJSLPA* publie des numéros spéciaux instructifs, typiquement une fois par année, qui se concentrent sur des questions d'actualité ou des enjeux émergents dans les domaines de l'audition et de la communication. Ces questions offrent une occasion de présenter de l'information approfondie sur un sujet qui ne se trouve pas généralement dans une source unique. Le Dr J. B. Orange, de l'Université Western, est le rédacteur invité du prochain numéro spécial, qui portera sur l'important sujet de la démence. Ce numéro rassemblera des communications de chercheurs canadiens sur la recherche dans les domaines de la communication cognitive et de la démence, ainsi que sur les problèmes des soignants qui y sont associés.

Le présent numéro du *CJSLPA* contient six communications sur divers sujets dans le domaine de l'orthophonie et de l'audiologie. Deux articles rapportent des études qui ont été soutenues en partie par le programme de bourses de recherche clinique de l'ACOA. À travers des études de cas, Carson et al. ont examiné les changements dans la production de la parole chez des enfants atteints d'autisme après l'usage d'un système de communication par échange d'images. Chasin a fait une recherche sur les besoins en gain dans les prothèses auditives pour les intrants de langage à faible volume chez 102 personnes qui utilisent des langues dont les fins de phrases ont moins d'intensité. Dans le troisième manuscrit, von Tilling décrit les attentes de 106 personnes qui bégayaient concernant la façon dont différentes façons de parler sont perçues par les auditeurs. Washington et al. appliquent une approche de recherche qualitative à l'exploration des points de vue de parents d'enfants ayant des troubles de communication concernant la relation entre l'enfant et l'orthophoniste et la communication fonctionnelle de l'enfant. Gill et ses collègues présentent une analyse préliminaire d'un nouvel instrument fondé sur des critères, le TOFOD (Test of Following Oral Directions – le test de suivi de consignes orales). La dernière communication, par Talbot et ses collègues, se penche aussi sur un domaine d'intérêt du travail de pédiatrie. Les auteurs partagent les résultats d'un programme de dépistage auditif à l'école qui s'adresse aux enfants de quatre à six ans, à Ottawa.

J'espère que ce numéro vous plaira et, comme toujours, je vous invite à partager votre recherche au niveau national et international avec une contribution à l'ACOA.

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The Collateral Effects of PECS Training on Speech Development in Children with Autism

Les effets collatéraux de l'enseignement du PECS sur le développement du langage chez les enfants atteints d'autisme

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Julie Theurer
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KEY WORDS
AUTISM
PICTURES EXCHANGE COMMUNICATION SYSTEM
SPEECH

Abstract

Research suggests that 25 to 61% of children with autism will use little or no functional speech to communicate. For these children, many speech-language pathologists will teach the use of the Picture Exchange Communication System (PECS). Studies have reported some children go on to develop functional speech after using PECS. What remains unclear is (i) which children will begin to use functional verbal abilities, and (ii) why this occurs for some and not others. The purposes of this study were to: (a) measure changes in speech production in children with autism after PECS use, and (b) explore whether these changes could be related to children's pre-intervention characteristics, including adaptive functioning, symbolic representation, motor imitation and receptive and expressive language skills. Three male children with autism spectrum disorder aged 2–3 years participated in this study, which followed a single-subject, changing-criterion design. At study outset, speech skills and pre-intervention characteristics were assessed. Parents were then trained to use PECS with their child during weekly clinic and home visits across a five-month period. Speech production data were collected during monthly probes and at post-intervention, then analyzed and compared to pre-intervention characteristics. Results showed changes to speech occurred for Participants 1 and 3. Comparison of pre-intervention characteristics revealed imitation as the only skill area that was different between children, with Participant 3 demonstrating higher motor and verbal imitation scores. These preliminary results suggest that stronger imitation skills may increase the likelihood that a child with autism will develop functional speech after PECS use.

Abrégé

La recherche suggère que de 25 à 61 % des enfants atteints d'autisme utiliseront peu ou pas de langage fonctionnel pour communiquer. De nombreux orthophonistes vont enseigner à ces enfants l'usage du PECS (Picture Exchange Communication System – système de communication par échange d'images). Des études ont rapporté qu'après avoir utilisé le PECS certains enfants continuent à développer un langage fonctionnel. Ce qui reste incertain, c'est (i) de savoir quels enfants commenceront à utiliser des habiletés verbales fonctionnelles et (ii) pourquoi cela se produit-il chez certains et pas chez d'autres. Les buts de cette étude étaient : (a) de mesurer les changements dans la production du langage, chez les enfants atteints d'autisme, après l'utilisation du PECS et (b) d'explorer pour savoir si ces changements pourraient être reliés aux caractéristiques de l'enfant préalables à l'intervention, notamment, le fonctionnement adaptatif, la représentation symbolique, l'imitation motrice et les compétences linguistiques réceptives et expressives. Trois garçons de 2 à 3 ans atteints du trouble du spectre de l'autisme ont participé à cette étude ayant un plan à sujet unique et à critères changeants. Au départ de l'étude, les compétences langagières et les caractéristiques pré-intervention furent évaluées. Les parents furent ensuite formés pour utiliser le PECS avec leur enfant pendant des visites hebdomadaires en clinique et à la maison réparties sur une période de cinq mois. Les données de production de langage furent recueillies à chaque mois et après l'intervention, puis analysées et comparées aux caractéristiques pré-intervention. Les résultats ont montré que des changements s'étaient produits pour les participants 1 et 3. Les comparaisons des caractéristiques pré-intervention ont révélé l'imitation comme étant le seul domaine de compétences qui différait d'un enfant à l'autre, le participant 3 démontrant des pointages plus élevés pour la motricité et l'imitation verbale. Ces résultats préliminaires suggèrent que des compétences plus fortes en imitation peuvent augmenter la probabilité qu'un enfant atteint d'autisme puisse développer un langage fonctionnel après usage du PECS.

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Autism spectrum disorder is a developmental disorder characterized by social withdrawal, impairments in communication, resistance to change and repetitive or stereotypic behaviours (American Psychiatric Association, 2000). With respect to communication, research suggests that between 25% and 61% of children with autism will use little or no functional speech to communicate (Weitz, Dexter, & Moore, 1997); a characteristic which can persist into adulthood (Howlin, Goode, Hutton, & Rutter, 2004). When oral communication is present, it is often characterized by delays in speech and language skills relative to chronological age, atypical features such as echolalia or stereotypic speech patterns, and restricted communicative functions (Carr & Felce, 2007).

Several skills have been identified that may influence the development of speech and language abilities in a child with autism. First, Yoder and Stone (2006) suggested that the acquisition of symbolic representation skills are a prerequisite for the development of speech used for communication. Symbolic representation is defined as "the possibility of being able to represent something (object, concept, action, etc.) by means of a differentiated referent serving only for that representation" (Piaget, 1962, in Blanc, Adrien, Roux, & Barthelemy, 2005, p. 231). Therefore, once children acquire this skill, they are able to use and manipulate a symbol (e.g., a word) to represent a specific thing (e.g., an object), regardless of whether it is present or not, to serve a specific communicative function. Blanc and colleagues (2005) have suggested that this ability is disordered in children with autism and may have detrimental effects on speech and language development.

A second possible predictor of later expressive language development is imitation skill. Stone and Yoder (2001) found that motor imitation predicted spoken language abilities in children with autism. The authors suggested that motor imitation includes two skills: (a) attending to another person, and (b) forming a mental representation of that person's behaviour with enough detail to be able to replicate that behaviour. They proposed that these skills underlie the child's ability to learn the social constructs of their community, which includes language. McDuffie, Yoder and Stone (2005) expanded on this study and found that both motor imitation without the use of objects and commenting predicted later language production. Speech imitation skills have also been suggested to predict speech as an outcome of augmentative and alternative communication (AAC) (Yoder & Layton, 1988). Yoder and Layton (1988) found that children with weak verbal imitation skills used fewer words than children with stronger verbal imitation skills after AAC training. The authors suggested that children with low verbal imitation skills fail to process speech in favour of processing the visual information associated with the AAC system and found in the natural environment. Motor imitation impairments are common in children with autism (Williams, Whiten, & Singh, 2004); this may be a potential contributor to the delay in their development of speech and language abilities.

In children with autism, initial language abilities have also been indicated as a predictor for later speech and language abilities. For example, Szatmari, Bryson, Boyle, Streiner, and Duku (2003) suggested that early language skills predicted later communication abilities in children with autism. Smith, Mirenda and Zaidman-Zait (2007) found that expressive language predicted vocabulary growth two years later in children with autism who had varying language abilities at baseline. Consistent with the findings from other studies, the authors also found verbal imitation skills, pretend play with objects and the number of gestures used to initiate joint attention, predicted later vocabulary growth.

For children with autism who do not use speech as their primary mode of communication, many speech-language pathologists will teach the use of AAC strategies to support social communication. This can include the use of pictures, sign language or speech generating devices. One of the most common AAC approaches used with this population is the Picture Exchange Communication System (PECS). Historically, concerns have been raised that using AAC would decrease the amount of natural speech a child will produce (Schlosser, 2003; Bondy & Frost, 1994), which has led to some reluctance in implementing these strategies. Research indicates that, although not a primary goal of PECS, some children have developed speech after using the system (Bondy & Frost, 1994; Charlop-Christy, Carpenter, Le, Leblanc & Kellet, 2002; Ganz & Simpson, 2004; Carr & Felce, 2007; Kravits, Kamps, Kemmerer, & Potucek, 2002; Tincani, 2004; Yoder & Stone, 2006).

A number of hypotheses have been proposed to account for the positive impact of AAC on speech development in children with autism. First, the AAC system may decrease the pressure the child feels to produce speech, and this stress reduction may facilitate speech outcomes (Lloyd & Kangas, 1994). Second, AAC systems may allow the child to avoid the motor and cognitive demands associated with speech production and focus solely on the goal of communication. After establishing a foundation in this area, the child may then be better able to allocate resources necessary for improving speech production (Romski & Sevcik, 1996). Third, behaviourists argue that the principles of automatic reinforcement encourage speech development based on Skinner's (1957) analysis of verbal behaviour. It has been suggested that the use of an AAC system such as PECS, together with spoken words, paired with a desired item (reinforcement), will not only increase AAC system use, but natural speech production as well (Millar, Light, & Schlosser, 2006).

The development of speech as a by-product of AAC-system use in children with autism is an outcome that has received limited attention in the literature. In an attempt to synthesize the results found to date, Schlosser and Wendt (2008) conducted a systematic review that evaluated the effects of AAC strategies on speech production in individuals with autism. They identified 27 participants across nine single-subject design studies and 98 participants across two group design studies that met criteria for inclusion in their review. Of these studies, they found five single-subject designs that used PECS as the AAC intervention, one single-subject design that compared PECS with sign language, and one group design that compared PECS with Responsive Education and Prelinguistic Milieu Teaching.

The most important finding of Schlosser and Wendt's (2008) review was that none of the studies found a decrease in speech production as a result of AAC intervention. However, the extent of speech gains did vary between studies. The authors suggested that since individuals diagnosed with autism tend to be a very heterogeneous population, these individual differences could, in part, distinguish those children who will develop speech from those who will not.

PECS is a picture-based communication system that teaches children to communicate within a social context (Bondy & Frost, 1994). The protocol is divided into six phases that parallel typical language development. Instruction in each phase uses the basic principles of applied behaviour analysis, such as shaping and differential reinforcement, to teach children to initiate communication. In initial phases, children are taught to request items by giving a picture to a communicative partner in exchange for the item. As stages progress, children learn how to seek out a communication partner, construct multi-picture sentences, and use different communicative functions (Bondy & Frost, 2001).

Since its development, PECS has become one of the more popular AAC strategies used with children with autism for several reasons (Mirenda & Erikson, 2000). First, PECS does not require children to have prerequisite skills such as imitation or attending skills that are necessary for success with most other AAC systems (Bondy & Frost, 1994). Second, PECS begins instruction by teaching children to request, in contrast to most traditional speech and language intervention techniques that first teach children to label. Bondy and Frost (2001) suggest that requesting should be taught first to children with autism since tangible items (e.g., food, toys) can provide more concrete reinforcement. This type of consequence is more motivating to children with autism as compared to social reinforcement (e.g., verbal praise) typically received for labeling (Bondy & Frost, 2001). Third, PECS is a relatively cost-effective and easily portable approach that can be implemented in a variety of settings (Charlop-Christy et al., 2002), making it appealing to both families and professionals.

The acquisition of "useful speech" as an effective mode of communication by age 5-6 years has been identified as one of the best predictors of later adaptive functioning and overall outcome in children with autism (Gillberg & Steffenburg, 1987; Tidmarsh & Volkmar, 2003). This finding is extremely relevant to speech-language pathologists, who focus on improving the communication skills of children in this population. Teaching a child with autism to communicate through speech using traditional methods can be an intensive and lengthy process, with outcomes being variable — and generally unpredictable — for each child (Howlin, 1989; Bondy & Frost, 2001). One example of a traditional approach is the use of operant methods to teach children to speak using imitative responses of words or word approximations. Another is using a clinician-directed approach to establish verbal responses during elicitation tasks such as labelling. The assumptions of both these approaches is that children with autism have the basic prerequisite skills to engage in this form of learning (e.g., sitting and attending skills), the prompts used for teaching can be easily faded out to allow for spontaneous use of language, and learning verbal skills in one context will generalize to other environments or people; none of which may be true for certain learners (Bondy & Frost, 2001). Therefore, there is a tremendous need in the field of speech-language pathology to understand how to best capitalize on gains in spoken language acquisition that may be made with AAC.

The present pilot study had two main purposes. The first purpose was to measure changes in the speech of children with autism using PECS following a parent-training model. Specifically, we examined pre and post intervention changes to speech sounds (e.g., 'ah', 'oo', etc.) and words (e.g., proper nouns and words found in the dictionary) used by children during requests. PECS was used because it is one of the more common AAC approaches chosen for implementation in clinical practice with children with autism. A parent-training model was selected because it has been demonstrated to be an effective intervention approach for children with autism (Brookman-Frazee, Vismara, Drahota, Stahmer, & Openden, 2009; McConachie & Diggle, 2007) and early language delays (Roberts & Kaiser, 2011). It was also selected for reasons of ecological validity, described in further detail below. Studies have indicated that interventions that include opportunities for parents to practice their new skills with their child during the training session, and that include feedback in the practice session are more effective than parent-training interventions without these elements (Kaminski, Valle, Filene, & Boyle, 2008; Ingersoll & Dvortcsak, 2006; Kaiser & Hancock, 2003; Kaminski et al., 2008). As a result, our parent-training model included practice-with-feedback.

The second purpose was to determine if any changes in speech were related to the children's pre-intervention characteristics. Few studies have compared children's pre-intervention characteristics prior to AAC intervention to determine what skills a child possesses before training that may encourage speech development. Therefore, in this study, extensive pre-intervention assessment was conducted of each child's language, symbolic representation, imitation and adaptive functioning.

A supplementary purpose of this study aimed to establish an ecologically valid and reliable design that could be used on a larger scale in future research. We sought to establish ecological validity by implementing PECS in a manner consistent with clinical services offered to families of children with autism in the community in which the study was conducted. Children with autism residing in the study region who receive PECS instruction in the context of speech and language services, tend to receive 30 to 60 minutes of therapy per week. Additional in-home support services for PECS are also available to families through Applied Behaviour Analysis (ABA) programs and children's treatment centers. In our study, parents received PECS training in clinic once per week for thirty minutes, similar to what may occur during one type of direct speech and language therapy. Families were then asked to continue using PECS at home with their child, and consultation was also provided once per week in the home environment. This type of scenario is similar to what may be offered by in-home ABA support services.

Method

Participants

Three male children with autism spectrum disorder participated in the study. All participants (a) had a diagnosis of autism spectrum disorder made by a child psychiatrist, developmental paediatrician or multidisciplinary team; (b) came from a home in which the primary language spoken was English; (c) had normal hearing according to audiological assessment; (d) had not been taught to use an AAC system prior to the study; and (e) were considered to have no functional verbal language, defined by fewer than 20 different words used communicatively (Yoder & Stone, 2006). Although not a requirement to participate, none of the children were enrolled in any other therapies for the duration of the study. The *Pragmatics Profile of Everyday Communication Skills in Pre-School Children – Revised (PPECS-R)* was used to obtain information from parents regarding their children's communication skills prior to intervention.

Participant 1 was aged 3 years, 5 months at study outset. His parents reported that he did not use any spontaneous speech but relied on gestures to communicate, which was consistent with researcher observations. They also reported that he initiated communication infrequently, and when he did, requests for food or access to favourite toys were the primary messages. When requests were denied or delayed, he sometimes exhibited maladaptive behaviour. Observations of Participant 1 prior to intervention also revealed minimal joint attention abilities, delayed play skills and a restricted range of interests. Participant 1's mother was 31-years old, of Korean ethnicity, with a university education.

Participant 2 was 3 years, 5 months at study outset. His mother reported that he did not use spontaneous speech and rarely initiated communication. She also reported that when he did initiate communication, he used gestures. Communication mainly surrounded requests for desired objects; however, in general, he persistently attempted to access items independently, including moving or climbing on furniture. Occasionally, Participant 2 would also request to engage in social games he played with his mother. These reports were consistent with what was observed prior to intervention. In addition, Participant 2 exhibited poor joint attention abilities and a tendency to easily lose interest in objects and activities. Participant 2's mother was 40-years old, of South African origin, and had a college education.

Participant 3 was aged 2 years, 4 months at study outset. His mother reported that he did not use spontaneous speech to communicate and he rarely initiated communication. She indicated that his preference was to use gestures to request desired objects or food; however, on other occasions he would look at a desired object and cry. His mother reported his preference was to play on his own, typically walking away when others attempted to engage with him. She also reported that he had a very limited number of preferred toys or food items. The information obtained from the parental report was consistent with observations of Participant 3 in the clinic. In addition, he displayed severely delayed joint attention and play skills. Participant 3's mother was 37-years old, Caucasian and had completed high school.

Setting

Assessment and PECS Training Sessions. Assessment and PECS training were conducted in the H. A. Leeper Speech and Hearing Clinic at Western University. During the pre-intervention assessment, several preferred items were placed around the room. During PECS training, a subset of preferred items would be placed in the room at the beginning of clinic visits. Some would remain out of reach until training began and others were available for the child to play with while the child's mother discussed the progress made since the last visit, and goals for the current session, with the researcher. This process lasted approximately one to five minutes. Assessment and PECS training sessions were videotaped by a member of the research team who was present in the room.

Home visits. During home visits, children used PECS in various rooms of the house (e.g., living room, kitchen, dining room). In general, home visits only included the child, the mother and the researcher; however, on occasion, the child's father or sibling would be present and at times participated. Participant 1 also had two visits conducted at the daycare setting he attended during the final month of PECS training. The research team provided consultation to the daycare staff regarding ways to implement his PECS skills into their program (e.g., snack time, circle time).

Materials

Preferred Items. Preferred items were chosen based on observed preferences during assessment, parental input and ongoing preference assessments throughout the study. Preferred items included toys, books, food and activities that each child found reinforcing. Examples of toys include cars, balls, tops, musical toys, bubbles and electronic toys. Examples of books include magazines, auditory books and picture books. Activity examples include colouring, painting, tickles, videos and social games. Food items were only used with Participant 1 and included fruit snacks, Smarties and fish crackers.

PECS Materials. All picture icons were created using the *Pics for PECS* software provided with the PECS training manual. For pictures of preferred items that were not available via this software, identical images of the items available from the Internet were used. All picture icons were in colour and a small piece of Velcro was attached to the back. For Participant 1 and 3, the picture icons were 1.75" X 1.75" throughout the entire study. For Participant 2, during initial training, picture icons were enlarged to 4" x 4". However, as the training progressed his picture icons were systematically decreased in size to 2" x 2".

At the appropriate time in the training, children were provided with a three-ring binder (15cm x 23cm) to use as their communication book. The binders had several thin strips of Velcro attached to both the outside and inside, on which picture icons could be adhered. At the bottom edge of the binder, there was a longer additional piece of plastic known as the sentence strip, which was used in later phases of PECS training. This had Velcro on one side to adhere it to the communication book, and Velcro on the other side for adhering the picture icons. An example of picture icons used is provided in Figure 1.

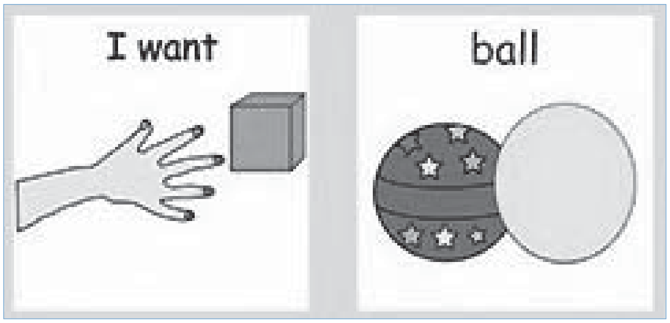

Figure 1: An example of picture icons used by children as would be seen on the sentence strip.

Procedure

A single-subject, changing criterion design was used to evaluate the collateral effects of PECS training on speech development. A set of three language samples was conducted prior to and following PECS training to establish a representative sample of speech skills before and after intervention. To determine change across these samples, each child's speech/oral communication was assessed relative to the following dependent variables: (a) frequency of use of sounds to communicate across communicative intents; (b) frequency of use of words to communicate across communicative intents; (c) percentage of adaptive communication, either verbal or nonverbal; and (d) percentage of maladaptive communication, either verbal or nonverbal. Sounds were defined as any phoneme used in the English language (e.g., /p/, /i/) or phoneme combinations (e.g., /ba/, /badigu/) not separated by pauses that cannot be categorized as words. Words were defined as any language form found in the Webster's English Dictionary or proper nouns (e.g., Dora, Mickey). Adaptive communication was defined as any behaviour used to send a message to the listener (e.g., verbal, non-verbal or both combined) that would be considered appropriate by most adults, for example, pointing to an item to make a request, turning a head away from an object to indicate protest/refusal or taking an adult's hand to gain attention. Maladaptive communication was defined as any behaviour used to send a message to the listener (e.g., verbal, non-verbal or both combined) that would be considered inappropriate by most adults, for example, tantrum behaviour such as screaming and crying to request an item, hitting a person to indicate protest/ refusal, or biting the listener's arm to gain attention.

Language probes were also conducted once per month to measure changes in speech throughout the intervention.

Pre-Intervention Assessment

Language. Three, 20-minute language samples were collected approximately one week apart to provide baseline information about the children's speech skills in context. Researchers created a play setting in the clinic room by making preferred toys available for the child to access. Researchers then interacted with the child and created communicative temptation scenarios to provide an opportunity for the child to communicate (e.g., provide bubbles with the lid on, place desired item slightly out of reach, etc.).

Standardized assessment of language was conducted using the *Preschool-Language Scale – Fourth Edition* (*PLS-4;* Zimmerman, Steiner & Pond, 2002). The *PLS-4* was chosen to provide a measure for receptive and expressive language that ranges from birth onward, therefore having the capability of capturing early developing language skills. With this tool, we were able to obtain a standard score for language ability using caregiver report, observation or elicitation tasks.

Adaptive Functioning and Socialization. The Parent/ Caregiver Rating Form for the *Vineland Adaptive Behaviour Scale – Second Edition (VABS-2*; Sparrow, Cicchetti & Balla, 2005) was used to measure the children's level of overall adaptive functioning in their environment. The Socialization subdomain was also used to evaluate the children's social interaction skills.

Imitation. Two types of imitation skills were assessed: a) motor imitation (with and without objects) and b) verbal imitation. Motor imitation was assessed using the Visual-Motor Imitation subtest of the *Psychoeducational Profile – Third Edition (PEP-3*; Schopler, Reichler, Bashford, Lansing, & Marcus, 1990.). Verbal imitation skills were assessed using the *Early Echoic Skills Assessment (EESA*; Esch, 2008). This informal tool assessed the child's ability to imitate early developing vowel and consonant sounds at the syllable and word level.

Symbolic Representation. Parents completed the *Communication and Symbolic Behaviour Scale-Developmental Profile (CSBS DP) - Infant and Toddler Checklist* (Wetherby & Prizant, 2002). The Symbolic Composite was used to measure symbolic representation skills in each child.

PECS Training

PECS training sessions were implemented by three, second-year graduate students in speech-language pathology at Western University. One student, the first author, acted as the primary researcher for this study and had additional training in the field of ABA, with six years' experience implementing PECS with children with autism. Each member of the research team had attended a PECS basic two-day training workshop offered by Pyramid Consultants before the study began. Prior to study outset, the primary researcher also provided training to the other two graduate students regarding basic principles of ABA. In addition, she provided regular feedback regarding each child's progress throughout the study.

In general, one member of the research team was assigned to work with a particular child for the duration of the study. However due to scheduling conflicts, occasionally another member of the research team would conduct the PECS training sessions. The mothers of all three children received training with their child in clinic, and were also primarily involved in home visit consultations.

Clinic visits occurred once per week, during which time the mothers were taught how to implement PECS with their child following the protocol outlined in the PECS training manual (Frost & Bondy, 2002). All children began at Phase 1 and, upon mastery, moved forward through each phase in sequence. A description of each phase is provided in Table 1. Mastery criterion was 80% correct independent trials (at least 10 trials per session) for three consecutive sessions, with at least two communication partners, in two different settings, with at least five items. Specific target behaviours for mastery and error correction procedures were unique to each phase and outlined *a priori* based on recommendations from the training manual.

The clinic sessions were 30-40 minutes in length. During the first five minutes of the clinic visit, the child's progress since the last visit and goals for the current session were discussed. During this time, the child was allowed to access a few preferred items. Then, PECS training occurred for approximately 30 minutes,

Table 1. Outline of PECS Phases Based on Recommendations from the PECS Training Manual – Second Edition (Frost & Bondy, 2002).

PECS Phase	Description
Phase 1 – "How" to Communicate	Children are taught to approach a communication partner and exchange a picture, at which point they receive a desired item
Phase 2 – Distance and Persistence	Children are taught to travel to their PECS binder and their communication partner at increasing distances. They are also taught to be persistent communicators regardless of what the communication partner is doing
Phase 3a – Picture Discrimination	Children learn to discriminate between pictures of preferred items and non-preferred, neutral and low-preferred items
Phase 3b – Picture Discrimination	Children learn to discriminate between pictures of highly preferred items
Phase 4 – Sentence Structure	Children are taught to build multi-picture sentences by placing an 'I want' picture icon and a preferred item picture icon on the sentence strip. They then exchange the sentence strip with the communication partner
Phase 5 – Responsive Requesting	Children learn to respond to the question "what do you want?" by going to their communication book and requesting a desired item
Phase 6 – Commenting	Children are taught to respond to various questions (e.g., "what do you see?", "what do you hear?"). Then they are taught to spontaneously comment using these sentence starters (e.g., "I see…", "I hear…")

with the researchers providing modeling and verbal feedback to train parents to implement PECS with their child. After PECS training, approximately five minutes was spent debriefing the parent regarding the current session, along with answering any more detailed parent questions. Parents were encouraged to implement the strategies learned in clinic at home with their child; however, no specific amount of time was recommended or required.

Home visits were also conducted once per week for approximately 30 minutes. During this time, researchers observed mothers using PECS with their child in the home environment. Feedback was given by the researchers regarding the parent's use of the strategies discussed in clinic sessions and the child's progress toward their current PECS goal. As well, specific parental questions were answered at this time. The home visits were designed to ensure generalization of PECS skills to an environment in which the child will most likely use PECS post-intervention. Also, these home visits were designed to provide support to parents experiencing challenges with the implementation of PECS specific to the home environment.

PECS training continued consistently for a five-month period with a two-week break for Christmas holidays when the H. A. Leeper Speech and Hearing Clinic was closed.

Probes. One PECS training session for each child was randomly selected per month to assess how speech was developing throughout the study. To maintain observational duration that was consistent with the language samples, the primary researcher watched only the first 20 minutes of the video recorded clinic session.

Post-Intervention Assessment

Language. Three, 20 minute language samples were collected post-intervention to ensure a representative sample of speech skills was captured. Researchers established similar conditions as described in the pre-intervention language samples such as setting up a play setting in the clinic room and creating communication temptation scenarios. A few of the preferred items available were different in the pre- versus post-intervention language samples. This difference was due to the fact that children had developed new preferences for certain items throughout the study. A second difference was that each child's PECS binder was available for use during the post-intervention samples.

Parent Questionnaire. A final parent questionnaire was given to collect information regarding maternal characteristics, frequency and duration of PECS use away from clinic and changes to behaviour and communication that the parents noted at home.

Analysis

At the outset of the study, planned dependent variables included frequency of sounds and words used to across communicative intents, and percentage of both adaptive and maladaptive communication. As the study progressed, it was noted that all three children's communicative functions were mainly restricted to requesting and protesting. Protest behaviour was rare and mainly restricted to non-verbal behaviour. In general, all three children chose to ignore the communication partner instead of engaging in maladaptive communication. During language samples, more consistent attempts were made to contrive protest behaviour to observe communicative responses. Following several attempts to elicit this type of communicative intent, children would use non-verbal protest behaviour to communicate with the researcher (e.g., turning a head, pushing object away). These types of communication exchanges were not contrived during the intervention process and protest behaviour rarely occurred spontaneously during this time. In contrast, the majority of non-verbal and verbal behaviour for all children occurred during requests, in both the gathered language samples and intervention sessions.

As a group, the children also did not exhibit any maladaptive behaviour to communicate during the pre and post assessment or intervention phases of the study. Typically, they would oscillate between engaging with the researcher or parent to make requests and disengaging all together. For example, children would walk around the room, sit on the floor or begin other self-stimulatory behaviours (e.g., playing with their fingers, pulling their clothing or rubbing the floor).

As a result of these observations, only the frequency of sounds used to request and the frequency of words used to request were analyzed. Requests were defined as the child independently approaching the adult and/or using sounds or words with the intent to send a message to a communication partner to access a desired item/activity (e.g., object or action). The vocalizations may or may not have been accompanied by a nonverbal behaviour (e.g., pulling adult's hand toward an item and saying /ah/, giving an item and saying /open/, exchanging a picture icon and saying /i-i-i-i/). Data were collected on dependent measures from video recordings of pre- and post-intervention language samples and from monthly probes of video recorded PECS training sessions.

Interobserver Agreement. Interobserver agreement (IOA) was calculated to determine the reliability of the observations by using a point-by-point agreement ratio. An agreement occurred when both observers independently recorded the same observation. Reliability was calculated by dividing the number of agreements by the total number of agreements plus disagreements and multiplied by 100.

The primary researcher and an unfamiliar observer independently coded observations. The unfamiliar observer was a second-year graduate student in Speech-Language Pathology at Western University who was not familiar with the children and was blind to the study purpose. Informal training of coding procedures was conducted prior to the unfamiliar observer watching the videos. Reliability was based on IOA data from language samples pre- and post-intervention.

With respect to the frequency of sounds used to request, the average IOA for Participant 1 was 99%, for Participant 2 was 71%, and for Participant 3 was 63%. With respect to the frequency of words used to request, Participant 3 was the only child for whom this calculation was relevant, and the average IOA was 100%.

It appeared that the difficulty in establishing higher reliability for some participants was mainly a result of disagreement regarding the communicative intent of the behaviour. The unfamiliar observer had a greater tendency to code behaviours as communicative compared to the primary researcher. Since the opportunity for both coders to reach consensus was not available, only those behaviours that both coders agreed upon in independent analyses were retained for analysis.

Results

Pre-Intervention Characteristics

Data for each child are summarized in Table 2 for all areas assessed.

Symbolic representation. Standard scores could not be calculated since participants were chronologically older than the maximum age established for the *CSBS DP - Infant and Toddler Checklist* norms. Therefore, symbolic representation skills were compared based on each child's raw scores from the Symbolic Composite. The participant's raw scores ranged from 9 to 13. Analysis of individual items revealed Participant 1 consistently looked when his name was called, understood 11-30 words or phrases without the use of gestures, played with a variety of objects, and used a few familiar items for their intended use (e.g., cup, bowl, spoon, toothbrush). He did not exhibit any pretend play. Participant 2 had a similar profile, however attending to his name was inconsistent; he understood 4-10 different words or phrases without gestures and engaged in some pretend play. Participant 3's individual item responses were identical to Participant 1's except his parents

Table 2. Individual Performances on Measures of Symbolic Representation, Imitation, Language, and Adaptive Functioning Administered Pre-Intervention.

PECS Phase	Participant 1	Participant 2	Participant 3
CSBS:DP Symbolic Representation raw score	11	13	9
PEP-3 Visual Motor Imitation percentile rank	13th	22nd	44th
EESA Verbal Imitation raw score	0	0	5.5
PLS-4 Auditory Comprehension standard score (95% CI)	50 (50-57)	50 (50-57)	61 (54-68)
PLS-4 Expressive Communication standard score (95% CI)	61 (54-68)	61 (54-68)	68 (61-75)
VABS-2 Socialization standard score (95% CI)	61 (54-68)	63 (56-70)	65 (58-72)
VABS-2 Adaptive Behaviour standard score (95% CI)	52 (47-57)	61 (56-66)	65 (61-69)

Note. CSBS:DP = Communication and Symbolic Behavior Scales: Developmental Profile Infant/Toddler checklist; PEP-3 = Psychoeducational Profile, 3rd edition; EESA = Early Echoic Skills Assessment; PLS-4 = Preschool Language Scale, 4th edition; VABS-2 = Vineland Adaptive Behavior Scale Parent/Caregiver Rating form, 2nd edition

reported variability in attending to his name and occasional interest in different objects for play.

Imitation. Children's imitation skills were compared based on values obtained using the *PEP-3* and *EESA*. Each child received a percentile score for the Visual Motor Imitation subtest on the *PEP-3*. Participant 1 received a below average score, while Participant 2's motor imitation was estimated to fall in the low average range. Participant 3 received a score that placed his motor imitation skills in the average range. Participant 3 also received the highest score for verbal imitation as assessed by the *EESA*. He received a raw score of 5.5 out of 25 for Group 1 targets, which included imitating syllables ah, oo, oh, wa wa, moo and baa. This is in contrast to Participants 1 and 2, who demonstrated no verbal imitation skills for any targets.

Language. All three participants performed significantly below average on both the Auditory Comprehension and Expressive Communication subtests of the *PLS-4*. Receptive language skills were at the 1st percentile for all participants. Expressive language skills were at the 1st percentile for Participants 1 and 2, and at the 2nd percentile for Participant 3.

Adaptive functioning. Standard scores from the Socialization Subdomain and the Adaptive Behaviour Composite from the *VABS – 2* Parent/Caregiver Form were well below average for all participants. Parent reports placed socialization skills at the 0.5th percentile for Participant 1 and at the 1st percentile for Participants 2 and 3. Adaptive behaviour functioning was below the 1st percentile for Participants 1 and 2 and in the 1st percentile for Participant 3.

Acquisition of PECS

Participant 1 met criterion for Phases 1, 2, 3a, 3b and 4. He was simultaneously learning Phase 5 and the attributes *big* and *little* at the time of reassessment. His mother reported they practiced PECS at home five days per week, for approximately 4 to 6 hours per week.

Participant 2 met criterion for Phases 1, 2 and 3a. He was progressing through Phase 3b when reassessment began. His mother reported they practiced PECS away from clinic six days per week, for an approximate total of 10 to 12 hours per week.

Participant 3 met criterion for Phase 1 and Phase 2. He was learning Phase 3a at the time of reassessment.

His mother reported they practiced PECS at home five days per week, totalling approximately 4 to 6 hours of training per week away from clinic.

Speech Requests

At baseline, the frequency with which Participant 1 used sounds to request ranged from 2 to 8 in the 20-minute sample. During PECS training, he began to show slight increases in this behaviour. At post-intervention, he continued to increase the frequency with which he used sounds to request, ranging from 8 to 18. Participant 1 was not observed to use any words to request at baseline, throughout training or post-intervention.

At baseline, the frequency with which Participant 2 used sounds to request ranged from 0 to 5. During PECS training, his use of sounds to request remained at baseline levels; however, at post-intervention, there was a slight increase in the frequency with which he used sounds to request, ranging from 1 to 12. Participant 2 was not observed to use any words to request at baseline, throughout training or post-intervention.

Throughout baseline, Participant 3's frequency of requests using sounds ranged from 2 to 18. Once PECS intervention began, the frequency with which he used sounds to request decreased steadily to zero and remained at zero throughout Phase 1. Upon introduction of Phase 2, Participant 3 began to increase the frequency with which he used sounds to request, ranging from 0 to 4 post-intervention. At baseline, he did not use any words to initiate requests. During the intervention, he used the word *bye-bye* paired with the exchange of a picture icon, to request to play by himself. Post-intervention, Participant 3 initiated requests using the word *open*, accompanied by giving a closed container or bag to the adult, on four occasions.

All children accompanied sound use with a nonverbal behaviour to initiate requests. As well, Participant 3 consistently used nonverbal behaviour to support all word use. Data for each child are shown in Figure 2.

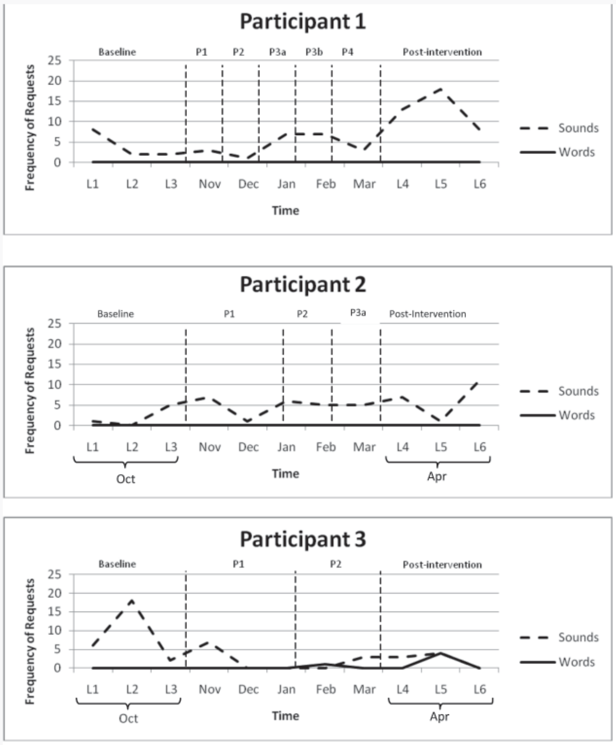

Figure 2: Frequency of requests made with sounds and words during baseline, PECS training and post-intervention for each participant. P1, P2, P3a, P3b and P4 reflect PECS stages.

Discussion

In this pilot study, three children with autism were taught to use PECS using a parent-training model. Mothers were trained to implement PECS with their child in a clinical context and then generalized their child's PECS skills in the home environment. A single-subject, changing criterion design was used to measure collateral changes in speech that occurred during PECS training. Several studies have shown improvements in speech after children with autism have used the PECS system (Bondy & Frost, 1994; Charlop-Christy et al., 2002; Ganz & Simpson, 2004; Carr & Felce, 2007; Kravits et al., 2002; Tincani, 2004; Yoder & Stone, 2006). To our knowledge, this is the first attempt to include extensive assessment of children's pre-intervention characteristics across multiple domains in an effort to identify features that distinguish those children who develop functional speech after PECS use from those who do not. The results of this study suggest that children with stronger imitation skills pre-intervention may be more likely to develop speech after PECS intervention.

The first goal of the study was to measure changes to speech in children with autism following PECS intervention. All three children showed unique data patterns between pre and post intervention. Participant 1 showed an increasing trend from baseline to post-intervention in his use of sounds to request. He did not use words to request throughout the duration of the study. Data for Participant 2 showed relatively no change to his use of sounds during requests throughout the study. He also did not use any words at the study outset, throughout the duration of the study, or at post-intervention. Finally, Participant 3 was using more sounds to make requests at baseline compared to the other two children. Once PECS intervention began, his use of sounds to request declined to zero; however, during Phase 2, this behaviour began to increase. More interestingly, data showed that Participant 3 was the only child to start using words to request through the intervention period and at post-intervention. Anecdotally, it is also relevant to note that Participant 3 was also using words in other contexts throughout the study that were not captured during the language assessments or during video recordings of PECS training. During the beginning of Phase 1 training, Participant 3 would spontaneously say "bye-bye" to the researcher when leaving the clinic. He also spontaneously imitated words during PECS training, such as "yay" and "thank you" and displayed delayed echolalia for words he had previously heard, such as "wow" and "smile for me."

The second goal of the study was to determine if changes to each child's speech could be related to their individual pre-intervention characteristics. Evaluation of pre-intervention characteristics failed to reveal skill differences among the children with respect to socialization and receptive and expressive language; confidence intervals from the *VABS – 2* Socialization subdomain and *PLS – 4* standard scores overlapped. With respect to overall adaptive functioning as measured by the *VABS – 2*, Participant 3 was slightly stronger than Participant 1 given the non-overlapping confidence bands. There were also minimal differences between children's symbolic representation skills when comparing scores received on the *CSBS DP – Infant and Toddler Checklist*, with Participant 3 having slightly poorer symbolic representation skills than the other two boys. Since these results indicated that the children had similar skills at pre-intervention with respect to language, socialization, adaptive functioning and symbolic representation, it suggested that these skill domains may not be related to changes in their speech.

The most relevant finding with regards to pre-intervention characteristics was that Participant 3 had notably better imitation skills than the other two participants as measured by the *EESA* and the *PEP-3*. Not only did he have stronger motor imitation skills (with and without objects), but he was the only child who demonstrated verbal imitation skills at study outset. Since Participant 3 was the only child to begin to use words to request, this result could suggest that stronger imitation skills may increase the likelihood of functional speech developing after PECS intervention. This finding is consistent with suggestions from Charlop-Christy et al. (2002) that imitation skills may facilitate changes to verbal behaviour, and with results from Schwartz, Garfinkle and Bauer (1998) that children who could imitate during and following PECS intervention made greater improvements in speech production compared to those who could not.

Further interpretation of these results requires the consideration of findings from previous research for a more accurate analysis. First, Participant 1's data showed an increase in sounds used to request throughout PECS intervention; however, these data should be interpreted with caution. Although Participant 1 did show an increase in sounds used to request, he did not use any words. As well, the sounds Participant 1 used were a random assortment of phonemes that were always accompanied by nonverbal behaviour (e.g., exchanging a picture and saying "aidagadu") but also frequently occurred when he was on his own, away from a communicative context. Previous research from Ganz and Simpson (2004) suggested that changes to non-word vocalizations were not related to changes in word use after children used PECS. Therefore, although Participant 1 began using more sounds during requests, this may not be indicative of the development of functional speech.

Inspection of Participant 3's data might be initially interpreted as support for the hypothesis that children's speech will decline with AAC intervention, but this initial assumption could be misleading. Bondy and Frost (1994) pointed out that some children who do develop speech after PECS use, will, at some point, display a period where picture use is their only effective communication method. Research also suggests that significant increases in word use may not be seen until Phase 3 or 4 in PECS, or perhaps ever later (Ganz & Simpson, 2004; Kravits et al., 2002; Bondy & Frost, 1994). Since Participant 3 was just starting Phase 3, it is possible that the higher frequency of verbal behaviour to make requests is just the beginning of an increasing trend.

One limitation of this study was that the design did not account for maturation. Therefore, it is possible that the changes in speech would have occurred regardless of PECS intervention. A second limitation was the limited time within which PECS intervention occurred. The short study duration makes it difficult to observe any large or long-term changes to sound and word use. Also, research suggests that increases to word use are mainly seen in later stages of PECS, therefore the trends in the data may have appeared different for each child if progress was tracked for a longer period. Third, assessment tools used to measure pre-intervention characteristics may not have captured the entire extent of each child's specific skill level in that area. For example, although the *PLS-4* provided a standardized method of testing and comparing scores, a more informal method may have captured more specific language differences. Also, the *Communicative and Symbolic Behaviour Scale* offers a more in depth assessment of prelinguistic skills, including symbolic representation, compared to the *CSBS DP – Infant and Toddler Checklist*. This standardized tool would have also yielded percentile ranks and standard scores for a more accurate comparison of skill level. A fourth limitation is that this study included only three children. It is possible that additional participants would have revealed different patterns in pre-intervention skill level and speech outcomes, therefore influencing the overall interpretation of the results. Finally, fidelity measures were not taken during intervention, therefore, it is possible that the method of intervention delivery was not consistent across participants and may have had an effect on the outcomes seen. Although this is a consideration, it is important to remember that the way the intervention was provided in this study is reflective of how intervention is delivered in the community and is therefore in keeping with the goal of ecological validity.

Although it is rare for speech-language pathologists to offer home training services similar to what occurred in this study, it is not uncommon for children with autism to have access to this type of support through other means offered concurrently with speech and language treatment. This could include home training provided by ABA programs, as well as access to workshops and training offered by community children's treatment centers. Based on this, we felt the intervention model used in this study realistically captures what can happen in the community to support these families, therefore achieving the goal of ecological validity for this study design. Future research could consider eliminating the home visits but providing details regarding other community support resources families received during the intervention. The challenge with this model would be the likelihood that the children would not receive the same kind of support from the community, therefore adding a confounding variable to the interpretation of the final results. Although this confounding variable would be a factor to consider, research that lists the services families accessed outside of the clinical context may be more practical for most speech-language pathologists to conduct within their practice, rather than providing those services themselves.

Another point to consider regarding the home visits in this study relates to the amount of time parents implemented PECS in the home. Based on post-intervention parent report, mothers stated they used PECS with their child approximately 1-2 hours per day. It is unclear whether this frequency of PECS use at home would have occurred in the absence of the home visits, which may have acted as an incentive for regular use. Future research could examine the level of impact home support has on parent performance with regards to PECS use in the home.

Future research should include larger sample sizes and a study design that accounts for maturation. The effects of a longer period of intervention should also be examined, namely, a duration that allows children the opportunity to master all PECS phases. This increased period of observation would also provide greater opportunity to study long-term changes in speech, as well as other communicative functions. In addition, examination of changes to non-verbal communicative behaviour would also be valuable. Our clinical observations were that all three children initiated communication more often using PECS. Future research could more objectively compare how often children use speech to communicate in the context of their overall communicative rate including PECS. Also, measuring changes to other prelinguistic skills would be informative to clinical practice. Following this study, all parents reported their children showed increases in intentional communication at home, comprehension of language, eye contact and imitation skills. This type of evidence would be valuable to clinicians making treatment recommendations to families of children from this population. Finally, it would be useful to include assessment of other skills such as joint attention and play skills that research has suggested are also related to later expressive language growth in children with autism.

Overall, results from this study suggest that stronger imitation skills may encourage speech development as a collateral effect of PECS training. Given the preliminary nature of this study, this finding should be interpreted with caution. This pilot study was able to provide an ecologically valid framework upon which future research can build to examine why some children with autism develop speech after PECS use. This contribution is especially valuable to the clinical literature in speech-language pathology where there is great need for ecologically valid research that will enable clinicians to provide families with more information about potential treatment outcomes. Continued research in this area is critical, not only for speech-language pathologists, but for other professionals who implement PECS with children with autism. If research can confirm what type of speech improvements occur with PECS, and with whom they are most likely, we can capitalize on a simple intervention procedure that could significantly alter outcomes in the lives of children with autism.

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Sentence Final Hearing Aid Gain Requirements of Some Non-English Languages

Ajustements spécifiques de gain des appareils auditifs pour les finales de phrases de certaines langues autres que l'anglais

Marshall Chasin

Abstract

The speech intelligibility index (SII) has many uses for assessing aided gain from hearings aids. In an effort to extend the various hearing aid fitting formulae to non-English languages, some researchers have modified the SII. These changes result in a number of frequency response-related issues such as an increase in the low frequency region due to a language being tonal or morae based. Nevertheless, the SII provides no information for supra-segmental, morphological or syntactic properties of a language. Linguistic differences that would not show up on a measure of the SII are the subject of this study. Specifically, languages that possess a syntactic word order of subject-object-verb (SOV) have lower intensity sentence final levels than English. It was hypothesized that in these SOV languages more gain for soft-level (sentence final) inputs would be required than when listening to, or speaking English. One hundred and two bilingual hard of hearing subjects (71 female and 31 male) who spoke English as well as another language possessing a SOV word order and who were undergoing a routine clinical hearing aid evaluation were assessed. Each of the subjects was provided control over the NOAH hearing aid module and was instructed to adjust the amount of gain required for soft-level inputs while listening to .wav files of cold running speech in their non-English language, as well as while listening to a similar .wav file of English. Differences in the amount of gain desired for soft-level inputs for each of the 102 subjects was recorded at 1000 Hz. Clinical information was provided concerning how the amount of hearing aid gain for soft-level inputs can be changed as a function of language that inherently has less sentence final intensity than English. Results indicate that languages that possess a SOV word order requires about 3 dB more gain for soft-level inputs found in a sentence final position (verb) than for languages that possess a SVO word order such as English. This finding, based on a suprasegmental characteristic of speech, would not be seen on conventional measures of SII.

Abrégé

L'index d'intelligibilité de la parole (IIP) a de nombreux usages pour évaluer le gain d'appareils auditifs. Dans un effort d'appliquer les différentes formules d'ajustement des appareils auditifs à des langues autres que l'anglais, certains chercheurs ont modifié l'IIP. Ces changements aboutissent à un certain nombre de problèmes reliés à la réponse en fréquence comme une augmentation dans les basses fréquences due au fait qu'une langue soit basée sur les tons ou les morae. Quoi qu'il en soit, l'IIP ne donne aucune information pour les propriétés supra-segmentales, morphologiques ou syntaxiques d'une langue. Des différences linguistiques qui ne ressortiraient pas sur une mesure de l'IIP font l'objet de la présente étude. Plus précisément, les langues possédant un ordre syntactique de type sujet-objet-verbe (SOV) ont des niveaux de finales de phrases de plus faible intensité que ceux de l'anglais. On a posé l'hypothèse que, dans ces langues SOV, plus de gain pour l'input de faible niveau (finale de phrases) serait nécessaire que quand on écoute ou on parle l'anglais. Cent deux participants bilingues malentendants (71 femmes et 31 hommes) parlant l'anglais ainsi qu'une autre langue de structure SOV et consultant pour une évaluation clinique de routine de leur appareil auditif furent évalués. On a donné à chacun des participants le contrôle sur le module NOAH dédié aux appareils auditifs et on leur a demandé d'ajuster la quantité de gain nécessaire pour les inputs de faible volume lors de l'écoute de fichiers .wav d'un passage verbal sans changement d'intonation dans sa langue, autre que l'anglais, ainsi qu'en écoutant un fichier .wav semblable en anglais. Les différences dans la quantité de gain désirée pour les inputs à faible volume pour chacun des 102 participants ont été enregistrées à 1000 Hz. L'information clinique a été fournie au sujet du changement possible de la quantité de gain de l'appareil auditif en fonction d'une langue qui a, de façon inhérente, des finales de phrases moins intenses que l'anglais. Les résultats indiquent que les langues qui ont un ordre de mots SOV ont besoin d'environ 3dB de plus de gain pour des mots de faible intensité trouvés dans une position finale de phrase (verbe) que pour des langues possédant un ordre de mots SVO, comme l'anglais. Cette constatation, basée sur les aspects supra-segmentaux de la langue, ne serait pas perceptible à partir des mesures conventionnelles de l'IIP.

KEY WORDS
HEARING AIDS
LANGUAGES
AMPLIFICATION
COMPRESSION

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Introduction

The use of speech as an input to a hearing aid has been well studied over the years. Among them, Cox and Moore (1988) and Cornelisse, Gagné & Seewald (1991) have calculated the long term average speech spectrum (LTASS) in an effort to determine both the output and the gain required for hearing loss in order to establish sufficient audibility. The calculations required for audibility are essentially ones involving the estimate of a person's frequency by frequency acuity (e.g., the audiogram), the electro-acoustic features of a hearing aid (specifically gain and output), and the intensity and spectral energy distribution of the input. Altering some of the electro-acoustic parameters of a hearing aid, within the limits of its technology, can often place amplified speech into a region that is both audible and does not exceed a person's loudness discomfort level. While the nature of the audiogram tends to be well defined, as does the nature of the electro-acoustic manipulation of the hearing aid, the precise nature of the speech input to the hearing aid still requires some study. Specifically, how does the specification of the electro-acoustic parameters in a hearing aid vary as a function of different non-English languages?

Byrne et al. (1994) studied the long term average speech spectra of 12 languages from around the world (including several dialects totalling 18 samples) and found that "The similarity of the LTASS across samples demonstrates that it is reasonable to propose a universal LTASS, which should be satisfactory for many purposes and applications to most, if not all, languages." (p. 2119). This is actually not too surprising since all language samples emanated from a human vocal tract that has a similar range of outputs. A low back vowel in Portuguese is articulated in a similar manner to a Chinese one. The issue however is not the similarity in LTASS, which is predictably the same throughout the world, but the differences in the frequency bands that carry differing levels of speech clarity. These band importance functions such as the speech intelligibility index (SII) can, and do, vary throughout the world.

Based on the work of Studebaker and Sherbecoe (1991), the SII, and its predecessor the articulation index (AI), have been shown to be quite useful in the determination of which sounds tend to contribute known amounts towards the audibility and thereby, the intelligibility. These can be language specific and are well defined measures of the importance for various bands contributing towards the intelligibility of the language (ANSI, 1997).

The language specific SII can be quite useful and show differences that can be useful to make changes in the frequency response of hearing aids. Specifically Kewley-Port, Burkle, & Lee (2007) and Wong, Hola, Chua, & Soli (2007) have shown an increased importance of the SII for the lower frequency bands in Chinese due to the phonological importance of tones (occurring on the vowels). An increased gain in the low-frequency region for Chinese would serve to improve intelligibility, at least in quiet situations. It is predicted that in the next few years more work will undoubtedly be done in calculating non-English SII measures. These calculations will be important and will provide important frequency response shaping information. A discussion of how changes in the SII may affect the frequency response settings can be found in Chasin (2008a).

Nevertheless, the SII only provides part of the picture. The SII has some limitations and these include being based on only the phoneme, or at most, short utterances. The SII provides no information on the larger syntactic or morphological structures in spoken language. Some languages such as Japanese, and to a lesser extent, Vietnamese, have a rigid consonant-vowel-consonant (CVC) morphological structure. Does a hearing aid require a faster release time on the compressor than would be the case in English such that the quieter consonant achieves sufficient audibility if it follows an intense vowel? The SII would provide no information on this.

Another linguistic issue that cannot be observed in a SII measure, and that is the subject of this study, refers to the importance of the word order within a sentence. In English, there is a SVO word order. Due to lung volume constraints, sentence final utterances are less intense than those found sentence initially we simply run out of air. Sentence final nouns such as objects locally increase the intensity. Content words such as nouns are typically more intense than function words such as pre-positions, adjectives and verbs. Languages with a SVO word order typically have a greater sentence-final intensity than other languages that have no sentence final nouns. In contrast, SOV languages tend to have the quieter "post-positions", verbs and adjectives in a sentence final position that is inherently less intense such that these words risk not being as audible as sentence initial words and nouns. This phenomenon is shown schematically in Figure 1a., Figures 1b and 1c show actual data using the spectral analysis program PRAAT. Figure 1b shows the English sentence "My mother is at home" with a sentence final noun 'home'. Figure 1c shows the Korean sentence "A pretty picture is hanging on the wall" with a sentence final (present progressive) verb 'hanging'.

In many cases, people will be bi- or multi-lingual. Clinically, one can set a hearing aid to have one program

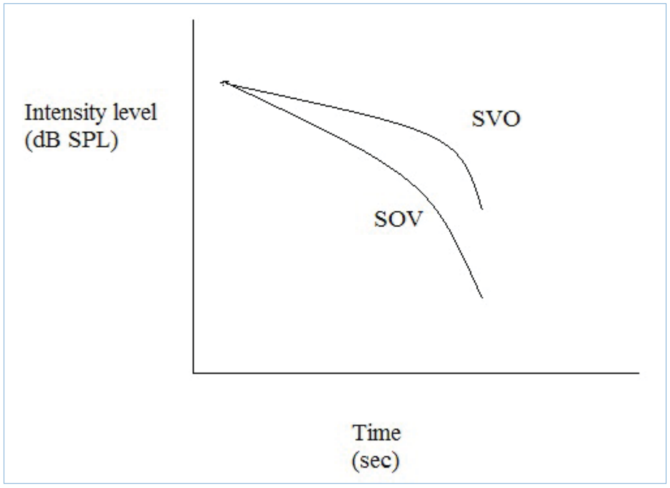

Figure 1a. A stylized decrease in speaking intensity as a function of time where sentence final segments and words are less intense than those in a sentence initial location. This natural decrease in vocal intensity is exacerbated in those languages that have a SOV word order with no content words (e.g., objects) near the end of the sentence.

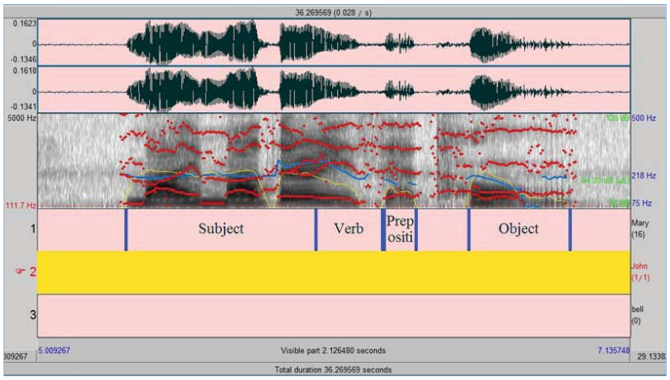

Figure 1b. PRAAT output showing the English (SVO) sentence 'My mother is at home.' http://www.fon.hum.uva.nl/praat/.

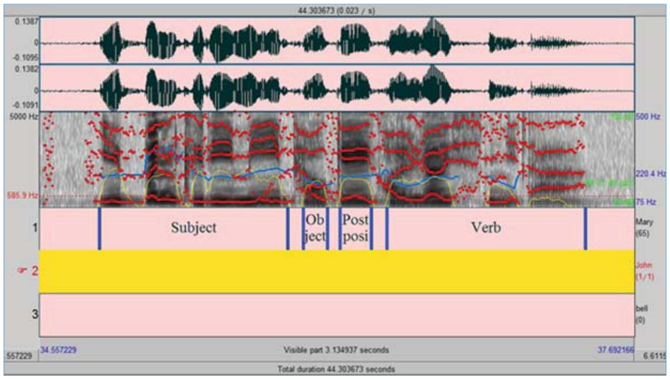

Figure 1c. PRAAT output showing the Korean (SOV) sentence "A pretty picture is hanging on the wall', with a sentence final verb. http://www.fon.hum.uva.nl/praat/.

function as "speech in quiet for English" and another program to function as "speech in quiet for Turkish" or other language. A list of commonly spoken languages that have a SOV word order is shown in Table 1.

Table 1. Examples of five languages that have a SOV word order with sentence final intensities being significantly quieter than for English. *Hindi and Urdu are considered to be the same language despite having different alphabets and different cultural roots.

Hindi-Urdu*
Turkish
Iranian/Farsi
Japanese
Korean

When it comes to assessing those language cues for hard of hearing people that are not represented in the SII, there is virtually no information in the literature. Chasin (2008a) provides some preliminary data as does Chasin (2011) but the analysis in the supra-segmental area for hard of hearing people is still in its infancy.

The purpose of this study is to determine how much, if any, additional amplification is required for hard of hearing bilingual speakers for soft-level inputs such as those found in a sentence final position in SOV languages. This would have ramifications for other soft-level inputs such as sibilants and other obstruent sounds but this has not specifically been studied in this paper. In contrast, the fitting characteristics of the obstruent sounds such as fricatives, affricates and stops would show up in measures of the SII, if they are linguistically distinctive in a particular language. This would relate to an increase in gain in the higher frequency region, probably above 3000 Hz.

It is hypothesized that in non-English languages that have a SOV syntactic structure, more hearing aid gain is required for soft-level (sentence final) inputs than for English given the same audiometric configuration. Accordingly the null hypothesis is that there should be no gain differences between English and SOV languages for soft-level inputs for a given hearing loss. Preliminary pilot work performed by Chasin (2008b) shows that the difference in hearing aid gain required for soft-level inputs for the languages mentioned in Table 1 are not statistically different and as such have been grouped together under the general heading of SOV languages.

Method

One hundred and two subjects who were clinical patients in a Toronto area audiology and otolaryngology practice (71 female and 31 male) were assessed over a twenty month time period. Each of the subjects spoke a SOV language as their first language and also spoke English with sufficient fluency, and cognitive ability to be able to understand instructions provided in English. In many cases, the subjects also spoke a third or even a fourth language. All subjects were provided with both written and oral information concerning the goals of the study and participation was entirely voluntary. The subjects had all agreed to have a hearing aid evaluation because of the degree of non-treatable or sensori-neural hearing loss, and the perceived need for amplification in some part of their daily lives. Audiometric configuration varied but all 102 subjects had at least a 45 dB HL hearing loss at 1000 Hz and were fitted with semi-occluding or fully occluding earmolds. None of the subjects had a hearing loss in excess of 85 dB HL at 1000 Hz. The audiometric high frequency hearing loss acuities ranged from 40 dB HL to "no response" at 4000 Hz.

Subjects who were not interested, had a severe to profound hearing loss, had limited English, or had cognitive difficulties (as reported by a family member) were excluded from the study. It is quite possible that for those people with severe and profound hearing losses, the gain for soft-level inputs would be very large for reasons of audibility rather than linguistic preference.

Digital recordings (.wav files) of cold running speech were made for English and five commonly used languages in a large metropolitan area that have a SOV word order. Shown in Table 1, these five languages were Hindi-Urdu, Turkish, Iranian/Farsi, Japanese and Korean. Linguistically, Hindi and Urdu are considered to be the same language despite having different alphabets and having different cultural roots. Using a MXL 770 condenser microphone and an M-Audio Firewire 410 audio digital recording interface, recordings were made using Pro-Tools 10 software spectral analysis and manipulation software (www.avid.com/US/products/Pro-Tools-Software) in a clinical sound treated audiometric booth. All .wav files were assessed spectrographically to ensure that there was no saturation effects and no DC offset bias (Adobe Audition CS5.5, www.adobe.com/products/audition.html). The .wav files were routed to KRK VXT 4 monitors (www.krksys.com) mounted at ± 45 degrees at ear level.

Between 2008 and 2010, the 102 bilingual (English and one of the five SOV languages being studied) hard of hearing subjects were recruited. These participants agreed to purchase bilateral hearing aids through the audiology dispensing clinic and were fit with hearing aids, initially according to the Desired Sensation Level approach (Scollie et al., 2005), and then with slight adjustments to the frequency response that may have been useful for issues concerning the naturalness of speech. These were all first time users. The "slight adjustments" in frequency response were made while listening to the English .wav files. Gain for soft, medium and high level inputs was specified. The subjects then were given control (via the NOAH module) over the amount of gain for soft-level inputs until they were satisfied with the quality of the sound. Specifically, the subjects were asked to "adjust the sound by using the 'up' and 'down' arrows on the computer keyboard until you feel that sound is the most comfortable" while listening to first, recorded English, and then a recorded sample of their second SOV language. They were allowed to do this for as long as they desired. This was stored in the first program of the hearing aid. The reason for first adjusting the amount of gain for soft-level inputs was to familiarize the subjects to the expected sound quality that they may expect from hearing aids, since they were all first time hearing aid users. This was an ergonomic finding from Chasin (2008b).

The same process was duplicated with their second SOV language (while listening to their SOV language) only this time the subjects adjusted the gain for soft-level inputs themselves without any input from the audiologist. This was stored in the second program of the hearing aid.

The difference at 1000 Hz was calculated between programs one and two for each subject such that they served as their own control. Since each of the subjects had at least a 45 dB HL hearing loss at 1000 Hz, all were prescribed and fit with at least 15 dB of gain at this frequency. The choice of a measurement at 1000 Hz was partly arbitrary but fulfilled the two requirements that all subjects required amplification at this frequency and that all subjects had measureable hearing thresholds at this frequency. Slightly different results would probably be obtained if a different metric was utilized. A paired t-test was performed and tests were carried out at the $\alpha = .05$ level of significance.

For this study the English program was always set up first. This was done because the initial fitting of the hearing aids was associated with the necessary explanation and counselling. The hearing aid fitter was only conversant in English so it was clinically reasonable to continue with the English program first and the non-English SOV language second. There may be an order effect and this clinical decision may have ramifications as a source of error in this study.

All hearing aid fittings were performed with a probe tube microphone situated in the ear canal, and all measured differences selected on the NOAH module during the experiment were validated by probe tube microphone measures. This is in accordance with standard audiology practice at this clinical facility. Since this was a clinical research program, there were a number of different hearing aid models used, but all had the capability to have the gain for soft, medium and high level inputs specified separately.

Results

The raw data are shown in Figure 2 and the results are shown in Table 2. There is significant evidence to reject the null hypothesis that there should be no gain differences between English and SOV languages for soft-level inputs, (p <.001). For those languages assessed that possess a SOV word order, in order to hear the final elements of a sentence with sufficient audibility, more hearing aid gain is required for soft sounds. This amounts to approximately 3 dB greater gain (at 1000 Hz) than for a SOV language such as English.

Table 2. Statistical analysis showing significant evidence to reject the null hypothesis of no difference between the amount of gain for soft-level inputs, for the two syntactic linguistic forms.

t	df	Sig. (2-tailed)	Mean diff.	Lower CI limit	Upper CI limit
10.368	101	P <0.001	3.068	2.482	3.656

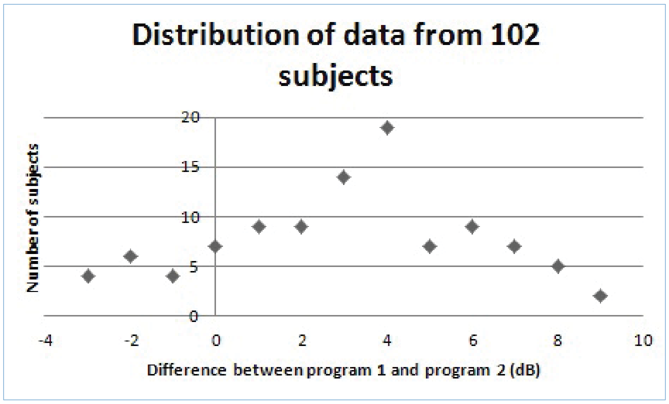

Figure 2: Raw data for all 102 subjects showing the difference for each subject between the English and the second SOV language, for the amount of desired gain for soft-level inputs.

An improved audibility for soft sounds, such as those that may be found at certain quieter syntactic locations, does not necessarily mean improved communication ability in noisy social environments. Depending on the individual, this may only be the first of several steps in the rehabilitative pathway.

Discussion

Modern hearing aids have the capability of having more than one program that can be independently adjusted for any number of listening situations. They can also be adjusted for listening to different languages, within certain limits.

Differences that can be observed on a SII or similar measure are those that may result in changes in the frequency response. This may include an increased low frequency gain for improved audibility of sonorants that may carry tonal information, an increase in the amount of gain locally at 3000 Hz for Slavic languages due the importance of palatalization that manifests itself in the third formant region (around 3000 Hz), or Arabic that has a proliferation of important high frequency cues because of the phonological importance of the various high frequency stops and affricates.

In contrast, differences at the syntactic or supra-segmental level where most of the nouns are clustered near the beginning of a sentence (e.g., SOV languages) appear to require more hearing aid gain for (sentence final) soft-level inputs. This ensures that sentence final elements are sufficiently audible to add to improved intelligibility.

There is a lack of research examining some supra-segmental elements in speech on hearing aid fittings. A literature review indicated no other research has been performed in this area other than Chasin (2008a; 2011. Of the small body of research that is marginally relevant to this area, all work has been performed at the phoneme level only, such as alterations in the SII for a particular language (Kewley-Port et al., 2007, and Wong et al., 2007). Phoneme level changes, as observed in language specific SII measures, will only result in frequency response changes. While this is an important area of research that has direct clinical ramifications, these studies only assess a portion of the language specific settings that might be required by a non-English speaker.

An area of future work involves whether these preference-selected settings that were obtained at the initial hearing aid fitting were actually preferred at a later point in time (e.g., six months or longer). Preliminary research indicates that that is indeed the case but the data are only based on a small sample. Another area of future work, and a possible source of error in this present study, is the order of adjustment. In this study the English program was set up initially, followed by the non-English SOV program. Although this was performed based on reasons of clinical expediency, the order of presentation and programming will be studied in greater depth in future studies.

This study, as well as the work of Kewley-Port et al. (2007) and Wong et al. (2007) has been performed for "speech in quiet" settings. It is quite possible that these suggested changes to the frequency response (in the case of SII phoneme level differences) or the amount of gain for soft-level inputs (in the case of SOV syntactic differences) are minimized in a noisier environment. For example, while Kewley-Port and Wong and colleagues suggest an increase in the amount of gain for low frequency (sonorant) sounds in tonal languages such as Chinese, the reduction in signal to noise ratio (with slightly greater gain being provided to background noise), may act in the opposite direction. It is quite possible that SII based- research that indicates a low frequency extension in gain relative to English may be possible, in conjunction with an algorithm that utilizes a technique such as modulation rate analysis that could help distinguish between low frequency environmental noise and low frequency speech information.

All hearing aids in this study have wide dynamic range compression; however some use varying time constants in various channels while others do not and this may have affected the subjects' preferences of their chosen settings. This is an uncontrolled feature of this work. However, given that the data have still achieved statistical significance, even while using potentially different technologies, these results can be viewed with greater clinical significance than if this study would have been done with potentially more similar hearing aids. A further modification of this study is being contemplated in using a virtual hearing aid that is entirely software driven. Truly identical hearing aid responses can be obtained within a well-controlled paradigm where all changes in the "compression engine" of the software can be implemented.

Another limitation is the preliminary finding from Chasin (2008b) that all SOV languages can be grouped together. It is quite possible that with better controls of the compression system (as suggested below) that subtle differences can be found between the various SOV languages that were missed on earlier analysis.

There are many elements of languages that have yet to be examined in sufficient detail and these include the nature of the release times for the hearing aid compressor for those languages that have a rigid morphology such as the Japanese CVCV structure. A more rapid release time may be appropriate for those languages such that the less intense intervocalic consonants achieve sufficient audibility.

Use of a virtual generic hearing aid in future studies may not only reduce the variability in the data but also be able to be implemented for a wide range of assessment of clinical audiology questions.

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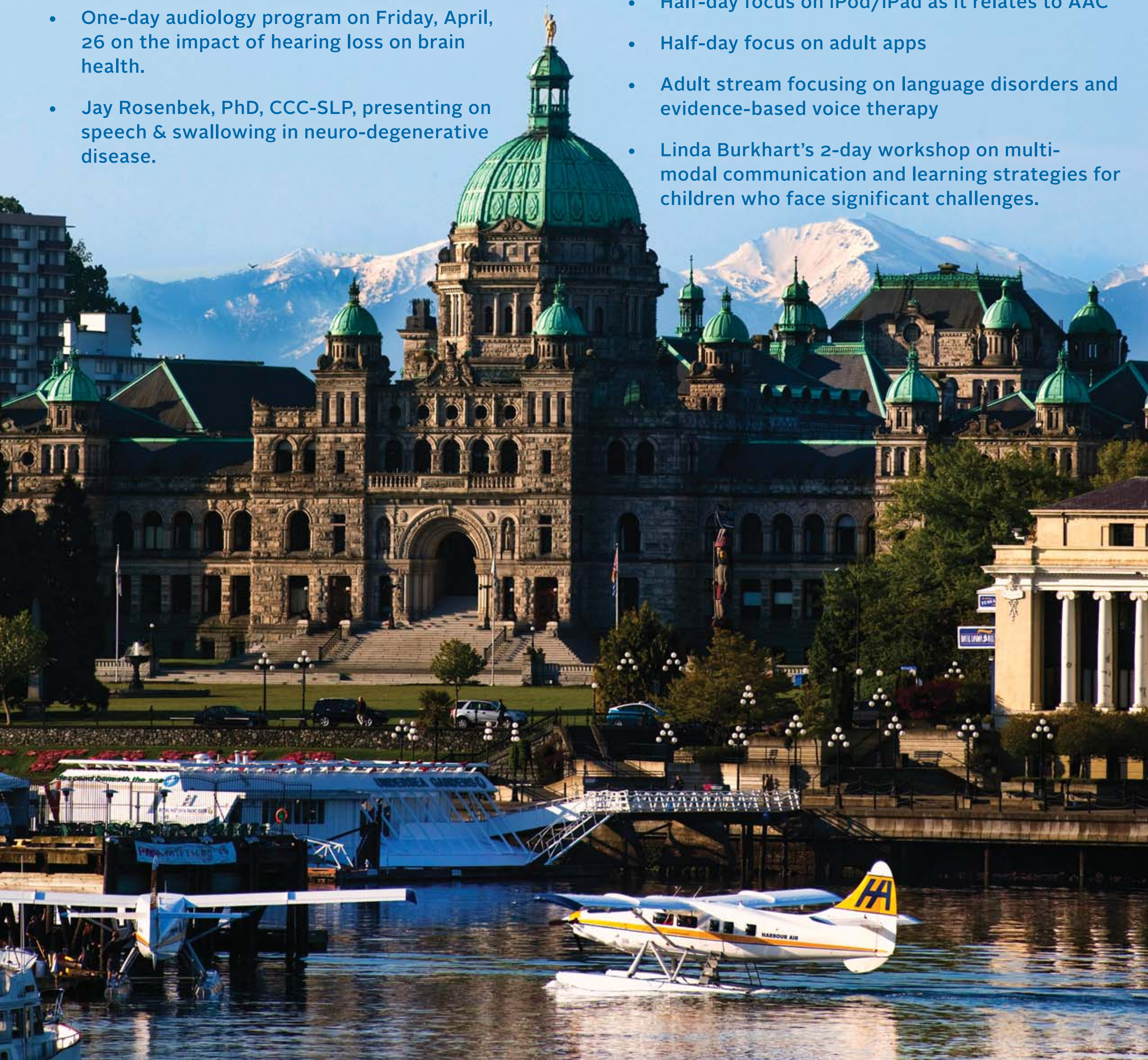

Listener Perception Beliefs of Stuttering, Prolonged Speech and Verbal Avoidance Behaviors in People who Stutter

La perception des croyances de l'auditeur au sujet du bégaiement, la parole prolongée et les comportements verbaux d'évitement chez les personnes qui bégaient

Johannes Von Tiling
Alexander Wolff Von Gudenberg

KEY WORDS
STUTTERING
LISTENER PERCEPTIONS
SOCIAL ANXIETY
PROLONGED SPEECH
AVOIDANCE BEHAVIORS

Abstract

Recent studies suggest that people who stutter fear listeners' negative reactions to their stuttering and that this social anxiety plays an important role in their everyday coping with stuttering. This study explores (a) what kind of negative perceptions are feared, and (b) whether these listener perception beliefs depend on how the person speaks. One hundred and six people who stuttered reported listener perception beliefs to five ways of speaking: (1) normal fluency, (2) stuttered speech (repetitions, prolongations, blocks), (3) prolonged speech learned in fluency shaping therapy, (4) hesitant speech (verbal avoidance behaviors like interjections and revisions) and (5) a mix of stuttered speech and hesitant speech. Each participant watched five video clips, each containing one way of speaking. Participants made quantitative judgments on each clip regarding listener perception beliefs of pleasantness, self-confidence, communicative competence, intelligence, social rejection and causal attribution.

It was found that people who stuttered expected fluent speech to be perceived most positively and hesitant speech most negatively. People who had undergone fluency shaping treatment in the past expected prolonged speech to be perceived more positively than stuttered speech, whereas people who had not undergone fluency shaping therapy expected no difference.

In the discussion section, speech-language clinicians are encouraged to integrate the analysis of listener perception beliefs and their implications for social anxiety into stuttering treatment.

Abrégé

Des études récentes suggèrent que des gens qui bégaient craignent les réactions négatives des auditeurs face à leur bégaiement et que cette anxiété sociale joue un rôle important dans la façon dont ils s'accommodent chaque jour de leur bégaiement. Cette étude explore (a) quelles sortes de perceptions négatives sont appréhendées et (b) si les idées qu'on se fait des croyances des auditeurs dépendent de la façon dont la personne parle. Cent six personnes qui bégayaient on rapporté les idées qu'ils se faisaient de la perception des auditeurs devant cinq façons de parler : (1) un débit normal, (2) une parole bégayée (répétitions, prolongations, blocages), (3) un débit prolongé appris en thérapie axé sur le modelage de la fluidité, (4) un débit hésitant (comportements d'évitement verbal comme les interjections et les révisions) et (5) un mélange de parole bégayée et de débit hésitant. Chaque participant a regardé cinq clips vidéo contenant chacun une façon de parler. Les participants ont posé des jugements quantitatifs sur chaque clip concernant leurs croyances face à la perception de l'auditeur, sur ce qui est agréable, ainsi que sur la confiance en soi, la compétence communicative, l'intelligence, le rejet social et l'attribution causale. On a trouvé que les gens qui bégaient s'attendaient à ce qu'un débit fluide soit perçu le plus positivement et qu'un débit hésitant soit perçu le plus négativement.

Les personnes qui avaient subi un traitement de modulation de la fluidité dans le passé s'attendaient à ce que le discours prolongé soit perçu plus positivement que le discours bégayé, alors que les gens qui n'avaient pas subi cette thérapie ne s'attendaient à aucune différence.

Dans la partie discussion, les cliniciens en orthophonie sont encouragés à intégrer l'analyse des croyances face à la perception de l'auditeur et de leurs répercussions pour l'anxiété sociale dans le traitement du bégaiement.

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Introduction

According to recent studies, people who stutter (PWS) report more anxiety in situations where social evaluation might occur than people who do not stutter (e.g., Kraaimaat, Vanryckeghem, & Van Dam-Baggen, 2002; Messenger, Onslow, Packman, & Menzies, 2004). They often hide their stuttering (Petrunik & Shearing, 1983; Vanryckeghem, Brutten, Uddin, & Borsel, 2004) and feel ashamed and stigmatized (Corcoran & Stewart, 1998; Klein & Hood, 2004). PWS seem to fear listeners' negative reactions to stuttering, and to avoid stuttered speech in order to be perceived more positively (Plexico, Manning, & Levitt, 2009). Although it is not clear whether anxiety and avoidance cause stuttering directly, their clinical importance is beyond question (Manning, 2001).

The fear of being evaluated negatively by other people is often called social anxiety (Crozier & Alden, 2005). Most people show social anxiety in certain situations, like public speaking. It should not be confused with social phobia (or social anxiety disorder) which is an anxiety disorder characterized by intense fear in social situations causing considerable distress. Someone who is socially anxious in a certain situation usually has fearful thoughts (cognitive component of social anxiety), shows behavioral reactions like avoidance (behavioral component) and perceives physical sensations like sweating (physiological component). The present research focuses on the cognitive component of PWS's social anxiety, that is, the thoughts that lead PWS to the conclusion that dysfluent speech is something to be feared and avoided. While the cognitive component of, for example, test anxiety, is well researched (Zeidner, 1998), that of PWS's social anxiety is not. For example, do they fear they may give the impression that they are not intelligent, or that listeners may laugh at them? Furthermore, the present research explores whether those beliefs depend on how PWS speak. For example, do PWS expect more positive reactions to their post-therapy speech than to stuttering?

PWS may expect different types of listener reactions, resulting in different subtypes of beliefs. First, they may expect the listener to have negative perceptions of their personality and competencies. These beliefs about cognitive reactions to stuttered speech will be called *listener perception beliefs* from now on. Second, they may form expectations about negative long-term behavioral consequences of producing stuttered speech, for example, bullying or victimization at work. These beliefs are called *social rejection beliefs*. Third, they may anticipate how listeners think about the causes of the speaking problems (i.e., *causal attribution beliefs*, see Weiner, 1995).

Listener perception beliefs

Quantitative data regarding listener perception beliefs are scarce. Blood, Blood, Tellis and Gabel (2001) found that adolescents who stuttered reported poorer self-perceived communicative competence than adolescents who did not stutter. However, self-perceived communicative competence may be correlated, but not identical to listener perception beliefs. Kraaimaat et al. (2002) reported that PWS feared and avoided speech acts like giving criticism, expressing an opinion, paying a compliment and initiating contact more than fluent people did. Recently, Menzies et al. (2008) found that many PWS feared being judged as unintelligent, incompetent, retarded, worthless or dumb. Similarly, qualitative research indicates that many PWS fear being judged as unintelligent, mentally retarded (Plexico et al., 2009), or mentally defective (Corcoran & Stewart, 1998). Cream, Onslow, Packman and Llewellyn (2003) examined the experiences of people who used prolonged speech (with some residual stuttering). Their participants reported difficulties in expressing their personality and communicating their emotions. In summary, little is known about the nature of the negative personality and competence judgments of which PWS are afraid. However, existing studies suggest that PWS expect to be perceived as emotionally and communicatively incompetent. These findings seem to concur with studies of how PWS are actually seen by fluent speakers, which will be described in the following.

These studies focused on *stereotypes*, that is, people's opinions about "stutterers" in general. MacKinnon, Hall and MacIntyre (2007) reviewed the literature on stereotyping and indicated that PWS are stereotyped as shy, insecure, reticent, guarded, avoidant, introverted, quiet, hesitant, self-derogatory, nervous, tense and afraid. Studies of *listener perception* examine how a PWS is perceived in a given situation, for example, shown in a video clip producing a monologue or reading a text (see further discussion in Von Tiling, 2011). That is, listeners are not asked to describe their opinions about "stutterers" in general, but about "this man/woman you have just seen". In a phenomenological analysis, Susca and Healey (2002) found that people listening to the speech of a PWS draw conclusions about the personality and competencies of the speaker (e.g., intelligence). This is of interest here because personality and competence judgments are likely to evoke PWS's social anxiety and shame. Susca and Healey (2002) found that the PWS shown in a video clip were perceived as nervous, awkward, not believable, low in intelligence, giving odd descriptions and having problems putting words and letters in the right order. Several quantitative studies (e.g., Panico, Healey, Brouwer, & Susca, 2005) found that the more dysfluencies produced by a male who stuttered, the less he was perceived as a "competent speaker".

According to both listener perception studies and stereotype studies, PWS may be regarded as (1) emotionally incompetent (e.g., nervous, awkward, self-derogatory), and (2) communicatively incompetent (e.g., not a competent speaker, giving odd descriptions, shy, quiet, introverted) (Von Tiling, 2011). *Emotional competence* includes the abilities to express and perceive emotions appropriately, to have good self-esteem, to have good relationships with other people and to be liked by other people (Petrides, Furnham, & Mavroveli, 2007). *Communicative competence* is the ability to adapt messages effectively and appropriately to the interaction context (Rickheit, Strohner, & Vorwerg, 2008; see also Blood, Blood, Tellis, & Gabel, 2001). Someone who is perceived as communicatively incompetent is seen as having problems in making his or her point clear, in making arrangements and in avoiding misunderstandings. These two dimensions have proven to be important in self-presentation research (Jones & Pittman, 1982) and also have been found in studies about stigma (Gabel, Blood, Tellis, & Althouse, 2004).

Von Tiling (2011) reported that listener perceptions were influenced by the PWS's "way of speaking". Listeners made judgments upon watching one of four randomly assigned speech samples. Each of the four video clips showed the same everyday conversation between three young men, but differed in the way of speaking. The excessive use of verbal avoidance behaviors like interjections, revisions, incomplete phrases and pauses made PWS look more emotionally and communicatively incompetent than the use of stuttered speech (core behaviors) or prolonged speech. There were no differences between stuttered speech and prolonged speech.

It is unknown if listener perception beliefs vary with the way of speaking used. For example, a person may have different listener perception beliefs when stuttering than when using prolonged speech. Such differences would be interesting because they might be helpful in, for example, explaining why PWS differ in their motivation to use prolonged speech. Furthermore, PWS's listener perception beliefs regarding *prolonged speech* may depend on their own history of using prolonged speech. In our own clinical experience, the intensive training in using prolonged speech that is usually done in a group setting leads some clients to expect listener reactions to it to be more positive than they objectively are. They may not be able to realize that, as Von Tiling (2011) reported, there are usually no better listener perceptions of unnatural sounding fluent speech than of stuttered speech.

Social rejection beliefs

Existing research indicates that many PWS do have social rejection beliefs (e.g., they feel socially rejected). This was found in qualitative studies (Corcoran & Stewart, 1998) as well as in quantitative studies. For example, Klein and Hood (2004) reported that more than 70% of PWS agreed that stuttering decreases one's chance of being hired or promoted. According to Rice and Kroll (1994), 16% of PWS had been told that they would not be hired because of their stuttering.

Causal attribution beliefs

There are no empirical studies of causal attribution beliefs of PWS. However, there are studies of causal attributions regarding stuttering made by listeners. Von Tiling (2011) showed that listener perceptions were partly dependent on the listeners' causal attributions of speaking difficulties, that is, whether they assumed a chronic speech defect or a temporary problem. Boyle, Blood and Blood (2009) found that listeners who were told that stuttering had "psychological" origins showed more stigmatizing reactions to PWS than listeners who were told that stuttering had "genetic" origins. In the present work, the concept of stigmatizing will not be used because, being more or less able to choose between different ways of speaking, PWS do not necessarily have an easily identifiable stigma. Whereas Boyle et al. examined the effects of genetic and psychological attributions of stuttering on listener perception, Von Tiling (2011) was interested in the distinction of disorder attributions (i.e., internal, stable, uncontrollable attributions) vs. non-disorder attributions (i.e., internal, unstable, controllable attributions) of communication problems. For example, people who use prolonged speech may expect positive listener perceptions because they may believe that they cannot be identified as a "stutterer".

The present research

This study examined listener perception beliefs, social rejection beliefs and causal attribution beliefs to five ways of speaking that were defined following Von Tiling (2011): (1) normally fluent speech, (2) stuttered speech, i.e., a speech containing core behaviors (repetitions, prolongations and blocks), (3) prolonged speech, (4) hesitant speech and (5) stuttered/hesitant speech. Prolonged speech is a speech pattern that is learned in fluency shaping therapy (e.g., Webster, 1974). Its main characteristics are syllable prolongations, gentle voice onsets, smooth sound transitions and light articulatory contacts. Prolonged speech sounds less natural to listeners than normally fluent speech (e.g., Stuart & Kalinowski, 2004). The study by Cream et al.

(2003) suggests that people using prolonged speech may be aware of these negative naturalness judgments. Little is known, however, about listener perception beliefs of people using prolonged speech. *Hesitant speech* contains no core behaviors, but it does contain associated behaviors, such as interjections (starters, fillers), revisions, incomplete phrases and pauses that occur when the speaker seeks to avoid core behaviors (Guitar, 2006; Vanryckeghem et al., 2004). Hesitant speech contains more and longer interjections, revisions, incomplete phrases and pauses than the speech of most normally fluent people. It is, like stuttered speech, a form of coping with the feeling of stuttering, or, in a word, a form of stuttering. Petrunik and Shearing (1983) found that the hesitant and inappropriate communication behaviors implied in avoidance strategies can make the PWS look more emotionally disturbed and disagreeable than when stuttering. Since most PWS are not able or do not want to avoid every moment of stuttered speech, a combination of both stuttered speech and hesitant speech was examined as well, called *stuttered/hesitant speech*.

In the present study, PWS were expected to have negative listener perception beliefs regarding emotional competence, communicative competence and intelligence, and to expect social rejection when they were dysfluent. In addition, listener perception beliefs were expected to be dependent on causal attribution beliefs, that is, on how PWS expected listeners to think about the causes of the presented speaking problems. Furthermore, it was expected that people who learned prolonged speech in a fluency shaping treatment in the past differed in their responses from those who had not. In summary, five research questions were asked:

> (R1) Do PWS expect more negative listener reactions to stuttered speech, prolonged speech, hesitant speech and stuttered/hesitant speech than to normally fluent speech?
>
> (R2) Are there significant differences in listener perception beliefs and social rejection beliefs between stuttered speech, prolonged speech, hesitant speech and stuttered/hesitant speech?
>
> (R3) Are there differences between different dimensions of listener perception beliefs, e.g., emotional competence, communicative competence, intelligence and social rejection?
>
> (R4) Are listener perception beliefs associated with participants' history of fluency shaping treatment?
>
> (R5) Are listener perception beliefs associated with causal attribution beliefs?

Methods

Participants

A total of 106 PWS (83 males, 23 females; 84 adults, 22 adolescents) agreed to participate in this study. The onset of stuttering obtained from self-report ranged from three to five years. All participants were native German speakers. Age and gender details are shown in Table 1.

Fifty-eight participants were recruited from the Kassel Stuttering Therapy program (KST; Euler, Gudenberg, Jung, & Neumann, 2009). KST is a modified version of Webster's (1974) Precision Fluency Shaping Program. It is a two-week intensive fluency shaping treatment program, including three weekend refreshers (one, three and six months after intensive treatment). Participants (labeled from now on as offline participants) were tested at one of these refreshers in the clinic. Twenty-two of these participants were adolescents (13-17-year-olds).

Forty-eight participants were recruited via postings in five popular German mailing lists about stuttering. The postings included an invitation to participate in an online study and a short description of the study's topic and time demands. Seventeen of these 48 online participants reported a history of fluency shaping treatment. More specifically, they reported having learned to use prolonged speech in the past, most of them at the KST (n = 13).

Table 1 shows some details of these two samples, including self-reported stuttering severity and self-reported avoidance tendency. The former was rated on a 5-point scale ranging from 1 (*very mild*) to 5 (*very severe*), using the video clip containing stuttered speech (see description below) as a common standard for all participants (representing a "4"). For the latter, they were asked, "*How often do you employ strategies to avoid stuttering in everyday life, like changing words, fillers etc.,?*", using a 5-point scale (1 = *never*; 2 = *rarely*; 3 = *sometimes;* 4 = *often*; 5 = *always*).

Stimuli

The participants watched five short video clips, each containing an everyday conversation between three young men. Fou 4 meters^2 r of them were the same as in the Von Tiling (2011) study, which did not use a fluent speech sample. The clips had been recorded with a digital video camera recorder (720 x 576 pixels). Before watching the clip, the participants were given the following background information about the clips: "Marcus happens to meet his colleague Stefan after a public event. Stefan introduces Marcus to his friend Kai. A conversation begins." Stefan and Kai are shown

Table 1. Number, gender, age, stuttering severity and avoidance tendency of different groups of participants.

Variable	Adults				Adolescents
	Participation		History of fluency shaping		(offline / fluency shaping only)
	offline	online	yes	no	
Number of participants	36	48	53	31	22
% males	81	79	79	81	73
Age, M (SD)	30.00	35.92	31.66	36.52	15.68
	(9.37)	(13.32)	(10.22)	(14.52)	(1.09)
Self-reported stuttering	2.89	2.92	3.02	2.70	2.91
severity (5-point), M (SD)	(1.13)	(1.11)	(1.08)	(1.15)	(.87)
Self-reported avoidance	2.77	3.37	2.87	3.65	2.57
tendency (5-point), M (SD)	(1.24)	(1.01)	(1.10)	(.95)	(1.40)

standing in front of a wall and talking about the event, holding champagne glasses in their hands. Marcus enters the scene. Stefan and Marcus greet one another. Stefan mentions that Kai, a computer specialist, might help Marcus with his computer problem. A conversation begins in which Marcus explains his computer problem to Kai and Kai tells Marcus his solution to the problem. Finally, Marcus thanks Kai for his advice and asks Stefan to hold his glass while he goes to the toilet. During the whole clip, the three men are shown in full-length, there are no cuts.

Each of the five video clips shows the same conversation, but differs in Marcus's way of speaking. Marcus produces normally fluent speech in clip 1, stuttered speech in clip 2, prolonged speech in clip 3, hesitant speech in clip 4 and stuttered/hesitant speech in clip 5. The stuttered/hesitant sample (clip 5) contained fewer stuttered speech moments than clip 2 and fewer hesitant speech moments than clip 4, since a PWS may be able to reduce the frequency of core behaviors by using hesitant speech (Guitar, 2006). The goal was speech samples that are supposed to be comparable in severity. Some details concerning the five conditions are shown in Table 2 (and see Von Tiling, 2011, for further details). Stefan and Kai act as if no unnatural sounding speech were occurring. They listen patiently and maintain eye contact with Marcus.

Marcus was acted by a 35-year-old speech-language pathologist employed by the KST. He was himself a person who stuttered in the past, but has been normally fluent for seven years now. He was asked to simulate the speech of a person who is normally fluent (clip 1), stutters severely before therapy (clips 2, 4 and 5) and after successful KST treatment (clip 3). That is, in clip 3, he was told to imitate the prolonged speech of a person who, having previously stuttered severely, had completed the two-week KST treatment successfully. According to SSI-3 standards (Riley, 1994), clip 2 showed severe stuttering and clip 5 showed moderate stuttering.

Table 2 shows that the four videos differ in length. The reasons for this and resulting limitations of the present study are discussed in section 4.2.

Procedure

The setting was different for the two samples. For the offline sample, the video clips were presented in the KST therapy room. The clips were watched in a group of eight clients attending a refresher session. The clips were projected on a 4 meters^2 screen by a video projector and two loudspeakers were used. The clients were not allowed to talk to each other during the study, which took about 25 minutes. For the online sample, the participants watched the clips on their home PCs via the internet. The clips and the written instructions

Table 2. Duration, percentage of stuttered syllables (%SS) and other characteristics of the five speech samples *(see Von Tiling (2011) for more details, including an online speech sample).*

Condition attribute	(1) Fluent	(2) Stuttered	(3) Prolonged	(4) Hesitant	(5) Stuttered / hesitant
Clip duration (s)	67	91	100	141	110
% SS	0	20	0	0	9
Length of the three longest fluency breaks (s)	--	3/3/2 (core beh.)	--	7/5/3 (pause/ filler)	2/2/1 (core beh.) 6/2/1 (pause/filler)
Fluency breaks (number)	No fluency breaks. General description: Normally fluent speech, appropriate in rate, rhythm and intonation	Repetitions (5), Prolongations (7), Broken words (6)	No fluency breaks. General description: 2-3 syllables per second, soft voice onsets, monotonous rhythm, natural intonation	Interjections (10), Revisions (5), Incomplete phrases (2), Pauses (4)	Repetitions (3), Prolongations (4), Broken words (2), Interjections (3), Revisions (2), Incomplete phrases (2), Pauses (2)
Physical concomitants (number)	--	Turns up his mouth slightly (5), Moves his head unnaturally (3), Poor eye contact while speaking (1)	--	Poor eye contact while speaking (7)	Turns up his mouth slightly (2), Moves his head unnaturally (2), Poor eye contact while speaking (4)

were exactly the same as for the offline sample. It was automatically confirmed that the required free software (Flash Player) was available and that internet speed was appropriate. Furthermore, reaction times were automatically recorded in order to exclude participants who had obviously not spent enough time working on the materials from the analysis.

The following descriptions are valid for both samples. On the first page (i.e., paper or web page), participants were told in colloquial language that the study was about perceived listener reactions to different ways of speaking often produced by PWS. On the second page, they were told that they were going to watch five video clips that differed only in the target person's way of speaking. They were informed about the background story to the video clips. Each participant (online sample) or group of participants (offline sample) was randomly assigned to one of five orders for video clip presentation. The Latin Square strategy was used to counterbalance sequential effects, and the five orders were: A:12543, B:24135, C:35412, D:43251, E:51324.

After watching each clip, the participants were asked four written questions (see also the Appendix):

(1) *"Now try to put yourself in Marcus's position. Imagine you would have been in this situation and would have spoken like Marcus did. How would you feel perceived by Kai who has just met you for the first time? — I would expect that Kai thinks I am… [nine items, see below]."*

(2) *"I would expect that Kai thinks I have… [shown on a bipolar 7-point-scale] a chronic speaking disorder versus problems with speaking only in this special situation (e.g., because of nervousness)."*

(3) *"How will my relationship with Kai probably develop in the future? [Two items, see below]."*

(4) *"In the following, you can make additional comments in your own words."*

The first question was designed to elicit listener perception beliefs and was measured on a 7-point bipolar adjective scale (1 = *very much*; 4 = *neutral*; 7 = *very much*). It was comprised of nine items that measures four attributes of listener perception beliefs, with some of these items being taken from the 25 adjective pairs by Woods and Williams (1976; translated into German by the author). The attributes and items measured were:

- Emotional competence: Pleasantness (*unfriendly–friendly, unpleasant–pleasant, dishonest–honest*)
- Emotional competence: Self-confidence (*anxious–composed, afraid–confident*)
- Communicative competence (*incompetent–competent; communicatively incompetent – communicatively competent; like someone who often causes misunderstandings – like someone who rarely causes misunderstandings*)
- Intelligence (*dull–intelligent*)

Only two sub-dimensions of the broad construct of emotional competence were measured, called pleasantness and self-confidence. The reason for this limitation was that, owing to the limited duration of the video clips, listeners may have found it difficult to rate more complex sub-dimensions like happiness or empathy (see Petrides et al., 2007). The more negative adjective was always on the left side of the scale in order to make the task easier for the participants.

The second question targeted causal attribution beliefs. The participant was asked whether he or she expected Kai to think that Marcus had "a chronic speaking disorder" (= 1; disorder attribution) or "problems with speaking only in this special situation (e.g., because of nervousness)" (= 7; non-disorder attribution), again on a 7-point bipolar scale.

In question three, the participant was asked to speculate whether Marcus would be socially rejected by Kai in the future. Considered on a 5-point scale (1 = strongly disagree; 5 = strongly agree), the two items were: "Because of my peculiar communication behavior, Kai probably would not like to make friends with me" and "Because of my peculiar communication behavior, Kai probably would not introduce me to his friends or invite me to a party." Neither causal attribution beliefs nor social rejection beliefs were measured in the fluent speech condition. In question four, participants were invited to make additional comments in their own words.

These instructions were repeated for each of the five video clips.

Data analysis

Online participants who watched some but not all video clips (n = 24) were excluded from the analysis. Mean and standard deviation ratings were calculated for each quantitative item. The ratings associated with pleasantness, self-confidence, communicative competence, or social rejection were aggregated to produce mean ratings (see Table 3). Internal consistency scores (Cronbach's Alpha) were calculated to test the reliability of the resulting scales (e.g., pleasantness of prolonged speech). Cronbach's Alpha scores ranged from 0.63 to 0.76 (pleasantness), from 0.75 to 0.80 (self-confidence), from 0.64 to 0.80 (communicative competence) and from 0.71 to 0.82 (social rejection). The five clip order groups (A/B/C/D/E, see above) comprised the following numbers of participants: 23/25/19/17/22: for the subgroup of adults without fluency shaping history: 7/7/5/5/7; for the subgroup of adults with fluency shaping history: 10/14/9/9/11; for the subgroup of adolescents with fluency shaping history: 6/4/5/3/4. Only 13% of the participants chose to make additional comments in their own words. Therefore, this item was excluded from the analysis.

Results

Listener Perception Beliefs and Social Rejection Beliefs of PWS (R1-R3)

Descriptive statistics of each aggregated score for each condition are shown in Table 3. Two-way mixed ANOVAs were calculated for each dependent measure, with video clip order as between-group independent variable and way of speaking as repeated-measures independent variable (N = 106).

Pleasantness. Mauchly's test indicated that the assumption of sphericity had been violated, χ^2 (9) = 23.41, $p < .05$, therefore degrees of freedom were corrected using Huynh-Feldt estimates of sphericity ($\varepsilon = .97$). There was a significant main effect of way of speaking on pleasantness, F (3.89, 393.27) = 117.93, $p < .001$, $\eta_p^2 = .54$. (η_p^2 stands for partial eta squares.) Bonferroni-corrected post hoc tests showed that all pairwise comparisons were significant (all *p*s < .001), indicating that fluent speech ratings were highest (most pleasant), followed by prolonged speech, stuttered speech, stuttered/hesitant speech, and hesitant speech. There was no significant main effect of clip order on pleasantness, F (4, 101) = .25, $p = .91$.

Self-confidence. Mauchly's test indicated that the assumption of sphericity had been violated, χ^2 (9) = 28.23, $p < .05$, therefore degrees of freedom were corrected by means of Huynh-Feldt estimates of sphericity ($\varepsilon = .96$). There was a significant main effect of way of speaking on self-confidence, F (3.82, 386.13) = 236.69, $p < .001$, $\eta_p^2 = .70$. Bonferroni-corrected post hoc tests showed that ratings of hesitant speech and stuttered/hesitant speech did not significantly differ ($p = .23$), but all other pairwise comparisons were significant (all *p*s < .001), indicating that fluent speech ratings were highest (most confident), followed by prolonged speech, stuttered speech and both stuttered/hesitant speech and hesitant speech. There was no significant main effect of clip order on self-confidence, F (4, 101) = 0.49, $p = .74$.

Table 2. Means and standard deviations of participants' listener perception beliefs and causal attribution beliefs, as a function of the way of speaking shown in the video clip.

Variable (scale range)	Group of participants	(1) Fluent speech	(2) Stuttered speech	(3) Prolonged speech	(4) Hesitant speech	(5) Stuttered / hesitant speech
Pleasantness (7)	Overall (*N* = 106)	6.01	4.77	5.29	3.79	4.27
		(.80)	(1.07)	(.98)	(1.11)	(1.03)
	Adults without fluency shaping history (*n* = 31)	6.12	5.15	4.86	3.99	4.54
		(.71)	(.85)	(1.19)	(1.20)	(1.05)
	Adults without fluency shaping history (*n* = 53)	5.84	4.69	5.40	3.76	4.16
		(.88)	(1.14)	(.81)	(1.07)	(1.05)
	Adolescents with fluency shaping history (*n* = 22)	6.24	4.44	5.62	3.58	4.17
		(.66)	(1.06)	(.87)	(1.08)	(.97)
Self-confidence (7)	Overall (*N* = 106)	6.32	3.54	5.39	2.87	2.57
		(.80)	(1.41)	(1.21)	(1.21)	(1.08)
	Adults without fluency shaping history (*n* = 31)	6.39	3.76	4.90	2.82	2.73
		(.63)	(1.47)	(1.15)	(1.28)	(1.28)
	Adults with fluency shaping history (*n* = 53)	6.14	3.55	5.49	2.74	2.43
		(.91)	(1.45)	(1.24)	(1.13)	(.97)
	Adolescents with fluency shaping history (*n* = 22)	6.66	3.23	5.82	3.27	2.66
		(.61)	(1.20)	(.99)	(1.28)	(1.02)
Communicative competence (7)	Overall (*N* = 106)	6.04	3.62	4.95	2.51	3.10
		(.79)	(1.20)	(1.06)	(1.03)	(1.11)
	Adults without fluency shaping history (*n* = 31)	6.23	4.19	4.49	2.43	3.37
		(.62)	(1.24)	(1.22)	(1.01)	(1.11)
	Adults with fluency shaping history (*n* = 53)	5.94	3.48	5.07	2.37	2.92
		(.92)	(1.19)	(.93)	(.89)	(1.09)
	Adolescents with fluency shaping history (*n* = 22)	6.05	3.17	5.29	2.95	3.18
		(.66)	(.85)	(.92)	(1.27)	(1.14)

Intelligence (7)	Overall (*N* = 106)	5.60 (.97)	4.21 (1.19)	4.74 (1.25)	2.77 (1.14)	3.52 (1.13)
	Adults without fluency shaping history (*n* = 31)	5.77 (.84)	4.61 (1.02)	4.52 (1.36)	2.94 (1.26)	3.71 (1.13)
	Adults with fluency shaping history (*n* = 53)	5.40 (1.06)	4.13 (1.29)	4.68 (1.19)	2.74 (1.04)	3.42 (1.15)
	Adolescents with fluency shaping history (*n* = 22)	5.86 (.83)	3.82 (1.05)	5.18 (1.18)	2.64 (1.22)	3.50 (1.10)
Social rejection (5)	Overall (*N* = 106)		3.00 (1.03)	2.42 (1.00)	3.20 (1.12)	3.07 (1.08)
	Adults without fluency shaping history (*n* = 31)		2.92 (1.00)	2.94 (1.11)	3.44 (1.06)	3.06 (1.07)
	Adults with fluency shaping history (*n* = 53)		3.02 (1.11)	2.20 (.83)	3.19 (1.18)	3.08 (1.10)
	Adolescents with fluency shaping history (*n* = 22)		3.07 (.89)	2.25 (1.00)	2.91 (1.01)	3.02 (1.07)
Causal attribution (7) (small numbers indicate high disorder attribution)	Overall (*N* = 106)		1.91 (1.50)	2.92 (1.68)	4.24 (1.86)	2.25 (1.63)
	Adults without fluency shaping history (*n* = 31)		1.48 (.68)	2.03 (1.38)	4.03 (2.07)	2.06 (1.79)
	Adults with fluency shaping history (*n* = 53)		1.74 (1.50)	3.13 (1.72)	4.13 (1.82)	2.21 (1.56)
	Adolescents with fluency shaping history (*n* = 22)		2.91 (1.90)	3.64 (1.50)	4.81 (1.60)	2.59 (1.56)
Global perception (7)	Overall (*N* = 106)	5.94 (.68)	3.99 (.96)	5.02 (.94)	3.06 (.83)	3.41 (.85)
	Adults without fluency shaping history (*n* = 31)	6.06 (.50)	4.37 (.92)	4.59 (1.04)	3.11 (.92)	3.65 (.88)
	Adults with fluency shaping history (*n* = 53)	5.79 (.80)	3.90 (.99)	5.11 (.84)	2.96 (.70)	3.27 (.80)
	Adolescents with fluency shaping history (n = 22)	6.12 (.51)	3.66 (.79)	5.40 (.84)	3.23 (.98)	3.41 (.88)

Communicative competence. Mauchly's test indicated that the assumption of sphericity had been violated, χ^2 (9) = 34.39, $p < .05$, therefore degrees of freedom were corrected using Huynh-Feldt estimates of sphericity ($\varepsilon = .93$). There was a significant main effect of way of speaking on communicative competence, F (3.73, 376.62) = 232.71, $p < .001$, $\eta_p^2 = .70$. Bonferroni-corrected post hoc tests showed that all pairwise comparisons were significant (all *ps* < .001), indicating that fluent speech ratings were highest (most communicatively competent), followed by prolonged speech, stuttered speech, stuttered/hesitant speech and hesitant speech. There was no significant main effect of clip order on communicative competence, F (4, 101) = 0.25, $p = .67$.

Intelligence. Mauchly's test indicated that the assumption of sphericity had not been violated, χ^2 (9) = 8.63, $p = .47$. There was a significant main effect of way of speaking on intelligence, F (4, 404) = 118.81, $p < .001$, $\eta_p^2 = .54$. Bonferroni-corrected post hoc tests showed that all pairwise comparisons were significant (all *ps* < .01), indicating that fluent speech ratings were highest (most intelligent), followed by prolonged speech, stuttered speech, stuttered/hesitant speech and hesitant speech. There was no significant main effect of clip order on intelligence, F (4, 101) = 0.92, $p = .46$.

Social rejection. Mauchly's test indicated that the assumption of sphericity had been violated, χ^2 (5) = 20.90, $p < .05$, therefore degrees of freedom were corrected using Huynh-Feldt estimates of sphericity ($\varepsilon = .96$). There was a significant main effect of way of speaking on social rejection, F (2.87, 289.14) = 15.19, $p < .001$, $\eta_p^2 = .13$. Bonferroni-corrected post hoc tests showed that ratings of prolonged speech were significantly lower (indicating less social rejection) than ratings of stuttered speech, hesitant speech and stuttered/hesitant speech (all *ps* < .001). Ratings of stuttered speech, hesitant speech and stuttered/hesitant speech did not significantly differ (all *ps* > .7). There was no significant main effect of clip order on social rejection, F (4, 101) = 0.94, $p = .44$.

Listener Perception Beliefs and History of Fluency Shaping Treatment (R4)

To reduce the complexity of the analysis, a global score of listener perception beliefs was calculated, aggregating all nine items measuring pleasantness, self-confidence, communicative competence and intelligence. The resulting variable was called global perception beliefs (negative versus positive). Cronbach's Alphas ranged from 0.80 to 0.88. Three subgroups of participants were compared, namely adults without fluency shaping history (called NFS-adults from now on; $n = 31$), adults with fluency shaping history (called FS-adults from now on; $n = 53$) and adolescents with fluency shaping history (called FS-adolescents from now on; $n = 22$). Descriptive statistics are shown in Table 3.

A two-way MANOVA revealed that there was no significant effect of clip order (F (20, 360) = 2.86, $p = .08$), but a significant effect of the subgroup variable on the five global perception belief scores, F (10, 176) = 3.80, $p < .01$, $\eta_p^2 = .14$, (i.e., the three different sub-groups differed in their ratings of at least one way of speaking). Bonferroni-corrected post hoc testing revealed that NFS-adults rated stuttered speech more positively but prolonged speech more negatively than both FS-adults and FS-adolescents (both *ps* < .05).

To rule out the possibility that these effects may be owed to the different settings associated with the different samples (online versus offline), it was tested whether these differences could be found among online participants only ($N = 48$; see Table 1 for details). There was a significant effect of the subgroup variable on the ratings of stuttered speech and prolonged speech, F (2, 46) = 5.20, $p < .01$, $\eta_p^2 = .18$. Univariate comparisons revealed that NFS-adults ($n = 31$) rated stuttered speech more positively ($p < .05$) but prolonged speech more negatively ($p < .05$) than FS-adults ($n = 17$).

Finally, two-way mixed ANOVAs were calculated for each of the three subgroups separately, with video clip order as between-group independent variable, way of speaking as repeated-measures independent variable and global perception as a dependent variable. There was no significant main effect of clip order on global perception beliefs in any of the three ANOVAs (all *ps* > .1). Using Huynh-Feldt estimates of sphericity, significant main effects of way of speaking on global perception beliefs were found in all of the three ANOVAs: for NFS-adults, F (4, 104) = 62.38, $p < .001$, $\eta p2 = .71$; for FS-adults, F (4, 192) = 109.41, $p < .001$, $\eta_p^2 = .70$; and for FS-adolescents, F (4, 68) = 48.17, $p < .001$, $\eta_p^2 = .74$. Bonferroni-corrected post hoc pairwise comparisons showed different results for the three groups. NFS-adults rated fluent speech more positively than all other ways of speaking, and both stuttered speech and prolonged speech more positively than both hesitant speech and stuttered/hesitant speech (all *ps* < .01). There were no differences, however, between stuttered speech and prolonged speech ($p = .99$), and between hesitant speech and stuttered/hesitant speech ($p = .07$). FS-adults rated fluent speech more positively than all other ways of speaking, followed by prolonged speech, stuttered speech and both hesitant speech and stuttered speech (all *ps* < .01). The only non-significant pairwise comparison was between hesitant speech and stuttered/hesitant speech ($p = .48$). FS-adolescents rated fluent speech more positively than prolonged speech, and prolonged speech more positively than stuttered speech, hesitant speech and stuttered/hesitant speech (all *ps* $< .01$). There were no differences between stuttered speech, hesitant speech and stuttered/hesitant speech (all *ps* $> .9$).

Similarly, a two-way ANOVA showed that there was an effect of the subgroup variable on social rejection beliefs of prolonged speech, F (2, 91) = 5.85, $p < .01$, $\eta_p^2 = .11$. Bonferroni-corrected post hoc testing revealed that NFS-adults expected more social rejection due to prolonged speech than FS-adults ($p < .01$). A two-way mixed ANOVA among NFS-adults showed no main effects of clip order or way of speaking on social rejection beliefs. However, among FS-adults, there was a main effect of way of speaking on social rejection beliefs, F (2.79, 133.85) = 11.31, $p < .001$, $\eta_p^2 = .19$. Bonferroni-corrected post hoc pairwise comparisons showed that FS-adults associated prolonged speech with less social rejection than stuttered speech, hesitant speech and stuttered/hesitant speech (all *ps* $< .01$).

Causal Attribution Beliefs (R5)

A two-way mixed ANOVA was calculated for causal attribution beliefs, with video clip order as between-group independent variable and way of speaking as repeated-measures independent variable ($N = 106$). Mauchly's test indicated that the assumption of sphericity had been violated (χ^2 (5) = 13.96, $p < .05$) and therefore degrees of freedom were corrected by means of Huynh-Feldt estimates of sphericity ($\varepsilon = .98$). There was a significant main effect of way of speaking on causal attribution beliefs, F (2.94, 293.86) = 40.77, $p < .001$, $\eta_p^2 = .29$. Bonferroni-corrected post hoc tests showed that ratings of hesitant speech were significantly higher (indicating fewer attributions to a "chronic speaking disorder") than ratings of stuttered speech, prolonged speech and stuttered/hesitant speech (all *ps* $< .001$), and that ratings of prolonged speech were significantly higher than ratings of stuttered speech ($p < .001$). All other pairwise comparisons were not significant. There was no significant main effect of clip order on causal attribution beliefs, F (4, 101) = 0.95, $p = .44$. Three two-way mixed ANOVAs for the different subgroups showed that the post hoc difference between stuttered speech and prolonged speech could only be found in the FS-adults group ($p < .001$), not in the NFS-adults group or in the FS-adolescents group (both *ps* $> .1$).

A two-way MANOVA revealed that there was no significant main effect of either clip order (F (16, 364) = 0.93, $p = .53$) or the subgroup variable (F (8, 176) = 1.71, $p = .1$, $\eta_p^2 = .07$) on the five scores of causal attribution beliefs. A two-way ANOVA, however, showed an effect of the subgroup variable on causal attribution beliefs of prolonged speech, F (2, 91) = 6.36, $p = .01$, $\eta_p^2 = .12$. Bonferroni-corrected post hoc testing revealed that NFS-adults were more likely to expect prolonged speech to be attributed to a "chronic speaking disorder" than FS-adults and FS-adolescents (both *ps* $< .01$).

The way FS-adults thought about prolonged speech compared with NFS-adults was further explored by correlational analysis. In the FS-adults subgroup, causal attribution beliefs of prolonged speech were associated with global perception beliefs ($r = .31$, $p < .05$), social rejection beliefs ($r = -.27$, $p < .05$) and avoidance ($r = -.29$, $p < .05$). That is, the more the FS-adults expected prolonged speech to be attributed to a "chronic speaking disorder", the more they expected negative listener perceptions and social rejection, and the more they employed avoidance strategies. Of these three associations, only the third one was found in the NFS-adults group as well ($r = .09$, *ns*; $r = .08$, *ns*; $r = -.27$, $p < .05$). Furthermore, in the FS-adults group, global perception beliefs of prolonged speech were associated with avoidance ($r = -.37$, $p < .01$), whereas in the NFS-adults group it was not ($r = -.13$, *ns*). That is, the more negative FS-adults expected listener perceptions to be, the more they used avoidance strategies. Including stuttering severity instead of avoidance in the analysis, no significant correlations were found. Furthermore, there were no significant correlations between causal attribution beliefs and global perception beliefs of stuttered speech, hesitant speech or stuttered/hesitant speech. No differential effects for age or gender were found in any of the reported analyses.

Discussion

In this study, 106 PWS were asked to report their expectations of listener perceptions to different ways of speaking often used by PWS. Five short video clips were presented in order to provide a clear example to the participants of how each way of speaking sounded and how it might be perceived in an everyday conversation. The five ways of speaking not only included fluent speech, stuttered speech and prolonged speech, which had been studied in past studies, but also speech that contained verbal avoidance behaviors like interjections and revisions, called hesitant speech.

Major Findings

PWS expected fluent speech to be perceived more positively than any of the four dysfluent ways of speaking (including prolonged speech, which is subsumed here in the term dysfluent speech). This result was found in all of the three subgroups of participants and all of the four dimensions of listener perception. That is, this group of PWS indicated that they feel they will be perceived as unpleasant, afraid, communicatively incompetent and unintelligent by a listener when being dysfluent. At least for adults with fluency shaping history, these anxious cognitions seem to be directly related to the use of avoidance strategies, i.e., they may lead them to avoid feared words and situations.

Both hesitant speech and stuttered/hesitant speech were, however, expected to be perceived more negatively than any of the other ways of speaking. Using the same video clips as in this study, Von Tiling (2011) found that people who did not stutter indeed perceived hesitant speech and stuttered/hesitant speech more negatively than stuttered speech and prolonged speech. It can be concluded that – at least when listening to another PWS – many PWS are aware that the excessive use of verbal avoidance behaviors like interjections and revisions is likely to be less socially accepted than stuttered speech and prolonged speech. For most dimensions of listener perception beliefs, stuttered/hesitant speech received better ratings than hesitant speech. Medium to large effect sizes as well as the fact that the order of the video clips had no significant effect on participants' judgments indicate that the reported differences are clear and robust.

Stuttered speech and prolonged speech were rated differently depending on fluency shaping history. Adults and adolescents who had undergone fluency shaping treatment in the past expected better listener perceptions of prolonged speech than of stuttered speech, whereas adults without history of fluency shaping treatment expected no difference. Furthermore, between-group differences in the ratings of stuttered speech and prolonged speech were found. In the Von Tiling (2011) study, fluent listeners associated stuttered speech with more emotional competence than prolonged speech, whereas there were no differences in other dimensions (see Manning, Burlison, & Thaxton, 1999, for similar results comparing stuttered speech with another kind of post-treatment speech, namely stuttering modification). It may be concluded that people who learned prolonged speech in programs like the KST are likely to have unrealistically positive expectations of how this way of speaking is perceived by listeners. One reason for this may be the difference in causal attribution beliefs. NFS-adults were more likely than FS-adults to believe that listeners attributed prolonged speech to a communication disorder. FS-adults expected fewer disorder attributions to prolonged speech than to stuttered speech. Interestingly, the more disorder attributions they expected, the more negative they expected listener perceptions to be, and the more they used avoidance strategies in their everyday life. This correlational post hoc analysis suggests that some adults who learned prolonged speech in therapy use prolonged speech in order to avoid being perceived as a chronic "stutterer," that is, they use it as an avoidance strategy. They may use it because they think they will not be seen as a "stutterer," and they use it only *if* they think they will not be seen as a "stutterer" — otherwise they avoid feared words and use hesitant speech. Of course, this interpretation is tentative and needs further empirical support in the future.

There were smaller effects for social rejection beliefs than for listener perception beliefs. NFS-adults and FS-adolescents did not expect any differences between the four dysfluent ways of speaking at all, whereas FS-adults associated prolonged speech with less rejection than the other three ways of speaking. It can be concluded that many PWS do expect social rejection because of stuttering (see descriptive statistics in Table 3), but that there are no clear differences in these anticipations between different dysfluent ways of speaking.

Causal attribution beliefs – with the exception of prolonged speech, seen above – were not directly associated with listener perception beliefs. PWS seem to be unsure whether it is more desirable to be perceived as a "stutterer" or as someone who is dysfluent for situational reasons. Perhaps, however, we should not expect a linear relationship here. PWS may prefer to be seen as a "mild stutterer", that is, a "stutterer" whose stuttering does not prevent him or her from communicating properly.

Limitations

There are limitations to this study. First, one may call into question whether the four dysfluent ways of speaking were really "comparable". Like in listener perception studies (e.g., Susca & Healey, 2002), the presented audio/video clips differed in length. For example, the clip containing hesitant speech is markedly longer and includes longer fluency breaks than the other four clips (see Table 2). Because there are no common severity definitions for prolonged speech or hesitant speech, the creation of the speech samples had to be grounded on the clinical experience of both the speech-language clinician acting as Marcus and the authors. According to this experience, a person who stutters severely will – at least in most cases – need more time using fillers and pauses to avoid stuttered speech than using stuttered speech. That is, the longer fluency breaks incorporated into hesitant speech can be thought of as an integral part of the hesitant speech strategy. The present study was a first attempt to compare prototypical samples of ways of speaking that were intended to be similar in severity, however, future studies should explore each way of speaking in different severities.

Second, the present study examined how PWS expect listeners to react to dysfluent speech when meeting the dysfluent person for the first time. Findings may not be the same with other social situations. Third, the video clips showed an everyday conversation between a PWS and two listeners, making it impossible to keep listener reactions completely constant. It seems unlikely, however, that small differences in these reactions (e.g., smiling a little bit more or less) biased the results. In addition, the conversation setting had an important advantage. Participants watched an everyday situation and could put themselves in the position of a speaker taking high communicative responsibility (e.g., explaining his computer problem, expressing his thanks, asking someone to hold his glass). Thus, it should have been easy for the participants to realize inappropriate communication behavior. Fourth, most participants with fluency shaping history were clients of the Kassel Stuttering Therapy program, an adaptation of Webster's (1974) fluency shaping program. Therefore it is not appropriate to generalize the findings to all persons who learned prolonged speech in therapy. In particular, it should be expected that clients of "integrative" treatment approaches (e.g., Guitar, 2006; Kully, Langevin, & Lomheim, 2007) may respond differently. Fifth, the clinician acting as Marcus was known to most FS-adults but only to a few NFS-adults. A confounding effect on the findings of this study is possible but rather unlikely, given its balanced repeated measures design.

Implications

Although most of the presented findings are based on post hoc analyses and need further clarification in future studies, they do have implications for clinicians and PWS. On a general level, they tell us that PWS are aware of the fact that, as listener perception and stereotype studies have demonstrated, they are likely to be socially rejected and to be perceived as emotionally incompetent, communicatively incompetent and unintelligent when stuttering. Furthermore, they suggest that these quite realistic beliefs can lead PWS to use avoidance strategies, although they know that avoidance can make them look more incompetent than stuttering. This study shows us that PWS are aware of these social dynamics of stuttering in an implicit way; clinicians should help them to make this knowledge explicit, that is, to make use of it in their everyday coping with stuttering. Clinicians should give their attention to the client's social anxiety, explore listener perception beliefs carefully and, if necessary, correct them in the light of scientific research. In the course of this, clients learn to answer the difficult but important question, "What do I gain or lose using this way of speaking?", to select an adequate way of speaking in a given situation, and to influence listener perceptions verbally or non-verbally.

This is particularly important in the case of prolonged speech. Although prolonged speech is currently an important tool in stuttering treatment, there is some controversy in its application. Some clinicians argue that clients should use prolonged speech all the time and without exception, whereas others believe that prolonged speech should be used as one flexible tool among others, like stuttered speech, spontaneous fluency and stuttering modification. If prolonged speech is used in an exclusive way, several theorists (e.g., Guitar, 2006; Manning, 2001; Starkweather & Givens-Ackerman, 1997; Yaruss, Pelczarski, & Quesal, 2010) argue that it is likely to become just another avoidance strategy and will not be effective in the long run. The present study which explored the perceptions of PWS who were trained to use prolonged speech all the time supports this view. These PWS still avoid feared words at least some of the time (see Table 1; see also Cream et al., 2003). They seem to value prolonged speech because they believe that it helps them to hide their stuttering and to be perceived more positively. Unfortunately, these expectations do not seem to correspond to reality. Listeners perceive prolonged speech as negatively and as much as a chronic communication disorder as stuttered speech (Von Tiling, 2011). Therefore, this study should encourage fluency shaping therapists to explain the benefits of prolonged speech to their clients more thoroughly. They should spend more time and effort explaining that prolonged speech should be used not as a tool for hiding stuttering, but as a tool for making communication easier. They should show clients that verbal and nonverbal behaviors evoking listeners' disorder attributions often lead to better – not worse, as some PWS seem to expect – listener perceptions. They should help clients to form realistic expectations of the social acceptance of prolonged speech, preventing disappointments which may lead to relapse.

This study is not the only one pointing to disadvantages of pure fluency shaping treatment. Menzies et al. (2008) compared fluency shaping therapy with a combination of fluency shaping and cognitive-behavioral therapy. Although there were no differences in fluency after therapy, only the combined approach resulted in a reduction of anxiety and avoidance. There are, however, more elaborate cognitive-behavioral treatment programs available focusing not only on negative attitudes and self-talk, but also on shame, self-esteem and other social-emotional aspects of stuttering (Starkweather & Givens-Ackerman, 1997). These may lead to even better results than the one used in the study by Menzies et al. Although cognitive-behavioral therapy is regarded as one of the most successful forms of psychotherapy for decades, speech-language pathologists are only beginning to realize its potential for stuttering treatment. The analysis of listener perceptions and listener perception beliefs should be one cornerstone of future cognitive-behavioral programs of stuttering.

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APPENDIX

The survey used to measure listener perception beliefs, social rejection beliefs and causal attribution beliefs (translated from German).

[Participants are watching the first video clip.]

Now try to put yourself in Marcus's position. Imagine you would have been in this situation and would have spoken like Marcus did. How would you feel perceived by Kai who has just met you for the first time?

I would expect that Kai thinks I am…

	very much	much	a bit	neutral	a bit	much	very much	
afraid	1	2	3	4	5	6	7	confident
unpleasant	1	2	3	4	5	6	7	pleasant
incompetent	1	2	3	4	5	6	7	competent
dull	1	2	3	4	5	6	7	intelligent
anxious	1	2	3	4	5	6	7	composed
communicatively incompetent	1	2	3	4	5	6	7	communicatively competent
unfriendly	1	2	3	4	5	6	7	friendly
dishonest	1	2	3	4	5	6	7	honest
like someone who often causes misunderstandings	1	2	3	4	5	6	7	like someone who rarely causes misunderstandings

I would expect that Kai thinks I have…

a chronic speaking disorder	1	2	3	4	5	6	7	problems with speaking only in this special situation (e.g., because of nervousness)

How will my relationship with Kai probably develop in the future?

	strongly disagree	disagree	neutral	agree	strongly agree
Because of my peculiar communication behavior, Kai probably would not like to make friends with me.	1	2	3	4	5
Because of my peculiar communication behavior, Kai probably would not introduce me to his friends or invite me to a party.	1	2	3	4	5

In the following, you can make additional comments in your own words.

Now please watch the second video clip...

[Second video clip and so on.]

Parents' Perspectives on the Professional-Child Relationship and Children's Functional Communication Following Speech-Language Intervention

Points de vue des parents sur la relation professionnel-enfant et communication fonctionnelle de l'enfant à la suite d'une intervention orthophonique

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KEY WORDS
COMMUNICATION DISORDERS
PRESCHOOLERS
ICF-CY
INTERVENTION OUTCOMES
PARENTAL PERSPECTIVES
SPEECH-LANGUAGE PATHOLOGY

Abstract

Background. Speech-language pathologists (S-LPs) use family-centred practices to implement intervention. Thus, consideration of family-based outcomes is encouraged. The *International Classification of Functioning, Disability and Health* – Children and Youth version (ICF-CY) framework supports S-LPs' consideration of these outcomes (e.g., parental perspectives on children's Activities and Participation and Environmental Factors associated with speech-language intervention).

Purpose. To explore parents' perspectives about: (a) the child-S-LP relationship (Environmental Factors) and (b) children's functional communication (Activities and Participation)

Method. Sixty-seven parents of preschoolers with communication disorders participated in this study. All 67 parents completed pre-intervention and post-intervention structured interviews about their children's functional communication. Parents of preschoolers who received intervention ($n = 52$) provided ratings and comments regarding the child-S-LP relationship established during intervention with the clinician ($n = 7$). Themes were identified using content analysis. Fifteen children were waitlist controls and did not receive intervention.

Results. Parents of preschoolers who received intervention reported significantly greater gains in children's functional communication compared to those who did not. Most parents (94%) provided positive/very-positive perspectives about the child-S-LP relationship. The child-S-LP rapport and the S-LPs' professional competence were common themes identified in parents' perspectives.

Conclusion: (a) Significant gains in preschool children's functional communication occurred following speech and language intervention and (b) factors such as the rapport established between the child and the S-LP as well as the S-LPs' professionalism were considered by parents to be important factors for creating a positive child-S-LP relationship during speech and language intervention.

Abrégé

Contexte. Les orthophonistes utilisent des pratiques centrées sur la famille pour intervenenir. Ainsi, la considération des résultats basés sur la famille est encouragée. Le cadre de la CIF-EA (Classification internationale du fonctionnement, du handicap et de la santé – version enfant et adolescents) soutient la considération de ces résultats par l'orthophoniste (par ex., les points de vue parentaux sur les activités et les facteurs de participation et d'environnement associés à l'intervention langagière).

But. Explorer les points de vue des parents concernant : (a) la relation enfant-orthophoniste (facteur environnemental) et (b) la communication fonctionnelle de l'enfant (activités et participation)

Méthode. Soixante-sept parents d'enfants d'âge préscolaire atteints de troubles de la communication ont participé à cette étude. Les 67 parents ont tous complété des entrevues structurées pré-intervention et post-intervention concernant la communication fonctionnelle de leur enfant. Les parents d'enfants d'âge pré-scolaire qui avaient reçu une intervention (n=52) ont donné des pointages et des commentaires concernant la relation enfant-orthophoniste établie pendant l'intervention avec le clinicien (n=7). Les thèmes furent identifiés au moyen de l'analyse de contenu. Quinze enfants, constituant le groupe contrôle tirés des listes d'attente, n'ont pas reçu d'intervention.

Résultats. Les parents d'enfants d'âge pré-scolaire qui ont reçu une intervention ont rapporté des gains significativement plus élevés dans la communication fonctionnelle, comparativement à ceux qui n'en ont pas reçue. La plupart des parents (94 %) ont donné un point de vue positif/très positif sur la relation enfant-orthophoniste. Le rapport enfant-orthophoniste et la compétence professionnelle de l'orthophoniste ont été des thèmes communs identifiés dans les points de vue des parents.

Conclusion : (a) Des gains significatifs dans la communication fonctionnelle des enfants d'âge préscolaire se sont produits à la suite de l'intervention en orthophonie et (b) des facteurs tels que le rapport établi entre l'enfant et l'orthophoniste, ainsi que le professionnalisme de l'orthophoniste ont été considérés par les parents comme étant des facteurs importants pour la création d'une relation enfant-orthophoniste positive pendant l'intervention orthophonique.

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Much of paediatric rehabilitation within the western context adheres to a family-centred practice model (Law et al., 2005; Watts Pappas & McLeod, 2009). Family-centred practice is a philosophy of care that strongly encourages and values parental involvement (Crais, Roy, & Free, 2006; Dunst & Trivette, 1996). This model of practice, comprised of both relational (e.g., good listening skills, respect, being nonjudgmental) and participatory components (e.g., including the parent, offering individualized and flexible services), encourages therapists, children and family members to work collaboratively (Wiart, Ray, Darrah, & Magill-Evans, 2010). Most preschool and school intervention programs, however, focus only on the relational component (Dunst, 2002). While there are challenges to implementing the family-centred service model, much of paediatric rehabilitation within the western context, including speech-language pathology, promotes working with the whole family (Darrah, Lay, & Pullock, 2001; Dunst & Trivette, 1996; Palisano, 2006).

In countries like Canada, government ministries that fund speech and language services for preschool and school-age children have released position statements that articulate the need for parental involvement in their child's therapeutic process (Ministry of Education, 2005; Ministry of Health, 1996). To date, speech-language pathologists (S-LPs) have shifted from having limited parental involvement to more collaborative relationships with parents and other members of the family, such as involvement during intervention and assessment sessions (Watts Pappas, McLeod, McAllister, & McKinnon, 2008). Parental involvement in children's early intervention or later school programs can lead to better outcomes because those who are impacted by the child's disability have been considered and included in the intervention process (Henderson, 1988; Ryan, 1995). S-LPs are therefore encouraged to involve parents in their children's therapeutic process (Washington, Thomas-Stonell, McLeod, & Warr-Leeper, 2010). To be more family-centred, S-LPs must gain the family's perspective.

A shift in the paradigm for paediatric healthcare has fostered a focus beyond that of impairment to include family perspectives on children's functional communication and contextual factors (McLeod & Threats, 2008; Howe, 2008; Rosenbaum & Stewart, 2004; Washington, 2007, 2010) such as therapeutic relationships. The *International Classification of Functioning, Disability and Health – Children and Youth* (ICF-CY) provides a theoretical context delineating specific considerations for the child-therapist relationship (Environmental Factors[1]) and children's functional communication (Activities and Participation) (WHO, 2007). This holistic framework was derived from the *International Classification of Functioning, Disability and Health* (ICF) (WHO, 2001) with a specific focus on the birth to 18-year-old population. The ICF-CY framework has two parts, each with a corresponding set of components that classifies health and well-being using a structured and interrelated hierarchical organization (WHO, 2007). The inclusion of Environmental Factors supports consideration of social, cultural and institutional factors that influence children's functioning. In Chapter 3 of Environmental Factors entitled Support and Relationships, the child's relationship with the professional (e.g., S-LP, section e355) is highlighted.

The therapeutic relationship in speech-language pathology refers to the relationship established between the S-LP and the child during intervention. Functional communication is defined as the ability to convey or receive a message regardless of mode, to communicate effectively and independently in natural environments (Goldsmith, 1994). Ultimately, functional communication (i.e., participation) refers to the child's ability to be included with others (e.g., friends or other peers, family members, teachers) (Thomas-Stonell, Oddson, Robertson, & Rosenbaum, 2009), in particular, the child's ability to use his/her speech (i.e., articulation) and language (i.e., vocabulary or grammar) skills to start or enter a conversation, engage in play with others and establish socially productive relationships (Fujuki, Spackman, Brinton, & Hall, 2005; Hart, Fujuki, Brinton, & Hart, 2005; Thomas-Stonell et al., 2009; Washington, 2010). Improvements in functional communication following speech and language intervention are however considered the ultimate therapeutic outcome, thus facilitating participation in everyday life activities (Threats, 2003).

With the move towards family-centred practices, parents have been included in intervention and therefore have the opportunity to observe the child-S-LP relationship. Further, parents have opportunities to observe their children's interactions in everyday environments (e.g., home, playground, school). Consequently, asking parents their perspectives on the child-S-LP relationship and children's functional communication is considered appropriate.

Parental Perspectives on Speech Therapy

Parents of preschool children with communication disorders play a vital role in the assessment and intervention process (Bowen & Cupples, 2004; Crais, 1991, 1995; Glogowska, 2005; Markham & Dean, 2006; Kleinman, Braun, & Napiontek, 2004; Rudolph, Kummer, Eysholdt, & Rosanowski, 2005; Watts Pappas et al., 2008).

However, there are few studies that have investigated parents' views of S-LP intervention (Andrews, Andrews, & Shearer, 1989; Glogowska & Campbell, 2000; Watts Pappas et al., 2008). To date, there is no published work regarding parents' perspectives of the child-S-LP relationship during speech-language pathology; however, two conference presentations have provided the following insights.

A survey of public perceptions regarding speech and language intervention in Greece was recently completed using a random sample of adults (Vlassopoulos & Desylla, 2010). These participants were asked to provide their perceptions of speech therapy, namely to describe what they perceived the job of the speech therapist to be. Those adults in the sample whose children had received speech and language services also provided additional information about their own as well as their child's experience during speech therapy. Results from this study revealed that 92.4% of adults had positive perceptions of speech and language intervention (Vlassopoulos & Desylla, 2010). In particular, parents of children with communication disorders commented positively on the S-LPs' abilities to work well with children and families.

Additionally, Watts Pappas, McLeod and McAllister (2007) described six themes identified by parents of children with speech sound disorders and S-LPs regarding the factors that had an impact on the development of parent/professional partnerships: (a) approachability, (b) effective communicative skills, (c) respect for parents' beliefs, (d) professional competence, (e) rapport with child and (f) support of parental involvement. Parents identified all six factors, whereas, S-LPs only identified the first four factors, omitting (e) rapport with child and (f) support of parental involvement.

Only a few research studies have investigated parents' perspectives on children's functional communication following speech and language intervention (McCormack, McLeod, Harrison, & McAllister, 2010; Thomas-Stonell et al., 2009). In one study it was found that parents are twice as likely as S-LPs to note the negative impact of communication disorders on a 2- to 6-year-old child's ability to participate in daily life activities (e.g., communicate clearly with others) and on their emotional health (e.g., frustration, behaviour problems) (Thomas-Stonell et al., 2009). This Canadian study of 375 parents of children with communication disorders and their S-LPs (Thomas-Stonell et al., 2009) found that parents like S-LPs, reported meaningful positive changes in their children's functional communication following speech and language intervention. In particular, parents reported that their children could communicate more effectively with others. These findings suggested that parent reports of changes in functional communication following speech and language intervention were consistent with those of trained professionals. Thus, measuring functional communication from the parents' perspective is another potentially important means of establishing children's functional communication.

Government mandates and changes in clinical practice philosophies towards a family-centred approach have encouraged and supported parental involvement in children's therapeutic process. A growing number of childhood disability researchers (e.g., Dunst & Trivette, 1996; Bishop & McDonald, 2009; Bowen & Cupples, 2004; Glogowska & Campbell, 2000; McCormack et al., 2010; Thomas-Stonell et al., 2009) have begun to reflect these changes and have included parents in their research. Despite the current emphasis on family-centred clinical practices, little is known about parental perspectives on children's functional communication and parental perspectives on the child-S-LP relationship established during speech and language intervention. If S-LPs are to be family-centred in their service delivery practices, inclusion and understanding of parental perspectives is therefore essential.

Purpose

The authors of this study sought to examine the perspectives of a group of Canadian parents of children with speech-language disorders. The purposes of this study were to explore: (a) parents' perspectives on the child-S-LP relationship established during speech-language intervention and (b) parents' perspectives on changes in children's functional communication from pre-intervention to post-intervention. The authors of this study completed this research to address two primary implications for speech therapy practices. First, the authors believed that there could be a wide-range impact of impairment-based therapies on a child's ability to be included with others. Previous researchers, who have discussed the ICF and ICF-CY theoretical framework, have suggested that targeting goals in one ICF or ICF-CY domain could have direct effects in other domains (McLeod & Threats, 2008; Washington, 2007; 2010). The investigation of this theoretical concept in a clinical research study was deemed relevant to S-LPs as it could establish the worth of speech-language services on other areas of development, not directly targeted during intervention. Positive experiences on children's functional communication could be occurring, but have not yet been fully explored. Second, the authors wanted to investigate the topic of parental perspectives on the child-S-LP relationship because this topic potentially offered a wealth of information, considered useful in guiding S-LPs' future practices. In particular, S-LPs could be informed about which aspects of the therapeutic relationship were most commonly perceived by parents as contributing to the development of a positive therapeutic relationship. Ultimately, S-LPs could modify their services to engage in evidence-based practices (EBP), guided by these parental perspectives.

This study was part of a larger program of validation research using the Focus on the Outcomes of Communication Under Six (FOCUS©; Thomas-Stonell, Oddson, Robertson, & Rosenbaum, 2010). In that program of research, participation outcomes and predictors of participation outcomes were examined for children with communication disorders following speech and language intervention.

Method

The authors employed a quasi-experimental design (Portney & Watkins, 2009) and data were collected over an 18-month time frame. Ethical and managerial boards provided approval for this project. All participants provided written consent to participate.

Sample and Participant Selection

Seven S-LPs across three sites invited 96 parents of children with communication disorders to participate in this study. Each of these sites provided government-funded access to paediatric speech and language services in Ontario, Canada. To facilitate recruitment, convenience sampling was utilized. A standard script was used when recruiting each participant. Sixty-seven parents (64 mothers and 3 fathers) agreed to participate and were enrolled in the study with no attrition. Preschoolers and their parents resided in rural or urban settings and came from either single (48%) or dual (52%) income earning families. Preschoolers came from a range of racial backgrounds. Most participants (55%) were Caucasian ($n = 37$), 12% were Hispanic ($n = 8$), 12% were South-Asian ($n = 8$), 11% were Caribbean-Black ($n = 7$), 4.5% were Asian ($n = 3$), 4.5% were African-Black ($n = 3$) and 1% were characterized as other ($n = 1$). Some families (25%) also reported that English was not the only language spoken in the home; however, all participating families were proficient in English.

Children ranged in age from 36 to 60 months (mean = 52 months) and the majority were males (66%). Children either had only a communication disorder ($n = 43$) or had a communication disorder and a developmental mobility impairment ($n = 24$). In this study, 52 preschoolers received speech and language intervention (Group 1), while the remaining 15 preschoolers were on a waitlist for intervention (i.e., parents who could not attend intervention sessions at the interval offered). The group of children awaiting intervention acted as a wailist control group (Group 2).

The most prevalent diagnosis for children identified with developmental mobility impairments was cerebral palsy (58%). Most of these children were classified as Level 4, "child functions in sitting (usually supported) but independent mobility is very limited" on the *Gross Motor Function Classification System for Cerebral Palsy* (GMFCS; Palisano et al., 1997). The identified communication disorders for all children were: speech and language disorder (64%), language disorder only (21%) and speech sound disorder only (15%). All preschoolers' communication level was established by participating S-LPs using the *Communication Function Classification System* (CFCS; Hidecker et al., 2011). The purpose of the CFCS is to classify the everyday communication performance of an individual into one of five levels. The CFCS focuses on Activity and Participation levels as described in the WHO's ICF (Hidecker et al., 2011). A parent, caregiver, and/or a professional who is familiar with the individual selects the person's communication level. Most preschoolers (39%) were classified as "effective sender and receiver with familiar partners" (Level 3 communicator).

All preschoolers were equivalent at pre-intervention for age, $F(1,65) = 1.77$, $p = .188$, $\eta^2 = .03$, initial communication level, $F(1,65) = 2.53$, $p = .117$, $\eta^2 = .04$ and sex, $F(1,65) = 3.89$, $p = .053$, $\eta^2 = .06$. Participants were also equivalent in pre-intervention functional communication skills as measured by the *Vineland Adaptive Behavior Scales-II* (VABS-II; Sparrow, Cicchetti, & Balla, 2005), $F(1,65) = 1.34$, $p = .251$, $\eta^2 = .02$ and the *Focus on the Outcomes of Communication Under Six* (FOCUS$_©$; Thomas-Stonell et al., 2010), $F(1,65) = .45$, $p = .507$, $\eta^2 = .01$. Please see Table 1 for participants' pre-intervention characteristics. In terms of parental characteristics, preschoolers were also found to be equivalent for: racial background (i.e., Caucasian versus non-Caucasian), $F(1,65) = .38$, $p = .540$, $\eta^2 = .01$; income earning, $F(1,65) = .23$, $p = .630$, $\eta^2 < .01$ and English as a second language home environment, $F(1,65) = 2.53$, $p = .117$, $\eta^2 = .04$.

All children received intervention at their local community site. Intervention reflected current community-based practices, which included access to individual and/or group intervention. According to the participating S-LPs, as well as random observations completed by the first author, each site engaged in family-centred intervention services including: (a) engaging in active listening, (b) being compassionate, empathetic, respectful and non-judgmental in their language and behaviour towards both the parent and the child, (c) being aware of their professional beliefs

Table 1. Participants' pre-intervention characteristics

		Group 1 (*n* = 52)	Group 2 (*n* = 15)
Age in months	Age (mean)	52	49
	Age (range)	37-72	37-62
Gender distribution	Females (*n* =)	21	2
	Males (*n* =)	22	13
CFCS Level	Level (mean)	3	3
	Level (range)	1-5	1-4
VABS-II	Mean (SD)	119.21 (22.75)	111.60 (21.16)
FOCUS©	Mean (SD)	253.87 (51.55)	263.80 (47.88)

CFCS = *Communication Function Classification System (Hidecker et al., 2011)*
VABS-II = *Vineland Adaptive Behavior Scales-II (Sparrow et al., 2005)*
FOCUS© = *Focus on the Outcomes of Communication Under Six* (Thomas-Stonell et al., 2010)

and attitudes towards families, and as such were careful about working to complement parental capabilities and competencies, (d) ensuring that sessions were individualized, flexible (e.g., offering sessions at times most convenient to parents' schedules) and responsive to family concerns (e.g., addressing areas of need highlighted by the families) and (e) providing families with opportunities to be actively involved in decisions and engaging in S-LP/parent collaborations. Parents were present and participated in the intervention sessions. For example, the S-LP would first model an elicitation technique with the child and then encourage the parent to practice that same strategy with their child. Hand-over-hand facilitation was provided as needed for each parent.

On average, preschoolers received 15.63 hours of direct group or individual intervention with a S-LP (*SD* = 13.16, range = 3 - 57 hours, inter-quartile range = 11.40). The average intervention length was 18.19 weeks (*SD* = 10.32, range = 5 – 29 weeks, inter-quartile range = 19.25). Individual intervention was provided 65% of the time, group intervention was provided 25% of the time, and group plus individual intervention was provided 10% of the time. Intervention was provided once or twice weekly over a six-month interval. For example, the child receiving three hours of intervention was provided with six, 30-minute sessions once weekly.

The number of hours of intervention was determined by each site, in accordance with its typical clinical practices (e.g., based on extent of communication disorder). Consistent with service delivery practices in Ontario, most children (79%) received intervention once weekly that lasted between 30 and 50 minutes. At the end of each session, S-LPs provided suggestions for home practice targeting goals addressed during the intervention session. All intervention sessions were provided in English. At post-intervention, children were discharged from their current block of intervention and their parents were provided with home practice suggestions targeting goals addressed during the intervention block. Children's speech and language skills were re-evaluated within three-month post-intervention to establish next steps for services.

Across the three participating sites, there was common intervention content to address the preschoolers' needs. Specifically, there were similarities in approaches to intervention, type of intervention and goals targeted. Intervention goals across preschoolers were: Articulation/Phonology (33%), Expressive Language (29%), Receptive Language (14%), Intelligibility (14%), Voice/Resonance (5%), Play (3%) and use of Augmentative and Alternative Communication Devices (2%). Children's functional communication skills were not directly targeted.

Parent Report Measures

In this study, parental perspectives were obtained in two stages. In stage 1, all parents were asked to complete 25-minute structured telephone interviews at pre-intervention and post-intervention describing their children's functional communication. These interviews were completed with an independent S-LP who was not involved in the children's intervention.

Interviews about parental perspectives on their children's functional communication were established using two specific measures only. One measure, the VABS-II (Sparrow et al., 2005) was an established measure of functional communication (participation) while the other measure, the FOCUS© (Thomas-Stonell et al., 2010) is a newly established treatment outcome measure of functional communication, currently in its validation stage. Higher scores on both measures were better than lower scores, as a higher score indicated better functional communication.

The VABS-II is an interview-based standardized assessment of everyday adaptations for four major domains, including communication, daily living skills, socialization and motor skills for birth to 90 years. For the purposes of this investigation, only parental responses for the socialization domain of the VABS-II were utilized. Administration of the VABS-II – socialization domain was considered relevant to the current project to establish functional communication from the parents' perspective using a measure with established psychometric properties. Parents described their children's functional communication in three main areas: (a) interpersonal relationships, (b) play and leisure and (c) coping skills, with response options for usually, sometimes or partially, never or don't know.

The FOCUS© is a new, broad-based measure of communication skills following speech and language intervention for children six years of age and younger. Based on the ICF-CY framework, it contains items that evaluate communication skills at the level of Activities and Participation as well as investigations of Personal Factors relating to communication. Unlike most speech and language outcome measures, it evaluates changes in both Capacity (what the child is capable of doing in an ideal environment such as a structured, therapeutic therapy session) as well as Performance (what the child is able to do in various environments such as home, school, daycare) (Thomas-Stonell et al., 2010). Inter- and intra-rater reliability of the measure for parents' responses is currently established (Thomas-Stonell et al., 2010). Further, preliminary evidence suggests that the FOCUS© has convergent validity for the construct of functional communication (i.e., participation) (Washington, Thomas-Stonell, McLeod, Oddson, & Warr-Leeper, 2010). Parents responded to 50 different statements about their children's abilities to be involved with others in meaningful ways (e.g., "My child makes friends easily") with response options on a 7-point-scale ranging from "not at all like my child" to "exactly like my child", or "can always do without help" to "cannot do at all".

In stage 2 (post-intervention), parents of children receiving intervention (*n* = 52 since 15 children were on a waitlist to receive intervention) were asked to provide a rating of the child-S-LP relationship established during speech and language intervention. These parents responded to the question, "How would you rate your child's therapeutic relationship with his/her speech therapist?" These ratings used a five-point Likert scale from 5 = very positive to 1 = not very positive. Parents were then asked why they gave the rating provided. No additional questions were used to solicit the parent comments about the ratings. Parents' comments were transcribed verbatim and then repeated back for accuracy. Parent ratings and comments were kept confidential and were not shared with the intervention sites or S-LPs.

Procedural validity: Part I. To ensure the integrity of the data collected, 10% of interviews (12 interviews) were randomly selected and observed by a second individual, one of two graduate students in speech-language pathology. For the fidelity process, interviews were equally observed from pre-intervention (six interviews) and post-intervention (six interviews) sessions.

Procedural validity: Part II. Administration of the VABS-II and the FOCUS© was counterbalanced across participants and phases. Following administration of the parent report measures, parents of intervention participants provided their ratings of the child-S-LP relationship. Parental comments supporting the child-S-LP ratings provided were collected last. Based on the observations of the two independent students, it was determined that the interviewer adhered to an invariant protocol 100% of the time.

Reliability for VABS-II and FOCUS$_©$ scoring. To ensure reliability of scores, double scoring for parental responses on the VABS-II and the FOCUS$_©$ was completed randomly and independently for the 12 sessions (interviews). Each session selected was from a different participant and equally selected across groups and assessment time points. Two graduate students in speech-language pathology were recruited to perform this task. For the VABS-II, point-by-point agreement in scoring ranged from 96% to 100%, with an average of 97%. For the FOCUS$_©$, point-by-point agreement in scoring ranged from 83% to 100%, with an average of 96%. These data suggested that the scoring of the VABS-II and the FOCUS$_©$ was reliable.

Content analysis and reliability. A content analysis of parental comments about the child-S-LP relationship was completed. Specifically, parental comments regarding "why" they gave the rating provided about the therapeutic relationship established between their child and the S-LP during intervention was used to supply the data for this analysis. Content analysis is a research method useful for establishing meaning from text (Neundorf, 2002; Weber, 1990). This analysis involves the systematic and objective analysis of message characteristics to make valid inferences from text (Neundorf, 2002). Fifty-one of the 52 parents provided comments about their ratings for the child-S-LP relationship. These comments were transcribed during the post-intervention interview and then entered into an excel spreadsheet with participant information removed.

Parental comments about the child-S-LP ratings were coded using six themes identified in the previous investigation of parents' perceptions of competencies in paediatric allied health intervention (Watts Pappas et al., 2007). The six themes used were: (a) *approachability*, (b) effective communicative skills, (c) respect for parents' beliefs, (d) professional competence, (e) rapport with child and (f) support of parental involvement. These themes had not previously been applied to S-LP intervention. Therefore, application of the themes in the current study provided insight into what factors may have contributed to parents' perspectives on the child-S-LP relationship established during speech and language intervention. These themes had face-validity as they were developed from parent comments about building therapeutic partnerships.

Two S-LPs who did not provide assessment or intervention for families and children in this study completed the content analysis. These S-LPs were blinded to the project aims. To facilitate the content analysis, the S-LPs participated in a training session where each theme was described using parent descriptions from the original study (Watts Pappas et al., 2007) of parents' perceptions of building partnerships with children (e.g., *approachability* "she was very professional, but at the same time very personable, a real person, not condescending"). At the end of the training session, the S-LPs were provided with a sheet containing these descriptions. The two S-LPs then independently read and coded each of the parent comments using one or more of the pre-identified themes. For example, one parent comment was "*She is a good therapist and (my child) enjoyed working with her*". This comment was coded using two different themes, professional competence for "*she is a good therapist*" and rapport with child for "*enjoyed working with her*". Inter-rater agreement for thematic coding of each parent comment in the current study was 90%.

Once the S-LPs had achieved a consensus (i.e., 90% inter-rater reliability) on the coding of parental comments, a further analysis of the two most frequently coded themes was completed. The same two S-LPs independently analyzed the parent comments to identify recurring subthemes in the written text. These S-LPs then compared and discussed their findings using an iterative face-to-face process, until 100% consensus was achieved. It was determined that additional subthemes could be identified.

Inter-rater reliability for the subcoding of parental comments using these additional themes was established using 20% of the original sample. These comments were randomly selected. One S-LP who helped to establish inter-rater agreement for the original coding participated along with a new S-LP blinded to the previous data or the purposes of the study. Agreement between these two S-LPs was established in two phases, each using 10% of the sample. For the first phase, data were coded independently by the two S-LPs with agreement established at 90%. For the second phase, data were once again re-coded with agreement established at 100%. The distribution of coded and subcoded themes is outlined in Table 2. A sample of parent comments along with the corresponding child-S-LP relationship ratings and assigned (sub)themes is provided in Appendix A. The samples chosen were selected randomly from all parent comments. The data in Appendix A represents 10% of the entire sample.

Data Analysis and Design

A pre-post design was utilized. Qualitative and quantitative analyses were completed. Raw scores (instead of standardized scores) were utilized. Researchers have recommended the use of raw scores for measuring treatment outcomes for children with communication disorders, as it is not realistic to expect noticeable relative gains (i.e., standard score or percentile rank changes) over a limited period of time in treatment (Hadley, Olsen, & Earle, 2005). All data were entered into the Statistical Program for the Social Sciences (SPSS) Version 18.0.0 computer program (PASW, 2009). To answer research question 1: What are parents' perspectives of the child-S-LP relationship during speech-language intervention?, results from the content analysis were provided. To answer research question 2: What are parents' perspectives of children's functional communication?, the two groups (intervention versus waitlist controls) were compared over two time periods (pre-intervention versus post-intervention). A 2 X 2 repeated measures Analysis of variance (ANOVA) was completed to address the group X time period data generated from the VABS-II and another 2 X 2 repeated

Table 2. Percentage of Theme and Subtheme Codings for Parent Comments

Theme [Total theme count*= 82]	Percentage of parent comments coded
Rapport with child	55
Professional competence	27
Support of parental involvement	10
Approachability	5
Effective communicative skills	2
Respect for parents' beliefs	1
Subthemes for Rapport with child [Total subtheme count*= 77]	**Percentage of parent comments sub-coded**
Child-S-LP interaction	34
Therapeutic experience	27
Child enjoyment	12
Child liking his/her S-LP	12
Child liking intervention	9
S-LP liking child	6
Subthemes for Professional competence [Total subtheme count*= 27]	**Percentage of parent comments sub-coded**
S-LP clinical skills	48
Child improvement/progress	44
Personality management	8

*coding and sub coding of parents' comments was established using one or more themes/subthemes.

measures ANOVA was completed to address the group X time period data generated from the FOCUS$_©$.

A significant interaction effect was predicted for both ANOVAs with the intervention group expected to show more change than the comparison group (i.e., waitlist controls) for pre-intervention to post-intervention test performance. Since previous univariate analyses have shown that participants were equivalent at pre-intervention for both VABS-II and the FOCUS© performance, a follow-up to the significant interaction was completed to determine if groups behaved differently at post-intervention only (column-effect). Planned follow-up tests ($p < .025$) were completed for significant F values.

Results

Perspectives on the Child-S-LP Relationship

Parents rated the child-S-LP relationship using a five-point rating scale, where 1 represented not very positive and 5 represented very positive. On average, most parents (94%) had positive or very positive perspectives on the child-S-LP relationship established during speech and language intervention (M = 4.4, SD = .75). There was very little variance in the ratings provided. Of the parents included in this study, 56% (29/52) rated the child-S-LP relationship as very positive, 38% (20/52) rated the relationship as positive, 4% (2/52) provided a neutral rating, while only 2% (1/52) rated the therapeutic relationship as not very positive.

Content analysis. The content analysis was completed to identify common themes in parental comments about the child-S-LP relationship. These comments were used to provide an expansion on the therapeutic rating provided by parents on the one to five-point scale. The most to least frequent themes were: (a) rapport with child (55%), (b) professional competence (27%), (c) support of parental involvement (10%), (d) approachability (5%), (e) effective communicative skills (2%) and (f) respect for parents' ideas and beliefs (1%).

A further analysis of the written text arising from the two most frequently coded themes (i.e., rapport with child and professional competence) was completed. A total of nine additional themes were identified using this process. Six subthemes were identified in the 'rapport with child' theme: child enjoyment, child-S-LP interaction, S-LP liking child, child liking S-LP, child liking intervention and therapeutic experience. Three subthemes were identified in the 'professional competence' theme: S-LPs' skills/abilities, S-LPs' managing child's personality, child's improvement/progress in therapy. These subthemes provided details about the factors that contributed to building the child-S-LP relationship. Please refer to Appendix A for an example of the (sub)themes.

Parental Perspectives on Children's Functional Communication

Parents' descriptions of their children using the VABS-II and the FOCUS$_{\copyright}$ were utilized to establish functional communication outcomes from pre-intervention to post-intervention. As predicted, there was a significant interaction effect, with intervention participants experiencing significantly greater progress compared to the comparison group (i.e., waitlist control participants). This finding suggested that parents of children receiving intervention observed that significantly greater changes in children's functional communication were occurring over time. Examples of changes observed included the following: (a) being able to tell stories that made sense, (b) participating in group activities, (c) joining in conversations with peers, (d) engaging in pretend play with others, (e) making friends with others and (f) responding to others when asked questions.

Results for the VABS-II scores were as follows: both the group type, $F(1,65) = 7.37$, $p = .008$, $\eta_p^2 = .10$ and the time period, $F(1,65) = 44.10$, $p < .001$, $\eta_p^2 = .40$, main effects were significant, as well as the Group Type X Time Period interaction, $F(1,65) = 4.47$, $p = .038$, $\eta_p^2 = .06$. Due to the significant interaction effect, main effects for group type and time period were not interpreted. Instead, a simple main effect analysis at the post-intervention time point (column effect) was completed as a follow-up to the significant interaction effect. Significant differences were found at post-intervention, $F(1,65) = 15.40$, $p < .001$, $\eta2 = .19$. Pairwise comparisons of means at post-intervention revealed that intervention participants had higher VABS-II mean scores on average compared to waitlist controls. Figure 1 illustrates between group performances for VABS-II data.

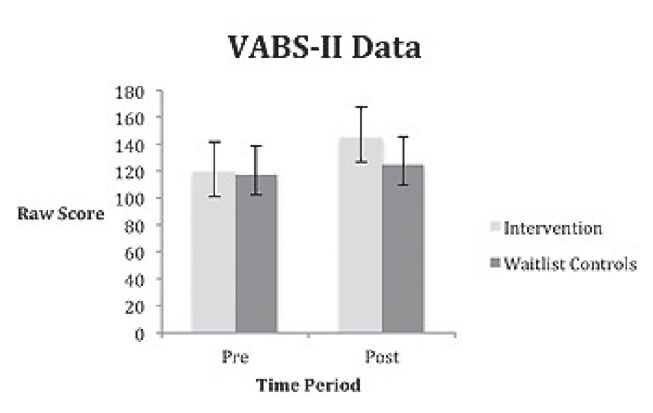

Figure 1. Preschoolers' between group performance on the Vineland Adaptive Behavior Scales (VABS) – II illustrated at each time period.

Results for the FOCUS© scores were as follows: the group type main effect was not significant, $F(1,65) = .40$, $p = .530$, $\eta_p^2 = .01$; however, the time period main effect, $F(1,65) = 24.74$, $p < .001$, $\eta_p^2 = .28$, as well as the Group Type X Time Period interaction, $F(1,65) = 15.73$, $p < .001$, $\eta_p^2 = .20$ were significant. Main effects for intervention group and time period were not interpreted. Instead, simple main effects analyses were completed as a follow-up to the significant interaction effect. Significant differences were found at post-intervention, $F(1,65) = 4.48$, $p = .023$, $\eta^2 = .06$. Pairwise comparisons of means at post-intervention revealed that intervention participants had higher FOCUS$_{\copyright}$ mean scores on average compared to waitlist controls. Figure 2 illustrates between group performances for FOCUS$_{\copyright}$ data.

Discussion

Child – S-LP Relationship

Parents had positive perspectives about the child-S-LP relationship following speech and language intervention. Characteristics such as the 'rapport with child' and the S-LP's 'professional competence' during intervention were large parts of having a positive child-S-LP relationship. There were particular features of each characteristic that contributed to these parental perspectives. The 55% of parent comments that were coded as 'rapport with child' were further analyzed and

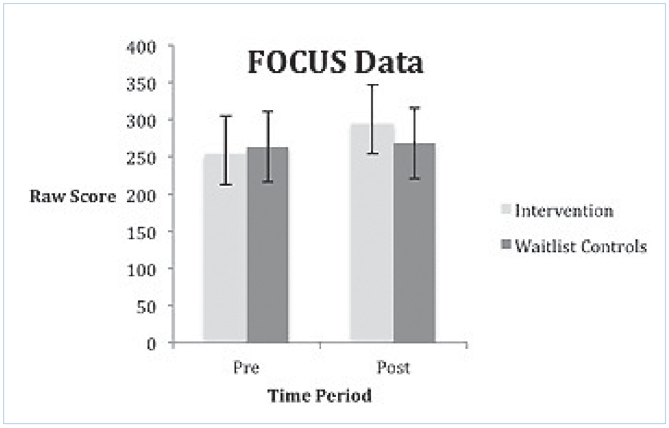

Figure 2. Preschoolers' between group performance on the Focus on the Outcomes of Communication Under Six (FOCUS©) illustrated at each time period.

led to the identification of six features that contributed to the perception of having a good rapport: child-S-LP interactions, therapeutic experience, child enjoyment, child liking S-LP, child liking intervention and S-LP liking child. These features reflect the relational component of family-centred practices. Further, the subsequent analysis of the 27% of parent comments coded as S-LPs 'professional competence' revealed that the S-LPs' clinical skills/abilities, child's progress in intervention and the S-LPs' abilities to manage the child's personality were components of the S-LPs' perceived competence. Ultimately, this perception of S-LPs being competent contributed to the parents' rating of a positive child-S-LP relationship.

Children's Functional Communication

The current findings demonstrate that speech and language intervention positively impacted functional outcomes in young children with communication disorders. The children who received intervention made significantly more gains compared to no intervention waitlist controls in functional communication skills. According to children's parents, these gains were noted in making friends, telling stories and engaging in conversations and play with others. The importance of investigating the child's ability to be included with others is being increasingly recognized (Howe, 2008; Threats, 2003; Washington, 2010). In particular, the ICF-CY framework has encouraged movement away from an impairment-based model of speech and language services toward the use of a holistic framework (e.g., ICF-CY) that focuses on functional assessments of children's communication from the parents' perspective (Rudolph et al., 2005; Thomas-Stonell et al., 2009; Washington, 2010). Thomas-Stonell and her colleagues (2009) found that parents of young children with communication disorders reported positive meaningful changes in children's functional communication following intervention.

In the current study, S-LPs did not provide direct targeting of children's functional communication. Instead, intervention goals focused primarily on traditional speech and language skills (i.e., impairment-based targets). Therefore, the significantly greater gains observed in functional communication provide some evidence for the broad range impact of speech and language intervention compared to no intervention for a variety of children with communication disorders. The child's ability to move beyond that, which is targeted in therapy, thus facilitating inclusion in everyday life activities, is considered the ultimate therapeutic outcome (Threats, 2003; Washington, Warr-Leeper, & Thomas-Stonell, 2011). As suggested by proponents of the ICF-CY framework (McCormack et al., 2010; McLeod & Threats, 2008; Thomas-Stonell et al., 2009; Washington, 2010), S-LPs should also consider broadening their intervention approaches to begin targeting functional communication (e.g., attention, socialization), which could positively impact on children's traditional communication skills.

Clinical implications. This research study has resulted in two important findings thought to have possible practical implications for S-LPs working with preschoolers with communication disorders. The first finding was that parents valued the S-LPs' rapport with their child and as well as the S-LPs' professional competence. The positive child-S-LP relationship, which was supported by the rapport established between the child and the S-LP, may have resulted in removing barriers to attendance and increasing motivation to come to therapy. The additional subthemes identified regarding the child-S-LP rapport offered some insight into why/how positive experiences may have occurred. Ultimately, decreased frustration on the part of the child (i.e., happy about going to therapy) and the parent (i.e., not fighting with child to go the speech therapy needed to address communication needs) could have occurred. Further, the parents' perception of the S-LPs' professional competence suggested that parents were attentive to the level of expertise the clinician had to address their child's communication needs. Combined, these insights have implications for the enactment of evidence-based practice within speech-language pathology. It can provide direction for how to consider the clients' perspective and the importance of the clinicians' expertise. S-LPs' consideration of these types of parental perspectives to guide future practices, can also contribute to the ongoing move towards family-centred practices in speech-language therapy.

The second finding of this research was that intervention reflecting impairment-based goals had an impact on functional outcomes, a result that has rarely been tested due to limited assessment tools. This result was tested using the new tool, the FOCUS© as well as the established measure, VABS-II socialization domain. The fact that outcomes using both measures were significant for intervention compared to waitlist controls supports the worth of speech-language interventions on other areas of development for preschoolers with communication disorders. The results provide evidence for the importance of the breadth of the ICF-CY. There is interaction between impairment and intervention and functional outcomes. Findings obtained from this study, suggested that direct targeting of one domain of the ICF-CY (e.g., Body Functions - articulation functions, section b320) resulted in observable gains in other domains (e.g., Activities and Participation – conversations with others, sections d3503 and d3504). As such, S-LPs should be aware of the broad based impact of direct, impairment based services on a child's ability to be included with others.

Limitations of the Present Study and Future Directions

A randomized sample of parents of children with communication disorders could not be obtained. Since this sample of parents was based on the caseload at three centres, the children may not be completely representative of all children identified with communication disorders.

Another limitation of this study was the sensitivity of the rating scale utilized to obtain parental perspectives on the child-S-LP relationship. There were only two positive response options on this scale. A large percentage of parents had positive or very positive perspectives of the child-S-LP relationship established in speech-language intervention. Future research investigations should incorporate a rating scale that has a broader range of response options to increase sensitivity. Two different response scales could be used to achieve this objective – one for positive responses and the other for negative responses. A more even distribution of responses would provide more insight into the parents' perspectives on the child-S-LP relationship. A greater distribution for ratings along the 5-point-scale would also facilitate comparisons between more positive and less positive parent ratings. Further, a larger group of questions that could help provide more variance across parents' comments could be used. Also, questions regarding parental perspectives on amount of change/progress expected in intervention could be collected. An interesting analysis comparing parents' ratings of change as well as the child-S-LP relationship to child progress on an outcome measure (e.g., the FOCUS©) could therefore be completed to determine the nature of the relationship among these factors.

Future investigations of the child-S-LP relationship could also be expanded to include perspectives of both the child and the S-LPs directly about the therapeutic relationship. Use of direct examination of these perspectives could provide a first-hand opportunity to examine how individuals engaged in the child-S-LP relationship view their partnership. This information could then be used to guide and/or inform professional practice. Additionally, to confirm the applicability of the themes/subthemes, parents could be asked to participate in focus groups. A discussion of the importance of the child-S-LP relationship, parent-S-LP relationship and the factors contributing to these relationships could be achieved. This would facilitate a greater understanding of and appreciation for parents' perspectives. It would also be important to ask parents directly about features of the speech-language services provided that were important to them. Specific information about the participatory component of family-centred practices could consequently be obtained.

An additional limitation was that counterbalancing in test administration across assessment intervals was aimed for by asking parents to complete the VABS-II followed by the FOCUS© at pre-intervention and at post-intervention the FOCUS© was administered first followed by the VABS-II. However, it is possible that this order confounded the results, since the assessment interval varied with the order of tasks. If this study were replicated, having half of the participants complete the VABS-II first and the other half complete the FOCUS© first at both pre- and post-test could achieve proper counterbalancing.

It is also acknowledged that we cannot confirm whether or not the parents were answering the questions to the functional communication outcomes, in order to be "good participants". Thus, there is a possible influence in the way the data were collected on these parental comments.

Conclusion

The findings of this descriptive study provide insights into a group of Canadian parents' perspectives on speech-language pathology. In particular, major components necessary for building positive therapeutic partnerships in speech language intervention (e.g., 'rapport established' and 'professional competence') were identified. Within speech-language pathology, we do not have enough information about these parental perspectives. Theoretical discussions about the provision of speech and language services beyond an impairment level however enable a greater understanding of: (a) other factors that could significantly contribute to parents' perspectives on the experience of therapy and (b) children's functional communication. Including parents in the therapeutic process and the evaluation of outcomes facilitates an enhanced understanding of their perspectives that could be used to guide service provision. Consequently, the needs of the child with the disability and his or her family can be better serviced.

Declaration of Interest Statement

The authors report that there are no financial or personal relationships with other people or organizations that could inappropriately influence the content and writing of this paper. Therefore, the authors report no conflicts of interest for this study. The authors alone are response for the content and writing of the paper.

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End Notes

[1] Capitalization has been used to be consistent with usage in the ICF-CY and to differentiate between everyday usage of these terms.

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APPENDIX A

Parent ratings, comments, and coded themes/subthemes

Participant	Parent Rating# of the Child-S-LP Relationship	Parent Comment (about child-S-LP rating)	Theme(s) Coded	Subtheme(s) Coded~
G1041	5	(My child) really likes her therapists. (My child) looks forward to seeing her therapist and (my child) gets really excited. (My child) says it's "my special time without my siblings"	Rapport with child	Child likes S-LP; child enjoyment; therapeutic experience
G1040	5	(My child) asks to go all the time to go to speech therapy. (My child) loved it, (my child) loved her teacher. They had a great time together	Rapport with child	Child likes therapy; child likes S-LP; child-S-LP interaction
G2011	4	*She is a good therapist** and (my child) enjoyed working with her+	*Professional competence** & rapport with child+	*S-LP abilities/skill**; child enjoyment+
G2015	4	(My child) had a good relationship with her therapist+. *She (the therapist), had good ideas and made (my child) learn more and talk better**	Rapport with child+ & *professional competence**	Child-S-LP interaction+; *S-LP's clinical skills; child improvement/progress**
G1031	5	(My child) had a good time with her teacher	Rapport with child	Child likes S-LP

Note. Parent ratings, associated comments and themes/subthemes coded represent 10% of the sample of available responses. These samples were randomly chosen.

#Parent rating scale: 5 = very positive, 4 = positive, 3 = neutral, 2 = not positive, 1 = not very positive

**Comment coded as professional competence/+comment coded as rapport with child*

~Subtheme(s) coded. These are subthemes arising from the two most frequently coded themes (rapport with child and professional competence) for why parents provided the child-S-LP ratings. Semicolon represents a new subtheme. The italicized parent comments/themes/subthemes represent those associated with ***professional competence****.*

The Ability to Follow Verbal Directions: Identifying Skill Levels and Measuring Progress

La capacité de suivre des consignes verbales : l’identification des niveaux de compétence et la mesure du progrès

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KEY WORDS
LISTENING
FOLLOWING DIRECTIONS
DIRECTIVE COMPLIANCE
FOLLOWING INSTRUCTIONS
COMPREHENSION PROBLEMS
UNDERSTANDING DIRECTIONS
AUDITORY COMPREHENSION

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Abstract

The ability to follow verbal directions is an essential classroom skill that children with language and cognitive challenges often fail to adequately develop. When problems following directions are identified, speech-language pathologists (S-LPs) have difficulty constructing measurable goals and systematic instructional tasks, and they have no exact means to measure the child’s progress. This article presents a preliminary analysis of a new criterion-referenced instrument that offers linguistically controlled incremental measurements to assist in bridging the gap between identifying deficit skill levels and quantifying goals and baselines for directive compliance. The instrument, the *Test of Following Oral Directions* (TOFOD), was developed and administered to 458 children, ages 5 through 10, to gather data regarding the mean levels at which typically developing children are able to follow specific directions. From the TOFOD, baselines can be constructed which allow the S-LP to pinpoint initial skill levels and to measure incremental changes in consistency or skill levels of children who need to increase their direction following ability.

Abrégé

La capacité de suivre des consignes est une habileté essentielle en salle de classe, que les enfants ayant des difficultés langagières et cognitives manquent souvent de développer de façon adéquate. Quand des problèmes à suivre les consignes sont identifiés, les orthophonistes ont de la difficulté à construire des buts mesurables et des tâches d’enseignement systématiques, et ils n’ont pas de moyens précis pour mesurer le progrès de l’enfant. Cet article présente une analyse préliminaire d’un nouvel instrument axé sur des critères offrant des mesures incrémentielles linguistiquement contrôlées pour aider à combler le fossé entre l’identification des niveaux d’incapacités et la quantification des buts et des bases de référence pour le respect des consignes. L’instrument, le *TOFOD (Test of Following Oral Directions)*, a été créé et administré à 458 enfants de 5 à 10 ans, pour recueillir des données sur les niveaux moyens auxquels les enfants en développement typique sont capables de suivre des consignes particulières. À partir du *TOFOD*, on peut construire des bases de référence permettant à l’orthophoniste de déterminer avec précision les niveaux d’habileté initiaux et de mesurer les changements incrémentiels dans la constance ou les niveaux d’habiletés des enfants qui ont besoin d’augmenter leur capacité à suivre des consignes.

The ability to follow verbal directions is an integral part of children's instructional day skill in this arena is critical to success in the classroom as well as at home or in the community, and inability to follow directions may handicap a child in the classroom (Anderson & Brent, 1994; Fazio, 1996). There are many reasons why children with normal hearing have difficulty following directions. It has been suggested that the underlying causes of the deficits are in the areas of grammar or cognition (Bishop, 1979, 1994; Bishop & Adams, 1992; Ellis-Weismer, 1985; Johnston & Ellis-Weismer, 1983; Johnston, Smith, & Box, 1997; van der Lely & Harris, 1990; van der Lely & Howard, 1993), working memory (e.g., Engle, Carullo, & Collins, 1991), and/or semantics (e.g., Ceci, Ringstrom, & Lea, 1981). It is difficult to determine which of these language components are to blame for the child's difficulties and what part memory plays in them. Gillam (1998) noted that it was impractical to measure a child's memory apart from his language because the skills are interrelated and inseparable. While it is clear that the skill of following directions is important in the classroom — quantifying that ability is challenging. Complying with verbal directions such as "Put your homework in your locker" requires many interrelated skills such as the ability to hear the instruction, understand the vocabulary, comprehend the syntax and hold the instruction in memory until it is completed (Gill & Henderson, 2003), as well as a host of nonlinguistic skills such as motivation, attention and physical dexterity. If several components of language are involved in following directions and these components are interdependent and inseparable, we may not be able to tease out specifically which aspect is creating difficulty for the child. However, it is important that we attempt to quantify as many elements as we can in order to provide effective therapy and measure progress.

A first step in working with children who appear to have difficulty following directions is to determine where their skills rank in comparison with their peers. Several popular normed and standardized tests that measure the skill of following directions, such as the "Concepts and Following Directions" subtest of the *Clinical Evaluation of Language Functioning*-4 (CELF-4; Semel, Wiig, & Secord, 2003) and the *Auditory Processing Abilities Test* (Swain & Long, 2004) provide a sample of the skill for comparison to typically developing children. The "Concepts and Following Directions" subtest of the CELF-4, which was enhanced substantially over previous editions, helps to determine whether the child is functioning as expected for his age. Once it is determined that a child's skill falls below expected levels, an Individualized Education Program (IEP) goal to increase the ability to follow directions is often adopted. At this juncture the speech-language pathologist (S-LP) may have difficulty constructing measurable goals, baselines and tasks that systematically increase in difficulty. This is often because the norm-referenced tests are not designed for these purposes, and there is a dearth of available criterion-referenced assessments developed specifically for following directions.

Therefore, the S-LP typically resorts to constructing vague goals, e.g., "Caitlyn will increase her ability to follow directions" or attempting to quantify the goal, e.g., "Caitlyn will follow two-part directions," by measuring the number of nouns and verbs or the number of words in the sentence. While this is certainly a step in the right direction, the length and complexity of sentences vary far beyond the simple counting of main nouns and verbs or words. In essence, "Touch the truck" and "Get the tiny yellow truck with the stripes on the side" could each be a "one-part" direction, when in fact the second directive might require extensive linguistic and cognitive processing depending on the available item choices. Further, a sentence such as "The dog was bitten by the cat," requires more advanced linguistic processing to comprehend than "Pick up the red pencil and bring it to me," a "two-part" direction of greater length.

Nippold (2007) reviewed the numerous syntactic attainments that occur in school-age children and young adults and noted that "greater sentence length does not always imply greater syntactic maturity" (p. 260). Many structures increase the complexity of language without increasing the length of the sentence, such as nominal and subordinate clauses and participle phrases. For example, comprehending the sentence "Sorting the papers irritated the boy." would require considerably more linguistic skill than would other six-word sentences typically produced or processed by a first grader. For tasks such as following directions, determination of complexity must include examination of more than sentence length.

While not specific to following directions, Robertson and Joanisse (2010) found that both sentence length and syntactic complexity influenced children's ability to comprehend spoken sentences. These authors examined sentence comprehension using a picture pointing task for typically developing children, children with dyslexia and children with language impairment. They found that regardless of participant group, longer sentences were harder to process than shorter sentences. Robertson and Joanisse also reported that children with language impairment consistently had more difficulty processing sentences in passive voice than sentences in active voice. In addition, they noted an interaction effect across groups where the syntactically complex sentences were difficult to process in longer sentences versus shorter sentences. Based on these findings, it may be expected that children with language impairments will have greater difficulty following directions as they become either longer or more syntactically complex. Sentences that are both long and syntactically complex should pose the greatest difficulty.

Robertson and Joanisse's (2010) findings that both length and complexity affect comprehension support the theory that children with language impairments have deficits in working memory (Gathercole & Baddeley, 1990; Montgomery, 1995, 2000). This working memory deficit implies that children with language impairments are less able to coordinate both storage and processing of linguistic information. The children with language impairments in Robertson and Joanisse's study had difficulty with syntactically complex sentences even with minimal working memory load, and in addition, they showed greater difficulty in comprehension when working memory demands were increased. Therefore, if clinicians are going to address difficulty in following verbal directions in therapy, it seems logical to have a tool available that takes into account both sentence length and linguistic complexity when measuring children's progress in sentence comprehension.

Gill and Henderson (2003) suggested a method for determining the linguistic complexity for directions and then determined the percentage of typically developing children who could follow directions at each level of linguistic complexity. Their system assigns unit values to each linguistic feature, including length and syntactic complexity, while holding vocabulary constant. This system, the *Linguistic Unit Analysis System* (LUAS) assigns one unit for most content words and additional units for elements of structural complexity such as passive voice. Additional value is added for words that add memory constraints such as lists of three or more items, and value is also added for grammatical markers that must be processed such as plural "s." No units are added for words that do not add new meaning to the directive, such as "you." (See Table 1 for a scoring example and Appendix A for explanation of point values.) The LUAS provides a system that could facilitate the development of a criterion-referenced test for following directions.

Criterion-referenced testing allows a child's abilities to be measured against a set of identified skills. McCauley (1996) supports the use of criterion-referenced measures by S-LPs and notes that most speech and language diagnostic texts encourage their use. She notes that criterion-referenced measures are necessary when specific information about a child's skill is needed in order to plan and implement therapy. Measures such as "Mean-Length of Utterance" provide valuable information to the S-LP, but unfortunately there are very few criterion-referenced measures that have been created for children with language disorders (McCauley, 1996). There are even fewer criterion-referenced tests that meet standardization criteria as seen in norm-referenced tests. Ideally, criterion-referenced measures would include guidelines for use and administration as well as an explanation of scoring procedures. These additions would substantially enhance the value of criterion-referenced tests (McCauley, 2001) which is needed to implement effective therapy and measure progress.

Table 1. Example of Linguistic Unit Analysis System Direction Scoring

Example of a Verbal Directive	Total Units Assigned this Directive	Explanation of Unit Assignment for the Directive
Push the car.	3	1 point for the verb (*push*) 1 point for the article (*the*) 1 point for the noun (*car*)
Before you get the block, move the penny	8	1 point for conjunction (*before*) 0 points for you because processing of this is non-essential 2 points for verbs (*get* & *move*) 2 points for nouns (*block* & *penny*) 2 points for articles (*the* & *the*) 1 point for order-of-mention violation (when the first direction stated is not the first directive to be carried out)

The ability to follow verbal directions, a vital skill for academic success, is often impaired in children with language disorders. S-LPs can use normed, standardized measures to evaluate whether a child's skill in this area falls below acceptable levels when compared with others his age. However, once it is determined that a child's direction-following skill falls below the norm, the S-LP has little on which to base his/her therapy. It is important for the S-LP to have a method for defining exactly where the child's specific skills break down. The purpose of this study was to develop a criterion-referenced test based on an existing system of linguistic measurement (the LUAS) and to administer it to 5- to 10-year-old children to begin a preliminary determination of its reliability and convergent validity with existing measures of direction following. The secondary purpose was to suggest how the test could be used to construct sets of directives specifically targeting the child's skill level for use in treatment and measuring progress.

Method

Development of the Test

The LUAS was used to construct the *Test of Following Oral Directions* (TOFOD). Instructions of increasing length and linguistic complexity were composed according to a point system summing their overall complexity. Two directions of equal complexity were constructed at each level of difficulty, beginning with a 3-point direction (*Touch the cup*). Twenty-two subsequent pairs of directions were compiled, each with a systematically increased level of difficulty up to 25 points (one point higher than the highest level achieved by 10-year-olds; Gill & Henderson, 2003). An example of a 25-point directive is: *Before you put the long string and the yellow block in the blue cup, put the red block and the short pencil on the white paper*.

Directions were composed using vocabulary likely to be in the lexicon of most first or second grade elementary school children. Names of objects reflected low-level vocabulary so that compliance would be more likely to measure length and syntactic complexity rather than semantic knowledge. Common objects representing the items mentioned in the direction were assembled. Instructions for administration of the test were created and a layout with the names of the objects was printed. To ensure that the children recognized each object and knew the test vocabulary, the instructions began with a request for the children to point to each object. The authors determined that each object should be placed back in its original position after the children carried out the instruction in order to ensure the consistency of the visual stimuli. Further, to avoid test fatigue, the authors determined that older children could omit the first four sets of instructions (Level One: 3 - 9 point directions) if they successfully completed the first three pairs of the more difficult instructions (Level Two: 8-25 point directions). Further, to maintain attention and shorten the testing, it was decided that if the children were successful on the first item in the paired directions at each level, they would not be asked to complete the second or parallel item. However, if they missed the first instruction at a given level, they would have an opportunity to undertake the second item at that point level. For example, if children correctly answered item IX A, they were given credit for item IX A and IX B. On the other hand, if they missed item IX A, they would attempt IX B so that they had two chances to complete a 12-point direction. Similar to many standardized test procedures, a ceiling was established and testing was discontinued if a child missed both A and B of three consecutive numbered instructions.

Administration of the Test

The TOFOD was initially field tested on 10 children to determine participant interest and ease of administration. Following that, a visual aid depicting object placement was added (replacing the printed word layout) to allow the examiner to return objects to their original spot more quickly. (See Appendix B for the TOFOD protocol and Appendix C for the visual layout.)

Six graduate students from the speech-language pathology master's program at Texas Woman's University served as the test administrators. These examiners were trained in the administration and scoring of the TOFOD by the first author, and they practiced with each other several times. The examiners then observed and scored the results as the first author administered the test to another graduate student. All six examiners' scores agreed.

The authors received institutional review board permission to administer the TOFOD to kindergarten through fifth graders in three elementary schools within an urban school district in north Texas. This school district was composed of 17 elementary schools, three junior high schools, three high school campuses, and served 14,500 students. Three of the elementary schools were selected for this study because they were composed of three distinct socioeconomic strata. The elementary schools included one school designated as low-socioeconomic status, one as middle-socioeconomic status and one as high-socioeconomic status based on the percentages of students eligible to receive free lunches (Harwell & Lebeau, 2010; Stein, et al., 2008). Ethnic make-up of the schools is listed in Table 2.

The TOFOD was administered to 458 typically developing children, ages 5 years to 10 years, 5 months.

Table 2. Percentage of Children Comprising Each Ethnic Group in the Elementary Schools by Socioeconomic Status (based on percentage of free lunches)

	*Low	*Middle	*High
Caucasian	55	73	73
Hispanic	37	11	9
African-American	5	11	9
Other	3	5	2

**Schools that provide free lunches to more than 77% of the children are classified as low socioeconomic; schools that provide free lunches to 22-76% of the children are classified as middle socioeconomic; schools that provide free lunches to less than 22% of the children are classified as high socioeconomic (Harwell & Lebeau, 2010; Stein, et al., 2008).*

All participants spoke English as their primary language, had passed a vision and hearing screening and had not been identified by their schools as needing any special services or having been referred for testing for special services. All children in each of the selected elementary classrooms were tested so that no child was excluded; however, test scores from any children who had not met the inclusion criteria were excluded. Each child was individually tested in a separate room near his/her regular classroom. The test was re-administered to 46 of the participants two to four weeks after the first administration to determine whether the test results remained stable. The nature of the test is such that a child would not be likely to memorize specific directions. In addition, to determine how the TOFOD compared to existing standardized measures which tapped the skill of following directions, 50 participants were also tested using the "Concepts and Directions" (CD) subtest of the *Clinical Evaluation of Language Fundamentals-3* (CELF-3; Semel, Wiig, & Secord, 1995), the *Token Test for Children* (TTC; DiSimoni, 1978), and the "Oral Directions" (OD) subtest of the *Detroit Test of Learning Aptitude*, 2nd edition (DTLA-2; Hammill, 1985).

Results

Means and Standard Deviations of Scores

The TOFOD was administered to 458 participants ranging in age from 5 years, 0 months (5;0) to 10 years, 5 months (10;5). Scores were reported by age groups in 6-month intervals with the means and standard deviations for each group (See Table 3). Scores were out of a possible maximum of 44 points. There was a gradual increase in mean scores as age increased from 5 years, 6 months (5;6) to 10 years, 5 months (10;5). The mean scores from 5;0 to 5;11 remained stable.

Test-Retest Reliability

A test-retest correlation is one method of determining reliability, a measure of how precisely the scores were measured. If a test is reliable, then the scores were measured without systematic error, which could include any unintentional differences in the process of administering the test, in the focus of the child, or differences due to practice effects. From the original 458 children, the test was administered again to 46 students two to four weeks after the initial administration to determine test-retest reliability. Scores from TOFOD2 were then compared with the scores from the initial administration of the TOFOD, and the correlation between the two sets of scores was found (n = 46, r = 0.965, p <.001). These results suggest that there is significant reliability in the TOFOD test; however, additional measures of reliability should be included in future administrations of this instrument with a larger number of subjects to confirm this finding.

Convergent Validity

Determining convergent validity will help establish whether the TOFOD measures the intended hypothetical construct: the ability to follow directions. Raw scores from the TOFOD were correlated against

Table 3. Means and Standard Deviations of Test of Following Oral Directions Scores by Age Groups

Age	N	M	SD
5.0-5.5	11	22.00	6.148
5.6-5.11	34	21.97	7.022
6.0-6.5	53	24.60	8.065
6.6-6.11	40	26.35	7.876
7.0-7.5	42	29.57	7.286
7.6-7.11	28	32.50	6.708
8.0-8.5	43	34.23	5.781
8.6-8.11	45	36.73	4.604
9.0-9.5	68	36.93	5.132
9.6-9.11	48	37.85	4.263
10.0-10.5	46	38.76	3.012

raw scores from the CD subtest of the CELF-3, the TTC test, and the OD subtest of the DTLA-2 from the participants who were given all four tests. There was a non-significant correlation between the TOFOD and the CD (n = 50, r = 0.099, p = .493), which indicates that the TOFOD does not have convergent validity with the CD but rather discriminant validity. Therefore, the TOFOD does not measure the same construct as the CD. The TOFOD had significant convergent validity with the TTC (n = 50, r = 0.728, p <.001) and the OD (n = 50, r = 0.655, p <.001). Based on this data, the TOFOD measures the same variable as the TTC and the OD subtest (see Table 4.)

Discussion

The purpose of this study was to develop a criterion-referenced measure for following directions that contains linguistically-controlled functional directives to help pinpoint exactly where a child's direction-following skills break down. By enabling the S-LP to establish where the child has difficulty, the TOFOD allows for determination of the exact level to begin therapy and utilization of a step-wise progression of difficulty and a precise measurement of progress. Preliminary analyses suggest that the instrument offers a reliable tool for typically developing children; however, this should be interpreted with caution because results

Table 4. Correlation Matrix for Test of Following Oral Directions with CD, TTC, and OD

	TOFOD raw	CD raw	TTC raw	OD raw
Pearson Correlation	1	0.099	0.728*	0.655*
Sig. (2-tailed)		0.493	0.000	0.000
n	50	50	50	50

**Correlation is significant at the 0.01 level (2-tailed). CD: Concepts and Directions Subtest; TTC: Token Test for Children; OD: Oral Directions Subtest*

might differ for children who are highly distractible or inattentive.

A high convergent validity was found to occur for the TOFOD and the TTC and for the TOFOD and the OD, indicating that the tasks tested the same hypothetical constructs even though different methods were used. There were some notable differences between the measures. The TTC used 10 parallel instructions at each of five widely-spaced levels of difficulty while the TOFOD used two parallel directions at each of 22 incrementally increasing levels of difficulty. For example, the first set of 10 TTC directions were “Touch the red circle,” then “Touch the green square,” then “Touch the red square.” The fifth set of TTC instructions ended with “Before touching the yellow circle, pick up the red square.” Increases in difficulty in the TOFOD progressed in a step-wise fashion, allowing for a more accurate identification of exactly where skill levels broke down. The OD subtest also differed in its method of determining a child’s ability to follow directions from the TOFOD in that the OD subtest required pencil-paper tasks that rapidly increased in difficulty and included various semantic concepts such as manipulation of ordinals (e.g., “Put the third letter of the first word in the circle”), while the TOFOD used object manipulation, low level vocabulary and gradual increases in difficulty. The major advantage of the TOFOD over the OD and TTC is in its carefully controlled and incremental increases in difficulty. This feature allows for precision in planning for treatment and measuring progress.

As expected, the CD subtest measures did not converge with the TOFOD’s measures. Because the CD subtest was designed as a normative measure, it did not attempt to begin at a low difficulty-level and increase gradually; instead, the difficulty increased quickly to cover a broad range of concepts. The CD did not utilize low-level directions such as “Touch the cup” as in the TOFOD; in fact, the initial direction was “Point to all the triangles but none of the black ones.” Most of the directions (23 out of the 30) were at or above a difficulty designated by the CELF-3 authors as the basal for 13-year-olds. In contrast, the TOFOD measured a much narrower conceptual skill set and utilized a gradual progression of difficulty for following directions for 5- to 10-year-olds.

Suggested Uses of the Test

After determining from a normed test (e.g., the CELF-4) that a child is not following directions at an expected level, the S-LP must establish a baseline of the child’s abilities and develop goals and strategies to systematically improve the child’s level of functioning The TOFOD offers a way to pinpoint the skill level where the child breaks down and a system to construct a baseline from which to evaluate progress. Caitlyn, for example, might have scored a 5 on the TOFOD, if she were credited with correctly following Parts A and B on instructions I and II, only Part B on instruction III and no correct responses for the next three sets of instructions. The S-LP would then consider the difficulty level that Caitlyn obtained. In this example, Caitlyn consistently followed up to 6-unit directions but did not consistently follow higher levels. Armed with this knowledge, the SLP might then construct a 15-item baseline consisting of five 7-unit directives, five 8-unit directives and five 9-unit directives. Careful consideration of answer choices available to the child is essential in the construction of the baseline. When there are multiple options to choose from in order to carry out a direction, the child would have to fully understand the direction, whereas having a single response option might not require complete decoding. For example, if the instruction is to "Get the red striped ball" and there is only one ball, no additional processing would be required for the adjectives *red* and *striped*. Conversely, adding a variety of balls for the child to choose from would increase the difficulty. (See Table 5 for a sample baseline.) Caitlyn's short-term goal could be aimed at increasing the level at which she was able to successfully complete the directive (e.g., increasing from mastery of 6-unit directives to 9-unit directives). Since it is unlikely that the TOFOD exhibits practice effects, re-administration of this initial baseline following treatment could be done and could assist in determining progress. For a child who was inconsistent in following directions, the baseline might consist of 10 or 15 items focused within one particular unit level, and the child's score could indicate his/her progress in consistency (e.g., increasing from 40% to 80% accuracy at the 5-unit level). Long-term goals might be worded in terms of increased scores on the TOFOD.

Limitations and Future Directions

This study offers a preliminary analysis of a criterion-referenced instrument that may allow S-LPs to pinpoint starting points for intervention and to measure progress for children who have difficulty following directions. However, there are several important limitations to this study. First, only one

Table 5. Sample Baseline for Units 7-9*

Direction	Linguistic Construction	Unit Level
	Verb, article, adjective, noun, preposition, article, noun or Verb, article noun, preposition, article, adjective, noun	
Put the short string on the plate.		7
Put the book on the shiny penny.		7
Put the red block on the book.		7
Put the paper on the long string.		7
Put the long pencil by the cup.		7
	Verb, article, adjective, noun, preposition, article, adjective, noun	
Put the blue block on the shiny penny.		8
Put the short pencil by the red block.		8
Put the dull penny beside the long string		8
Put the blue block on the red block.		8
Put the short string on the long pencil.		8
	Verb, article, noun, conjunction, article, noun, preposition, article, noun	
Put the book and the cup on the paper.		9
Put the sack and the paper in the box.		9
Put the cup and the book on the plate.		9
Put the plate and the cup in the box.		9
Put the box and the paper on the book.		9

** Items required: a shiny penny, a dull penny, a red block, a blue block, a short string, a long string, a short pencil, a long pencil, a piece of paper, a book, a cup, a sack, a plate, and a box.*

measure of reliability was performed. Preliminary analysis suggests that the TOFOD is reliable in test-retest applications for children with typical language. Stronger conclusions could be drawn by using additional measures of reliability. For example, if the examiners had administered both parts A and B for each level, a split-half measure of internal consistency could have been determined. Instead, in an effort to maintain the child's attention, credit was given for part B if the child passed part A. A second limitation to the study is that the TOFOD was administered only to children with typically developing language; children with language disorders may perform less consistently. Next steps in the development of this instrument would be to allow for determination of split-half measure of internal consistency and to determine how practical and functional the TOFOD would be for children who have difficulties in following directions.

Finally, the ability to follow directions requires an array of skills, making it difficult to establish content validity. Acceptable content validity requires that all the components of a skill be described and that the test sample all of those behaviors. It is difficult to enumerate all aspects of following directions and to sample and independently measure contributing factors such as motivation to comply or attention. However, the TOFOD does include a carefully described and analyzed set of linguistic skills because it is based on a system, the LUAS, which assigns values to word classes (e.g., nouns), syntactic variables (e.g., order-of-mention violations) and memory constraints (e.g., number of items to remember) while holding the vocabulary and the number of response choices constant. (See Appendix A for an explanation of point values.) A logical examination of the content of the TOFOD test items suggests that many of the linguistic behaviors of direction following, including syntactic complexity and memory challenges, are represented, and that vocabulary and response choice options are controlled. Because language is composed of numerous complex and interrelated skills, validity may have to be inferred (Schiavetti & Metz, 2006). In the future, efforts should continue to ensure that the test fully covers the domain of "following directions" and is valid for the purpose of identifying intervention goals.

Conclusion

For children who are experiencing difficulty in mastering the skill of direction following, careful selection of starting points and instructional levels is an essential prerequisite for measuring the efficacy of treatment and for allowing instruction to proceed systematically. The TOFOD is a criterion-referenced linguistically-controlled instrument for measuring direction-following skill and for assessing incremental changes in this skill for 5 to 10 year-old children. Specifically, the TOFOD provides the S-LP a clear starting point for construction of a both a baseline and intervention targets. This facilitates the implementation of measurable goals and the identification of incremental progress. Further study will help solidify the reliability, validity and practical usefulness of the TOFOD.

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ILLUSTRATIONS

Pre-Text:
As Caitlyn brought her paper up to my desk, I heard myself saying, "Caitlyn! I said to put your homework in your desk until after we got back from lunch. You have got to start listening!" As soon as the words had left my mouth, I wished I could have taken them back. Telling her to listen after the fact was not only useless but also punitive. And, I had no idea if the instructions I had given her were at a level she could process. I knew she had trouble following directions but I had no idea where her skills fell or if they were improving.

Post-Text:
The next time I needed Caitlyn to follow my instructions, my request was more appropriate for her level of understanding. I said, "Caitlyn, put your homework in your desk. Now come up here." When she succeeded at that, I was able to give her a high five, and respond with "Nice work, Caitlyn!"

APPENDIX A

From: Linguistic Unit Analysis System for Verbal Instructions (Gill & Henderson, 2003).

Element	Unit Value For Underlined Structure	Examples
Nouns	1 1 1	Touch the cup. Move the block. Show me art is fun.
Nouns (same referent) repeated in the same directive.	0	Put the cup on the plate and the block on the plate.
Verbs or Verbals (two-word verbs)	1 1 1 1	Pick up the cup. Wake up the puppy. Point to the block. The dog threw up.
Auxiliary verbs	1	When you are putting the block on the cup...
Implied or actual repeats of verbs	0	Put the block in the cup and (put) the cup on the plate.
Adjectives – determiner, descriptive, quantitative, cardinal and ordinal adjectives.	1 1 1 1	Touch the yellow cup. Move some blocks. Pick up two blocks. Get the straw.
Prepositions or Phrasal Prepositions	1 1	Put the block in the cup. Put the book on top of the cup.
Adverbs (Including not)	1 1 1	First put the block in the cup. Get a pen, then write your name. Run quickly to the blackboard.
Conjunctions	1 1	Push the penny and get the block. Get a cap since your coat is gone.
Pronouns	1 1 0 0	Give it to him. Look at yourself. Before you get the book. You sit down.
Progressive, perfect, and past tense markers.	1 1	While you are putting the... When you have given...
Possessive and plural markers.	1	Get the blocks...
Order of Mention Violations (OMV; when the first direction stated is not the first directive to be carried out or processed)	8 pts (1 for OMV + 7 for content words). 5 pts (1 for OMV + 4 for content words).	Before you put the cup on the plate, put a block in the cup. Put the penny in the cup if you are a girl.
Noun = Subject Violations (N=SV; when the first noun is not the subject, e.g, passive voice)	9 pts (2 pts for N=SV + 7 for content words).	Show me the window was hit by the boy.
Reversible Passive Voice (RPV)	10 pts (1 pt for RPV + 2 points for N=SV + 7 for content words).	Show me the boy was hit by the girl.
Listing of more than two nouns in succession following a verb (N2V).	10 pts (2 pts for N2V + 8 for content words).	Put the track, the block, and the penny...
Use of more than two ordinals in a direction.	14 pts (2 for third ordinal + 12 pts for content words).	Write the third letter of the fifth word in the second square...

APPENDIX B

Test of Following Oral Directions

Administrator: Test administrators should be speech-language pathologists, special educators, teachers, or other personnel trained to work with children with language and/or learning disorders.

Preparation: Collect the 20 common objects shown in the visual layout (Appendix C).

Starting Point: For children below the chronological or cognitive age of eight years, start with Level One. For children aged eight and up, begin with Level Two.

Repetitions: none

Credit: If the child correctly carries out Part A of each numbered set, do not administer Part B, but give one point for both Part A and Part B. If Part A is missed, give a score of zero and administer Part B. If Part B is correct, award 1 point and if incorrect, give zero points.

Ceiling: Discontinue testing when the child misses both A and B of three consecutive numbered items.

Familiarity with test items: Before beginning the test, be sure that the child understands the name of all the items to be used in that level of the test. Do this by asking the child to point to each item as you name it. If the child missed any of the items, show the child the item and name it. After several other items are identified, return to the missed item and ask the child to point to it again. If the child still does not know the name of the item, do not administer this test. If a child begins with Level One, repeat this with Level Two items prior to beginning Level Two.

Directions: Arrange the items in front of the child as shown in the visual layout for the Level being tested (see Appendix C). Say, “Look at these objects. I’m going to tell you to do something with them. Try to do what I say.” Read each direction and wait for the child to complete it. Give each instruction only once. Return the item to its original place after the child completes the direction.

LEVEL ONE

I. ______ A. Touch the cup. (3 units)
______ B. Push the penny. (3 units)

II. ______ A. Put the pencil on the plate. (6 units)
______ B. Put the cup on the paper. (6 units)

III. ______ A. Put the red block on the string. (7 units)
______ B. Put the yellow block on the paper. (7 units)

IV. ______ A. Put the pencil and the cup on the book. (9 units)
______ B. Put the penny and the string on the plate. (9 units)

LEVEL TWO

V. ______ A. Put the yellow block in the red cup. (8 units)
______ B. Put the long string on the blue paper. (8 units)

VI. ______ A. Put the penny and the key on the book. (9 units)
______ B. Put the tape and the car on the plate. (9 units)

VII. ______ A. Put the long string and the key on the book. (10 units)
______ B. Put the red paper and the fork on the plate. (10 units)

VIII. ______ A. Put the tape and the long pencil beside the red cup. (11 units)
______ B. Put the red block and the car on the white paper. (11 units)

IX. ______ A. Put the short string and both blocks on the blue paper. (12 units)
______ B. Put the short pencil and both cups on the long string. (12 units)

X. ______ A. Put the penny, the fork and the key on the book. (13 units)
______ B. Put the tape, the car and the key on the plate. (13 units)

XI. ______ A. Before you put the tape on the yellow block, put the car on the penny. (14 units)
______ B. Before you put the car on the plate, put the key on the red block. (14 units)

XII. ______ A. Before you pick-up the key and the tape, put the yellow block on the plate. (15 units)
______ B. Before you touch the car and the fork, put the penny on the red block. (15 units)

XIII. ______ A. Put the car and the penny in the red cup. Push the tape and the key. (16 units)
______ B. Put the long string and the white paper by the blue cup. Push the yellow block. (16 units)

XIV. ______ A. Put the fork and the penny on the book, put the car and the key on the plate. (17 units)
______ B. Put the penny and the car on the tape, put the key and the fork on the book. (17 units)

XV. ______ A. Put the red and yellow blocks on the blue paper and push the key near the book. (18 units)
______ B. Put the long and short strings in the red cup and hide the key in the book. (18 units)

XVI. ______ A. Put the penny, the car and the tape by the blue cup. Put the fork on the plate. (19 units)
______ B. Put the tape, the fork, and the book by the red block. Put the car on the key. (19 units)

XVII. ______ A. Put the yellow block, the car and the fork on the red paper. Put the penny beside the book (20 units)
______ B. Put the short string, the penny and the key in the blue cup. Put the fork beside the plate. (20 units)

XVIII. ______ A. Put the yellow block in the blue cup, put the red paper on the book and put the long pencil on the plate. (21 units)
______ B. Put the long pencil on the red paper, put the yellow block by the plate and put the short string on the book. (21 units)

XIX. ______ A. Put the yellow block in the red cup, put the short pencil by the long string and put the penny on the white paper. (22 units)
______ B. Put the short pencil by the red block, put the long string by the yellow block and put the blue paper in the book. (*22 units)

XX. ______ A. Put the long string around the yellow block, put the short pencil beside the red paper, and put the blue paper beside the red cup. (*23 units)
______ B. Put the short pencil beside the red cup, put the long string under the blue paper and put the yellow block beside the red block. (*23 units)

XXI. ______ A. Before you put the blocks and the cups on the red paper, drop the long string and the key on the blue paper. (*24 units)
______ B. Before you put the strings and the pencils on the white paper, drop the red cup and the yellow block near the plate. (24 units)

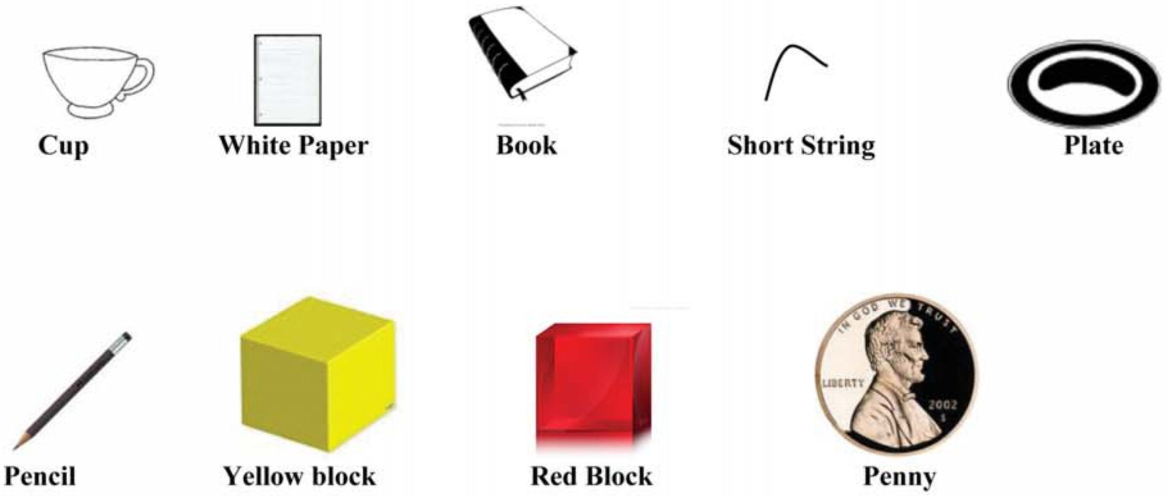
XXII. ______ A. Before you put the long string and the yellow block in the blue cup, put the red block and the short pencil on the white paper. (*25 units)
______ B. Before you put the short pencil and the red block in the blue cup, put the yellow block and the long string on the white paper. (*25 units)

______ **Total number of items correct (44 possible).** If A was correct, give credit for B also.

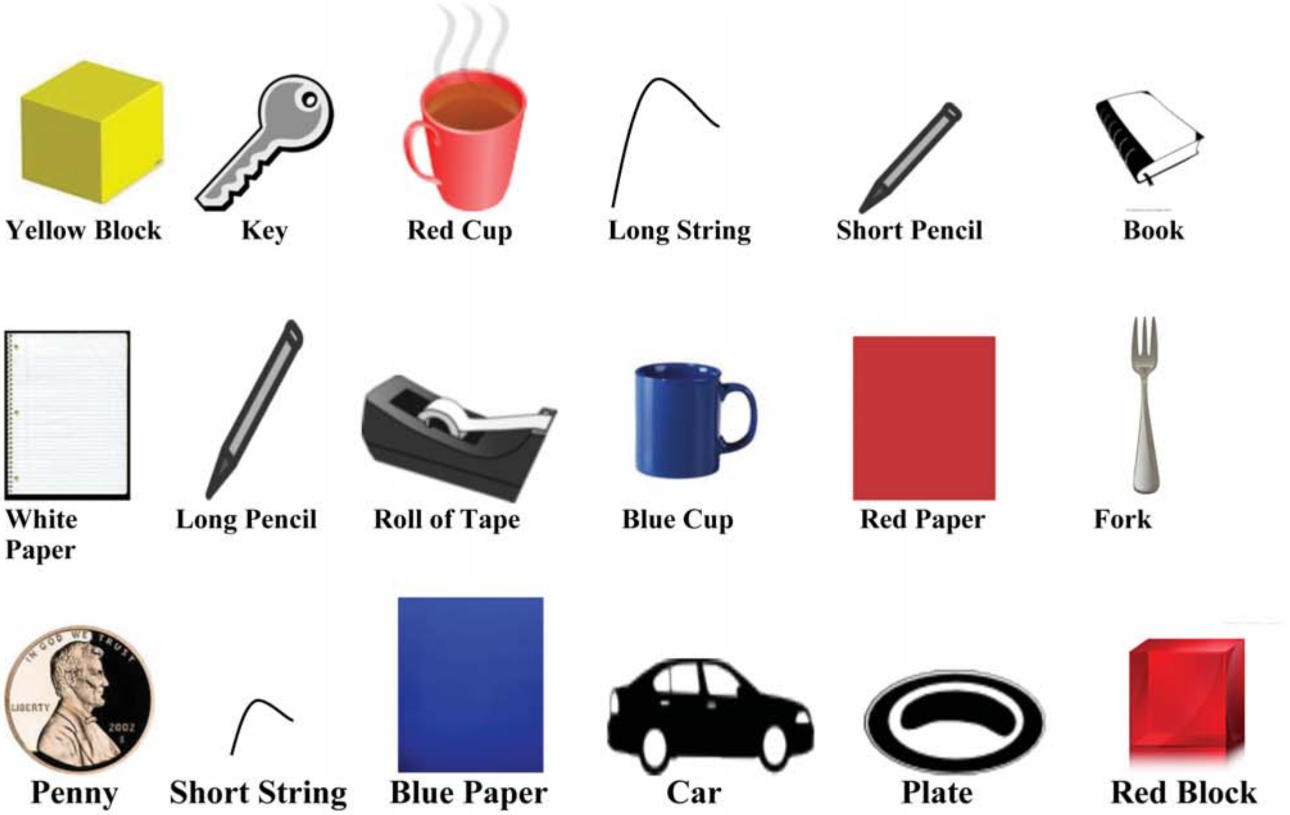
*(*This instruction included repeated nouns which were counted in the unit total both times because they referred to a different object each time they occurred.)*

APPENDIX C

Visual Layout of Objects



Level Two



Résultats d'un programme de dépistage de la surdité auprès d'enfants âgés de quatre à six ans

Results of a hearing screening program with four to six year old children

Anne-Marie D. Talbot
Nancy A. Ethier
Elizabeth M. Fitzpatrick
Nicholas J. Barrowman

MOTS -CLÉS

DÉPISTAGE DE LA SURDITÉ
ENFANTS D'ÂGE SCOLAIRE
RÉFÉRENCES AUDIOLOGIQUES OU MÉDICALES
DÉFICIENCE AUDITIVE

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Canada

Abrégé

Le but de la présente étude était d'analyser les résultats d'un programme de dépistage audiologique en milieu scolaire effectué sur une période de trois ans (2007-2010). Un total de 933 enfants âgés de quatre à six ans ont participé au programme de dépistage. En 2007-2008, les procédures du programme comportaient l'audiométrie tonale alors qu'en 2009-2010, l'otoscopie, la tympanométrie et les émissions oto-acoustiques (ÉOA) ont été ajoutées au protocole. À la suite du dépistage, 20,2 % des enfants (n = 188) ont été référés en audiologie clinique ou pour une consultation médicale. Seul le niveau scolaire s'est avéré être un facteur associé significativement au taux de références, c'est-à-dire que les enfants de la maternelle et du jardin (quatre et cinq ans) étaient plus à risque d'être référés que les enfants de la première année (six ans). Le taux de références relatif au présent protocole de dépistage a été comparé à celui de *l'American Speech-Language-Hearing Association [ASHA] (Guidelines for Audiologic Screening, Panel on Audiologic Assessment*, 1997). Les résultats ont montré un taux de références significativement plus élevé en appliquant les critères de l'ASHA comparativement à celui relié aux critères du présent programme de dépistage. Bien que des programmes de dépistage universel néonatal de la surdité existent, les résultats de cette étude appuient l'idée de la création de programmes de dépistage de la surdité au-delà de la période néonatale car bon nombre d'enfants d'âge préscolaire et scolaire présentent des signes de troubles d'audition.

Abstract

The goal of this study was to analyze the results of a hearing screening program with school-aged children over a three year period (2007-2010). A total of 933 children, from four to six years of age, were screened. In 2007-2008, the audiologic screening consisted of a hearing (pure tone) screening while otoscopy, tympanometry and oto-acoustic emissions (OAE) were added to the screening protocol in 2009-2010. Results showed that 20.2 % (n = 188) of the children were referred for further hearing and/or medical evaluation. The grade level of the children was the only factor associated with the number of referrals, in that junior kindergarten and kindergarten students (four to five years of age) were significantly more at risk of being referred than first-grade children (six years of age). The number of referrals obtained as part of this study was also compared with the number of referrals that would have been made if the Guidelines for Audiologic Screening *(American Speech-Language-Hearing Association [ASHA], Panel on Audiologic Assessment*, 1997) had been strictly followed during the program. The results of this comparison have shown a significantly higher number of referrals when the ASHA guidelines are applied compared to the guidelines of this screening program. This study clearly shows that there is an important need for hearing screening in the school-age population as many children still present hearing disorders that have yet to be diagnosed, even though universal newborn hearing screening programs are in place.

Résultats d'un programme de dépistage de la surdité auprès d'enfants âgés de quatre à six ans

Il est aujourd'hui bien documenté qu'une perte auditive qui n'est pas détectée peut entraîner des difficultés d'acquisition de la parole et du langage, de pauvres performances académiques et affecter le développement social de l'enfant (Bamford et al., 2007; Cunningham & Cox, 2003). Bien que des programmes de dépistage universel néonatal de la surdité existent, des pertes auditives congénitales, particulièrement celles de degré léger, ne sont pas toujours détectées (American Speech-Language-Hearing Association [ASHA], 2002). Le dépistage universel néonatal ne permet pas non plus de déceler les pertes auditives progressives ou celles acquises durant l'enfance (Weichbold, Nekahm-Heis & Welzl-Mueller, 2006) et n'a rarement été effectué auprès d'enfants immigrés au Canada après leur naissance. Ainsi, la poursuite du dépistage de la surdité au-delà de la période néonatale pourrait être utile pour détecter, entre autres, les pertes auditives permanentes n'ayant pas été identifiées lors du dépistage néonatal.

Les statistiques disponibles illustrent l'importance de dépistages subséquents de la surdité. En effet, la prévalence des pertes auditives permanentes augmenterait avec l'âge jusqu'à environ neuf ans (et possiblement même après cet âge) à un taux de 1,65/1000 à 2,05/1000 naissances (Fortnum, Summerfield, Marshall, Davis & Bamford, 2001). Présentement, la proportion d'enfants ayant une perte auditive identifiés par le dépistage néonatal au Royaume-Uni est d'environ 1,06/1000 naissances, ce qui signifie qu'environ 50 à 90 % des enfants restent encore à être identifiés au cours de l'enfance (Fortnum et al., 2001). Plus encore, Weichbold et al. (2006) ont réalisé une étude auprès de 105 enfants ayant une perte auditive permanente. Ils ont trouvé qu'environ 25 % de ces enfants avaient obtenu leur diagnostic durant l'enfance. Bien que, dès la naissance, un suivi soit souvent en place pour les enfants à risque de surdité, un quart des enfants dans cette étude ne présentaient pas de facteurs de risque associés à une perte d'audition tandis qu'un autre tiers a développé une surdité progressive à partir de l'âge de trois ans. Les auteurs de cette étude ont ainsi souligné l'importance de la réalisation d'un suivi audiologique dès la naissance et que ce suivi soit maintenu tout au long de la période scolaire. Par ailleurs, la différence des seuils auditifs entre les deux sexes ne semble pas significative, bien qu'ils soient en moyenne plus élevés chez les garçons (Georgalas, Xenellis, Davilis, Tzangaroulakis & Ferekidis, 2008).

Les dépistages se poursuivant pendant la période scolaire sont également importants pour identifier les enfants ayant une surdité conductive. Les otites moyennes sont la cause principale d'une perte auditive conductive chez les enfants (Cunningham et al., 2003) et celles-ci se présentent particulièrement à partir de la naissance jusqu'à l'âge de dix ans (Crandell & Flannagan, 1998; Northern & Downs, 2002). De plus, l'incidence des otites moyennes serait plus élevée en hiver et au printemps comparativement aux saisons plus chaudes (Driscoll, Kei & McPherson, 2001). Les résultats de l'étude de Serpanos et Jarmel (2007), effectuée auprès de 34 979 enfants âgés de trois à cinq ans, ont montré que 18 % des enfants ayant consulté à la suite d'un dépistage avaient une perte auditive, dont 12 % avaient une perte auditive conductive. Globalement, une perte auditive ou un problème otologique a été confirmé chez 49 % des enfants ayant consulté, représentant une prévalence de 1,8 % des problèmes auditifs ou otologiques auprès d'une population préscolaire. Pour les enfants d'âge scolaire, le taux de prévalence serait encore plus élevé, soit de 11 à 15 % (Adams, Hendershot, Marano & Centers for Disease Control and Prevention/National Center for Health Statistics, 1999; Bess, Dodd-Murphy & Parker, 1998; Niskar et al., 1998).

Afin de minimiser l'impact d'une perte auditive permanente ou temporaire sur le développement de l'enfant, l'ASHA (2002) recommande un dépistage de la surdité dès l'entrée à l'école, puis annuellement de la maternelle jusqu'à la troisième année et en septième et onzième année. Plusieurs techniques peuvent être employées lors des dépistages, la plus commune étant l'audiométrie tonale. Cette méthode est souvent jumelée à la tympanométrie, un test rapide informant l'audiologiste du fonctionnement de l'oreille moyenne. Une autre méthode de plus en plus utilisée dans les dépistages en milieu scolaire consiste à mesurer les émissions oto-acoustiques (ÉOA). Il s'agit d'une procédure rapide et objective souvent utilisée auprès de très jeunes enfants pour détecter une perte auditive (Nozza, Sabo & Mandel, 1997; Spektor, Leonard, Kim, Jung & Smurzynski, 1991; White et al., 1994). Son utilisation auprès des enfants d'âge préscolaire/scolaire a été étudiée et il pourrait s'agir d'une alternative à l'audiométrie (Driscoll et al., 2001; Georgalas et al., 2008; Richardson, Williamson, Lenton, Tarlow & Rudd, 1995; Sideris & Glattke, 2006; Taylor & Brooks, 2000; Yin, Bottrell, Clarke, Shacks & Poulsen, 2009).

Dans le but d'établir le protocole optimal pour le dépistage de la surdité en milieu scolaire, plusieurs études se sont intéressées au taux de sensibilité et de spécificité des différentes méthodes couramment employées dans les dépistages scolaires. Celles-ci rapportent des résultats différents. Par exemple, concernant l'emploi des émissions oto-acoustiques, certains auteurs obtiennent des taux de sensibilité et de spécificité qu'ils jugent assez élevés pour proposer ce test comme méthode alternative à l'audiométrie tonale (Driscoll et al., 2001; Taylor & Brooks, 2000) alors que d'autres obtiennent des taux plus variables et continuent ainsi de recommander l'audiométrie tonale comme méthode primaire de dépistage (Krueger & Ferguson, 2002; Sabo, Winston, & Macias, 2000). Selon les résultats d'une revue sur l'efficacité des méthodes de dépistage scolaire, Bamford et al. (2007) ont conclu que l'audiométrie tonale demeure la méthode de choix pour les dépistages. Ils ajoutent qu'il n'y a pas assez d'études à ce jour pour se prononcer sur l'efficacité de combiner plusieurs tests dans un même protocole de dépistage.

Actuellement, il n'existe aucun programme systématique de dépistage de la surdité dans les écoles en Ontario, contrairement aux programmes de dépistage néonataux. En effet, le Programme de dépistage néonatal de l'Ontario (PDNO), établi en 2002, inclut entre autres le dépistage universel néonatal de la surdité, la surveillance des enfants à risque d'une perte d'audition et le suivi approprié jusqu'à l'âge de six ans (Hyde, 2008). Au-delà de cet âge, le dépistage de la surdité demeure important pour les raisons mentionnées précédemment. C'est pourquoi la clinique interprofessionnelle en soins de santé primaire de l'Université d'Ottawa a développé un programme de dépistage de la surdité et l'a implanté dans un conseil scolaire à Ottawa.

La présente étude rapporte les résultats d'un programme de dépistage de la surdité mené en milieu scolaire : 1) en quantifiant le taux de références pour une consultation en audiologie clinique et en médecine au cours de la durée du programme 2007-2010 et en le comparant à celui obtenu selon les lignes directrices de l'ASHA; 2) en examinant les facteurs associés au taux de références, tel que les deux périodes du programme, les écoles, les saisons lors desquelles ont eu lieu les dépistages, le sexe et le niveau scolaire des enfants testés et 3) en rapportant les résultats relatifs à chaque test utilisé pour le dépistage, soit l'audiométrie tonale, l'otoscopie, la tympanométrie et les émissions oto-acoustiques. Le but de l'étude n'est donc pas de vérifier l'efficacité du programme de dépistage pour déterminer la spécificité et la sensibilité des épreuves de dépistage.

Méthodes

Devis et contexte

Il s'agit d'une étude de type descriptive sur une cohorte rétrospective. Le programme de dépistage de la surdité en milieu scolaire a débuté comme projet pilote en 2005 à la suite d'un partenariat entre l'Université d'Ottawa et le Conseil des écoles publiques de l'Est de l'Ontario (CEPEO). Les résultats de la présente étude proviennent des mesures de dépistage de la surdité effectuées en milieu scolaire entre janvier 2007 et mai 2010. Cette étude a été approuvée par le comité de déontologie de l'Université d'Ottawa.

Participants

Le dépistage a été effectué auprès d'enfants de quatre ans (maternelle), cinq ans (jardin) et six ans (première année) dans neuf écoles élémentaires publiques francophones de la région d'Ottawa, dont cinq situées en banlieue d'Ottawa. Le niveau socio-économique était relativement équivalent entre les milieux de cette région (Statistiques Canada, 2006). Un formulaire de consentement a été envoyé aux parents des élèves par la direction des écoles. Seulement les élèves dont le formulaire de consentement était dûment rempli ont participé au programme de dépistage.

Procédures du dépistage de la surdité

L'équipe effectuant le dépistage incluait un audiologiste membre de l'Ordre des audiologistes et des orthophonistes de l'Ontario (OAOO) ainsi que deux ou trois étudiants-es aux études supérieures de l'Université d'Ottawa dans le domaine des sciences de la santé. Toutes les séances de dépistage ont été effectuées dans des salles réservées à cet usage pour la journée. Le niveau de bruit ambiant n'a pas été mesuré à l'aide d'un sonomètre, mais les évaluateurs se sont assurés que les sons aux fréquences testées étaient audibles à 20 dB HL sous écouteurs avant de procéder aux séances de dépistage auprès des élèves.

L'implantation du programme de dépistage de la surdité s'est faite dans un contexte clinique et ce n'est que récemment que les données ont été compilées et analysées pour répondre à des objectifs de recherche. Ainsi, les critères de référence et les procédures de dépistage ont été modifiés au cours des années selon les nouveaux équipements disponibles et les salles où avaient lieu les dépistages. Les procédures du programme de dépistage utilisées au cours des années sont illustrées dans le tableau 1. De nouvelles procédures ont été ajoutées à partir de 2009 en plus de l'audiométrie tonale. Les critères utilisés pour émettre une référence ont également été modifiés au cours de l'implantation du programme (voir tableau 1).

Enfin, dans le présent programme, l'audiologiste pouvait administrer à nouveau les tests aux enfants qui semblaient avoir des anomalies ou qui avaient obtenu des résultats anormaux au dépistage selon son jugement clinique (voir tableau 2). Les dépistages subséquents étaient effectués la semaine suivante. Ainsi, une référence audiologique ou médicale n'était pas toujours émise à la fin du premier dépistage. C'est à la suite de la répétition d'un test (pouvant aller jusqu'à deux reprises) que l'audiologiste décidait d'émettre ou non une référence.

Otoscopie. La visualisation du conduit auditif externe et du tympan a été effectuée chez un peu moins de la moitié des enfants à l'aide d'un otoscope (Heine Mini 2000 ou Welch Allyn). Les signes d'anomalies observés par les étudiants-es étaient notés sur le rapport de dépistage de l'enfant (ex : rougeur, cérumen, tympan rétracté ou bombé, présence de tubes, etc.). L'audiologiste émettait une référence médicale si (a) du liquide rétro-tympanique ou des malformations de l'oreille externe ou (b) des anomalies dans le conduit auditif (ex., : blocage de cérumen ou présence d'un corps étranger) étaient observés.

Audiométrie tonale. Les élèves se présentaient en petits groupes de trois ou quatre à la salle de dépistage. L'audiologiste donnait alors les consignes aux enfants et procédait à une démonstration de la tâche. Ensuite, chaque enfant était dirigé vers une station destinée à l'audiométrie où l'évaluateur s'assurait que l'enfant comprenait bien la tâche avant de le tester. L'enfant

Tableau 1. Résumé des procédures du programme de dépistage, des équipements et des critères de références utilisés selon les années

Année	Procédures	Appareils	Transducteurs	Critères de référence
2007-2008	Audiométrie tonale	- Audioscreener (2007) - Interacoustics AD-25 et Midimate 602 (2008)	TDH-39	- Seuil(s) > 30 dB HL à 1 kHz, 2 kHz ou 4 kHz - Seuil > 35 dB HL à 500 Hz - Autres inquiétudes à l'égard de l'audition de l'enfant
2009-2010	Audiométrie tonale	- Interacoustics AD-25 - Midimate 602	E-A-RTONE	- Seuil(s) > 20 dB HL à 500 Hz, 1 kHz, 2 kHz ou 4 kHz - Pauvre validité à l'audiométrie ou autres inquiétudes
	Otoscopie	- Heine Mini 2000 - Welch Allyn		Anormalités du tympan ou du canal auditif externe
	Tympanométrie	- GSI-38 Grason-Stadler (de janvier à juin 2009) - Titan (à partir de septembre 2009)		- un Type B, As ou Ad - un Type C obtenu à au moins deux reprises
	[1]Émissions oto-acoustiques (ÉOA)	Éclipse		Critères non spécifiés dans les dossiers. Résultats non utilisés à des fins de références

[1]*Les ÉOA ont été ajoutées en 2010 et ont seulement été effectuées auprès de 68 enfants.*

Tableau 2. Nombre d'enfants ayant subi au moins une répétition des tests au cours du programme de dépistage

Procédures	Une répétition	Deux répétitions
Audiométrie tonale	16	0
Otoscopie	36	14
Tympanométrie	49	16
Émissions oto-acoustiques	7	0

devait déposer un bloc sur une planchette lorsqu'il entendait un son dans les écouteurs. Pendant le test, l'évaluateur, assis devant l'enfant, renforçait son comportement lorsqu'il effectuait la tâche correctement. Les enfants difficiles à tester étaient évalués par l'audiologiste plutôt que par les étudiants-es. Des sons purs générés par un audiomètre (Audioscreener, Interacoustics AD-25 ou Midimate 602) ont été envoyés par conduction aérienne via des écouteurs supra-auriculaires TDH-39 ou intra-auriculaires E-A-RTONE à 20 dB HL à 500 Hz, 1 kHz, 2 kHz et 4 kHz et ce, à chaque oreille séparément. Lorsqu'un enfant ne répondait pas à 20 dB HL, le niveau de présentation était augmenté de 5 dB HL suivant les principes de la méthode ascendante-descendante (Hughson & Westlake, 1944) afin de déterminer son seuil auditif.

Tympanométrie. Une tympanométrie de base, utilisant une stimulation de 226 Hz a été effectuée. Les résultats ont été classifiés selon la nomenclature de Jerger (1970) soit par un type A, B, C, Ad, ou As. Tel qu'illustré dans le tableau 1, un tympanogramme de type B, As, Ad ou un type C obtenu à au moins deux reprises menait à une référence en audiologie clinique.

Émissions oto-acoustiques. Le test des émissions oto-acoustiques (ÉOA) par produits de distorsion a été ajouté lors des dernières séances dans la batterie de tests afin de déterminer sa pertinence comme outil de dépistage de la surdité dans un contexte scolaire. Les ÉOA ont été mesurées à 500 Hz, 1 kHz, 2 kHz, 4 kHz, 6 kHz et 8 kHz. L'absence d'ÉOA à certaines fréquences était notée sur le rapport de dépistage de l'enfant. Les critères de référence n'étaient pas disponibles dans les dossiers. Les résultats des ÉOA n'ont pas été pris en considération lors de la décision finale de l'audiologiste de référer.

Suivi après les séances de dépistage

Lorsque les résultats étaient anormaux, une lettre expliquant les résultats ainsi que l'importance de consulter en audiologie ou en médecine était envoyée aux parents ou tuteurs de l'enfant. Toutefois, aucun suivi visant à savoir si les parents ou tuteurs avaient entrepris les démarches de consultation n'a été effectué dans le cadre de cette étude.

Compilation des données

Les résultats du dépistage ont été compilés dans une base de données à l'aide du logiciel Microsoft Access 2003. Le profil démographique (sexe, niveau scolaire, école) et clinique (résultats à l'otoscopie, tympanométrie, émissions oto-acoustiques, audiométrie tonale) de chaque enfant a été extrait de son dossier. Lorsqu'un enfant était référé en audiologie clinique selon ses résultats à l'audiométrie tonale, ses seuils audiométriques étaient quantifiés selon le calcul de la moyenne des sons purs (MSP) à 500 Hz, 1 kHz et 2 kHz et classifiés dans l'une des catégories du tableau 3.

Tableau 3. Classification des seuils audiométriques (Jerger & Jerger, 1980)

Catégories	Étendues (dB HL)
Légère	21 – 40
Modérée	41 – 60
Sévère	61 – 80
Profonde	81 et +

Le besoin d'émettre une référence audiologique ou médicale selon les critères de l'ASHA (Guidelines for Audiologic Screening, Panel on Audiologic Assessment, 1997) a également été pris en compte dans cette étude. Cette association suggère des critères spécifiques afin d'émettre une référence pour une consultation en audiologie et en médecine. Selon les critères de l'ASHA, un enfant doit être référé en audiologie clinique s'il obtient un seuil auditif supérieur à 20 dB HL à 1 kHz, 2 kHz et 4 kHz. Pour référer en médicine, l'ASHA utilise à la fois les résultats de l'otoscopie et ceux de la tympanométrie. L'intérêt de cette analyse était de comparer le nombre d'enfants référés selon les critères du présent programme de dépistage à celui obtenu selon les critères de l'ASHA.

Tel qu'il a été mentionné, dans la présente étude, il était possible que l'audiologiste administre à nouveau certains tests de la batterie de dépistage aux enfants qui semblaient présenter des anomalies. Toutefois, seuls les résultats de la dernière séance de dépistage ont été retenus pour cette étude.

Analyses statistiques

Dix pourcent des données ont été contre-vérifiées par un cinquième chercheur. Ce dernier n'a détecté qu'une seule erreur, ce qui correspond à un taux d'erreur de codification de 1,1 %. Les données ont ensuite été transférées dans le logiciel SPSS version 18 (Statistical Package for the Social Sciences – SPSS, Inc, 2009) à partir duquel plusieurs comparaisons ont pu être effectuées. Premièrement, l'utilisation d'une série de tests de khi-carré a permis de vérifier si un lien existait entre deux variables catégorielles, tel que les résultats obtenus au programme de dépistage d'une part et les écoles, les niveaux scolaires, le sexe de l'enfant ou les saisons d'autre part. Deuxièmement, l'utilisation de la statistique Kappa a permis de mesurer l'accord entre différents jugements pour les mêmes enfants, en tenant compte de la possibilité d'accord au hasard (par exemple, est-ce qu'un enfant échouant l'audiométrie tonale est à risque de présenter une dysfonction de l'oreille moyenne?). Finalement, l'utilisation du test McNemar, une extension du test khi-carré pour proportions corrélées, a permis de comparer deux échantillons appariés dont les valeurs sont binaires (par exemple, est-ce surtout les basses ou les hautes fréquences qui sont difficiles à percevoir pour l'enfant?).

Résultats

Taux de références

Au total, 935 enfants d'âge préscolaire et scolaire ont participé au programme de dépistage de la surdité de 2007 à 2010. Les données de deux enfants n'ont pas été compilées en raison d'un manque considérable d'informations dans le rapport de dépistage. Sur les 933 enfants ayant participé au dépistage, 20,2 % (*n* = 188) des enfants ont été référés en audiologie clinique ou en consultation médicale, soit 18,3 % (*n* = 91 sur 497) en 2007-2008 et 22,2 % (*n* = 97 sur 436) en 2009-2010. Des enfants référés en 2009-2010, 45,4 % (*n* = 44) l'ont été à la suite de résultats anormaux à la tympanométrie ou à l'otoscopie. La différence entre la proportion d'enfants référés dans les deux périodes du programme n'était pas significative (χ^2 (1) = 2.238, p =.135).

Taux de références selon le présent programme de dépistage et selon celui de l'ASHA

La proportion d'enfants référés par le présent programme de dépistage a été comparée à la proportion d'enfants calculée en appliquant les critères proposés par l'ASHA, pour les deux périodes du programme (voir figure 1). Une différence significative de 30,4 % (χ^2 (1) = 84.823, p <.001) a été observée en 2007-2008 et une différence moins importante (1,4 %), mais tout de même significative (χ^2 (1) = 184.340, p <.001), a été obtenue en 2009-2010.

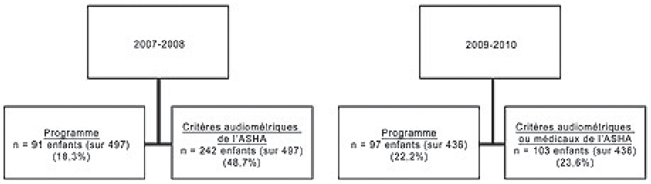

Figure 1. Le pourcentage d'enfants référés en audiologie ou en médecine selon les critères du présent programme de dépistage et selon les critères de l'ASHA. Le pourcentage a été calculé à partir du nombre d'enfants ayant participé à la première collecte de données en 2007-2008 et du nombre d'enfants lors de la deuxième période de collecte en 2009-2010.

Facteurs associés aux taux de références

Aucune différence significative n'a été observée en ce qui a trait au taux de références entre les neuf écoles de l'étude. Par contre, le niveau scolaire des enfants s'est avéré être un facteur déterminant. En effet, le nombre d'enfants de la maternelle et du jardin référés était significativement plus élevé que celui des enfants référés de la première année. En ce qui concerne les saisons, le nombre de références lorsque le dépistage a été effectué durant l'hiver (janvier, février, mars) n'était pas significativement différent de celui relatif aux références faites durant les autres mois. Aucune différence significative reliée au sexe de l'enfant parmi ceux référés pour une consultation à la suite du dépistage de la surdité n'a été démontrée (voir tableau 4 pour les analyses statistiques).

Résultats obtenus aux diverses procédures du programme de dépistage de la surdité

Les résultats aux tests utilisés dans le programme de dépistage de la surdité sont rapportés dans les prochains paragraphes (voir figure 2 pour un résumé détaillé). Le nombre d'enfants ayant participé à l'otoscopie, la tympanométrie et les émissions oto-acoustiques est moindre que celui des enfants ayant participé à l'audiométrie tonale puisque ces procédures ont été ajoutées dans la deuxième période du programme de dépistage (voir tableau 1).

Audiométrie tonale. Un total de 930 sur 933 enfants ont participé à l'audiométrie tonale. Les trois enfants n'ayant pas collaboré à l'audiométrie ont été référés

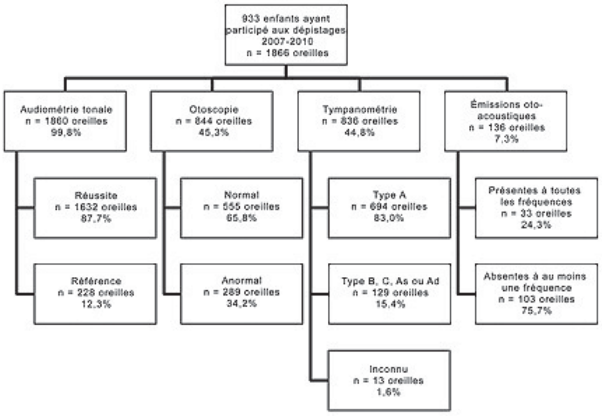

Figure 2. Pourcentage d'oreilles d'enfants d'âge scolaire dont les résultats sont normaux ou anormaux aux tests de dépistage de la surdité effectués entre 2007 et 2010.

en audiologie. Au total, 141 enfants ont été référés en audiologie. Parmi eux, 54 avaient des seuils audiométriques supérieurs à 20 dB HL unilatéralement (32 à l'oreille gauche et 22 à l'oreille droite). La surdité était de degré léger chez 51 enfants et de degré modéré chez trois participants. Parmi les 87 enfants ayant une surdité bilatérale, 81 avaient une surdité de degré léger et un enfant, une surdité de degré modéré (voir tableau 3). Les cinq autres enfants ayant une surdité bilatérale avaient une atteinte légère à une oreille et modérée à l'autre. Aucun enfant n'avait une perte auditive au-delà de 55 dB HL.

Selon les résultats du test McNemar, le nombre de seuils auditifs dépassant 20 dB HL était significativement plus élevé dans les basses fréquences en regroupant les réponses aux fréquences de 500 et 1000 Hz comparativement aux hautes fréquences en regroupant les réponses aux fréquences de 2000 et 4000 Hz ($\chi^2 = p <.001$). En effet, plus de 503 oreilles avaient un seuil auditif supérieur à 20 dB HL à 500 et 1000 Hz et à peine 15 oreilles avaient un seuil auditif supérieur à 20 dB HL à 2000 et 4000 Hz. On compte aussi 165 oreilles qui avaient un seuil auditif supérieur à 20 dB HL à toutes les fréquences.

Otoscopie. Un total de 45,2 % (*n* = 422) des enfants ont participé à l'otoscopie. Sur les 844 oreilles examinées, 65,8 % (*n* = 555) avaient une membrane tympanique ainsi qu'un conduit auditif externe normal. Des anomalies ont donc été observées dans 34,2 % (*n* = 289) des oreilles. Elles étaient présentes aux deux oreilles chez 56,2 % (*n* = 104) des enfants et uniquement à une oreille chez 43,8 % (*n* = 81) d'entre eux. La présence de cérumen dans le conduit auditif externe et la rougeur au tympan étaient les anomalies les plus souvent observées chez les enfants (voir figure 3).

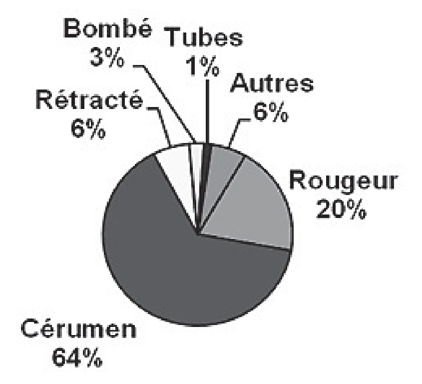

Figure 3. Pourcentage d'anomalies observées à l'otoscopie chez 422 enfants ayant participé à l'étude. Certaines oreilles ont été identifiées avec plusieurs anomalies (ex: rougeur et cérumen) et se retrouvent ainsi dans plusieurs catégories.

Tympanométrie. Un total de 44,8 % (*n* = 418) des enfants ont été soumis à la tympanométrie. De ce nombre, 77 % (*n* = 322) avaient un tympanogramme de type A, 3,8 % (*n* = 16) de type B et 3,4 % (*n* = 14) de type C bilatéralement. Chez les autres enfants (*n* = 66), différentes combinaisons de types de tympanogramme ont été observées d'une oreille à l'autre.

Émissions oto-acoustiques (ÉOA). Seulement 7,3 % (*n* = 68) des enfants ont participé aux ÉOA puisque ce test a été ajouté à la fin de la deuxième période du programme de dépistage. Un total de 14,7 % (*n* = 10) des enfants avaient des ÉOA présentes à toutes les fréquences bilatéralement. Sur les 136 oreilles testées, 24,3 % (*n* = 33) des oreilles avaient des ÉOA présentes à toutes les fréquences et 75,7% (*n* = 103) des oreilles avaient des ÉOA absentes à au moins une fréquence. Étant donné le faible nombre d'enfants ayant participé à ce test et puisque les résultats n'affectaient pas la décision de l'audiologiste de référer ou non, aucune analyse plus approfondie n'a été effectuée.

Tableau 4. Résultats des analyses statistiques des facteurs associés aux taux de références

Facteur	Valeur de P	Statistique khi-carré
École	0,069	χ^2 (8) = 14,533
Niveau scolaire	0,017*	χ^2 (2) = 8,196
Saison	0,689	χ^2 (1) = 0,160
Sexe	0,213	χ^2 (2) = 3096
Période du programme	0,135	χ^2 (1) = 2,238

* *significatif, p < ,05*

Discussion

Le but principal de cette étude était de rapporter les résultats d'un programme de dépistage de la surdité en milieu scolaire. Sur les 933 enfants ayant participé au programme de dépistage de 2007 à 2010, 20,2 % (*n* = 188) enfants ont été référés pour une consultation en audiologie clinique ou en médicine. Ce taux s'apparente au taux de référence de 18 % ayant été obtenu par Serpanos et Jarmel (2007) sur une cohorte rétrospective de 34 979 enfants âgés de trois à cinq ans.

Sur l'ensemble des enfants référés à la suite du dépistage, plus de cas ayant des problèmes aux deux oreilles que de cas ayant des problèmes à une oreille ont été rapportés (87 contre 54, respectivement), ce qui concorde avec les résultats obtenus par Serpanos et Jarmel (2007). Autant pour les cas de problèmes bilatéraux qu'unilatéraux, les enfants de la présente étude avaient principalement des seuils audiométriques entre 21 et 40 dB HL, représentant 97 % des enfants dont les seuils auditifs se trouvaient dans la catégorie légère du tableau 3 pour au moins une oreille. Il n'y a que 6 % des enfants pour qui les seuils auditifs s'apparentaient à la catégorie modérée du tableau 3 pour au moins une oreille. Un constat similaire a été trouvé dans des recherches antérieures puisque la plupart des enfants d'âge scolaire ayant une perte auditive ont souvent une surdité minime à légère (Bess et al., 1998; Niskar et al., 1998).

Malgré le fait que les résultats de certaines études s'apparentent à ceux de la présente, il est important de souligner que les différences méthodologiques entre les études concernant l'application des protocoles de dépistage en milieu préscolaire et scolaire peut rendre difficile la comparaison des données entre les études (Allen, Stuart, Everett & Elangovan, 2004; Bamford et al., 2007; Serpanos et al., 2007). En effet, plusieurs études ont des critères de référence qui sont des modifications des lignes directrices émises par l'ASHA (1997), ce qui conduit à des taux de références variables et difficiles à comparer d'une étude à l'autre. Comme il a été entrepris dans cette étude, certains auteurs ont aussi effectué une étude en appliquant strictement les lignes directrices de l'ASHA (1997). Entre autres, les résultats de l'étude d'Allen et al. (2004) effectuée auprès d'enfants âgés entre trois et quatre ans ont fait ressortir des statistiques surprenantes. Près de la moitié des enfants (46 %) ayant été soumis au dépistage de la surdité ont été référés pour une deuxième session de dépistage de la surdité, une évaluation médicale ou pour les deux. Ce nombre se compare à celui qui a été obtenu en 2007-2008 dans le cadre de la présente étude, puisque 48,7 % des enfants auraient été référés à la suite de l'application des critères proposés par l'ASHA.

Le taux de références de l'ASHA dans la présente étude était cependant moins élevé en 2009-2010 puisqu'il atteignait 23,6 %, soit un nombre beaucoup moins élevé que le 48,7 % obtenu en 2007-2008 (voir figure 1). Cette différence pourrait s'expliquer par le fait que les salles où avait lieu le dépistage étaient plus bruyantes en 2007-2008 qu'en 2009-2010, puisque l'audiologiste qui faisait les dépistages a été amené à modifier ses critères et à référer à un seuil supérieur à 30 dB HL plutôt qu'à un seuil de 20 dB HL, tel que suggéré par l'ASHA (1997). Par ailleurs, la réalité des milieux scolaires fait en sorte qu'il est parfois difficile d'effectuer des tests de dépistage de la surdité dans des endroits où les conditions sont idéales à une application stricte des lignes directrices proposées par l'ASHA (1997), c'est-à-dire dans des milieux où le niveau de bruit répond aux standards d'ANSI (American National Standards Institute, 1999). Allen et al. (2004) émettent par ailleurs l'hypothèse selon laquelle des changements des lignes directrices de l'ASHA contribueraient peut-être à augmenter la sensibilité et la spécificité des programmes de dépistage de la surdité. En effet, dans leur étude, près de la moitié des enfants ont échoué le dépistage. Ces auteurs avancent que la raison de l'obtention d'un taux de références aussi élevé pourrait être reliée au protocole de dépistage utilisé, étant celui de l'ASHA (1997). Selon ce protocole, pour réussir le test de dépistage, l'enfant doit obtenir des résultats à l'intérieur des limites de la normale aux trois tests utilisés – otoscopie, tympanométrie et audiométrie. L'enfant est référé en consultation aussitôt qu'il échoue au moins un de ces tests, ce qui peut conduire à un nombre important de faux-positifs. Il serait cependant souhaitable de bénéficier de plus d'études afin de savoir si une révision des critères pourrait en effet mieux refléter la réalité des conditions de dépistage retrouvées en milieu scolaire.

Le deuxième objectif de cette étude était d'examiner l'impact de certains facteurs sur le taux de références. Les résultats ont démontré que les filles et les garçons étaient à risque d'échouer les tests de dépistage de la surdité dans une même proportion, ce qui va dans le sens des résultats des études de Georgalas et al. (2008) et de North-Matthiassen et Singh (2007). La présente étude a aussi démontré que les saisons durant lesquelles le dépistage a été effectué n'étaient pas corrélées avec le taux de références. L'étude de Zielhuis et al. (1998) effectuée aux Pays-Bas a rapporté des résultats semblables auprès d'enfants du jardin et de la première année. Finalement, l'étude a aussi fait ressortir que les enfants de la maternelle et du jardin étaient significativement plus référés pour une consultation en audiologie clinique ou en médecine que les enfants de la première année, un résultat similaire à celui obtenu par Mundy (2001). Cet auteur a trouvé que 98 % des enfants de deuxième année obtenaient des résultats normaux comparé à 81 % des enfants d'âge préscolaire, ce qui indique que les enfants plus jeunes sont plus à risque d'obtenir des résultats anormaux au test de dépistage et d'être référés pour une consultation en audiologie ou en médecine.

Finalement, la différence entre les taux de références des deux périodes du programme n'était pas significative, et ce, malgré l'ajout de nouvelles procédures durant la deuxième moitié du programme de dépistage. Cela remet en question la nécessité d'employer un protocole incluant plus de tests que l'audiométrie tonale. Une quantité plus élevée d'équipement est non seulement plus coûteux mais nécessite aussi plus de temps pour tester chaque enfant. Cependant, tel qu'il a été abordé préalablement, selon les résultats des diverses études (Bamford et al., 2007; Driscoll et al., 2001; Krueger & Ferguson, 2002; Sabo et al., 2000; Taylor & Brooks, 2000), il est encore difficile de se prononcer sur le protocole optimal des tests à inclure dans la batterie de dépistage.

Limites de l'étude

Une des limites de cette étude est sa nature rétrospective, ce qui implique que les résultats ont été tirés à partir de données initialement recueillies dans un but clinique et pédagogique et non dans un but de recherche. La prise de données n'était pas consistante au cours des années en raison de l'absence d'un protocole bien établi, laissant place à des interprétations subjectives des données. Ensuite, les résultats ont été obtenus au cours de deux périodes durant lesquelles les procédures ont été modifiées selon la disponibilité de nouveaux équipements. Les critères de référence ont aussi subi des modifications. Finalement, l'étendue de l'étude n'a permis aucun suivi auprès des parents ou tuteurs des enfants référés afin de savoir s'ils avaient consulté. Cette information aurait permis de confirmer le nombre exact d'enfants qui avaient réellement des seuils audiométriques supérieurs à 20 dB HL ou une dysfonction de l'oreille moyenne à la suite du dépistage. Par ailleurs, avec cette information, il aurait été possible d'en connaître un peu plus sur la sensibilité et la spécificité du présent programme de dépistage de la surdité.

Contributions et recommandations de l'étude

La présente étude a permis quelques avancées puisque, contrairement aux programmes de dépistage néonataux de la surdité, très peu d'études dans la littérature portent sur les programmes de dépistage de la surdité en milieu scolaire au Canada. Pourtant, il est bien documenté que bon nombre d'enfants auront une perte auditive au cours de l'enfance (Adams et al., 1999; Bess et al., 1998; Fortnum et al., 2001; Niskar et al., 1998; Weichbold et al., 2006) et que les conséquences d'une perte auditive non dépistée peuvent être importantes (Bamford et al., 2007; Cunningham & Cox, 2003). Malgré ces faits, la mise en place de programmes obligatoires de dépistage de la surdité en milieu scolaire tarde toujours à se faire, possiblement en raison d'un manque d'études sur le sujet. Ainsi, cette étude a permis de documenter que plusieurs enfants d'âge préscolaire peuvent avoir une perte auditive. Le fait que la plupart des enfants référés à la suite du dépistage ont une surdité légère suggère l'importance d'un dépistage de la surdité en milieu scolaire. De plus, le dépistage d'une surdité peut permettre aux audiologistes de mettre en place des moyens d'intervention, comme sensibiliser les enseignants-es à reconnaître les signes d'une perte auditive, assurer un suivi approprié auprès des élèves dépistés et viser un apprentissage optimal en salle de classe par l'utilisation d'aides de suppléance à l'audition, comme par exemple, l'installation d'un système FM. Pour les futurs programmes de dépistage en milieu scolaire, il est recommandé de mesurer le niveau de bruit dans les salles de dépistage à l'aide d'un sonomètre et que les critères de référence soient bien définis au départ et maintenus tout au long du déroulement du programme. Il serait aussi pertinent que les prochaines études s'attardent davantage à la contribution d'autres tests dans la batterie de tests de dépistage de la surdité, notamment les émissions oto-acoustiques.

Remerciements

Cette recherche a été réalisée en partenariat avec l'Université d'Ottawa et le Conseil des écoles publiques de l'Est de l'Ontario. Ce projet n'aurait pas pu être réalisé sans la précieuse collaboration de Kari Lyn Gay et Josée Lagacé, audiologistes qui étaient responsables du programme de dépistage à la clinique interprofessionnelle en soins de santé primaire de l'Université d'Ottawa ainsi que d'Hélène Lanoix, spécialiste en surdité au Conseil des écoles publiques de l'Est de l'Ontario. Nous apprécions énormément l'implication, la patience et l'effort dont elles ont fait preuve tout au long de la réalisation de ce projet. Nous remercions également Joanne Whittingham, coordonnatrice de la recherche au Centre hospitalier pour enfants de l'est de l'Ontario (CHEO) ainsi que Dong Vo, superviseur au service de gestion des données de l'Hôpital d'Ottawa, Campus Civic puisque leur expertise nous a permis de bénéficier de judicieux conseils pour entreprendre la classification et l'analyse de nos données. Finalement, nous remercions aussi Jean-Grégoire Roveda, étudiant du programme de maîtrise en audiologie, pour avoir effectué la révision d'une portion des données amassées dans le cadre de cette étude.

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Note des auteurs

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Book Review
Évaluation de livre

Title: Choral Pedagogy and the Older Singer

Publisher: Plural Publishing

Authors: Brenda Smith and Robert T. Sataloff

Cost: $55.00 (softcover)

ISBN: 978-1-59756-438-0

Reviewer: Anick Lamarche

Affiliation: University of Ottawa

Choral Pedagogy and the Older Singer

In an era where longevity is no longer the exception but rather the rule, increasing weight is given to the needs, interests and health of the geriatric population. We are only beginning to acquire more in-depth understanding of present-day aging and all that it entails. Voice science has helped map out the decades of voice, but many unknowns remain, especially with respect to geriatric voice habilitation. In this light, "Choral Pedagogy and the Older Singer" by Brenda Smith and Robert T. Sataloff looks to fill a gap by delving into topics such as the aged voice as a tool for activity and participation, and the art of singing throughout senescence. Indeed, research is scarce on the topic of choral activity in the elderly population. This scarcity is perhaps why it is strange that much of the extant research does not find a place in this book's first chapter dedicated to research. Gunter, Grape, Theorell, Robertson and Gotell are all names that are left unmentioned despite the fact that these authors have investigated choir singing and well-being.

Geared to choral conductors, this book is presented as a textbook. Summaries and 'further research questions' are found at the end of each of the eight sections. The book's style is eloquent and for the most part accessible, despite some occasional use of professional jargon. The book's contents are ambitious — ranging from personal experiences and anecdotes to medical definitions, anatomical orientation, an overview of integrative medicine and age-tied challenges affecting vocal output, choir diction and the rehearsal process.

Paradoxically, this book, which speaks of healthy harmony of older voices, contains dissonances on several different levels. One may question the elected structure with 1.5 page-long chapters and highly disjointed sections. Extensive time is spent visiting topics outside the scope of the voice in the elderly and choir pedagogy (i.e., Chapters 12 and 13). At times, the writing is redundant (i.e., Chapters 21 and 22 finish and start with an identical quote). Some chapters meet the standards of a textbook chapter with proper claim, support and citations, while other chapters make complete abstractions of referencing, or refer to vernacular sources such as media communications or films. In addition, definitions are at times left incomplete (vibrato is defined only by frequency modulations) or very late. One definition occurred 14 chapters after the term originally appeared. This makes it difficult for the reader to stay in tune with the book's contents. Unfortunately, the lack of coherent structure, together with a slow pace of presentation (at times the book's topic is addressed at the end of a chapter), hides the pearls of information this book has to offer.

Several chapters have very practical tokens for the reader, including:

1. Warm-up and cool-down routines and vocal regimen found in Chapters 7 and 25.
2. Important notes on prevention and habilitation at the end of Chapter 12.
3. Creative use of imagery proposed in Chapter 22.
4. Useful voice classification-related tips in Chapters 23 and 24.
5. Discussions on the need to establish new vocal models and recalibrate vocal percepts among older choristers in Chapters 22 and 25.

From a health care perspective, Chapters 14, 15, 16 and 17, on topics of seating ergonomics, vocal health and the older singer, integrative medicine, and general principles of training respectively, offer new perspectives, good illustrations of key principles, good construction and structure and all have topic-relevant take-home messages.

Generally, the book’s illustrations are useful but could contain another level of information such as overall orientation to anatomical structures, or enhanced resolution and clarity so that arrows retain their functional role and are not lost in the image itself. For example, consistent angle display of the glottis could facilitate readership for those that may not be well versed in laryngeal anatomy.

All in all, this book will appeal to the reader interested in choral activity because many chapters provide practical information and tools to the conductor facing a “fifty plus” choir. The book also provokes some reflection with respect to the human connection to the voice and the need to dynamically rethink our vocal image for the elderly. From a health professional standpoint, a handful of chapters may be particularly insightful as they help draw attention to such basics as sitting, help reframe some therapeutic programming for the elderly population and suggest means to integrate holistic medicinal traditions with Western medical approaches.

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:

Tutorials: Review articles, treatises, or position papers that address a specific topic within either a theoretical or clinical framework.

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 http://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 elizabeth.fitzpatrick@uottawa.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 typedwritten 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 CJSLPA 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 CJSLPA 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 CJSLPA 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, CJSLPA 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 communi-cation 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 http://cjslpa.coverpage.ca. Si vous ne pouvez pas utiliser le système électronique, veuillez envoyer par courriel un fichier Word ou WordPerfect 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 elizabeth.fitzpatrick@uottawa.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 ½" X 11" de qualité. Toutes les marges doivent être d'au moins un (1) pouce. Un fichier électonique 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 librairies universitaires et commerciaux. 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.

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.

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'être 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.

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