Symposium Title: Language and Literacy Interventions for Students with Down syndrome: Current Empirical Evaluations and Next Steps for Future Research

Chairs: Christopher J. Lemons¹, Sue Buckley²

Overview: Language and literacy skills are predictors of post-secondary outcomes for individuals with Down syndrome and are thus critical targets for early intervention. As Down syndrome is the primary genetic syndrome associated with ID, occurring in 1 out of 700 to 1,100 births (Fidler, 2005), at least 150,000 students with Down syndrome are currently receiving services from public and private pre-Kindergarten through 12th grade in schools within the countries represented on this panel (Norway, United Kingdom, United States). There is evidence that children with Down syndrome have traditionally been viewed by society as individuals who would not obtain proficient levels of language or literacy (Kliwer, Biklen, & Kasa-Hendrickson, 2006; Oelwein, 1995). This fact coupled with the limited empirical work in the area has left parents and educators unclear regarding the most effective methods to improve language and literacy skills for children with Down syndrome. The purpose of this panel is to present findings from four experimental studies in which the efficacy of an early language or literacy intervention for children with Down syndrome was examined. In the first paper, Næss and colleagues will describe the outcomes of a randomized control trial evaluation of an early vocabulary intervention for first graders with Down syndrome. In the second paper, Baxter and colleagues will report on a randomized control trial targeting grammatical development in young children with Down syndrome. Burgoyne and Cain will present the fourth paper in which they will report findings from a study examining a parent-led shared-book reading intervention. In the fourth paper, Lemons and colleagues will report on a single-case design study evaluating an early phonological awareness intervention for children with Down syndrome. In sum, the panel will highlight current research on early language and literacy interventions for children with Down syndrome and provide directions for future research.

Paper 1 of 4

Paper Title: DSL+ An Effective Vocabulary Intervention for Children with Down Syndrome?

Authors: Kari-Anne B. Næss³, Silje Hokstad⁴, Liv Inger³,⁴, & Liz Smith⁵

Introduction: Children with Down syndrome are at risk for impaired language development, including weaknesses in vocabulary breadth and depth. Vocabulary is important for development of general language skills, as well as social and academic functioning. Yet few effect studies (Randomized Control Trial; RCT) of language interventions for children with Down syndrome exist. The DSL + intervention aims to be an effective vocabulary intervention for first graders with Down syndrome and is designed and developed based on reviews of earlier intervention research as well as knowledge about the specific language profile of children with Down syndrome. The intervention consists of daily training for 15/30 weeks and uses a dual approach; dialogues based on text free picture books and systematic training of words related to the picture books. The picture books and tasks are presented as an app, with the teachers’ support and facilitation of the app-based learning also a core element of the intervention. The first three days of training every week is given individually to familiarize the child with the picture book content and related vocabulary, preparing them for a small group session with mainstream peers on the fourth day of the week and a session in the full class on the fifth day of the week.

Methods: The effect of the DSL+ intervention was tested in a two-wave RCT. First graders (n=104) were randomly allocated to either the DSL+ intervention group or to an ordinary teaching group. Language tests to measure both direct and transfer effects

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were carried out before, during and after the intervention. In addition, individual training sessions on iPad were tracked, and audio files were collected from expressive tasks. The teachers who delivered the intervention received a training manual with detailed description of the intervention and had to participate in a two-day training course online before the intervention started.

Results: The preliminary findings show optimistic results and the intervention has proven popular both with children and their teachers. Quantitative data is being analyzed via Structural Equation Modelling (SEM) with latent variables assessing both the direct and the indirect effect of the intervention. Qualitative data is being analyzed by examining the relationship between the teachers’ question types and the adequacy of children’s responses. These analyses are currently in progress, and results will be presented at the conference.

Discussion: The preliminary results provide initial evidence that six-year-old children with Down syndrome can improve both their vocabulary skills and their number of adequate responses to teacher questions with both low and high levels of abstractions through language intervention. These findings are important in understanding the behavioral intervention needs and possibilities of children with Down syndrome so that appropriate support and services can be provided. Further research is needed to determine what interventions are most effective for whom.

**Paper 2 of 4**

**Paper Title:** An Evaluation of a Language Intervention for Children with Down Syndrome

**Authors:** Rebecca Baxter¹, Charles Hulme², Rachel Rees³, Alexandra Perovic¹

**Introduction:** Children with Down syndrome have broad and significant language impairments (Nass et al., 2011). Difficulties with expressive language and grammatical development are particularly marked (Laws & Bishop, 2004). This study evaluates the effectiveness of a 10-week intervention program designed to support grammatical development by teaching children to apply a specific grammatical rule (the simple past tense).

**Methods:** 52 children with Down syndrome (aged 7-11) attending mainstream schools in Hampshire, UK and surrounding borders were recruited. The intervention was evaluated using a randomized control trial (RCT). Participants were allocated into two groups: (1) an intervention group and (2) a waiting control group who received the intervention after a 14-week wait period. Children were assessed at three time points: pre-intervention (time 1), after the first 10-weeks of intervention (time 2), and after the waiting control group had received the intervention (time 3). The intervention was delivered by trained teaching assistants in daily 20-minute sessions. Teaching assistants were provided with an intervention manual and supported by a speech and language therapist who visited school every two weeks during the 10-week intervention.

**Results:** There were no differences between the two groups at time 1. At time 2, the intervention group had made significantly greater gains on standardized measures of past tense (effect size Cohen’s d=3.12) and grammar (d=0.52). Effects did not transfer to other grammatical rules. Group differences in favor of the intervention group were also significant on bespoke measures including taught verbs (d=3.63), matched untaught verbs (d=3.32) and story retell (d=1.92). At time 3 the intervention group had maintained gains whilst the waiting control group had made similar gains.

**Implications:** This study provides evidence for the effectiveness of a teaching assistant delivered language intervention program. Further large-scale evaluations of the program are needed to confirm and extend these findings.

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References/Citations:


**Paper 3 of 4**

**Paper Title:** Enhancing the Shared Book Reading Interactions of Parents and Young Children with Down Syndrome

**Authors:** Kelly Burgoyne¹, Kate Cain²

**Introduction:** Shared book reading provides a valuable mechanism for supporting children’s oral language development, contributing to vocabulary growth and to abstract language use (van Kleeck et al., 1997). How parents read with their child is important: children make greater gains when parents use simple techniques, such as asking open-ended questions, which promote the child’s active involvement (Mol et al., 2008). Many parents and children with Down syndrome regularly participate in shared book reading. Though few have examined shared reading with children with Down syndrome there is some evidence to suggest that children often take a passive role and that parents tend to use strategies that are likely to limit the linguistic demands on their child (Trenholm & Mirenda, 2006). Finding ways to support parents to increase their child’s verbal participation in shared reading may enhance opportunities to facilitate language development in this context.

**Methods:** This experimental study examines parent and child contributions during typical shared reading and compares that with reading a book in which question prompts have been inserted. Eight preschool children with Down syndrome (aged 4-6 years) and their parents were recorded reading two books, one of which was modified to include a set of prompts designed to increase the child’s active engagement. Measures included the relative proportion of time spent on extra-textual talk during the shared reading sessions, child communicative participation, and lexical diversity of children’s utterances.

**Results:** There was considerable variability in the nature of the shared reading interactions across parent-child dyads. On average, parents and children spent a significantly greater proportion of the shared reading session focusing on extra-textual talk when reading books with embedded prompts than when reading the unmodified book (t (7) = -2.468, p = .022; d = .91). Children’s relative participation in the shared reading interaction was significantly greater (t (7) = -2.338, p = .026, d = .89), and children produced significantly more words (t (7) = -2.418, p = .023, d = 1.01) and a greater range of words (t (7) = -2.604, p = .018, d = .97), when reading books with embedded prompts. Prompts had no effect on the complexity of child language as indexed by mean length of utterance.

**Discussion:** The findings from this study suggest that supporting parents of young children with Down syndrome to ask their child questions about the story during shared book reading activities enhances parent-child interactions by promoting extra textural talk and the child’s active participation. This creates opportunities for parents to model, scaffold and extend children’s language and thereby accelerate growth in early language skills. Further research is needed to evaluate the effects of training parents of young children with Down syndrome to use strategies such as asking questions during shared reading interactions on children’s language development. We believe that such training may be an important way in which parents can support the early language skills of children with Down syndrome.

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References:

**Paper 4 of 4**

**Title:** Phonological Awareness Intervention for Preschoolers with Down Syndrome

**Presenters:** Christopher J. Lemons¹, Lauren LeJeune¹, & Samantha Gesel¹

**Background:** We explicitly taught preschoolers with Down syndrome (DS) two components of phonological awareness (PA). We asked two research questions: (1) Can a researcher-created intervention increase participants’ ability to blend and segment sounds in words across three units: (a) syllables, (b) onset-rime, and (c) individual phonemes; and (2) Will students demonstrate similar gains across blending and segmenting tasks?

**Design:** We used a multiple probe (conditions) across behaviors (i.e., phonological units) design, which was appropriate for determining if a functional relation existed between intervention and mastery test results while minimizing testing effects.

**Methods:** Participants were two preschool-aged boys with DS who met inclusion criteria (e.g., ability to speak and imitate). Intervention sessions were 20 min, four days per week across five months. Instruction was based in segmenting and blending games, and sessions included application while listening to a story.

Our 16-item mastery test measured blending and segmenting target and transfer words with and without picture support. Probe sessions included three mastery tests, and intervention sessions included one mastery test from the targeted tier. We visually analyzed graphed data and conducted a post-hoc item analysis of mean differences in correct responses for blending and segmenting target and transfer words.

**Results:** Results indicated that a functional relation existed between intervention and one participant’s mastery test results, the second participant’s data provided two demonstrations of intervention effect (i.e., syllables and onset-rime). Post-hoc item analysis results indicated that, overall, participants increased their ability to orally blend, but not segment, sounds in words.

**Discussion:** Teachers of preschoolers with DS should be encouraged to provide explicit PA instruction to their students. However, there is a need for research on the following: (a) replication across children, (b) factors to support segmenting, (c) application to other PA tasks, and (d) whether preschool interventions support transition into elementary settings.

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