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Cognitive stimulation of pupils with Down syndrome: A study of inferential talk during book-sharing

Liv Inger Engevik *, Kari-Anne B. Næss, Bente E. Hagtvet

Department of Special Needs Education, University of Oslo, P.O. Box 1140, Blindern, NO-0318 Oslo, Norway

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ABSTRACT

In the education of pupils with Down syndrome, "simplifying" literal talk and concrete stimulation have typically played a dominant role. This explorative study investigated the extent to which teachers stimulated abstract cognitive functions via inferential talk during book-sharing and how pupils with Down syndrome responded. Dyadic interactions ($N = 7$) were videotaped, transcribed and coded to identify levels of abstraction in teacher utterances and to evaluate the adequacy of pupil responses. One-third of the teachers' utterances contained high levels of abstraction and promoted inferential talk. Six of the seven children predominantly responded in ways which revealed inferential thinking. Dialog excerpts highlighted individual, contextual and interactional factors contributing to variations in the findings. Contrary to previous claims, the children with Down syndrome in the current sample appear able to draw inferences beyond the "here-and-now" with teacher support. This finding highlights the educational relevance and importance of higher-order cognitive stimulation of pupils with intellectual disabilities, to foster independent metacognitive skills.

1. Introduction

The focus of this article is the stimulation of abstract thinking and reasoning in pupils with Down syndrome via inferential talk during book-sharing. For children with Down syndrome, cognitive stimulation is often considered a challenging educational task because intellectual disability may lead to concrete perception which is restricted to the "here and now". This statement is strongly present in the literature on intellectual disabilities (e.g. Baroff, 1986; Beirne-Smith, Ittenbach, & Patton, 2002; Jonsson, 1989; Kylén, 1987; Lovaas, 1981; Opp, 1992), and provides an explanation for the emphasis on concrete stimulation related to literal concepts found in educational programs involving pupils with intellectual disabilities, such as Down syndrome (Browder & Spooner, 2006; Farrell, 1996). In recent years, however, many pupils with Down syndrome have proven to be able to handle intellectually demanding tasks, such as learning to read (Laws & Gunn, 2002), but little is known about the children's capability to draw inferences from concrete events outlined in books, as well as the extent to which teachers stimulate such cognitive activity. However, studies of typically developing children suggest that adult-child interactions that support the transition from describing pictures in books to drawing inferences about causes and possible outcomes of events provide children with linguistic resources that may profoundly affect their cognitive development (Dickinson, 1991; Scribner & Cole, 1981; Sigel, 1993; Smith, Landry, & Swank, 2000; van Kleeck, 2008).

* Corresponding author.
E-mail addresses: l.i.engevik@isp.uio.no (L.I. Engevik), k.a.b.nass@uv.uio.no (K.B. Næss), b.e.hagtvet@isp.uio.no (B.E. Hagtvet).

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While the small body of research on book-sharing involving children with intellectual disabilities has primarily addressed language and narrative development (e.g., Miles & Chapman, 2002; Reilly, Losh, Bellugi, & Wulfeck, 2004), the current study focused on abstract thinking and reasoning abilities. More precisely, we have investigated the extent to which special education teachers utilize opportunities for cognitive stimulation by initiating inferential talk while constructing the story of a wordless picture book with their pupils with Down syndrome, and how the pupils responded.

1.1. Cognitive stimulation through inferential talk during book-sharing

Book-sharing is a common activity in educational contexts involving young children and provides rich opportunities for both literal (concrete) and inferential (abstract) talk. Literal talk involves labeling and descriptions, whereas inferential talk among other things involves multiple perspective-taking and complex reasoning about causal relationships (Blank, Rose, & Berlin, 1978; Tompkins, Zucker, Justice, & Binici, 2013). Engaging typically developing children in inferential talk is believed to expand their cognitive field by decontextualizing the verbal interaction from the immediate context of the material (Sigel, 1993). For example, helping a child to relate events from a storybook to personal experiences, or to predict the outcomes of events based on his or her prior knowledge, has been shown to stimulate the abstract operations and strategies needed for story comprehension (Dickinson & Smith, 1994). Adults interacting with typically developing three to four-year-olds during book-sharing have been found to encourage inference drawing beyond the information given in the book and to reduce their own amount of literal talk (Wheeler, 1983). Adults may involve children in drawing inferences and thinking abstractly by comments and statements that explain abstract concepts of the story or by posing questions to the child. Questions tend to require more cognitive resources from the child because they simultaneously demand information processing and response formulation. At the same time, questions typically give children beneficial opportunities to become active participants in book-sharing (Zevenbergen & Whitehurst, 2003).

It has been a common assumption that children with intellectual disabilities generally do not reach the Piagetian formal operational stage characterized by abstract thinking because of delays and limitations in underlying cognitive functions (see Kylén, 1987; Woodward, 1979). This assumption may explain the rather one-sided focus on concrete stimulation and "simplified" academic approaches within this pedagogical field (Browder & Spooner, 2006; Farrell, 1996). Consequently, we do not know the extent to which children with Down syndrome respond to cognitively complex interactions during book-sharing, nor do we know whether their apparent weak cognitive reasoning skills primarily relate to a lack of stimulation or to biological constraints. Over the past decades, the theoretical perspectives of relevance to the field of intellectual disabilities has broadened from the predominantly medical/neurological approach typically describing biological constraints to development, to include educational/psychological perspectives emphasizing the importance of fostering cognitive development by stimulating the child (Feuerstein, 1980; Gibson, 1996; Guralnick, 2005; Mercer, 1973). As argued by Gibson (1996), the biobehavioral resources and deficits associated with Down syndrome are not fixed. He emphasizes the importance of encouraging cognitive development by stimulating the ability to synthesize information (e.g., to relate an event from a book to the larger story, or to prior knowledge), which forms the foundation for metacognitive functions and abstract thinking. He further argues that such stimulation is facilitated by visual support and repeated attempts that aim toward consolidated learning (Gibson, 1996). Vygotsky (1978) similarly underscored the importance of encouraging the transition to abstract thinking in children with intellectual disabilities and warned schools early on against providing a teaching paradigm based solely on concreteness.

1.2. Research on levels of abstraction in book-sharing

The ratio of simple to complex teacher input during book-sharing was investigated in relation to children's subsequent gains at the highest level of abstraction in a study involving 35 typically developing children (aged 3:6–4:1 years) by van Kleeck, Gillam, Hamilton, and McGrath (1997). The researchers concluded that a combination of 70% input with low levels of abstraction and 30% input with high levels of abstraction constituted an optimal learning environment. Establishing a climate in which the child feels competent while presenting approximately one-third of the interactions at a challenging level created beneficial opportunities for cognitive growth, according to van Kleeck et al. (1997). However, it could be argued that an optimal ratio should not be seen as fixed; it is presumably affected by different child-related and contextual factors. Within a socio-cultural perspective, this ratio would only apply if low levels of abstraction allow for successful responses, and high levels of abstraction represent a challenge within the child's zone of proximal development (ZPD) (Vygotsky, 1962). Whether this is the case for elementary school pupils with Down syndrome is still uncertain.

In a survey study by Trenholm and Mirenda (2006), approximately 60% of the parents of individuals with Down syndrome aged 0–41 years reported that they labeled and pointed to pictures during book-sharing, whereas invitations for extended discourse, such as asking what happened in the story or what might happen next, were reported by only 25% of the 224 parents. Similarly, the parents of children with specific language impairments (SLI) have been found to limit their input to lower levels of abstraction for a longer period of time than the parents of children without SLI, as concluded by van Kleeck and Vander Woude (2003) in a review of the existing literature. According to the authors, parents appear to adapt the abstraction level to what they perceive to be the linguistic competence of their children. The authors further argue that although children with SLI benefit from concrete input and labeling, this approach may provide less practice at understanding and constructing abstract information, such as the "how" and "why" of stories and their characters. Shortages