



The role of linguistic context in deriving word meanings in individuals with Down Syndrome

Maja Roch*, Elena Florit, Chiara Levorato

University of Padova, Department of Developmental Psychology, via venezia 8, 35131 Padova, Italy

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ABSTRACT

Deriving the meaning of unknown words from context and its relationship to text comprehension was investigated in 24 individuals with Down syndrome and in 24 typically developing children matched for the Peabody Picture Vocabulary Test (PPVT) score.

The study consisted of three phases. Unknown words were identified during the first phase (PPVT). Those words were presented embedded in brief linguistic contexts during the second phase. Recognition (maintenance) of word meanings was verified in the third and final phase. Both groups of participants recognized the meanings of a noteworthy number of words in contexts and a high percentage of these was maintained when they were presented at a later date without the support of context. Over and above group differences and basic linguistic skills, text comprehension seems to predict the ability to use context. Context provides the semantic information necessary to extract word meaning by activating relevant world knowledge.

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1. Introduction

This study focuses on the ability of individuals with Down Syndrome (DS) to deduce the meaning of new words from linguistic contexts and the relationship between that ability and language comprehension. Its background is linked to the theory concerning the ability to use context clues to deduce meanings (Cain, Oakhill, & Elbro, 2003; Cain, Lemmon, & Oakhill, 2004; Cain, 2007; Cunningham, 2005; Levorato & Cacciari, 1992; Nagy & Scott, 2000). When a listener or reader encounters unfamiliar expressions (e.g. words, idioms) he/she analyzes the surrounding context for clues to its meaning (Fukink, 2005). It is well documented that linguistic expressions can be acquired after as little as a single exposure in a supportive linguistic context (Goodman, McDonough, & Brown, 1998; Nagy, Herman, & Anderson, 1985).

Proposed to explain how children interpret figurative language (Cacciari & Levorato, 1989, 1998; Levorato, 1993; Levorato & Cacciari, 1999; Levorato, Nesi, & Cacciari, 2004), the Global Elaboration Model (GEM Levorato & Cacciari, 1995) illustrates how they use linguistic context to derive the meaning of unfamiliar expressions and how these are discerned. Deducing the meaning of unknown words involves exploiting knowledge about the meaning of the surrounding context and the world (Hannon & Daneman, 2004; Levorato, Roch, & Nesi, 2007). Consistent with the GEM, the meaning assigned to an unfamiliar expression depends on the context in which it appears. Indeed, according to the construction–integration model, “The word meaning is always situation specific and context dependent” (Kintsch, 1998, p. 165). Only when a child is able to construct a coherent semantic representation can the meaning of an unknown expression be gathered from a text in which it is embedded.

* Corresponding author.

E-mail address: maja.roch@unipd.it (M. Roch).

GEM's implication that there is a relation between text comprehension and the ability to use context (Cain, Towse, & Knight, 2009; Levorato et al., 2004, 2007; Nesi, Levorato, Roch, & Cacciari, 2006) has been supported by studies on typically developing (TD) school-age children at different levels of text comprehension (Cain & Towse, 2008; Levorato et al., 2004, 2007; Nesi et al., 2006) and, more importantly for the current work, on individuals with DS (Levorato, Roch, & Beltrame, 2009; Roch & Levorato, 2010).

Roch and Levorato (2010) studied a group of 20 individuals with DS and a group of 20 TD children matched for their level of text comprehension in order to investigate their ability to interpret ambiguous idiomatic expressions (e.g. to break the ice). The participants with DS (mean age 14.9 years; $SD = 2.2$) and the TD children (mean age 6.7 years; $SD = 0.4$) were presented with unfamiliar idioms embedded in short linguistic contexts such as stories. The correct meanings of idioms were presented within multiple choice tasks together with a paraphrase of the literal meaning and other alternatives linked to the situation narrated in the context. The participants with DS were found to be as proficient as the TD children in identifying the meaning of idioms presented in context. Since the two groups were matched for their level of text comprehension, the investigators concluded that comprehension of an idiom is a function of text comprehension. In fact, the probability that the participants would choose the appropriate meaning of an idiom was associated to good text comprehension skills while that of choosing one of the two incorrect answers was associated to poor ones.

Levorato et al. (2009) studied a group of 16 adolescents with DS and a group of 16 TD six-year-olds matched for text comprehension to investigate their ability to use context to facilitate the comprehension of morphosyntactically complex sentences. All the study and control participants took the standardized version of the Test of the Reception of Grammar (TROG – Bishop, 1989) which assesses children's grammatical comprehension and tests understanding of sentence comprehension (the assessment phase). The TROG has a multiple-choice format; children taking the test are asked to listen to a sentence and to select the picture that matches its meaning. All the items use a simple vocabulary with grammatical complexity increasing as the test proceeds. Four 4-choice items are used to test understanding of each of 20 sentence types.

Two weeks later, the participants taking part in that study were administered a modified version of the test during which the same sentences were once again presented in a spoken context three or four sentences long. The participants were again asked to match each sentence to the correct picture. The results showed that the individuals with DS, who were not as proficient as the TD children at recognizing the meaning of sentences when presented in isolation, did better in identifying the correct pictures when the sentences were introduced after a short context. This result suggests that individuals with DS are able to use contextual clues to infer the meaning of sentences they were otherwise be unable to understand. Over and above the ability to understand sentences per se, the ability to comprehend sentences in a wider context seems to be related to text comprehension which specifically contributes to comprehension of sentences embedded within a context.

In accordance with the GEM, the two studies cited above indicate that context facilitates identifying the meaning of unknown expressions and that there are common processes linking the use of context and text comprehension. In the light of these findings the hypothesis has been advanced that individuals with DS could also use context to identify the meaning of unknown words.

Chapman and other investigators demonstrated that individuals with DS are able to fast map (determine the meaning of a new word from seeing/hearing it used in a familiar context) the meaning of new words from a story context (Chapman, Sindberg, Bridge, Gigstead, & Hesketh, 2006; Kay-Raining Bird, Chapman, and Schwartz (2004); McDuffie, Sindeberg, Hesketh, & Chapman, 2007). In those studies, adolescents with DS were matched with TD children for either non-verbal mental age or for syntax comprehension to evaluate and compare their ability to define new words presented in the context of a spoken story. The adolescents with DS had more difficulty in defining words than the TD children matched for their nonverbal ability, but their performance was similar to that of the children matched for syntax comprehension. These results suggest that individuals with DS do indeed use information provided by a story's context to infer the meanings of novel words at the level predicted by their language capacity scoring.

The present investigation intends to take the studies described a step further and to extend the findings reported in the literature. The participants studied were thus provided with meaningful contexts simulating everyday life situations. Since individuals with DS seem to have poor memory and text comprehension abilities (Levorato, Roch, Florit, 2011), the contexts were only two or three sentences long and selected with the intent of providing the world knowledge necessary to identify the meaning of target words. The procedure differed from the one utilized by Kay-Raining Bird et al. (2004) as far as two details were concerned: (a) the words were not novel, as they were real Italian words from the Peabody Picture Vocabulary Test (PPVT, 1991) and (b) in view of the fact the persons with DS have difficulty with oral and written language, comprehension of the meaning of words embedded in a context was assessed utilizing a recognition rather than a definition task.

1.1. *The current study: its aims and research questions*

The current study consisted of three phases. During the first, a baseline assessment of receptive vocabulary was made to identify words that were unknown to the participants. During the second, carried out ten days later, each participant was presented with the words he/she was unfamiliar with at the baseline assessment but this time embedded in short linguistic contexts. Finally, during the third and final stage carried out two weeks later the unknown words were presented out of context.

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