INTRODUCTION.

Italian children with dyslexia experience difficulties in reading long stimuli and show an extremely slow and analytical reading behaviour. Recently, we showed that word naming times of children with dyslexia were shorter for stimuli composed of a root and a derivational suffix (e.g., CASSIERE, ‘cashier’), as compared to simple words of the same length and frequency not parsable in root + derivational suffix (e.g., CAMMELLO, ‘camel’) (Burani et al., 2008). We proposed that morphemes prove useful in processing linguistic stimuli in children with limited reading ability for whom most printed words are too large units to be processed as a whole.

A similar facilitation on naming times due to morphological composition was found in skilled readers of the same age. However, whereas skilled readers showed a reading advantage of morphological composition for new words (pseudowords) and low-frequency words only, children with dyslexia were facilitated both in new words and in words of different frequency, including high-frequency words (Marcolini et al., in press). For both children with dyslexia and skilled readers, the facilitating effect on naming times was mainly driven by the root (Traficante et al., 2010). Overall, the facilitating effect of word’s morphological composition is larger in children with dyslexia as compared to skilled readers of the same age (see also Carlisle & Stone, 2005; Elbrø & Arnbak, 1996).

The present study addresses the question of whether the facilitating effect found on low-frequency derived word reading is moderated by the length of the root. For adult readers, shorter
affixed words are more subject to whole-word processing than longer affixed words, with increasing word length enhancing the probability of compositional processing (e.g., Niswander-Klement & Pollatsek, 2006). To the best of our knowledge, the role of root length has not yet been investigated. We expected that, in the case of skilled young readers, the likelihood of relying on the root morpheme as a processing unit would depend on its perceptual salience within the word (see Kuperman et al., 2010; Laudanna & Burani, 1995, for processing accounts of the perceptual salience of affixes), thus biasing reading toward morphological decomposition. In contrast, readers with dyslexia might be facilitated by the presence of a root within a derived word, irrespective of root’s length, because of their difficulty in processing the word as a whole.

METHOD

Participants. Twenty children with dyslexia and 40 skilled readers, matched for gender, age and non-verbal intelligence were recruited from 6th grade classes of junior high school in Milan and from the Centre for Cognitive and Linguistic Disorders (ASL 1) in Rome.

Materials. Two sets of derived words, 30 with a short root (3-4 letters) and 30 with a long root (5-6 letters), and two sets of 30 simple words, matched to each set of derived words for length, word frequency and familiarity, bigram frequency, initial phoneme characteristics, and orthographic complexity, were selected. Words had a low frequency in a child’s written frequency count. Derived words were composed of a root and a derivational suffix. They were phonologically and semantically transparent with respect to their base word, and included highly familiar roots and suffixes. Suffix length was the same in the two derived sets (mean: 3.7 letter length). Accordingly, short-root derived words (e.g., DUR-EZZA, ‘hardness’) were shorter than long-root derived words (e.g., LONTANANZA, ‘distance’). Simple words (e.g., DIFETTO, ‘defect’; LIQUIRIZIA,
‘liquorice’, matched to each of the two length sets, respectively) were not parsable into root + derivational suffix. ¹

Procedure. Participants were instructed to read aloud as fast and accurately as possible the words that appeared singly on a computer screen. Responses were recorded by a microphone connected to a voice-key. Naming reaction times (RTs) were measured in milliseconds (ms). The experimenter noted mispronunciation errors.

RESULTS

ANOVAs were conducted for short-root and long-root derived words separately, comparing each set with the corresponding set of simple words. By-participants ANOVAs with group (children with dyslexia and skilled readers) as unrepeated factor, and morphological type (derived vs. simple) of the words as repeated factor were carried out on logarithmically transformed RTs and arcsine transformed error scores. In the by-items ANOVAs, word morphological type was the unrepeated factor and readers’ group was the repeated factor.

Naming times were faster and more correct for skilled readers than for children with dyslexia. However, while children with dyslexia took advantage of the morphemic structure of the word both with short-root and long-root stimuli, naming derived stimuli faster than simple words in both sets, skilled readers benefited from the morphemic structure only with long-root stimuli. For children with dyslexia, the presence of a long root also led to higher accuracy for derived than for simple words; for skilled readers pronunciation errors were few and no morphological effect emerged.

Post-hoc regression analyses on the derived words of the two length sets all together, were also conducted on RTs (as well as a sequential analysis of variance; see Baayen, 2008) to partial out the contribution of root length from the possible confounding influence of word length. For skilled readers, root length significantly predicted naming times with faster RTs for longer roots, over and

¹ About one half of the simple words ended with a pseudo-suffix (e.g., DIFETTO and LIQUIRIZIA, in which both -ETTO and -IZIA could be an Italian suffix). The number of pseudo-suffixed words was matched in the two length sets. None of the pseudo-suffixed simple words included a real root.
above the inhibitory effect of word length. The naming times of children with dyslexia were not predicted by root length.

DISCUSSION.
The results showed that, for skilled readers, the more perceptual salience a root has, the more it stands out of its embedding word, and the more biased the processing is towards using the root and the suffix for reading the complex word. In contrast, readers with dyslexia, for whom full-form processing is overall difficult, always showed a benefit from morphological processing, with faster naming times of words composed of root and suffix, irrespective of root length. These findings need to be accommodated within models of morphological processing that could account both for perceptual properties of morphemes, such as root length, and differing reading abilities.

REFERENCES.