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## Universal Dyslexia?

**Lauren Stewart**

Estimates of the prevalence of dyslexia in different countries seem to reflect differences in orthographic complexity; dyslexia is more common in countries where the orthography (spelling) is complex (e.g. USA and Britain), compared with those where orthography is transparent (e.g. Italy). A recent study by Paulesu et al. has shown that, although the manifestation of dyslexia might differ depending on the precise orthography used, the core cognitive deficit and brain basis is universal<sup>1</sup>. The study compared dyslexic and normal readers from countries with transparent (Italian) and complex (English and French) orthographies. Behaviourally, the dyslexics from each of the three countries showed a similar pattern of results, all performing poorly on subtests that required phonological short-term memory. Italian dyslexics did perform better than either the English or French dyslexics on reading tasks, but comparisons between dyslexic and normal readers from the same country revealed similarly marked differences irrespective of language.

At a neurophysiological level, the story was the same. PET scanning during implicit and explicit reading tasks revealed very similar patterns of brain activity in Italian, French and English dyslexic subjects: reduced activation in left inferior and superior temporal cortex and mid-occipital cortex. This pattern is consistent with previous findings from PET, MRI and magnetoencephalography studies of dyslexia. The marked similarity of brain activity across all three dyslexic groups contrasts with the situation in normal readers. A previous study by the same authors<sup>2</sup> found that Italian readers showed greater activation of left superior temporal regions but English readers showed greater activations of left posterior inferior temporal gyrus and anterior inferior frontal gyrus, differences which are consistent with the idea that Italians might be decoding words phoneme by phoneme whereas English readers require access to whole word information.

These findings suggest that there is a core impairment in phonological processing in dyslexia, regardless of orthography. The degree of orthographic complexity does, however, affect the manifestation of the impairment. In a transparent orthography such as Italian, reading problems will be less severe whereas complex orthographies are likely to magnify the problem. But the similarity in brain activation between the Italian and English dyslexics might also suggest that the dyslexic brain is less able to adapt to the subtle requirements of an orthographic system.

1 Paulesu, E. et al. (2001) Dyslexia: cultural diversity and biological unity. *Science* 291, 2165–2167

2 Paulesu, E. et al. (2000) A cultural effect on brain function. *Nat. Neurosci.* 3, 91–96