

Language Distance Drives Adaptive Effects in the Anterior Cingulate Cortex

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We test a new model in which a hallmark of bilingual reading across scripts is a convergence of orthographic processing systems onto a common network of neural structures, regardless of how spoken words are represented orthographically in writing systems (alphabetic vs non-alphabetic). Using functional MRI, highly skilled adult bilingual readers of distinct highly contrasting spoken languages (Dutch, English, Hindi, Chinese), performed an identical oral reading task with written words in their native language. Results showed limited variation at the neural level, confirming a common neural signature of reading proficiency across the wide spectrum of spoken languages. However, if participants performed written word translation, a different neural pattern emerged. Bilinguals who read languages with similar scripts (Dutch-English) activate the ACC differently to bilinguals who read languages with dissimilar scripts (Chinese-English and Hindi-English). Critically, ACC activity was graded according to spoken language families: bilingual speakers of Indo-European languages (Dutch, English, Hindi) showed greater activation if they read similar scripts (Dutch and English) than if they read two different scripts (Hindi and English) whereas bilingual speakers of Chinese who read in two different scripts showed least activation of ACC. This is the first evidence that writing systems interact with conflict monitoring in the bilingual brain and have implications for models of bilingual reading at the behavioural and neural level.