The origin of numerical abilities
Poster Submission

Title: Spatial biases in mental arithmetic are independent of reading direction habits

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Abstract :

Studies suggest that numbers are represented in ascending order on a left-to-right oriented continuum in Western cultures. An influential framework attributes the construction of these spatial-numerical associations (SNAs) to cultural factors as, SNAs were found to be reduced or inverted in right-to-left reading cultures (e.g., Arabic). Because the representation of numbers is spatially oriented, it has been assumed that solving arithmetic problems involves shifting attention toward the side of the continuum where the answer is represented. In the present study, we used a temporal order judgement task to evidence the spatial biases induced by solving arithmetic operation problems in monolingual French and Arabic speakers. Participants had to determine which of a left or right target appeared first on the screen while solving subtraction and addition problems. We observed that the right target should be presented several milliseconds before the left target to be perceived as simultaneous during subtraction. This finding indicates that attention was biased to the left side of space during subtraction compared to addition. Importantly, this was observed for both French and Arabic participants. Our results thus indicate that the orientation of reading does not determine the direction of SNAs in mental arithmetic.