The Genetic Relation between Working Memory Speed and Working Memory Capacity in Children
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Introduction
Working Memory (WM) is an important aspect of cognition. WM is not a unitary system; it can be divided into subsystems.

We examined the heritabilities of two WM subsystems, WM Speed (WMS) and WM Capacity (WMC), and tested the hypothesis that these systems are genetically different.

In addition we tested the hypothesis that the genetic relation between WMS and WMC is explained by general IQ.

Method
WMS was assessed with a reaction time (RT) task with three increasing memory load conditions. Indices were basic speed (Load 1) and Slope.

WMC was measured with two subtests of the WISC-R: Arithmetic and Digit Span.

General IQ (g) was assessed with the shortened version of the WISC-R.

We tested models in which WMS and WMC were correlated 0, or 1, or were freely correlated.

Results
The phenotypic correlations among the WMS and WMC indices were around -0.30. Heritabilities for all variables ranged from 43% to 56%.

A model with two genetic factors, representing WMS and WMC, which were correlated (-0.54) fitted the data best, indicating that WMS and WMC are genetically not unitary.

When general IQ was simultaneously analysed with the data the correlation between the genetic factors for WMS and WMC decreased to -0.25, but was still significant.

The model is presented in Figure 1.

Subjects
97 monozygotic twin pairs
80 dizygotic twin pairs
53 siblings

Conclusion
There is a significant genetic correlation between WMS and WMC. This means that WMS and WMC are partly mediated by the same genes and partly by different genes. About 50% of this genetic correlation is explained by general IQ.

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