Individual Differences and Heritability of Thinking Styles and Working Memory Capacity: A Dual-process Perspective

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Summary

Dual process theories propose that human decision-making involves the interplay of two distinct information processing systems, or modes of thinking: rational (logical) and experiential (intuitive). Previous research shows that individuals differ in their preferred modes of thinking and that these preferences for rationality and/or experientiality are believed to be predictive of a range of behaviours. Moreover, preference for rational thinking is believed to be intimately linked with working memory capacity (WMC). Three studies reported in this thesis investigated thinking styles, their relationship to WMC, their heritability and the extent to which they were associated with reasoning and decision-making performance across a range of tasks.

Study 1 investigated the relationship between WMC and thinking style preferences in a sample of 269 adults. Path analysis confirmed a mediation hypothesis, whereby rationality mediated the effects of WMC on performance on a number of decision tasks. Higher WMC was predictive of higher preference for rational thinking, and this in turn was predictive of better syllogistic reasoning, lower susceptibility to gambling bias, and lower superstitiousness and categorical thinking. As expected, WMC was not related to experientiality. Higher experientiality was predictive of poorer performance in syllogistic reasoning, and greater susceptibility to gambling bias and superstitiousness.

In Study 2 latent profile analyses were conducted using two separate samples (269 adults and 308 adolescents) to create a typology for thinking styles that incorporated thinking style preferences (rationality and experientiality) and WMC. Four profiles emerged: rationally dominant, experientially dominant, dual preference and disengaged. These four styles of thinkers differed significantly in their performance

across a set of reasoning tasks. Differences were also found in the proportions of adolescents and adults in each profile. Adults showed a tendency for divergent styles (rationally dominant or experientially dominant), whereas the largest adolescent groups were in convergent styles (disengaged or dual preference). The most marked difference was for adolescents, where the experientially dominant style was the smallest group (4%) and for adults, the experientially dominant group was the largest (47%).

In Study 3 we adopted a behavioural genetics approach to investigate the sources of variability in thinking styles. We found that genetic effects accounted for 44% of variability in experientiality, and the remaining 56% was due to factors unique to the individual (i.e., nonshared environment). For rationality, there was a familial factor that accounted for around a third (34%) of its variability, and the bivariate analysis estimated that this factor was due to genetic effects. The remaining two thirds of variability were attributable to unique environmental effects. The variability in WMC was attributable to genetics (39%) and unique environmental effects. We conducted a Cholesky decomposition to segment the association between rationality and WMC, and found that shared genetic effects explained over half of their phenotypic correlation.

These findings provide evidence that is in accord with dual process theories of cognition. There are two distinct thinking styles: one that is intimately tied to working memory capacity and the other that operates independently. Preferences for the two types of thinking were related to individual differences in normative decision-making and judgment biases. Those higher in rationality performed more favourably by normative standards than those lower in rationality, and those higher in experientiality performed less favourably than those lower in experientiality. The findings show overall

support for the view that WMC and rationality are related, and that a major source of this relationship is through a shared genetic factor. This evidence stems from multiple methodologies, including typological and behavioural genetic approaches, utilising both adolescent and adult samples.