**A schooling hypothesis**

Deater-Deckard and colleagues [2] recognize that heritable components of traits become more influential as children transition to school, because they are spending more time outside of the home and are gaining more control over their own experiences' ([2], p. F24). In other words, schooling affords children more choice, choice that may be related to genetic predispositions. The implicit assumption here is that children enter school at age 5; however, this is no longer necessarily the case. It is likely that many of the children in their sample, like all western samples, entered various early childhood education programs earlier in their lives. If there is sufficient variability on early childhood education experience within their sample, then this would offer Deater-Deckard et al. [2] the possibility of testing whether shared environment coefficients vary as a function of early childhood experience, that is, time outside the home. Specifically, they could use natural variation in early childhood experience to conduct a quasi-experiment on developmental shifts in shared environment estimates for task persistence to test a schooling hypothesis.

Plomin [4] identifies evidence for genetic change in cognitive ability at two time points: the transition from infancy to early childhood and the transition from early to middle childhood; the findings reported here pertain to the latter shift. Plomin [4] also reminds us that all theories recognize age 7 yrs as a time of transition. What this transition reflects is less clear. It is possible that genes turn off and on, of course. There is a second possibility. Consider that success on task persistence is grounded in systems to be involved in emotion regulation. The first task persistence to test a schooling hypothesis.

Deater-Deckard and colleagues [2] recognize that heritable components of traits ‘become more influential as children transition to school, because they are spending more time outside of the home and are gaining more control over their own experiences’ ([2], p. F24). In other words, schooling affords children more choice, choice that may be related to genetic predispositions. The implicit assumption here is that children enter school at age 5; however, this is no longer necessarily the case. It is likely that many of the children in their sample, like all western samples, entered various early childhood education programs earlier in their lives. If there is sufficient variability on early childhood education experience within their sample, then this would offer Deater-Deckard et al. [2] the possibility of testing whether shared environment coefficients vary as a function of early childhood experience, that is, time outside the home. Specifically, they could use natural variation in early childhood experience to conduct a quasi-experiment on developmental shifts in shared environment estimates for task persistence to test a schooling hypothesis.

Is emotion regulation self-regulation?

**Georg Northoff**

Laboratory of Neuroimaging and Neurophilosophy, Department of Psychiatry, Otto-von-Guericke University of Magdeburg, Leipziger Strasse 44, 39120 Magdeburg, Germany

Ochsner and Gross [1] suggest two different neural systems to be involved in emotion regulation. The first system concerns ventral and orbital prefrontal cortical regions accounting for context-dependent evaluation of the value of emotional stimuli as required in stimulus–reward reversal learning and extinction. The second

**References**


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**Concluding thoughts**

Over the years, critics of behavioral genetics have rightly pointed out potential methodological problems with the twin method, especially the equal environments hypothesis that people impose more similar environments on monozygotic twins than dizygotic twins. Although this criticism applies to studies in which the purpose is merely to produce quantitative genetic parameter estimates, it is hard to see how it might bias developmental shifts in effect sizes for these estimates. Like all findings, the present one on task persistence requires replication, especially replication across samples. We say this in light of the finding reported by Turkheimer et al. [10] that heritability coefficients vary greatly with socioeconomic status. Finally, we know that Deater-Deckard and colleagues [2] would agree with us that an important next step lies in documenting gene–environment processes directly via hybrid research models, combining work in molecular biology with longitudinal observations of behavior.
Putting the ‘I’ and the ‘Me’ in emotion regulation: Reply to Northoff

Kevin N. Ochsner1 and James J. Gross2

1 Department of Psychology, Columbia University, 369 Schermerhorn Hall, 1190 Amsterdam Avenue, New York, NY 10027, USA
2 Department of Psychology, Stanford University, Building 420, Stanford, CA 94305-2130, USA

Northoff’s comment [1] raises important questions about the role of the self in emotion regulation. Space constraints precluded our addressing these questions in our original article [2]. We are therefore delighted to have the chance to consider them here.

More than a century ago, William James [3] distinguished between two aspects of the psychological self: the ‘I’ and the ‘Me’. James’s ‘I’ is the first-person agentic ‘doer’ that in the context of emotion regulation inhibits prepotent responses, generates reappraisals, and so on. Because the ‘I’ aspect of self accompanies all goal-directed activities, it is involved in all forms of self-regulation, not just those involving the cognitive control of emotion. Research has just begun to examine the neural bases of this aspect of self, but we believe that, depending upon the task and context, different combinations of neural systems (including, for example, dorsolateral prefrontal cortex and anterior cingulate cortex) may be involved in the agentic, ‘I’ mode of regulatory control over emotion and other processes.

Future studies should focus on directly comparing self-referential processing and stimulus–reward reversal learning vs extinction; this could answer the question of whether self-referential processing is a separate process or not (see also [6,7]). Furthermore, one could investigate the interference between self-referential processing and other emotion regulation mechanisms (anticipation, attentional distraction, reappraisal). This could contribute to the issue of whether self-referential processing is a higher-order cognitive process by itself, or whether it is a more basal process underlying higher-order cognitive mechanisms of emotion regulation.

References
5 Ochsner, K.N. et al. (2004) For better or for worse: Neural systems supporting the cognitive down- and up-regulation of negative emotion. Neuroimage 23, 483–499