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**Superiority on the Embedded Figures Task in  
autism and in normal males: evidence of an  
“innate talent”?**

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*commentary for BBS on Howe, Davidson, and Sloboda's target article*

It is hard to argue with Howe, Davidson and Sloboda (HDS) in their reasonable conclusion that excelling is not necessarily a consequence of possessing innate gifts, since they present compelling evidence in support of the alternative theory, namely, that excelling often only occurs after large amounts of regular practice, training, and learning-related experiences. Theirs is not only an eminently balanced position (they after all do not deny that that innate talents may exist), but its implications are altogether far more socially and politically attractive, in implying that excellence is in theory accessible to everyone, given the relevant environmental conditions.

In this commentary I provide an example of a talent which looks to be strongly heritable, and which fits the restricted sense in which HDS argue innate talents may exist. In their view, innate talents may exist in the sense that : (1) individual differences in a special ability may be partly genetic; and (2) some attributes are only possessed by a minority of individuals. (See their Section 5). In my view a perfect example of this is the superiority seen on the Embedded Figures Test (EFT) by both normal males, and people with autism.

### **The Embedded Figures Task and normal males**

In the EFT, the person is shown a simple shape (the target) and is asked to find it as quickly and as accurately as possible in a larger complex design in which it is embedded. Two examples of the test are shown in Figure 1. In the original reports of this test (Witkin, Dyk, Faterson, Goodenough & Karp, 1962) it was found that males are significantly faster than females at finding the embedded target figure. Over the last 40

years this result has been replicated extensively. In our own studies we have also demonstrated this male superiority effect (Baron-Cohen & Hammer, 1997a).

insert Figure 1 here

Note that this should not be interpreted in any “sexist” light, as it is by no means obvious that just because your perceptual processes can disembedd the target quicker, that your perceptual processes are in any sense better. Rather, the author of the test interpreted this sex difference purely in terms of a difference in cognitive “style”, with no implication of those who are quicker on the EFT being better or worse than those who are slower. Those who are quick on the EFT are sometimes referred to as being more “field independent” in their cognitive style.

This male superiority on the EFT may well reflect an innate talent in that it is hard to see how males could have had large amounts of practice or training when the sex difference is found on the first presentation of the test. One might try to construct an argument in terms of how parents’ choice of toys for little boys confer an implicit opportunity for little boys to learn how to disembedd, but this is rather post-hoc and unproven. On the face of it, there is nothing quite like the EFT in their early environment which could account for the sex differences in terms of exposure, learning, and practice. In which case it could well be due to genetic factors.

### **The Embedded Figures Test and autism**

So much for fitting HDS' first criterion (individual differences). What makes performance on the EFT even more likely to reflect an innate talent is that it also fits their second criterion (possessed only by a minority of individuals). Here the relevance data is from people with autism or Asperger's Syndrome<sup>1</sup>. Both of these conditions are likely to be caused by genetic factors, on the evidence from family and twin studies (Bolton et al., 1994; Folstein & Rutter, 1977; Gillberg, 1991; Le Couteur et al., 1996). Of most relevance to this commentary, children with autism perform above their mental age on the children's version of the EFT (Shah & Frith, 1983), and adults with autism are *faster* on the adult version of the EFT (Jolliffe & Baron-Cohen, 1997).

What makes EFT performance seem strongly genetic is the finding that parents of children with autism or Asperger Syndrome share this ability in also being *faster* on this test (Baron-Cohen & Hammer, 1997a). The EFT results from both normal males, people with an autism spectrum condition, and their first degree relatives, in conjunction with other data, have led to the theory that autism might be an extreme of the normal male brain (Baron-Cohen & Hammer, 1997b).

The example we have provided does not contradict HDS' general thesis, and is forwarded to illustrate the restricted sense in which innate talents may exist. Of course, even the evidence reviewed here does not *prove* that performance on the EFT is due to genetic

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<sup>1</sup> Asperger's Syndrome is thought to lie on the autistic spectrum. It is diagnosed when an individual shares all of the features of autism (e.g., social abnormalities, communication abnormalities, and limited imagination, in early development) but does not show any history of either general cognitive or language delay, which are part of the diagnosis of autism (APA, 1994).

factors. It simply strongly suggests it. Proof, if it comes, will require the identification of genes contributing to EFT performance, together with evidence for how those genes actually function in relation to this aspect of cognition. Such genes are unlikely to be specific to performance on this kind of task, and instead may be secondary to some more basic aspect of cognition.

**Figure 1: Two examples from the Embedded Figures Test.** (Reproduced with permission).

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