Effects of Event Rate and Display Time on Sustained Attention in Hyperactive, Normal, and Control Children

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Two experiments were conducted to determine whether hyperactive boys have a unique deficit in sustained attention. Groups with DSM-III diagnoses of attention deficit disorder (ADDH), conduct disorder (CD), ADDH + CD, and learning disorder were compared with normal controls on the Continuous Performance Task. In Experiment 1, stimulus presentation rate (stimulus onset asynchrony, SOA) and display time were varied to manipulate attentional demand, and speed and accuracy of performance were measured. The ADDH group was uniquely affected, with less accurate performance at the fastest and slowest SOA. To distinguish the effects of time on task and SOA, the duration of each SOA condition was held constant in Experiment 2. The poorer performance of the ADDH group at the fastest SOA
was no longer evident. This finding indicates that the deficit of sustained attention in boys who have ADDH is associated with a greater susceptibility to refractory effects, which is influenced by practice.

The underlying disability of hyperactive children is thought to be a deficit in the ability to focus and sustain attention and to resist impulsive responding during academic and social tasks (Douglas, 1983). This hypothesis appears to be supported by considerable clinical and experimental evidence, and especially by the finding that, compared with normal controls, these children perform poorly on attention-demanding laboratory tasks (for a review see Douglas, 1983). However, doubt remains about the validity of the hypothesis because of methodological problems characterizing many of the studies.

One problem is that poor performance on a single condition of a task has been attributed to attention deficit. With such a design, it is impossible to distinguish poor performance due to inattentiveness from that due to other variables, such as lack of comprehension or motivation. It would be more appropriate to measure attention in terms of the effects of variables known to alter attention. The magnitude of these effects (e.g., the difference between an “easy” and a “difficult” attention condition) can be compared between groups to see whether the groups differ in their ability to attend. Groups that are deficient in attention should show larger (or in some cases smaller) differences than “normal” groups. An attention deficit would appear as an interaction between the independent variable and diagnostic group (e.g., hyperactive patients vs. normal controls).

Furthermore, in most research, performance on sustained attention tasks such as the Continuous Performance Task (CPT; Rosvold, Mirsky, Sarason, Bransome, & Beck, 1956) has been measured in terms of accuracy but not speed, and performance on reaction time (RT) tasks in terms of speed but not accuracy. Speed and accuracy must be measured simultaneously; otherwise, differences among experimental groups will not be detected when groups of subjects trade speed for accuracy differently, as has been seen in some studies (e.g., Firestone & Martin, 1979; Sergeant & Scholten, 1985).

In addition, there are problems in the diagnosis of hyperactivity. Typically, diagnosis has been based on the results of various questionnaires, clinical interviews, or direct observations that are not clearly described or may be of questionable validity (Schachar, Sandberg, & Rutter, 1986; Sergeant, 1981; Shaffer & Greenhill, 1979). A related difficulty arises from the existence of two sets of criteria for diagnosing hyperactivity: DSM-III (American Psychiatric Association, 1980) and ICD-9 (World Health Organization, 1978). Since these diagnostic schemata differ with respect to the pervasiveness of hyperactive symptomatology necessary for the diagnosis, they define different groups of children as hyperactive (Taylor, 1986). These groups