(48, 46, and 47 percent). It seems unlikely that the rate of brain dysfunction would be the same in neurological patients, dull-normal, and learning disabled; indeed it seems likely that brain disorder would be more common in the neurological patients than in the other two abnormal groups. But if groups differ in the base rate of some condition, then a valid test for that condition must show different rates in these groups (2).

In other words, the constant proportion of abnormal EEG's in the three different abnormal groups leaves us with two possibilities: either the rate of brain disorder is equal in these three groups or the EEG test has no validity for detecting brain disorder.

It might be argued that the data do at least support the validity of the EEG test for distinguishing normal from abnormal children, where abnormal now designates a behavioral category broad enough to comprehend neurological patients, dull-normals, and the learning disabled. The meaning and usefulness of this new combined category remain to be established.

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Table 1. Classification of groups of normal and at-risk children by a multiple discriminant function using neurometric EEG features.

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Normal</th>
<th>Abnormal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training set</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>153</td>
<td>82</td>
<td>18</td>
</tr>
<tr>
<td>At risk*</td>
<td>286</td>
<td>37</td>
<td>63</td>
</tr>
<tr>
<td>SLD</td>
<td>79</td>
<td>48</td>
<td>52</td>
</tr>
<tr>
<td>LD</td>
<td>69</td>
<td>39</td>
<td>61</td>
</tr>
<tr>
<td>NEURO</td>
<td>138</td>
<td>23</td>
<td>77</td>
</tr>
<tr>
<td>Independent replication</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>153</td>
<td>89</td>
<td>11</td>
</tr>
<tr>
<td>At risk*</td>
<td>286</td>
<td>38</td>
<td>62</td>
</tr>
<tr>
<td>SLD</td>
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<td>54</td>
<td>46</td>
</tr>
<tr>
<td>LD</td>
<td>69</td>
<td>39</td>
<td>61</td>
</tr>
<tr>
<td>NEURO</td>
<td>138</td>
<td>30</td>
<td>70</td>
</tr>
</tbody>
</table>

**"At risk" is the sum of the children in the SLD, LD, and NEURO groups.

Notes


McCauley and Ciesielski (1) question the validity of neurometric evaluation of the EEG for discriminating between children with and without brain dysfunction. Their reservation is based on the lack of evidence for differential incidence among children at risk for brain dysfunction because of specific learning disabilities (SLD), learning disabilities (LD), or the presence of various neurological symptoms (NEURO).

The purpose of our report (2) was simply to show that significant (abnormal) values of the 32 univariate features were more common among at-risk than normally functioning healthy children. Although the incidence of significant univariate features was almost identical in our three at-risk groups, clear differences among them can be demonstrated by multivariate techniques. One way to show this is to compute the Mahalanobis distance (3) across various subsets of the 32 features. This yields a multivariate estimate of abnormality which corrects for intercorrelations among the selected univariate features. Such multivariate features consistently yield an incidence of abnormality at chance levels for normal children, somewhat higher (two to three times chance) for SLD children, substantially higher (four to six times chance) for LD children, and very much higher (eight to twelve times chance) for the NEURO group.

Further, one can see the differences among the three groups by computing a multiple discriminant function using such features. We did this computation with a split-half "training set" consisting of 153 members of the group of normal children, 138 members of the neurological at-risk patients, 69 members of the "dull-normal" learning disabled group (LD), and 79 members of the learning disabled group with normal intelligence (SLD). The accuracy of classifying the children according to the discriminant function constructed on the training set was then independently replicated by using the second split-half of each group. The results of these computations are shown in Table 1.

In the training set, most of the normal children were indentified as such on the basis of the classification rules derived from neurometric EEG features. The proportion of children classified as abnormal increased steadily from SLD to LD to NEURO. The independent replication of these results in the second split-half test was excellent.

Most of the children in the NEURO group in the previous report (2) and the two NEURO subgroups referred to in Table 1 were diagnosed as suffering from neurological disorders or systemic diseases affecting brain function. It is of interest that the percentage of patients in the NEURO group classified as abnormal varied greatly in subgroups with different neurological diagnoses (4).

These findings thus support the validity of neurometric evaluations as an aid to identification of children with consistent behavior or cognitive problems who have brain dysfunction. Positive neurometric findings in normally functioning asymptomatic children should be regarded as probable false positives. However, if a child with consistent behavioral or cognitive problems displays positive neurometric findings, it seems reasonable to suggest that brain dysfunctions should be considered a more plausible explanation for those problems than psychosocial factors.

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References and Notes


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