A more robust predictor of ideomotor dyspraxia
Study on an alternative scoring method of the Bergès–Lézine’s Imitation of Gestures test

L. Vaivre-Douret*

University of Nanterre and Unité 483 INSERM, Paris, France

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Abstract

Use of the traditional Bergès–Lézine standardization [Test d’imitation de gestes (1963)] allowed us to confirm praxic disorders in children who are encountering obvious motor difficulties. However, in comparison to other neuropsychological assessments carried out on these children, it does not enable us to precociously pinpoint disorders in praxic organization. By means of a newly evaluated method (1997) developed on the basis of the Bergès–Lézine Imitation of Gestures test (1963), we retroactively assessed a group of children (N = 10) who had been observed in a longitudinal study at the age of 3–5 years and at 7–8 years and assessed with the Bergès–Lézine version (1963) of the Imitation of Gestures test. Our revised test (1997) takes into account the quantitative factor of success, as well as the qualitative factor of movement planning. It facilitates the early detection of motor organization disorders, in correlation with other neuropsychological assessments carried out on these children. Comparative clinical findings with the same group of children tested using the Bergès–Lézine version and ours indicate that our version detects, more robustly, children encountering difficulties resulting from ideomotor dyspraxia, not identified by the Bergès–Lézine test (1963). Our alternative scoring method of Bergès–Lézine’s test contributes largely to early detection of instrumental difficulties in children. Additionally, its predictive capacity makes it possible to apprehend disorders in distal and digital neuromotor functions. © 2001 National Academy of Neuropsychology. Published by Elsevier Science Ltd.

Keywords: Ideomotor dyspraxia; Imitation of gestures; Evaluation; Children; Neuronal model

* INSERM Unit 483, Pierre et Marie Curie University, PO Box 23, 9 Quai Saint Bernard, 75252 Paris Cedex 05, France. Tel.: +33-1-44-273747; fax: +33-1-44-273438.
E-mail address: ivaire@snv.jussieu.fr (L. Vaivre-Douret).
We compared assessments made on children using the Bergès–Lézine (1963) standardization with assessments carried out retrospectively using our revised test developed from the Imitation of Gestures test (Vaivre-Douret, 1997).

Bergès and Lézine (1963) worked together, pooling their knowledge of neuropsychological studies on children, towards the aim of assessing the levels of acquisition of elements in the corporal schema and motor coordination in the young child. Their study involved the child’s knowledge of their body, their movement, and their postural and motor efficiency. Bergès and Lézine’s testing was, to a great extent as possible with 3–6-year-olds, meant to be nonverbal. The best instrument that could be used was, therefore, the body itself, without any intermediary agent (pencil, paper, puzzle, etc.). As such, they developed a test involving the imitation of simple and complex gestures. This enabled them to study a child’s capacity to correctly imitate a series of gestures produced by an examiner located in front of the child.

One of Bergès and Lézine’s tests of simple gestures to be imitated consisted of hand movements (10 items), and the other of arm movements (10 items). Their complex-gestures tests consisted of finger movements (16 items) and reverse arm movements (10 items), having the child reverse (but not mirror) the gesture to show his/her acquisition of the notion of reversibility.

These tests were standardized on a total 439 children aged from 3 to 6 years inclusive, in the years 1950–1960. Standardization norms were given in medians and quartiles, in terms of whether models were copied correctly, regardless of how they were actually accomplished (that is, straight-off execution or step-by-step construction).

We developed (Vaivre-Douret, 1997) a long and a short version of this test on 428 children aged 4–8 years comprising imitation items of hand movements (10 items) and finger movements (16 items). We did not retain the arm movements in our test as even the youngest children obtain high success rates on these items, and, as such, does not add any predictive value in our test. For each test, we provided means and standard deviations per age group and scaling into five classes. This separation into five classes allowed us to transform the raw scores in standard scores for each age group. Class 5 represents the highest score, while Class 1 the lowest score attained. This transformation ranks each child within his/her class and age range.

The originality of our study lies not only in our standardization procedure, which takes into account the quantitative factor of success, as well as the qualitative factor of how the movement is planned, but also in the fact that we have selected the items from the Bergès–Lézine (1963) battery that are most predictive of motor function (short version). This function relies upon gestural skill, calling for both an internal representation of the gesture to be accomplished [goal planning and representation of one’s own hand involving both frontal and parietal cortices, representation of another’s hand (including temporal and/or premotor cortex) (cf. Fig. 1)], and a somatognosic integration (motor cortex) of the parts of the body being used. For a movement to be considered skillful, it should be precise, planned, and executed (motor command) in the shortest possible time with the least possible expenditure of energy. The precision of a movement is dependent upon the faculties of selective muscular dissociation and coordination that together account for dexterity, as well as the ability to exercise control at the tonico-emotional
level (cingulate cortex) (see Fig. 1 in relation to the neural bases of successive levels of control for praxic functions).

1. Method

1.1. Subjects

Neuropediatric assessments of a sample of children over the first 18 months of their life, and repeated at 3–5 years ($N=14$) indicate that, in comparison to the control group ($N=14$), all of our clinical subjects ($N=14$, of which five began walking after the age of 18 months) presented minor and specific neurological signs at 18 months and again at 3–5 years. That is, at least two out of three neurological signs detected in the sample (a ridge on the squamous
suture, a phasic stretch reflex in one or both gastrocnemius muscles, and/or an imbalance in passive axial tone were present) (Amiel et al., 1996).

We used the Bergès–Lézine (1963) Imitation of Gestures test in the pediatric department of the Port-Royal/Baudelocque Hospital to assess this sample of clinical subjects at the age of 3–5 years \((N = 14)\) in 1993, and at the age of 7–8 years \((N = 10, \text{four subjects were lost to unidentifiable factors})\) in 1996. The parents of all subjects had originally complained about their child’s clumsiness, lack of concentration, language difficulties, and/or reasoning difficulties in their approach to mathematics (cf. Table 1) between the age of 3 and 5. Neuropediatric assessments of these children over the first 18 months of their life and at 3–5 years indicated that, in comparison to the control group \((N = 14)\), all of our clinical subjects \((N = 14)\) presented minor and specific neurological signs (not diagnosed by their primary care pediatrician), that is, at least two out of three neurological signs detected (see above).

Psychologists and psychomotor therapists, who were initially blind to the impairments, examined these clinical subjects at 3–5 years and detected impairments in one or several functions: motor, praxic, and gnosic. Although they did not present any global intellectual deficit, five of the children did present certain difficulties in several areas of cognitive skills when assessed using the McCarthy (1972) scales of children’s abilities (Amiel et al., 1996).

We knew the neonatal background of these 10 clinical subjects reexamined at 7–8 years (i.e., risk factors and early neurological signs, cf. Table 2) because we had access to their birth examination information from the baby clinic at Port-Royal/Baudelocque Hospital.

1.2. Procedure

1.2.1. Testing

At the age of 3–5 years, and again at the age of 7–8 years, each child was assessed individually on the Bergès–Lézine Imitation of Gestures test by the same psychomotor therapist. No time limit was imposed for the execution of items, and each model was retained in view until the child had finished performing the movement. The overall test took an average of approximately 15 min per child. Order of testing items (long version), as well as marking and scoring procedures imposed in the Bergès–Lézine test, were rigorously observed, the

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Spoken language</th>
<th>Written language</th>
<th>Arithmetic</th>
<th>Concentration</th>
<th>Clumsiness</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>yes</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>S2(^{a})</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>S3</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>S4</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>S5</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>S6</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>S7</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>S8</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>S9(^{a})</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>S10(^{a})</td>
<td>no</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
</tbody>
</table>

\(^{a}\) Subject started to walk after the age of 18 months.
aforementioned authors having noted that the success or failure on an item is influenced by the preceding item. In making our retrospective analysis of results, we chose only to retain the results from tests that are included in our protocol (Vaivre-Douret, 1997), which comprises imitations of hand and finger movements, but excludes arm items. However, when we examined the 7–8-year-olds, we retained the Berge`s–Le´zine reverse-movement test of 10 arm items in order to check whether these children were able to mentally represent gestures.

1.2.2. Scoring

We applied the Berge`s–Le´zine (1963) scoring and assessment procedures scaled in quartiles and medians. Each item successfully executed scored one point if the proposed model was reproduced, regardless of how the subject managed it, whether in a single step or by means of a step-by-step construction. Failure to reproduce the model scored zero point. Bergès and Lézine distinguished between the score attributed for arm and hand items (total 20 items), and the score for finger items (16 items).

In addition, we also applied our own scoring method and standardization (Vaivre-Douret, 1997) using mean values with standard deviations (see Table 3 for finger items scores) or a standardization in five classes (see Table 4 for finger items scores) for each age group between 4 and 8 years. We consider that results were pathological when they were located in the lowest quartile (Q1), that is, two or more standard deviation points below the mean, or they were situated in Class 3. Results were considered deviant when the subject was located in a standardized class lower than Class 3, that is, in Class 2, which corresponds to the weakest results of the population of reference within the limits of normal.

Our own scoring method distinguishes two levels of performance, the qualitative and quantitative aspects of a copied gesture.
1.3. Performance A: a superior level of organization

Response is immediate. The gesture is planned and executed in a simultaneous and continuous movement. The subject’s capacity to voluntarily inhibit neuromuscular activity enables him/her to correctly adapt the organization and speed of execution to the complexity of the movement (unilateral or bilateral) to be imitated.

1.4. Performance B: a primary level of organization

Success is obtained by trial and error or in a step-by-step construction (order of execution ignored). This can be executed with or without correction and help from the other hand with varying levels of interruption in the organization of the gesture and a certain slowness in making the gesture.

We attribute the corresponding weighted score:

Immediate success = 1 point.
Step by step = 1/2 point.
Total failure = 0 point.

Our standardization was established on two versions of the test (Vaivre-Douret, 1997, 1998):

1. a “long version” comprising hand and finger movements to be imitated (in conformity with the distal and digital items developed by Bergès & Lézine, 1963). The maximum total weighted score equals 10 for the hand items and 16 for the finger items;

<table>
<thead>
<tr>
<th>Class</th>
<th>4 ans, N=60</th>
<th>5 ans, N=127</th>
<th>6 ans, N=164</th>
<th>7 ans, N=77</th>
<th>Class</th>
<th>Percent theoretical</th>
<th>Percent cumulative</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0 – 7</td>
<td>0 – 8.5</td>
<td>0 – 8.5</td>
<td>0 – 8.5</td>
<td>1</td>
<td>6.7</td>
<td>6.7</td>
</tr>
<tr>
<td>2</td>
<td>7.5 – 10</td>
<td>9 – 10.5</td>
<td>9 – 10.5</td>
<td>9 – 11</td>
<td>2</td>
<td>24.2</td>
<td>30.9</td>
</tr>
<tr>
<td>3</td>
<td>10.5 – 11.5</td>
<td>11 – 12</td>
<td>11 – 12.5</td>
<td>11.5 – 13</td>
<td>3</td>
<td>38.2</td>
<td>69.1</td>
</tr>
<tr>
<td>4</td>
<td>12 – 12.5</td>
<td>12.5 – 13.5</td>
<td>13 – 15</td>
<td>13.5 – 15.5</td>
<td>4</td>
<td>24.2</td>
<td>93.3</td>
</tr>
<tr>
<td>5</td>
<td>13 – 16</td>
<td>14 – 16</td>
<td>15.5 – 16</td>
<td>16</td>
<td>5</td>
<td>6.7</td>
<td>100.0</td>
</tr>
</tbody>
</table>
2. a “short version” predictive of distal motor coordination and comprising four items selected from the hand movement imitation models and eight items selected from finger movement models (maximum total weighted score = 12).

The selection of these items takes into account both distal and digital movements at both the motor and perceptual levels. These items can be performed at 4 years of age according to the results obtained from our long version. Additionally, these gestures were chosen to be the ones not already learned and not those already learned.

Findings

From a comparative perspective (assessment using the traditional Bergès–Lézine method and the Vaivre-Douret standardization), we were able to reexamine at the age of 7–8 years 10 out of the total 14 children examined earlier at the age of 3–5 years. In the analysis of our results, we, therefore, take into account only data of the 10 children we followed longitudinally.

(1) From results obtained on the traditional Bergès–Lézine test by the 3–5-year-olds (average age: 51.1 months, \(N = 10\)), only two children (20%) were in the lowest quartile (Q1, cf. Table 5). Both of these children showed slowed psychomotor development and did not start to walk before the age of 18 months. In both cases, the results concerned hand and arm items (as per the design of Bergès–Lézine’s standardization) and also the finger items for one of the two children. Arm items were overall successfully executed, except by these children.

We reassessed these same children at the age of 7–8 years (\(N = 10\)) using the Bergès-Lezine (1963) test. Four of them (of whom three had started to walk late) were rated in the lower quartile (Q1) either on two tests (hands, arms, and fingers; two children) or on one of them (two children).

(2) To make our retrospective assessment, we then went back over the data of these same children who had been assessed at the age of 3–5 years and 7–8 years, marking and awarding points as described in our long version presented above (Vaivre-Douret, 1997).

Our findings (cf. Table 3) on hand items and/or finger items indicate more severe results than those found of the Bergès–Lézine test. That is, two standard deviations below the mean for five children at the age of 3–5 years. Children walking late exhibited the poorest results. Four subjects were deviant. Four subjects had pathological results on two tests and an additional subject on one of them. The most discriminating test for all of the subjects was the finger movement imitation items.

By means of our standardization, we were, therefore, able to detect neuromotor dysfunction in the majority of subjects at the age of 3–5 years (9 out of 10, of whom five subjects are pathological and four are deviant, cf. Table 6).

We apply our standardization to the 7–8-year-olds (\(N = 10\)), and we saw a certain positive evolution, in part because of normal maturation effects. Additionally, these tests are normally successfully performed at the age of six, notwithstanding the possibility that the children may have received treatment in the interim. Nevertheless, half of the subjects still presented neuromotor disorders at the age of 7–8 years (three subjects show pathological results on one or two tests, and two subjects were deviant).

Retrospective scoring of these same protocols using our predictive short version (cf. Table 3) indicates that all of the subjects suffered from gnosapraxic difficulties at the age of 3–5 years, with five of them rated as pathological, and five as deviant (cf. Table 4).
Table 5
Comparison of results obtained on Imitation of Gestures tests by 3–5-year-olds reexamined at age 7–8 years, according to Berges–Lezine and Vaivre-Douret scales

<table>
<thead>
<tr>
<th>Subject</th>
<th>Berges–Lezine scales</th>
<th>Vaivre-Douret scales</th>
<th>Berges–Lezine scales</th>
<th>Vaivre-Douret scales</th>
<th>Short version (Vaivre-Douret scales)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Arms + hands</td>
<td>Fingers</td>
<td>Arms + hands</td>
<td>Fingers</td>
<td>Hands</td>
</tr>
<tr>
<td>S1</td>
<td>Q3</td>
<td>Med</td>
<td>M, cl. 3</td>
<td>−2σ cl. 1</td>
<td>Q3</td>
</tr>
<tr>
<td>S2b</td>
<td>Q1</td>
<td>Q1</td>
<td>−3σ cl. 1</td>
<td>−3σ cl. 1</td>
<td>Q1</td>
</tr>
<tr>
<td>S3</td>
<td>Q3</td>
<td>Med</td>
<td>−3σ cl. 1</td>
<td>−3σ cl. 1</td>
<td>Q3</td>
</tr>
<tr>
<td>S4</td>
<td>Q3</td>
<td>Q3</td>
<td>M, cl. 2</td>
<td>−1σ cl. 2</td>
<td>Q3</td>
</tr>
<tr>
<td>S5</td>
<td>Q3</td>
<td>Q3</td>
<td>M, cl. 3</td>
<td>M, cl. 2</td>
<td>Q3</td>
</tr>
<tr>
<td>S6</td>
<td>Q3</td>
<td>Q3</td>
<td>−1σ cl. 2</td>
<td>−1σ cl. 2</td>
<td>Q3</td>
</tr>
<tr>
<td>S7</td>
<td>Q3</td>
<td>Q3</td>
<td>M, cl. 3</td>
<td>−1σ cl. 2</td>
<td>Q3</td>
</tr>
<tr>
<td>S8</td>
<td>Q3</td>
<td>Q3</td>
<td>−3σ cl. 1</td>
<td>M, cl. 2</td>
<td>Q3</td>
</tr>
<tr>
<td>S9b</td>
<td>Q1</td>
<td>Med</td>
<td>−3σ cl. 1</td>
<td>−2σ cl. 1</td>
<td>Q1</td>
</tr>
<tr>
<td>S10b</td>
<td>Q3</td>
<td>Med</td>
<td>−3σ cl. 1</td>
<td>−2σ cl. 1</td>
<td>Q1</td>
</tr>
</tbody>
</table>

Med: Median; Q1: lower quartile; Q3: upper quartile; M: around mean (−1σ to +1σ); σ: standard deviation; cl: standardized class

Berges and Lézine do not distinguish between arm and hand items in their scales.

b Subject started to walk after the age of 18 months.
Furthermore, although the reverse-movement items on the Bergès–Lézine test are normally successfully performed at the age of 7–8 years, it seemed that 2 of the 10 subjects had not yet acquired the notion of reversibility in reference to their body. These two subjects both started walking after the age of 18 months.

**Discussion**

Our data, observations, and hypotheses are presented with the aim of refining the general approach to ideomotor developmental dyspraxia and its implications.

Use of the traditional Bergès–Lézine (1963) standardization enabled us to confirm praxic disorders in children who were encountering obvious motor difficulties. However, in comparison to other neuropsychological assessments carried out on these children, it did not enable us to precociously pinpoint disorders in praxic organization.

Our procedure for assessing distal neuromotor coordination was an aid to diagnosis as it constituted a veritable test for clinical screening by accentuating the quantitative (success) and qualitative (organization) aspects of imitative gestures. The standardization on the long version (Vaivre-Douret) has produced satisfying results in terms of sensitivity (at 3 years = 100% and at 7–8 years = 75%) and specificity (at 3 years = 62% and at 7–8 years = 100%). The same applies for the short version as L. Vaivre-Douret version; sensitivity (at 3 years = 100% and at 7–8 years = 67%) and specificity (at 3 years = 100% and at 7–8 years = 100%) are excellent (Vaivre-Douret, 1997). An examiner who observes that a child’s results are equal to or lower than two standard deviations from the mean, or, alternatively, that the child is rated in Class 1 or 2 would be alerted to carry out complementary neuromotor tests. Subjects whose results are equal to or lower than two standard deviations from the mean on one of the two tests in the long version (hands or fingers), and, more particularly, on the finger-movement imitations, could encounter difficulties in one or several learning areas at school (reading, writing, arithmetic) (Amiel et al., 1996).

In terms of the predictive value of this revised instrument, the greater the degree of deviance below the mean average on the overall tests (long version including hands and fingers), the greater the risk of the subject developing major associated cognitive disorders, as well as a nonnegligible possibility of visuospatial difficulties that will eventually affect learning (Vaivre-Douret, 1998).

When we examined the results of our subjects at the age of 3–5 years on six ideomotor tests consisting of mimes involving corporal and extracorporal movements, we saw that 8 out of 10 subjects performed the mimes in a very primitive manner, that is without manifesting any

<table>
<thead>
<tr>
<th>Table 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comparison of results on Berges–Lezine and Vaivre-Douret scales from our clinical study on 3–5-year-olds and 7–8-year-olds</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Results</th>
<th>Berges–Lézine arm–hand and/or finger tests</th>
<th>Vaivre-Douret hand and/or finger tests</th>
<th>Vaivre-Douret shorter version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pathologies</td>
<td>2 (20%)</td>
<td>4 (40%)</td>
<td>4 (40%)</td>
</tr>
<tr>
<td>Deviants</td>
<td>4 (40%)</td>
<td>5 (50%)</td>
<td>2 (20%)</td>
</tr>
<tr>
<td>Total subjects in difficulty</td>
<td>9 (90%)</td>
<td>5 (50%)</td>
<td>10 (100%)</td>
</tr>
</tbody>
</table>
symbolic representation. They were, therefore, assessed as having difficulties in relation to body space (Lhermitte, Lew, & Kyriaco, 1925; Lhermitte, Massary, & Kyriaco, 1928; Schilder, 1977). When we closely examine the results obtained by these children on McCarthy’s Scales of Children’s Abilities, we noted that most of the subjects show a large deviation between the verbal and performance scales, being much stronger on the verbal scale.

These results concur with our assessments and indicate, at the very least, that an ideomotor dysfunction is not necessarily accompanied by difficulties in visual perception.

On the whole, except in the case of two subjects who started walking after the age of 18 months and were deficient in various cognitive and praxic areas, there were very few items in our sample that were not successfully executed. Hence, if a child successfully managed to construct the model to be imitated using sight to help him/her, it was the qualitative aspect of this construction that informed us as to the ideomotor nature of his/her praxia.

Indeed, if the child performed the construction in a step-by-step process, and if the quantitative factor is not consistent with our standardization (Vaivre-Douret, 1997, 1999), or if, despite his/her inability to execute the required model, the global gestural form is correct even though he/she is not using the “right” fingers, then these responses point to problems of dexterity linked to a poor sensorimotor integration of the parts of the body being used and a poor organization of the body in time and space.

This point of view recalls Birdwhistell’s (1973) notion of kinematics, later taken up by Signoret and North (1979), which implies a perfect synergy between agonist and antagonist muscles, as well as an adequate level of control, both visual and kinesthetic, if necessary (Le Gall, 1992).

Furthermore, results on our tests (long and short versions) show a high correlation with success rates on traditional coordination motor tests on our sample of 428 children (Vaivre-Douret, 1997). Thus, the Dexterity of Performance Test (correctly placing counters in a box as quickly as possible) shows a .84 correlation with the imitation of hand movements test at the age of 4 years and a .71 correlation with the finger movements test at the age of 6 years. The Asymmetrical Prono-Supination Hand Movement Test shows a .78 correlation with the finger movements imitation test at the age of 4 years and a .87 correlation with the hand movements test at the age of 6 years. The Digital Awareness Test shows a .62 correlation with the finger movements test at the age of 6 years.

The successful execution of these tests (long or short versions) as rated on our standardization consolidates the hypothesis that a subject has effectively integrated his/her corporal schema into the temporo-spatial quality of the movement represented by the model to be imitated (cf. Fig. 1).

When a subject shows strong signs of spatial disorganization with no respect for direction or shape in his/her attempt to imitate the gestural model, a major visuoconstructive problem could be the reason. This type of problem would primarily involve the corporal schema, as the body axis is not yet serving as a criteria for organization in space. As such, it would then be necessary to use other appropriate tests to confirm for other possible accompanying neurocognitive disorders (mental representation impairments, neurovisual disorders, memory/concentration, or visuospatial disorders) (Mazeau, 1995). Recall that the population of children under examination here were subjects of a longitudinal study and that at least two minor neurological signs — aphasic stretch reflex and an imbalance in passive axial tone
(detected before the age of 18 months) still existed at the age of 3–5 years. One of the above-
mentioned signs arises from a distal pyramidal symptomatology of the lower limbs and the
other from an axial imbalance with predominance of extensors.

Developmental dyspraxia is a subject that calls for much closer study both from the point of
view of clinical observation and in terms of understanding its minor clinical neurological signs. These signs would indicate a minor deficit in the motor system (pyramidal tractus), which can explain a disorder of the execution of skilled movement. These signs are rarely examined in clinical studies on children’s development. Although professional literature does make mention of investigations on transitive and intransitive praxia in children (Ayres, 1979; Ayres, Mailloux, & Wendler, 1987; Cermak, Ward, & Ward, 1986; Denkla, 1974; Dewey, 1991; etc.), dyspraxia is often used synonymously with clumsiness, or developmental coordination disorder.

Our clinical experience has led us to see a connection between the existence of these minor clinical neurological signs and the presence of developmental dyspraxia, at least at the ideomotor level. This concurs with the DSM-IV (1996) (Masson edition) on disorders affecting the acquisition of motor coordination.

In adults, the psychopathology of motor apraxia follows a different developmental process (according to Liepmann, 1920, who puts melokinetic apraxia and ideokinetic apraxia on the same part). Our viewpoint is confirmed by a number of hypotheses, by the following authors (de Ajuriauguerra & Tissot, 1969; Déjerine, 1914; Denny-Brown, 1958; Luria, 1978) who describe impairments in dexterity and precision of movement, as well as a deficit in rapidity and exactitude. Poeck (1972) even raises the possibility of a “spastic deterioration of movement,” whereas we posit that ideomotor dyspraxia is a “phasic” deterioration in the execution of gestures.

During hospital consultations, the assessments that we made on children presenting signs of ideomotor dyspraxia very often highlight the existence of behavioral disorders of a hyperkinetic syndrome type (CIM-10, 1994) sometimes associated with attention deficit disorders. To continue our present studies, we will examine the rare magnetic resonance imaging (MRI) images that have been made on young children. We have already detected a faintly discernible tendency of a thinning of the corpus callosum in one or several areas of the brain, sometimes accompanied by a moderate ventricular dilatation, which is not necessarily asymmetrical (Le Normand, Vaivre-Douret Payan, & Cohen, 2000). The importance of the corpus callosum in fine motor control has already been raised by Ramaeckers (1991). This could assist us in beginning diagnostic testing of motor control and deficits in the coordination or in the execution of motor functions.

References


