

DENVER II

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KDB standards
pg. 73-75
personal/
social
skills*

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II. STANDARDIZATION

A. SELECTION OF POTENTIAL ITEMS

In the process of revising and restandardizing the DDST, several modifications were made in the original 105 items. This included omitting items due to their limited clinical value or difficulty in administration or scoring. Some DDST items were revised for clarification, and many new items were added, especially in the language sector. The pool of potential items for the standardization numbered 336. Scoring criteria for each item and for the child's general behavior were established prior to initiating data collection.

B. DESIGN OF THE SAMPLE

A quota sample design was used that controlled for maternal education, residence, and ethnicity within age groups. To facilitate field sampling, the testing age range of 2 weeks to 6-1/2 years was split into 10 age groups, as follows:

0 to 2 months	13 to 18 months
2 to 4 months	18 to 24 months
4 to 7 months	24 to 40 months
7 to 10 months	40 to 57 months
10 to 13 months	57 to 78 months

C. COLLECTION OF DATA

Data on the normative sample were collected during 1988 by 17 screeners. Before data collection, extensive training procedures were conducted to assure high inter-rater reliability. Post-screening reliability data were also gathered for the seven screeners who tested over 80% of the normative sample.

Screeners tested children who met the basic criteria for inclusion in the study, and whose age, race, place of residence, and mother's educational level were needed to meet the quota sample. Testing locations were throughout the Denver metropolitan area, and in several urban, semi-rural, and rural regions in the state of Colorado.

The children were located through the Denver Department of Social Services, the Denver and Colorado Departments of Public Health well-child clinics, pediatricians, family physicians, hospital birth records, child care centers, and private sources. Only full term children without obvious defects – and only one child per family – were included in the sample of 2,096 children. The sample finally obtained is described in the *DENVER II Technical Manual*.

D. COMPUTATION OF NORMS

The data were analyzed by logistic regression to determine the ages at which the children tested passed each of the items. A large number of observations per item were available for analysis, as each item was administered at least 440 times and up to 1,309 times (mean=783, SD=190.7). The analysis made it possible to determine when 25%, 50%, 75% and 90% of the children passed a test item. The variables of sex, maternal education, ethnicity, and place of residence were also analyzed with regard to differences in the ages at which children passed the item. (The norms for items demonstrating clinically significant differences are discussed in the *DENVER II Technical Manual*.)

In addition to the quantitative data analysis, several qualitative factors were subjectively evaluated for each item, such as ease of administration and scoring, interest value for the child being tested, and practicality. This information was used to help select items for the DENVER II from the pool of potential items on which data were obtained.

E. RELIABILITY

Thirty-eight children from 10 age groups were recruited and scheduled for two evaluations on each of two occasions separated by an interval of seven to 10 days. Four trained screeners examined or observed the testing of each child. Testers and observers scored the children independently, and results from the first evaluation were not available during the second week's evaluation.

Two types of reliability assessed were concurrent examiner-observer reliability and 7 to 10 day test-retest stability. The percentage of agreement in the observed evaluations was computed for each of the items administered. The mean examiner-observer reliability for the items included in the DENVER II is .99 with a range of .95-1.00 and a standard deviation of .016. The mean 7 to 10 day test-retest reliability for the same items is .90 with a range of .50-1.00 and a standard deviation of .12.

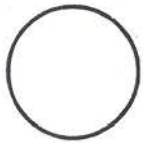
F. VALIDITY

Content validity of the original DDST items has been recognized through the test's acceptance all over the world. The new items were written and selected by professionals specializing in child development and pediatric screening. The validity of the test rests upon its standardization, not on its correlation with other tests since all tests are constructed slightly differently. Even tests such as IQ tests, which are purported to measure the same function, do not totally agree. Persons seeking more detailed information are advised to consult the *DENVER II Technical Manual*.

- not an IQ test
- not expected to do everything

DIRECTIONS FOR ADMINISTRATION

1. Try to get child to smile by smiling, talking or waving. Do not touch him/her.
2. Child must stare at hand several seconds.
3. Parent may help guide toothbrush and put toothpaste on brush.
4. Child does not have to be able to tie shoes or button/zip in the back.
5. Move yarn slowly in an arc from one side to the other, about 8" above child's face.
6. Pass if child grasps rattle when it is touched to the backs of tips of fingers.
7. Pass if child tries to see where yarn went. Yarn should be dropped quickly from sight from tester's hand without arm movement.
8. Child must transfer cube from hand to hand without help of body, mouth, or table.
9. Pass if child picks up raisin with any part of thumb and finger.
10. Line can vary only 30 degrees or less from tester's line. ✓
11. Make a fist with thumb pointing upward and wiggle only the thumb. Pass if child imitates and does not move any fingers other than the thumb.



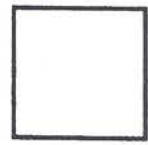
12. Pass any enclosed form. Fail continuous round motions.



13. Which line is longer? (Not bigger.) Turn paper upside down and repeat. (pass 3 of 3 or 5 of 6)



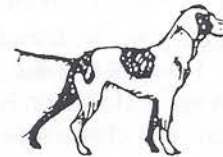
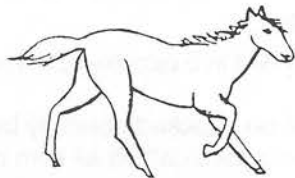
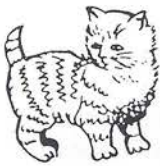
14. Pass any lines crossing near midpoint.

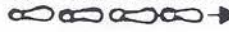


15. Have child copy first. If failed, demonstrate.

When giving items 12, 14, and 15, do not name the forms. Do not demonstrate 12 and 14.

16. When scoring, each pair (2 arms, 2 legs, etc.) counts as one part.
17. Place one cube in cup and shake gently near child's ear, but out of sight. Repeat for other ear.
18. Point to picture and have child name it. (No credit is given for sounds only.)
If less than 4 pictures are named correctly, have child point to picture as each is named by tester.



19. Using doll, tell child: Show me the nose, eyes, ears, mouth, hands, feet, tummy, hair. Pass 6 of 8.
20. Using pictures, ask child: Which one flies?...says meow?...talks?...barks?...gallops? Pass 2 of 5, 4 of 5.
21. Ask child: What do you do when you are cold?...tired?...hungry? Pass 2 of 3, 3 of 3.
22. Ask child: What do you do with a cup? What is a chair used for? What is a pencil used for?
Action words must be included in answers.
23. Pass if child correctly places and says how many blocks are on paper. (1, 5).
24. Tell child: Put block on table; under table; in front of me, behind me. Pass 4 of 4.
(Do not help child by pointing, moving head or eyes.)
25. Ask child: What is a ball?...lake?...desk?...house?...banana?...curtain?...fence?...ceiling? Pass if defined in terms of use, shape, what it is made of, or general category (such as banana is fruit, not just yellow). Pass 5 of 8, 7 of 8.
26. Ask child: If a horse is big, a mouse is ___? If fire is hot, ice is ___? If the sun shines during the day, the moon shines during the ___?
Pass 2 of 3.
27. Child may use wall or rail only, not person. May not crawl.
28. Child must throw ball overhand 3 feet to within arm's reach of tester.
29. Child must perform standing broad jump over width of test sheet (8 1/2 inches).
30. Tell child to walk forward,  heel within 1 inch of toe. Tester may demonstrate.
Child must walk 4 consecutive steps.
31. In the second year, half of normal children are non-compliant.

OBSERVATIONS:

C. CALCULATING THE CHILD'S AGE AND DRAWING THE AGE LINE

1. General Instructions

General information such as the child's name, birth date, and test date should be recorded first on the test form. The child's age is computed by subtracting the date of birth from the date of testing. (When it is necessary to "borrow" in the subtraction, 30 days are borrowed from the month column, and 12 months are borrowed from the year column.)

Example #1:	Year	Month	Day
Date of Test	90	7	15
Date of Birth	-88	-3	-10
Age of Child	2	4	5

The age of the child in Example #1 is found to be 2 years, 4 months, and 5 days.

Example #2:	Year	Month	Day
.....	89	6	45
Date of Test	90	7	15
Date of Birth	-88	-10	-28
Age of Child	1	8	17

The age of the child in Example #2 is 1 year, 8 months, and 17 days. The age is calculated as follows:

- Step 1.** It is not possible to subtract 28 days from 15. Therefore, borrow 30 days (1 month) from 7 months. Add 30 days to 15 to make 45 days. Six months are left in the month column.
- Step 2.** Subtract 28 days from 45 days = 17 days.
- Step 3.** It is not possible to subtract 10 months from 6. Therefore, borrow 12 months (1 year) from 90. Add 12 months to 6, to make 18 months; 89 is left in the year column.
- Step 4.** Subtract 10 months from 18 months = 8 months.
- Step 5.** Subtract 88 from 89 = 1 year. The age of the child in Example #2 is found to be 1 year, 8 months, and 17 days.

Accurate age calculation is very important, and should be checked carefully before proceeding with the test. The child's age is used as a reference point against which all item performances are compared.

2. Adjusting for Prematurity

For children who were born more than 2 weeks before the expected date of delivery and who are less than 2 years of age, the calculated age must be adjusted. To adjust the age, first divide the number of weeks premature into months and days, using 4 weeks to a month and 7 days to a week. Then subtract the resulting month(s) and days from the calculated age.

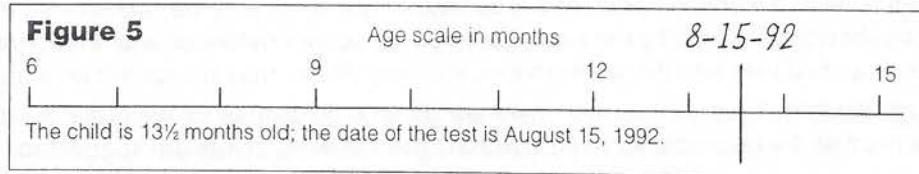
Example #3:	Year	Month	Day
Date of Test	90	8	20
Date of Birth	-90	-6	-1
Age of Child	2	19	
6 weeks premature	-1	-14	
Adjusted Age of Child	1	5	

6 weeks

The calculated age of the child in Example #3 is found to be 2 months 19 days. The child was born 6 weeks (1 month 14 days) prematurely, so this amount is subtracted from the calculated age to arrive at the adjusted age of 1 month 5 days. Use this adjusted age to draw the age line. In addition, it is necessary to indicate on the test form that the child's age was adjusted for prematurity. No age adjustment is necessary for children 2 years of age and above or for children born later than expected. (When the child reaches 2 years of age or more it is no longer necessary to adjust for prematurity because the weeks premature represent an increasingly smaller fraction of the child's total age.)

3. Drawing the Age Line

After correctly calculating the age of the child to be tested (and adjusting for prematurity, if necessary), use the age scales and a straight edge to accurately draw an "age line" from the top to the bottom of the form. Each space between age marks at the top and bottom of the form represents one month until 24 months; thereafter, each space represents 3 months. Use the exact calculated (or adjusted) age to draw the age line, without rounding off days, weeks, or months. After drawing the age line, write the date of the test above it, as shown in Figure 5.



As test interpretation depends on the correct placement of the age line, the age scale should be carefully checked to assure that the line has been drawn in the correct location.

D. TEST ADMINISTRATION

1. General Instructions

The DENVER II can be used to screen a child repeatedly from birth to six years of age. To use the same test form on more than one occasion, it is suggested that a new age line (with the date of testing entered above it) be drawn each time the child is screened, and that the scoring of items be done in such a manner as to distinguish the scores for each administration. For example, this may be accomplished by using a different colored pencil.

All items must be tested in accordance with standardized administration procedures described in this manual; otherwise, the norms depicted by the bars will not be applicable. Examiners should review the directions for administration of the test periodically to guard against unintentional deviations.

2. Building Rapport

In the testing situation, the examiner's efforts should be directed toward obtaining the best test performance possible from the child and obtaining accurate information from the caregiver. Rapport with the child and caregiver is essential.

The test is to be given with the child's parent or primary caregiver present. To elicit the most natural activities from the child, every effort should be made to make the caregiver and child comfortable. It is best to administer the test while the child is dressed. Boots or shoes that restrict the child's performance of motor items should be removed before these items are administered. A young child may sit on the caregiver's lap. An older child may sit alone on a chair if he or she is comfortable and can reach the test materials easily. Ideally, the child will sit so that his or her arms can rest upon the table. The child's elbow should be level with the table top. If a child sitting on a lap is too low, ask the person holding the child to put a folded blanket on the lap to raise the child. A table that can be adjusted for height, or a child-sized table and chair, is ideal for testing preschool-aged children. Infants may be evaluated on the floor if a safe table is not available.

3. Introduction

The caregiver should be asked when the child was born and whether the child was born prematurely. The examiner should then calculate the child's test age and determine if the calculation is correct. Since the testing may cause anxiety for the child's caregiver, it is essential to explain that the DENVER II is administered to determine the child's current developmental status, that the test is not an IQ test, and that the child is not expected to pass all of the items administered.

4. Order of Testing

The order of presenting the items should be flexible, and the sequence should be adjusted according to the responsiveness of the child. It is generally helpful to place one or more age-appropriate test items (such as a rattle for the infant, blocks for a toddler, paper and pencil for a preschooler) on the table so that the child can amuse him- or herself while the examiner asks the parent the reportable items of the Personal-Social sector. The child's free activity while "report" items are being asked of the caregiver is considered part of the evaluation, and the examiner should be attentive to the child's spontaneous behavior. Test items may be scored on the basis of any relevant behavior observed by the examiner even if it occurs before or after the formal testing. For example, if a child runs into the testing room, the item "Runs" may be scored as a pass.

Although flexibility is very important, there are general guidelines for the order of administering the items that are favorable for most children. The following points are suggested:

- a. In general, items requiring less active participation of the child should be administered first (such as the "report" items in the Personal-Social sector). These should be followed by the Fine Motor-Adaptive items, which do not require the child to speak; next, the Language items; and finally, the Gross Motor items. For most children it is best to administer the Gross Motor items last, since they require a sense of confidence which generally increases as testing progresses. In addition, some children become excited when performing the Gross Motor items and subsequently are reluctant to return to the examining table to perform items in other test sectors.
- b. Tasks that the child can perform easily should be administered first. The child's efforts should be praised, even on items that are failed. This builds the child's confidence and may encourage him or her to attempt more difficult items.
- c. Items that use the same materials in the test kit, such as blocks, may be administered consecutively to save time. This helps to avoid continued removal and retrieval of materials during the testing, which can disrupt the "flow" of the session.
- d. It is recommended that only materials used for the specific item be placed on the table to avoid distractions. Testing may also progress more smoothly if the test kit is kept out of sight and reach of the child (perhaps on the examiner's lap).
- e. For infants, it is recommended that all items administered with the baby lying down be tested together.
- f. Regardless of the age of the child, in each sector testing should begin with items that fall completely to the left of the child's age line, and continue to the right.

5. Number of Items to be Given

The number of items to be given varies with the age and abilities of the child being tested. In practice the number of items administered may depend on:

- The time available for testing, and;
 - Whether the goal is to identify developmental delays and/or the relative strengths of the child.
- a. To determine if the child is developmentally at risk, administer the test as follows:
 - Step 1:** In each sector, administer at least three items nearest to and totally to the left of the age line and every item that is intersected by the age line.
 - Step 2:** If the child is unable to perform any item in Step 1 (fails, refuses, has had no opportunity), administer additional items to the left in the appropriate sector until the child passes three consecutive items.
 - b. To determine a child's relative strengths (a ceiling), administer the test as follows:
 - Step 1:** In each sector, administer at least three items nearest to and totally to the left of the age line and every item that is intersected by the age line.
 - Step 2:** Continue to administer items to the right of any passes in each sector until three failures are recorded.

The child may be given up to three trials to perform each item, when appropriate, before scoring a failure. More than three trials may teach the child an item not previously accomplished. Such "teaching" would also extend the testing time.

3 items to left of birthline (use easy ones to the left until 3 P's)
-do all block tests at same time, then move on...

6. Test Behavior Ratings

The "Test Behavior" ratings are scored after the completion of the test. Using the rating scale provided, the screener can compare the behavior of the child during the test with the child's previous performance. Always ask the caregiver if the child's performance was typical of his or her ability and behavior at other times. Sometimes a child may be too ill, tired, hungry, or upset when tested to display actual capabilities. In such cases, the test may be rescheduled on a different day at a time the child is likely to be more cooperative.

7. Item Scoring

The score for each item should be recorded on the bar near the 50% hatch mark. The following scores are used for the DENVER II:

- "P" for Pass – the child successfully performs the item, or the caregiver reports (when appropriate) that the child does the item.
- "F" for Fail – the child does not successfully perform the item, or the caregiver reports (when appropriate) that the child does not do the item. (3 chances)
- "N.O." for No Opportunity – the child has not had the chance to perform the item, due to restrictions from the caregiver or other reasons. This score may only be used on "report" items.
- "R" for Refusal – the child refuses to attempt the item. Refusals can be minimized by telling the child what to do rather than asking. If given instruction in proper administration, the caregiver may administer the item. Report items cannot be scored as refusals.

E. INTERPRETATION

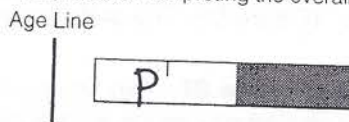
The DENVER II is used to identify the child whose development appears to be delayed in comparison to the development of other children. It can also be used to identify changes in developmental rates or patterns over time. Individual items are interpreted first, and then the entire test is interpreted.

1. Interpretation of Individual Items

a. "Advanced" Items

If a child passes an item that falls completely to the right of the age line, the child's development is considered advanced on that item. This is because the child has passed an item that most children do not pass until an older age. This is illustrated in Figure 5a. "Advanced" items are not considered for purposes of interpreting the overall test.

Figure 5a – An "Advanced" Item
(Not considered for purposes of interpreting the overall test)

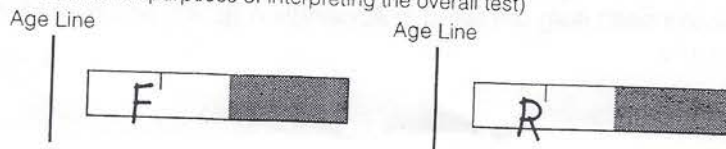


continue w/
advanced
until 3
passes...
(ceiling)

b. "Normal" Items

Failure or refusal of individual items do not necessarily indicate a delay in development. For example, if a child fails or refuses an item that falls completely to the right of the age line, the child's development is considered normal. This is because the child is younger than the age at which 25% of children in the standardization sample could do the item; the child is not expected to pass such an item until an older age. This is illustrated in Figure 5b.

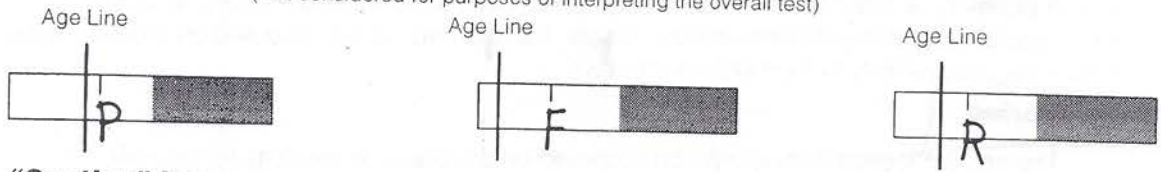
Figure 5b – "Normal" Items
(Not considered for purposes of interpreting the overall test)



As shown in Figure 5c, a child can pass, fail, or refuse an item on which the age line falls between the 25th and 75th percentile, and the child's development on that item will be considered normal. "Normal" items are not considered for purposes of interpreting the overall test.

Figure 5c – "Normal" Items

(Not considered for purposes of interpreting the overall test)

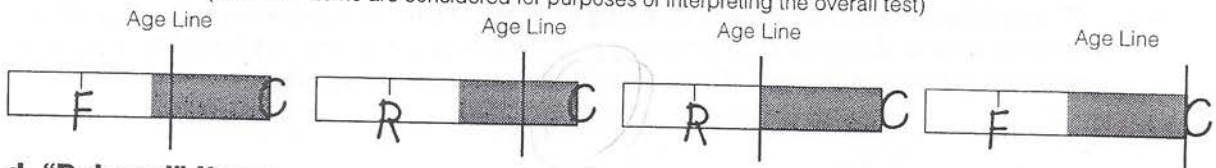


c. "Caution" Items

A "Caution" on an individual item is considered when interpreting the entire test. A "Caution" can be determined in one of two ways, as shown in Figure 5d. A "Caution" is scored when a child fails or refuses an item on which the age line falls on or between the 75th and 90th percentile. This is because more than 75% of children in the standardization sample can do the item at a younger age than the child being tested. A "Caution" is indicated on the test form by writing a "C" just to the right of the bar.

Figure 5d – "Caution" Items

("Caution" items are considered for purposes of interpreting the overall test)

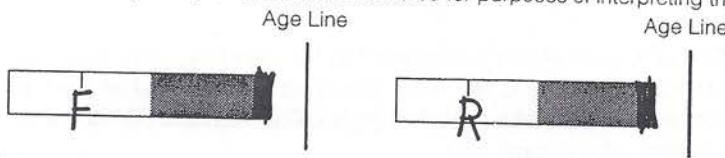


d. "Delayed" Items

Like "Cautions," "Delays" on individual items are considered when interpreting the entire test. "Delays" are indicated in Figure 5e. As can be seen, a "Delay" results when a child fails or refuses an item that falls completely to the left of the age line. This is because the child has failed or refused an item that 90% of children in the standardization sample passed at an earlier age. "Delays" are indicated by coloring in the right end of the bar.

Figure 5e – "Delayed" Items

("Delayed" items are considered for purposes of interpreting the overall test)

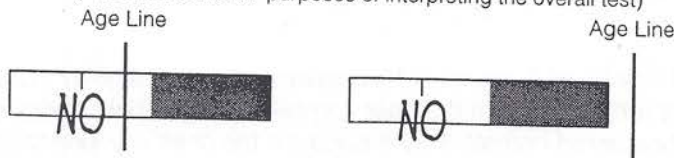


e. "No Opportunity" Items

Report items which the parent says the child has not had an opportunity to try are scored as "N.O." for "No Opportunity" (Figure 5f). These items are not considered in interpretation of the entire test.

Figure 5f – "No Opportunity" Items

(Not considered for purposes of interpreting the overall test)



Note: The exact ages at which 25%, 50%, 75%, and 90% of children in the standardization sample passed each item are listed in Appendix A (p. 43) and may be consulted when scoring individual items.

2. Interpretation of the Test (These are suggested guidelines.)

The DENVER II is interpreted as follows:

Normal:

- No Delays (and a maximum of 1 Caution)
- Conduct routine rescreening at next well-child visit.

Suspect: / Questionable

- Two or more Cautions and/or One or more Delays.
- Since communities' and programs' priorities differ in types or severity of problems they seek to identify in screening, it will be necessary to adjust Suspect criteria to most efficiently achieve their goals. Tables of percentages of Cautions and Delays that may be expected for different demographic groups are provided in the *DENVER II Technical Manual*, pages 19-21.
- Rescreen in 1-2 weeks to rule out temporary factors such as fatigue, fear, illness.

Untestable:

- Refusal scores on one or more items completely to the left of the age line or on more than one item intersected by the age line in the 75%-90% area.
- Rescreen in 1-2 weeks.

3. Referral Considerations

If, upon rescreening, the test result is again Suspect or Untestable, whether or not to refer should be determined by the clinical judgement of the supervising professional based upon:

- profile of test results (which items are Cautions and Delays)
- number of Cautions and Delays
- rate of past development
- other clinical considerations (clinical history, examination, etc.)
- availability of referral resources

Monitoring the screening program is discussed in the *DENVER II Technical Manual*, pages 18-22. The use of such monitoring is strongly recommended to assist the supervising professional in establishing and adjusting referral criteria.

3. Profiles of Various Test Results

Pages 14-16 provide examples of Interpreting tests that are Normal, Suspect, and Untestable.

abnormal
- 2 or more delays