

## Insights from AGS Development Scores of Scores—The Art of Keeping Them Straight!

January 2003 Clinical Café by Tina Radichel, M.S., CCC-SLP

How do you describe a client's performance on a test? "Judy was at the 5th percentile." "Antonio's results show a standard score of 88." "Mai performed at the 4th stanine." With so many ways to report test performance, it's no wonder people are confused about score interpretation! This month's Clinical Cafe is a quick tutorial on normative scores. Print this article and tack it to your desk; give it to your favorite school psychologist, teacher, or principal; line your materials cupboards with it; or put it wherever it will be handy!

The following is a list of typically used normative score types. With each is a definition, a bit of perspective about the score type, and an example of an interpretation of a score. Notice that a *raw score* is not included in this list because raw scores are simply a frequency count of correct or incorrect answers and should not be used to describe student performance. They cannot be interpreted directly or compared between subtests. A raw score's only purpose is to be used to derive normative scores. With that in mind, on with the list.



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### Standard Score

A standard score indicates the distance of a person's raw score from average, taking into account the variability of scores among examinees of that age or grade. Standard scores are expressed in whole numbers with a mean of 100 and a standard deviation of 15. Standard scores are usually expressed with a confidence interval. Confidence intervals are expressed first as a percent (90% confidence level) and then with a standard score range. The percent indicates the degree of certainty that the examinee's true score is based on his or her ability (rather than just the person's performance on a particular test), and the score range indicates the range of standard scores within which the true score is likely to fall.

As an equal-interval measure, a standard score is one of the most common and useful metrics because it can be compared across subtests and across other tests and also can be arithmetically manipulated (added, subtracted, multiplied, divided, averaged, etc.). One important point needs to be made about standard scores. Often, we receive calls from customers who believe that if a client receives the same standard score from year to year, they are showing no growth. This is not accurate. Because the reference point for a standard score is the client's own age group at the time of testing, which changes and grows in skill from year to year, the exact same standard score from one September to the next indicates one full year of growth.

**Example:** *"Rob's raw score converts to a standard score of 89, which falls within one standard deviation of the mean and is in the average range. Last year on this test, Rob's standard score was 86. Receiving approximately the same standard score as a year ago indicates that Rob has demonstrated one year's growth in this skill area."*

### Percentiles or Percentile Rank

A percentile indicates the percentage of people in the reference group who performed at or below the examinee's score. This score type is easily confused and unfortunately is widely misused, despite its popularity. Percentiles are an ordinal or rank-order scale of measurement, rather than an equal-interval scale. That means that you cannot subtract or average percentile scores in order to represent growth or change.

**Example:** *"Kirby's raw score converts to a percentile rank of 10. This means that 10 percent of the reference group performed at or below Kirby's performance."*

## **Stanine**

The term stanine is a contraction of "standard nines." Stanines provide a single-digit scoring metric with a range from 1 to 9, a mean of 5, and a standard deviation of 2. Each stanine score represents a specific range of percentile scores in the normal curve. Stanines are useful when you are interested in providing a "band" interpretation rather than a single score cutoff. Stanines 1 and 2 represent the bottom 11 percent of the examinee's performance distribution, indicating a need in the tested skill area. Stanines 8 and 9 indicate a performance within the top 11 percent and a strength in a skill area. Stanines 4, 5, and 6 represent the average range.

**Example:** *"Yasmine scored in the 5th stanine, which represents the middle 20 percent of examinees. This is in the average range."*

## **Normal Curve Equivalent**

Normal curve equivalents (NCEs) are based on percentiles but are statistically converted to an equal-interval scale of measurement. NCEs range from 1 to 90, with a mean of 50 and a standard deviation of 21.06. NCEs of 1, 50, and 99 correspond to percentiles of 1, 50, and 99. However, other NCE values do not have a direct relationship to percentiles.

NCEs are used in many federal and state programs as a method of reporting specialized programs, such as Title I. Since they can be arithmetically manipulated (i.e., they can be averaged), they are particularly helpful for reporting data.

**Example:** *"On this test, Gabriella's normal curve equivalent was 54. This represents an average performance, with about half of the examinees her same age (or grade) performing better on this skill and about half performing more poorly."*

## **Grade Equivalent**

A grade equivalent (GE) is the grade at which a person's raw score is the median (or at the 50th percentile) score. Grade equivalents are expressed in tenths of a grade (1.2 = the second month of first grade).

Keep in mind that a GE has nothing to do with how the examinee performs against the local school curriculum or standards for a particular grade, nor does it take into account the person's life experiences. Again, the reference for this score is the standardization sample of the test. Grade equivalents are also a rank-order scale; they place an examinee on a growth continuum, which may or may not increase at regular intervals. The same grade equivalent on two different subtests may not mean the same thing. Therefore, GEs are not the best option for making diagnostic and placement decisions.

**Example:** *"Jamal's grade equivalent for this test is 4.2. This means that Jamal's score is the middle or median score for typically developing students in the second month of fourth grade."*

## **Test-Age Equivalent or Age Equivalent**

Similar to a grade equivalent, a test-age equivalent represents the age in years and months at which a particular raw score is the median score. Like GEs, test-age equivalents are a rank-order scale; they place an examinee on a growth continuum, which may or may not increase at regular intervals. The same test-age equivalent on two different subtests may not mean the same thing. Thus, test-age equivalents are not the best option for making diagnostic and placement decisions.

**Example:** *"Lisa's raw score of 17 converts to a test-age equivalent of 10-6. This means that Lisa's raw score is the same as the middle or median raw score for children aged 10 years 6 months. However, Lisa's*

*raw score of 17 may represent very different specific skills than those of children who are chronologically 10 1/2 since she is 14. Further investigation of specific strengths and needs is warranted."*

## **Summary**

By now you're probably thinking, "I was told there would be no math in speech-language pathology!" Sorry, this is not totally true. (I know, I'm not thrilled about this either!)

It's not so bad if you keep in mind the following: Normative scores that are an equal-interval scale of measurement (standard scores, NCEs) can be arithmetically manipulated (i.e., added, subtracted, multiplied, or divided). Those that are rank-order scales (percentiles, stanines, grade and test-age equivalents) cannot be used this way. This is very important to remember when working with individuals or groups of students and their data. For example, you can average a class's standard scores on a particular test, but you may not average the students' percentile ranks.

The different score types offer different information, but they are also elements of mathematics and have their own rules! Use your calculators sparingly!

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**Happy New Year!**