



## Norms: Who Wants to Be Normal?\*

**HOGAN**  
ASSESSMENT SYSTEMS

\*a question posed to R. Hogan from Timothy Leary in 1995

Hogan Assessment Systems announces the 2007 publication of the *Hogan Personality Inventory Manual (3<sup>rd</sup> Edition)*. The latest edition documents various changes in the inventory along with new data supporting the factor structure, reliability, and validity. However, a major improvement of the inventory is the availability of updated norms. Norms were last published in 1995 and we have observed some scale score shifts over the last 12 years.

What are norms? Nunnally (1967, p. 244) explains that “norms are any scores that provide a frame of reference for interpreting the scores of particular persons.” Norms are essential for providing a context to interpret raw scores of a test. The HPI is interpreted using percentile scores. A percentile indicates the percent of people scoring at or below a given raw score on a test. For example, if 85% of people score below an Adjustment raw score of 35, then anyone who scores a 36 on Adjustment exceeds 85% of the norming sample. The *Hogan Guide* (R. Hogan, Hogan, & Warrenfeltz, 2007) suggests that scores above the 65 percentile are interpreted as high scores. Raw scores on a scale are meaningless; interpretation depends on accurate norms to provide a frame-of-reference. By using norms, we can compare the characteristics of one person to a suitable group of other people and draw some conclusions about that person’s behavior.

A critical step in developing norms is to obtain scores from a large number “suitable” people. Text books and professional testing guidelines insist that the people in the samples tested must be “representative” of the kinds of people for whom the test interpretations are intended. Although this seems straightforward, in fact, many test norms are “notoriously inadequate” using inappropriate samples for comparing the intended test takers (Cronbach, 1984). Cronbach listed four standards for developing norms: (a) norming samples should consist of individuals for whom the test was intended and with whom an examinee will be compared; (b) the sample should be representative of the population; (c) the sample should included a sufficient number of cases; and (d) the sample must be appropriately subdivided.

Test publishers have a professional responsibility to assure that norms are up-to-date and that these are readily available. In the 1999 *Standards for Educational and Psychological Testing*, Standard 4.18 states that

If a publisher provides norms for use in test score interpretation, then so long as the test remains in print, it is the publisher’s responsibility to assure that the test is renormed with sufficient frequency to permit continued accurate and appropriate score interpretation.

Factors that influence the currency of norms which, in turn, influence interpretation of scores should be examined periodically. Any number of trends could affect the score distributions obtained over time.

In our judgment, there are at least five factors that can affect norms for personality inventories used for employee selection and career development. Consider the following examples:

1. Norm samples who were tested at Time 1 and included in the norm base are no longer appropriate for an updated version of norms.
2. New test takers are more familiar with personality inventories than previous test takers and have more experience completing these kinds of inventory questions.
3. The types of individuals asked to contribute to the norming samples change, with representation coming from groups who are more extraverted and ambitious than those sampled for previous norms.
4. The purpose or application of test results expands and/or changes, thereby affecting the nature of the comparison group.
5. The representation of the norming samples changes from Time 1 to Time 2 due to demographic and/or occupational shifts.

Our analyses indicate an HPI norm shift over the last 15 years. We suspect that all five factors above account for the shift. However, our reanalysis of HPI score data should meet all reasonable academic and professional standards, including the four criteria set forth by Cronbach (see above).

In general, this is how we proceeded to update the HPI norms; the details and results of the analysis appear in the 2007 *Hogan Personality Inventory Manual* (3<sup>rd</sup> Edition). We drew representative norming samples from the Hogan data warehouse. Beginning with a population ( $N = 624,856$ ) of working adults, data were collected from on-line testing between June 10, 2003 and June 9, 2005. We eliminated cases from this population based on two rules. First, we removed all cases with an HPI Validity scale raw score of less than 10. Applying this rule eliminated 34,059 cases. Second, we removed cases with excessive missing items. The HPI scoring engine eliminated cases with 33% of items, or 68 items, missing data. Following this logic, we eliminated 4,809 cases. After deletions, the norming population included 585,988 cases.

We applied the three sampling plan criteria and derived the final norming sample using both inductive and deductive approaches. We included a proportionate number of cases from the 23 Department of Labor (DoL) occupational categories, except in categories where we lacked data (i.e., Farming, Fishing and Forestry Occupations). Additionally, because examinees are not required to provide gender and race data, there were some missing data for these variables resulting in a slightly disproportionate representation of the US workforce. To achieve proportionate occupational representation in the norming sample, we mapped our test data to DoL categories. Table 1 lists the percentage of people in the US workforce by occupational category, as reported in May 2005 (US Department of Labor, 2006).

We followed the DoL classification guidelines by linking jobs in the norming sample to the SOC system (US DoL, 2001). We assigned each case to one of the DoL groups. This ensured that the norming samples represented a realistic distribution of jobs from the US workforce. To increase the accuracy of our classifications, two Hogan psychologists completed the groupings independently. This resulted in 99% classification with the remaining discrepancies resolved through discussion. As seen in Table 1, the HPI database contains 14 of the 23 DoL occupational categories, or 84.4 % of the 2005 US occupations.

Table 1  
HPI Database Classified by DoL Occupations

<b>DoL Occupation</b>	<b>Hogan Archive HPI cases</b>	<b>Percent of Total in HPI Archive</b>	<b>Percent of US Employment</b>	<b>Percent of US Occupations Represented</b>
Management occupations	12,097	5.43%	4.6%	4.2%
Business and financial operations occupations	6,567	2.95%	4.2%	3.7%
Architecture and engineering occupations	1,534	.69%	1.8%	4.4%
Healthcare practitioners and technical occupations	3,241	1.46%	5.0%	6.6%
Protective service occupations	205	.09%	2.3%	2.6%
Food preparation and serving related occupations	329	.15%	8.3%	2.2%
Building and grounds cleaning and maintenance occupations	867	.39%	3.3%	1.2%
Personal care and service occupations	939	.42%	2.4%	4.2%
Sales and related occupations	22,678	10.18%	10.7%	2.7%
Office and administrative support occupations	151,791	68.15%	17.5%	6.9%
Construction and extraction occupations	253	.11%	4.9%	7.4%
Installation, maintenance, and repair occupations	9,565	4.29%	4.1%	6.4%
Production occupations	2,891	1.30%	7.9%	13.7%
Transportation and material moving occupations	9,766	4.38%	7.4%	6.2%
<b>TOTAL</b>	<b>222,723</b>	<b>100.00%</b>	<b>84.4%</b>	<b>72.4%</b>

Compared to the US workforce, some occupations were not represented in the HPI archival data and others were over represented. In other words, the current HPI archival data set represents the HAS client base and there are expected differences between the client base and representation of the total US workforce. To control for this inconsistency, yet maintain the best representation of both the US workforce and the HAS client base, we calculated the percent of the total US workforce accounted for by the occupations represented in the HPI archival data (i.e., 84.4%). Then, we used this adjustment to determine the number of cases needed from the HPI archival data set by occupation in the norm sample.

The “Office and Administrative Support Occupation” category showed the largest over representation. As such, this category was used as the starting point for developing the normative sample. First, 46,163 respondents were randomly selected from this occupation. Second, this occupation was anchored to equal 30.41% of the normative sample. Third, the sample sizes for other occupational categories were determined based on their percentage within the US workforce and the available sample size within the Hogan archive. Finally, we added cases from occupational categories that did not reach the percentage of people in the US workforce. These steps made the resulting normative sample similar to the US workforce and reduced the norming selection sample from 222,723 to 117,095. The final sample by occupational designation appears in Table 2. To reflect the Hogan Assessment Systems’ client base and balance demographic characteristics (e.g, gender), an additional 10,725 selection cases with unknown occupational categories were added to the norming selection sample.

After populating categories to represent the selection client base, development client cases were added. Although development clients are generally in upper-level management jobs and fall into the DoL code of “Management Occupations,” they remained separate in the norm group because the examinees’ job status may account for some differences in scores and the examinees’ motivation for taking the test could also account for score differences.

Table 2  
HPI Norming Sample Distribution by Occupation Using Applicants in Selection Contexts

<b>Occupation</b>	<b>Number of cases</b>	<b>Percentage</b>
Management occupations	12,097	10.33%
Business and financial operations occupations	6,567	5.61%
Architecture and engineering occupations	1,534	1.31%
Healthcare practitioners and technical occupations	3,241	2.77%
Protective service occupations	205	.18%
Food preparation and serving related occupations	329	.28%
Building and grounds cleaning and maintenance occupations	867	.74%
Personal care and service occupations	939	.80%
Sales and related occupations	22,678	19.37%
Office and administrative support occupations	46,163	30.41%
Construction and extraction occupations	253	.22%
Installation, maintenance, and repair occupations	9,565	8.17%
Production occupations	2,891	2.47%
Transportation and material moving occupations	9,766	8.34%
<b>TOTAL</b>	<b>117,095</b>	<b>100.00%</b>

To ensure that the correct proportion of development cases were included in the norming samples, we searched the Hogan data warehouse for users' HPI data. The ratio of selection to development examinees for the Hogan System is 9:1. To keep this ratio in our norming group, 15,463 development cases were combined with the selection database. The final distribution of selection and development cases is presented in Table 3. Adding the development cases to the selection sample described in Table 2 resulted in a total norming sample of approximately 10% development cases and 90% selection cases. To enhance the representation of the norming sample, 13,331 unclassified cases were added as shown in Tables 3 and 4.

Table 3  
Final Norming Sample Distribution by Test Purpose

<b>Test Purpose</b>	<b>Number of Cases</b>	<b>Percent of Final Sample</b>
Selection	127,820	81.61%
Development	15,463	9.87%
Not indicated	13,331	8.51%
<b>TOTAL</b>	<b>156,614</b>	<b>100.00%</b>

Table 4  
Final Norming Sample Distribution by Occupation

<b>Occupation</b>	<b>Number of Cases</b>	<b>Percent of Final Sample</b>
Management occupations	12,097	7.72%
Business and financial operations occupations	6,567	4.19%
Architecture and engineering occupations	1,534	0.98%
Healthcare practitioners and technical occupations	3,241	2.07%
Protective service occupations	205	0.13%
Food preparation and serving related occupations	329	0.21%
Building and grounds cleaning and maintenance occupations	867	0.55%
Personal care and service occupations	939	0.60%
Sales and related occupations	22,678	14.48%
Office and administrative support occupations	46,163	29.48%
Construction and extraction occupations	253	0.16%
Installation, maintenance, and repair occupations	9,565	6.11%
Production occupations	2,891	1.85%

Transportation & material moving occupations	9,766	6.24%
No occupation indicated	10,725	6.85%
Development	15,463	9.87%
Not indicated	13,331	8.51%
<b>TOTAL</b>	<b>156,614</b>	<b>100.00%</b>

**References**

Cronbach, L. J. (1984). *Essentials of Psychological Testing* (4th ed.). New York: Harper & Row, Publishers.

Hogan, R., Hogan, J., & Warrenfeltz, R. (2007). *Hogan Guide*. Tulsa, OK: Hogan Assessment Systems.

Nunnally, J. C. (1967). *Psychometric theory*. New York: McGraw-Hill.