

O*NET[®] Analyst Occupational Abilities Ratings: Analysis Cycle 10 Results

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O*NET ANALYST OCCUPATIONAL ABILITIES RATINGS: ANALYSIS CYCLE 10 RESULTS

Introduction

The Occupational Information Network (O*NET) is a comprehensive system developed by the U.S. Department of Labor that provides information for 965 occupations within the U.S. economy. This information is maintained in a comprehensive database which was developed to replace the Dictionary of Occupational Titles (DOT) (U.S. Department of Labor, 1991). In order to keep the database current, the National Center for O*NET Development is involved in a continual data collection process aimed at identifying and maintaining current information on the characteristics of workers and jobs. The information that populates the O*NET database is collected from three primary sources: incumbents, occupational experts, and occupational analysts. Targeted job incumbents provide ratings on occupational tasks, generalized work activities (GWA), knowledge, education and training, work styles, and work context areas. Importance and level information regarding the abilities and skills associated with these occupations is being collected from occupational analysts. It should be noted that there are theoretical or philosophical reasons for preferring one rater group to the other for collecting different types of data. For example, incumbents are generally more familiar with the day-to-day duties of their job; therefore, they are the best source of information regarding tasks and GWAs. In contrast, it is likely that trained analysts understand the ability and skill constructs better than incumbents and therefore should provide the ability and skills data (Tsacoumis, 2007). Granted, it is imperative that the occupational analysts have detailed occupation information in order to rate the ability and skill constructs. It has also been suggested that some incumbents deliberately inflate their ratings to influence policy decisions regarding, for example, compensation and training (Harvey, 1991; Morgeson, Delaney-Klinger, Mayfield, Ferrara, & Campion, 2004). Given these considerations, occupational analysts as opposed to incumbents provide the ability and skill information in the O*NET database.

This report focuses on the ability results only. Abilities are "... relatively enduring attributes of an individual's capability for performing a particular range of different tasks" (Fleishman, Costanza, & Marshall-Mies, 1999, p. 175). Abilities are sometimes referred to as traits as they tend to remain stable over long periods. The 52 O*NET abilities cover performance applicable to a broad range of jobs in the world's economy. These abilities are grouped into four categories: cognitive, psychomotor, physical, and sensory-perceptual.

To facilitate the ability rating process, occupational analysts are provided relevant occupational information. Trained occupational analysts are responsible for rating the importance and level of the 52 abilities for each of the O*NET occupations. More specifically, eight trained occupational analysts provided ratings for each occupation. For a description of the entire analyst data collection process, including the preparation and distribution of the occupational data, the steps associated with the ratings process, and the collection and management of the ability ratings, see *O*NET Analyst Occupational Abilities Ratings: Procedures* (Donsbach, Tsacoumis, Sager, & Updegraff, 2003).

To ensure a controlled data collection and management process, occupational data is being collected in groups or "analysis cycles." This report describes the results from the data

collection process for the tenth analysis cycle of 192 occupations. Seventy-five of these occupations were rated previously in Cycle 9¹. Only ratings from Cycle 10 are included in this report for those 75 occupations. Note that beginning with Cycle 10, additional information (i.e., knowledge domains) was included in the analyst stimulus materials. Reports describing each of the previous cycles are available at <http://www.onetcenter.org/resData.html#waves>. Results for subsequent cycles will be reported in separate reports. For a description of the O*NET Data Collection Publication Schedule see www.onetcenter.org. The O*NET-SOC Codes and Titles for occupations included in O*NET Analysis Cycle 10 are presented in Appendix A.

Evaluation of Cycle 10 Analyst Ratings

As mentioned above, occupational analysts provided ratings on importance and level of the 52 abilities for each of the 192 occupations in Cycle 10. The mean, standard deviation, and SE_M of the importance and level ratings were computed. These results are shown in Appendix B.

Four sets of analyses were performed to evaluate the ratings that occupational analysts provided. First, we focused on identifying the data that may be difficult to interpret based on limited agreement among raters or because there is an indication that the ability level rating is not relevant for a specific occupation. Thus, a set of recommended suppression criteria was established which flagged: (a) an ability level rating as not relevant to an occupation because of low importance ratings, (b) an ability with too little agreement in importance ratings across raters for a particular occupation, and (c) an ability with too little agreement in level ratings across raters for a particular occupation.

The remaining three sets of analyses focused on computing measures of interrater agreement and interrater reliability. Poor agreement or reliability estimates may be an indication that there is confusion about the constructs, potentially due to either the nature of the definition or rater training. Specifically, the second analysis involved computing the interrater agreement among the eight raters in each rating group. Next, the interrater reliability of the raters was computed to determine the extent to which raters agreed about the order of and relative distance between constructs on a particular scale (i.e., importance or level) within a particular occupation. That is, this analysis provides information regarding the consistency across raters in terms of how they rate the required level or relative importance of the 52 ability constructs to performance in a particular occupation. Finally, another interrater reliability estimate was computed to examine the consistency of ratings across occupations within constructs. In other words, this type of interrater reliability focused on the extent to which raters agree about the order of and relative distance between occupations on a particular scale for a particular construct.

Cycle 10 Recommended Data Flags

Three distinct criteria were established to flag the ability data. All three flags affect the presentation of data within the publicly available O*NET Online (online.onetcenter.org). First, the level rating of an ability was flagged as not relevant for a particular occupation if two or fewer of the eight occupational analysts rated its importance as two or greater. Thus, the level rating of an ability is considered not relevant when that construct is not important for the

¹ This ensured that all occupations updated a second time and new and emerging occupations were rated using the same methodology.

performance of the particular occupation. For example, in the Cycle 10 data, the level ratings for the Spatial Orientation were considered not relevant for Employment Interviewers (13-1071.01) as well as Medical Secretaries (43-6013.00) because Spatial Orientation was not considered important for the performance of these two occupations. In this cycle, there were 2,362 not relevant flags (see Table 1). To facilitate interpretation of these results, it should be noted that there are 9,984 sets of ratings (191 occupations x 52 abilities) in the current cycle. Given this, 23.66% (2,362/9,984) of the ability ratings were flagged as not relevant.

Table 1 shows the number of not-relevant flags for ability level. The abilities with the most flags in Cycle 10 include Dynamic Flexibility, Explosive Strength, Night Vision, Peripheral Vision, Glare Sensitivity, Sound Localization, and Spatial Orientation; each of these abilities has received large numbers of flags in previous cycles. Given that these constructs capture fairly specific physical capabilities intuitively not required for many occupations, these results are not surprising.

The remaining two criteria involve the recommended suppression of identifying any ability importance or level mean rating that had a standard error of the mean (SE_M) greater than .51. These criteria were established to capture those ratings deemed to have insufficient agreement across raters. The value of .51 was selected because $1.0/1.96 = .51$. An SE_M greater than .51 means that the upper and lower bounds of the confidence interval are more than one scale point away from the observed mean. There were no instances in Cycle 10 where the mean importance rating was flagged for insufficient agreement. In fact, no importance ratings received flags for an SE_M greater than .51 since Cycle 3.

The results of the suppression criteria for level for Cycles 1-10 are presented in Table 2. There were 33 insufficient agreement flags for level ratings. It should be noted that the number of flags indicating insufficient agreement with level ratings in Cycle 10 represents the lowest percentage of insufficient agreement flags compared to all previous cycles (33%). The abilities that were flagged the most for the level criteria were: Sound Localization (n = 4) and Control Precision (n = 4). This represents an increase in the number of flags for Sound Localization, but the number of flags for Control Precision is consistent with Cycle 9.

Although there were some small increases in the number of level flags for a few abilities, most abilities received the same number of flags in Cycle 10 or decreased slightly. Two of the four abilities identified as receiving the most flags from Cycle 9 (i.e., Auditory Attention, Spatial Orientation) decreased in Cycle 10 while the other two remained the same (i.e., Control Precision, Manual Dexterity). Overall, a small number of abilities (three) showed a decrease in the number of flags and 32 abilities remained the same from Cycle 9 to Cycle 10.

With the exception of Cycle 7, a decreasing trend exists across all cycles in the percentage of flagged ability level ratings. Even the increase in Cycle 7 was relatively small. These findings suggest there remains a high level of agreement among the occupational analysts. The detailed results of the recommended data flags and suppression criteria are depicted by the shaded cells in the results presented in Appendix B.

Table 1. Number of Times Ability Level Flagged as Not Relevant

| Element Name | Cycle 1 (N = 54) | Cycle 2 (N = 126) | Cycle 3 (N = 109) | Cycle 4 (N = 100) | Cycle 5 (N = 91) | Cycle 6 (N = 100) | Cycle 7 (N = 101) | Cycle 8 (N = 100) | Cycle 9 (N = 31) | Cycle 10 (N = 192) |
|------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|----------------------------|------------------------------|
| Oral Comprehension | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Written Comprehension | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Oral Expression | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Written Expression | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Fluency of Ideas | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| Originality | 0 | 7 | 2 | 0 | 0 | 1 | 0 | 1 | 0 | 0 |
| Problem Sensitivity | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Deductive Reasoning | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Inductive Reasoning | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Information Ordering | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Category Flexibility | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mathematical Reasoning | 0 | 6 | 4 | 1 | 3 | 4 | 4 | 6 | 0 | 1 |
| Number Facility | 3 | 5 | 0 | 1 | 1 | 3 | 2 | 4 | 0 | 1 |
| Memorization | 0 | 1 | 0 | 0 | 0 | 5 | 3 | 1 | 1 | 0 |
| Speed of Closure | 0 | 2 | 3 | 0 | 0 | 0 | 1 | 3 | 0 | 0 |
| Flexibility of Closure | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Perceptual Speed | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 3 | 0 | 0 |
| Spatial Orientation | 36 | 48 | 66 | 81 | 54 | 48 | 35 | 33 | 14 | 130 |
| Visualization | 0 | 6 | 3 | 0 | 2 | 0 | 0 | 1 | 0 | 0 |
| Selective Attention | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Time Sharing | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 |
| Arm-Hand Steadiness | 9 | 14 | 11 | 49 | 15 | 14 | 7 | 6 | 1 | 42 |
| Manual Dexterity | 9 | 19 | 9 | 54 | 16 | 16 | 7 | 6 | 1 | 48 |
| Finger Dexterity | 0 | 6 | 3 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| Control Precision | 6 | 19 | 13 | 48 | 16 | 12 | 7 | 6 | 1 | 33 |
| Multilimb Coordination | 13 | 31 | 23 | 50 | 25 | 15 | 10 | 7 | 7 | 64 |
| Response Orientation | 30 | 72 | 50 | 66 | 39 | 28 | 16 | 14 | 9 | 91 |
| Rate Control | 35 | 88 | 57 | 73 | 43 | 29 | 18 | 16 | 9 | 98 |
| Reaction Time | 27 | 65 | 40 | 66 | 39 | 23 | 13 | 14 | 9 | 91 |
| Wrist-Finger Speed | 26 | 50 | 54 | 76 | 50 | 32 | 21 | 17 | 7 | 106 |
| Speed of Limb Movement | 28 | 57 | 49 | 65 | 47 | 34 | 20 | 22 | 12 | 107 |
| Static Strength | 21 | 38 | 33 | 56 | 36 | 23 | 15 | 11 | 8 | 84 |
| Explosive Strength | 44 | 104 | 90 | 93 | 85 | 93 | 93 | 80 | 27 | 160 |

Table Continued on Next Page

| Element Name | Cycle 1 (N = 54) | Cycle 2 (N = 126) | Cycle 3 (N = 109) | Cycle 4 (N = 100) | Cycle 5 (N = 91) | Cycle 6 (N = 100) | Cycle 7 (N = 101) | Cycle 8 (N = 100) | Cycle 9 (N = 31) | Cycle 10 (N = 192) |
|--|----------------------------|-----------------------------|-----------------------------|-----------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|----------------------------|------------------------------|
| Dynamic Strength | 28 | 61 | 46 | 65 | 42 | 28 | 15 | 17 | 13 | 97 |
| Trunk Strength | 8 | 16 | 23 | 29 | 30 | 21 | 6 | 4 | 7 | 77 |
| Stamina | 21 | 42 | 38 | 58 | 38 | 25 | 14 | 12 | 13 | 90 |
| Extent Flexibility | 22 | 47 | 36 | 64 | 40 | 24 | 15 | 13 | 13 | 95 |
| Dynamic Flexibility | 52 | 104 | 102 | 98 | 90 | 99 | 99 | 92 | 28 | 182 |
| Gross Body Coordination | 21 | 46 | 36 | 58 | 38 | 25 | 14 | 13 | 13 | 90 |
| Gross Body Equilibrium | 27 | 67 | 53 | 61 | 44 | 26 | 14 | 13 | 13 | 91 |
| Near Vision | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Far Vision | 0 | 4 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Visual Color Discrimination | 2 | 18 | 7 | 2 | 1 | 0 | 0 | 2 | 0 | 0 |
| Night Vision | 44 | 99 | 83 | 83 | 58 | 53 | 40 | 35 | 14 | 146 |
| Peripheral Vision | 44 | 85 | 79 | 82 | 55 | 54 | 41 | 32 | 14 | 145 |
| Depth Perception | 11 | 21 | 24 | 35 | 12 | 13 | 6 | 4 | 0 | 15 |
| Glare Sensitivity | 41 | 93 | 68 | 84 | 48 | 45 | 30 | 28 | 11 | 140 |
| Hearing Sensitivity | 2 | 39 | 32 | 16 | 3 | 0 | 0 | 3 | 0 | 0 |
| Auditory Attention | 2 | 10 | 4 | 1 | 2 | 0 | 0 | 1 | 0 | 0 |
| Sound Localization | 44 | 95 | 83 | 84 | 54 | 52 | 39 | 32 | 13 | 138 |
| Speech Recognition | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Speech Clarity | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Flags out of all possible ability ratings | 23.36% (656/2808) | 22.74% (1,490/6,552) | 21.67% (1,228/5,668) | 30.75% (1,599/5,200) | 21.70% (1,027/4,732) | 16.25% (845/5,200) | 11.52% (605/5,252) | 10.69% (556/5,200) | 16.00% (258/1612) | 23.66% (2362/9984) |

Table 2. Level Flags Due to Large SE_M

| Element Name | Cycle1&2 (N = 180) | Cycle 3 (N = 109) | Cycle 4 (N = 100) | Cycle 5 (N = 91) | Cycle 6 (N = 100) | Cycle 7 (N = 101) | Cycle 8 (N = 100) | Cycle 9 (N = 31) | Cycle 10 (N = 192) |
|------------------------|------------------------------------|------------------------------|------------------------------|-----------------------------|------------------------------|------------------------------|------------------------------|-----------------------------|-------------------------------|
| Oral Comprehension | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Written Comprehension | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Oral Expression | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Written Expression | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| Fluency of Ideas | 7.5 | 10 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| Originality | 2 | 8 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Problem Sensitivity | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Deductive Reasoning | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Inductive Reasoning | 0.5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Information Ordering | 0.5 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Category Flexibility | 1 | 10 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Mathematical Reasoning | 4 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| Number Facility | 8 | 10 | 9 | 3 | 1 | 2 | 0 | 0 | 0 |
| Memorization | 10.5 | 18 | 1 | 5 | 3 | 5 | 2 | 0 | 1 |
| Speed of Closure | 18 | 29 | 5 | 10 | 4 | 4 | 2 | 1 | 1 |
| Flexibility of Closure | 21.5 | 35 | 22 | 5 | 1 | 1 | 1 | 0 | 1 |
| Perceptual Speed | 13.5 | 15 | 9 | 3 | 0 | 1 | 0 | 0 | 1 |
| Spatial Orientation | 5 | 6 | 1 | 1 | 1 | 4 | 3 | 2 | 0 |
| Visualization | 16 | 26 | 16 | 6 | 4 | 1 | 0 | 1 | 0 |
| Selective Attention | 1 | 6 | 0 | 2 | 0 | 1 | 0 | 0 | 0 |
| Time Sharing | 3 | 7 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Arm-Hand Steadiness | 2.5 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Manual Dexterity | 7 | 9 | 2 | 4 | 0 | 0 | 0 | 2 | 2 |
| Finger Dexterity | 10 | 9 | 0 | 3 | 0 | 0 | 0 | 1 | 1 |
| Control Precision | 4.5 | 8 | 4 | 5 | 1 | 1 | 1 | 4 | 4 |
| Multilimb Coordination | 4 | 5 | 1 | 5 | 1 | 0 | 0 | 0 | 1 |
| Response Orientation | 7 | 11 | 4 | 3 | 1 | 5 | 3 | 0 | 1 |
| Rate Control | 2.5 | 6 | 0 | 3 | 1 | 1 | 2 | 0 | 1 |
| Reaction Time | 12.5 | 19 | 4 | 4 | 3 | 13 | 2 | 0 | 1 |
| Wrist-Finger Speed | 27 | 7 | 1 | 2 | 2 | 15 | 0 | 1 | 2 |
| Speed of Limb Movement | 2.5 | 13 | 2 | 1 | 1 | 7 | 4 | 0 | 0 |

Table Continued on Next Page

| Element Name | Cycle1&2 (N = 180) | Cycle 3 (N = 109) | Cycle 4 (N = 100) | Cycle 5 (N = 91) | Cycle 6 (N = 100) | Cycle 7 (N = 101) | Cycle 8 (N = 100) | Cycle 9 (N = 31) | Cycle 10 (N = 192) |
|---|-----------------------------------|-----------------------------|-----------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|----------------------------|------------------------------|
| Static Strength | 5 | 12 | 4 | 0 | 0 | 3 | 4 | 0 | 0 |
| Explosive Strength | 3 | 6 | 0 | 1 | 3 | 2 | 2 | 0 | 2 |
| Dynamic Strength | 5.5 | 9 | 2 | 2 | 2 | 2 | 3 | 0 | 0 |
| Trunk Strength | 1.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Stamina | 2.5 | 3 | 1 | 1 | 0 | 1 | 0 | 0 | 0 |
| Extent Flexibility | 7 | 14 | 0 | 5 | 4 | 10 | 4 | 0 | 0 |
| Dynamic Flexibility | 4 | 5 | 0 | 0 | 0 | 1 | 2 | 0 | 1 |
| Gross Body Coordination | 0 | 2 | 1 | 1 | 0 | 1 | 1 | 0 | 0 |
| Gross Body Equilibrium | 2 | 5 | 1 | 1 | 1 | 1 | 1 | 0 | 1 |
| Near Vision | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Far Vision | 15 | 20 | 3 | 9 | 0 | 1 | 0 | 1 | 2 |
| Visual Color Discrimination | 10.5 | 18 | 7 | 4 | 1 | 2 | 8 | 1 | 1 |
| Night Vision | 3.5 | 1 | 0 | 0 | 3 | 3 | 4 | 0 | 1 |
| Peripheral Vision | 1.5 | 3 | 0 | 2 | 1 | 6 | 1 | 0 | 0 |
| Depth Perception | 0.5 | 8 | 2 | 1 | 0 | 0 | 0 | 0 | 0 |
| Glare Sensitivity | 2 | 9 | 1 | 0 | 0 | 2 | 6 | 1 | 2 |
| Hearing Sensitivity | 4.5 | 10 | 5 | 4 | 1 | 2 | 2 | 0 | 0 |
| Auditory Attention | 5 | 23 | 0 | 2 | 6 | 10 | 11 | 2 | 1 |
| Sound Localization | 5 | 8 | 4 | 3 | 2 | 5 | 3 | 1 | 4 |
| Speech Recognition | 4 | 3 | 4 | 2 | 1 | 3 | 0 | 0 | 0 |
| Speech Clarity | 1 | 6 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Total Flags out of all possible ability ratings | 5.81% (544/9360) | 7.82% (443/5668) | 2.31% (120/5200) | 2.30% (109/4732) | 0.94% (49/5200) | 2.27% (119/5252) | 1.40% (73/5200) | 1.16% (18/1612) | 0.33% (33/9984) |

Cycle 10 Interrater Agreement

Interrater agreement was computed to examine the level of absolute agreement among the occupational analysts in ratings within a construct for a particular occupation. For example, these indices identified the extent to which eight raters provided the same rating regarding the level of the ability *Written Comprehension* required to perform a particular occupation. To look at agreement, we calculated the standard deviation (*SD*) of ratings across occupational analysts for a given construct and scale for each occupation and the SE_M of these ratings. For both indices, lower values indicate higher agreement, and vice versa.

A summary of these results is shown in Appendix C. The columns labeled “Mean of M_S ” show the mean of the occupational analyst mean importance and level ratings across the 52 abilities for each occupation.² The columns labeled “Median of SDs ” show the median of the SDs associated with each mean importance and level rating across the 52 abilities for each occupation. Finally, the columns labeled “Median of SE_{MS} ” show the median of the SE_{MS} associated with each mean importance and level rating across the 52 abilities for each occupation.

The importance ratings across all occupations had a median SD of .52 and a median SE_M of .18. The level ratings across occupations had a median SD of .64 and a median SE_M of .23. These results for importance and level reveal that raters agreed similarly in this cycle compared to previous cycles. Overall, while the values are generally greater (indicating less agreement) for level than they are for importance, the results indicate that the ratings made by the occupational analysts were consistent for both scales.

Cycle 10 Interrater Reliability: Across Constructs Within Occupations

To examine the interrater reliability of the Cycle 10 ratings we calculated the interclass correlations ($ICC [3, k]$; Shrout & Fleiss, 1979) among the occupational analyst’s ratings to look at consistency across constructs within occupations. As mentioned previously, this calculation examines the similarity in the rank ordering and relative distance between the abilities on a particular scale within an occupation. Our target level of interrater reliability is a median $ICC (3, k)$ of .80 or greater. The value of .80 is judged to be a good rule-of-thumb that has been used in multiple contexts, including O*NET (e.g., Clement, Chauvot, Philipp, & Ambrose, 2003; McCloy, et al., 1999; Rase & Tognetti-Stuff, 1983).

The results of these analyses are presented in Appendix D. The data revealed high levels of interrater reliability across the 192 Cycle 10 occupations. Specifically, the mean and median ICC for importance ratings for the abilities across the occupations was .96 and .97 ($SD = .03$), respectively. The mean and median ICC for the level ratings were also .96 and .97, respectively ($SD = .03$). The reliability for both the importance and level ratings exceeded the median target coefficient value of .80. Results also indicate that for the most part, occupations with the lowest reliability coefficients for importance had the lowest values for level ratings. This may be due to the skip pattern which forces a “0” for level if the ability is rated not important. Overall, the results support a good level of agreement in the occupational analysts’ ratings.

² While the mean is not a measure of agreement, it can affect the potential range of the SD and SE_M .

Cycle 10 Interrater Reliability: Across Occupations Within Constructs

Another effective way to evaluate the reliability of the occupational analyst’s ratings is to look at the consistency across occupations within constructs. This type of reliability is the extent to which raters agree about the order of and relative distance among occupations on a particular scale for a particular construct. For example, is there consistency across raters in how they differentiate among occupations on the required level of the ability *Oral Comprehension*? To make this evaluation, Shrout and Fleiss’ (1979) $ICC(3, k)$ is calculated for each construct on each scale (instead of for each occupation on each scale as described above). For example, each of the 52 ability importance scale ratings will have a reliability value. The target level of interrater reliability for this coefficient is that the median $ICC(3, k)$ across the construct ratings for a particular domain on a particular scale be .80 or greater (e.g., the median reliability across 52 ability level ratings should be at least .80). The value of .80 is judged to be a good rule-of-thumb that has been used in multiple contexts, including O*NET (e.g., Clement, Chauvot, Philipp, & Ambrose, 2003; McCloy, et al., 1999; Rase & Tognetti-Stuff, 1983).

This reliability analysis was conducted for abilities on all occupations in Cycles 1 through 10 and results are presented in Table 3. Note that a number of occupations were rated in two different cycles (e.g., Cycles 5 and 7); therefore, the reliability analyses are based on 1,004 rating targets. The values in the columns titled $ICC(C,1)$ reflect the single rater reliabilities, whereas the values in the columns titled $ICC(C,8)$ reflect the reliability for eight raters. Overall for the abilities, the median $ICC(C,8)$ across the construct ratings for importance was .87 ($M = .84, SD = .11$) and for level was .90 ($M = .87, SD = .09$). This indicates that on the whole, the reliabilities achieved the target level. The majority of the abilities had high $ICC(C,8)$ reliabilities for both importance and level. In fact, there were 20 ability levels with reliabilities greater than .90 for both importance and level (e.g., Spatial Orientation). However, there are some low reliabilities to note.

Table 3. Interrater Reliabilities and Standard Errors of Measurement for Abilities Across Occupations in Cycles 1 through 10

| Ability | | Cycles 1 through 10 (N = 1,004) | | | | | |
|---------|------------------------|---------------------------------|----------|-------|----------|----------|-------|
| | | Importance | | | Level | | |
| | | ICC(C,1) | ICC(C,8) | s_E | ICC(C,1) | ICC(C,8) | s_E |
| 1 | Oral Comprehension | 0.40 | 0.84 | 0.18 | 0.50 | 0.89 | 0.20 |
| 2 | Written Comprehension | 0.49 | 0.89 | 0.19 | 0.60 | 0.92 | 0.21 |
| 3 | Oral Expression | 0.48 | 0.88 | 0.18 | 0.53 | 0.90 | 0.20 |
| 4 | Written Expression | 0.49 | 0.88 | 0.20 | 0.62 | 0.93 | 0.24 |
| 5 | Fluency of Ideas | 0.39 | 0.84 | 0.21 | 0.47 | 0.88 | 0.28 |
| 6 | Originality | 0.46 | 0.87 | 0.20 | 0.52 | 0.90 | 0.27 |
| 7 | Problem Sensitivity | 0.36 | 0.82 | 0.18 | 0.49 | 0.88 | 0.23 |
| 8 | Deductive Reasoning | 0.35 | 0.81 | 0.18 | 0.50 | 0.89 | 0.23 |
| 9 | Inductive Reasoning | 0.41 | 0.85 | 0.18 | 0.52 | 0.90 | 0.23 |
| 10 | Information Ordering | 0.21 | 0.68 | 0.19 | 0.33 | 0.80 | 0.23 |
| 11 | Category Flexibility | 0.20 | 0.67 | 0.19 | 0.30 | 0.77 | 0.25 |
| 12 | Mathematical Reasoning | 0.48 | 0.88 | 0.22 | 0.57 | 0.91 | 0.30 |
| 13 | Number Facility | 0.40 | 0.84 | 0.23 | 0.50 | 0.89 | 0.32 |

Table Continued on Next Page

| | | Cycles 1 through 10 ($N = 1,004$) | | | | | |
|---------|-----------------------------|-------------------------------------|----------|-------|----------|----------|-------|
| | | Importance | | | Level | | |
| Ability | | ICC(C,1) | ICC(C,8) | s_E | ICC(C,1) | ICC(C,8) | s_E |
| 14 | Memorization | 0.18 | 0.64 | 0.23 | 0.24 | 0.72 | 0.34 |
| 15 | Speed of Closure | 0.22 | 0.69 | 0.25 | 0.29 | 0.76 | 0.35 |
| 16 | Flexibility of Closure | 0.21 | 0.68 | 0.26 | 0.28 | 0.75 | 0.33 |
| 17 | Perceptual Speed | 0.27 | 0.75 | 0.24 | 0.28 | 0.76 | 0.31 |
| 18 | Spatial Orientation | 0.56 | 0.91 | 0.19 | 0.57 | 0.91 | 0.27 |
| 19 | Visualization | 0.39 | 0.83 | 0.23 | 0.43 | 0.86 | 0.33 |
| 20 | Selective Attention | 0.12 | 0.53 | 0.21 | 0.15 | 0.59 | 0.26 |
| 21 | Time Sharing | 0.17 | 0.62 | 0.22 | 0.20 | 0.66 | 0.28 |
| 22 | Arm-Hand Steadiness | 0.73 | 0.96 | 0.19 | 0.73 | 0.96 | 0.26 |
| 23 | Manual Dexterity | 0.72 | 0.95 | 0.20 | 0.67 | 0.94 | 0.29 |
| 24 | Finger Dexterity | 0.44 | 0.86 | 0.23 | 0.44 | 0.87 | 0.29 |
| 25 | Control Precision | 0.72 | 0.95 | 0.19 | 0.69 | 0.95 | 0.29 |
| 26 | Multilimb Coordination | 0.72 | 0.95 | 0.20 | 0.72 | 0.95 | 0.27 |
| 27 | Response Orientation | 0.64 | 0.93 | 0.19 | 0.68 | 0.94 | 0.29 |
| 28 | Rate Control | 0.70 | 0.95 | 0.18 | 0.69 | 0.95 | 0.26 |
| 29 | Reaction Time | 0.72 | 0.95 | 0.19 | 0.72 | 0.95 | 0.30 |
| 30 | Wrist-Finger Speed | 0.45 | 0.87 | 0.21 | 0.46 | 0.87 | 0.33 |
| 31 | Speed of Limb Movement | 0.60 | 0.92 | 0.18 | 0.62 | 0.93 | 0.26 |
| 32 | Static Strength | 0.71 | 0.95 | 0.19 | 0.75 | 0.96 | 0.27 |
| 33 | Explosive Strength | 0.40 | 0.84 | 0.13 | 0.40 | 0.84 | 0.21 |
| 34 | Dynamic Strength | 0.61 | 0.93 | 0.19 | 0.65 | 0.94 | 0.26 |
| 35 | Trunk Strength | 0.65 | 0.94 | 0.19 | 0.69 | 0.95 | 0.26 |
| 36 | Stamina | 0.68 | 0.94 | 0.18 | 0.67 | 0.94 | 0.25 |
| 37 | Extent Flexibility | 0.74 | 0.96 | 0.17 | 0.75 | 0.96 | 0.28 |
| 38 | Dynamic Flexibility | 0.21 | 0.68 | 0.11 | 0.23 | 0.71 | 0.17 |
| 39 | Gross Body Coordination | 0.65 | 0.94 | 0.18 | 0.69 | 0.95 | 0.25 |
| 40 | Gross Body Equilibrium | 0.63 | 0.93 | 0.17 | 0.63 | 0.93 | 0.25 |
| 41 | Near Vision | 0.15 | 0.58 | 0.19 | 0.32 | 0.79 | 0.24 |
| 42 | Far Vision | 0.34 | 0.80 | 0.23 | 0.32 | 0.79 | 0.32 |
| 43 | Visual Color Discrimination | 0.38 | 0.83 | 0.23 | 0.41 | 0.85 | 0.33 |
| 44 | Night Vision | 0.52 | 0.90 | 0.16 | 0.54 | 0.90 | 0.24 |
| 45 | Peripheral Vision | 0.59 | 0.92 | 0.15 | 0.60 | 0.92 | 0.22 |
| 46 | Depth Perception | 0.59 | 0.92 | 0.20 | 0.59 | 0.92 | 0.28 |
| 47 | Glare Sensitivity | 0.65 | 0.94 | 0.15 | 0.68 | 0.95 | 0.23 |
| 48 | Hearing Sensitivity | 0.42 | 0.85 | 0.24 | 0.43 | 0.86 | 0.32 |
| 49 | Auditory Attention | 0.34 | 0.80 | 0.23 | 0.37 | 0.82 | 0.34 |
| 50 | Sound Localization | 0.50 | 0.89 | 0.17 | 0.53 | 0.90 | 0.25 |
| 51 | Speech Recognition | 0.20 | 0.67 | 0.21 | 0.25 | 0.73 | 0.29 |
| 52 | Speech Clarity | 0.36 | 0.82 | 0.19 | 0.38 | 0.83 | 0.27 |

Note. These ICCs indicate how consistently raters rated (rank ordered) occupations on a given ability. s_E = Standard error of measurement = Observed score variance times the square root of one minus ICC(C,8).

The lowest ability ICC(C,8) reliabilities were found for Selective Attention and Near Vision, both of which had importance reliabilities under .60. The constructs with the lowest level reliabilities was Selective Attention and Time Sharing, neither of which had reliabilities exceeding .70. Even though these are not the only abilities with low variation in the importance

or required level across jobs, low variance is a contributing factor to low reliability. Also, the reliabilities are consistent with those in the previous cycles for these constructs.

Eight additional abilities had ICC(C,8) reliabilities for importance that were less than .70: Time Sharing, Memorization, Speech Recognition, Category Flexibility, Dynamic Flexibility, Flexibility of closure, Information Ordering, and Speed of Closure. ICC(C,8) reliabilities for the level ratings of these abilities (except for Time Sharing) were greater than .70. The observed differences in ability reliabilities for importance and level likely reflect high agreement but lack of variability in the ratings of these constructs across occupations on importance yet high agreement and high variation in the ratings of these constructs across occupations on level.

Keep in mind that some variation in calculated values is likely to occur by chance. As previously described, the goal was for the ICC(C,8) reliabilities to have a median value across constructs of .80 or greater, which was achieved for both importance and level (.87 and .90, respectively). These results suggest that there was a good level of agreement among the raters with respect to the order and relative distance among occupations on particular constructs for importance and level.

Summary

The main findings of the analysis of Cycle 10 analyst ratings were as follows:

- About 23% of the ability level ratings were flagged as “not relevant” because the construct was considered not important for performance. This is an increase from the most recent cycles, but not the highest it has ever been (30%). The constructs that were flagged were very similar to those flagged in previous cycles and conceptually it is understandable that these constructs may be considered not-relevant for the given occupations.
- Less than 1 percent of the level ratings were flagged based on a SE_M greater than .51; this is the lowest percentage compared to all previous cycles.
- There was strong interrater agreement for this cycle as evidenced by the overall low medians of SE_{MS} .
- All within-occupation ICC reliabilities were well above the target value of .80. These high levels of interrater reliability indicate that the occupational analysts rank ordered the abilities within each occupation similarly on both importance and level.
- Index interrater reliability calculated at the end of Cycle 10 was high and did not vary greatly from one occupation to the next.
- The importance and level median across-occupation ICC reliabilities were above the target value of .80. These high levels of interrater reliability indicate that analysts rank ordered occupations within each ability similarly on both importance and level.

Given these results, it appears as though the analysts were well trained and understand the abilities and associated definitions. Review training for returning analysts and, if required, new analyst training will continue to occur prior to each new cycle. Agreement was high and there is clear evidence regarding the quality of the data.

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