

libq\_vir.wp1 9/5/06

RUNNING HEAD: Integrity of Service Quality Data

How You Can Evaluate the Integrity of Your  
Library Service Quality Assessment Data: Intercontinental  
LibQUAL+® Analyses Used as Concrete Heuristic Examples

Bruce Thompson

*Texas A&M University  
and  
Baylor College of Medicine*

Martha Kyrillidou

*Association of Research Libraries*

Colleen Cook

*Texas A&M University*

---

Paper presented at the Library Assessment Conference: Building Effective, Sustainable, Practical Assessment, Charlottesville, VA, September 25, 2006.

How You Can Evaluate the Integrity of Your  
Library Service Quality Assessment Data: Intercontinental  
LibQUAL+® Analyses Used as Concrete Heuristic Examples

Abstract

This user-friendly, conversational presentation explains how you can evaluate the integrity or trustworthiness of library service quality assessment data. Using the metaphor of a bathroom scale, the ideas underlying (a) score reliability and (b) score validity are presented in an accessible manner. The use of the software, SPSS, to compute the related statistics is illustrated. LibQUAL+® data are used in heuristic examples, to make the discussion concrete, but the illustrations apply to both new and other measures of library service quality. We ought always empirically check our assumptions about the quality of our data whenever we try to characterize service quality.

Librarians and library patrons have always recognized that measures of library input metrics, such as collection counts, were limited indicators of library service quality. The library with the biggest collection might not be best organized to help users find the information they need, while a smaller library with a more humble collection might be staffed by user-sensitive librarians who are intensely passionate about helping users locate the information they seek (Heath, Cook, Kyrillidou & Thompson, 2002; Kyrillidou & Heath, 2004).

The growing influence of the Internet has heightened awareness of the limitations of input metrics as indicators of service quality (Thompson, Kyrillidou & Cook, 2006). Around 1996 both library reference and circulation transactions began downward trends, reflecting the growing use of the Web (a) to identify sources of needed information and (b) to obtain the information, often in digital form (Kyrillidou & Young, 2005). In consideration of these trends, in October, 1999, the Association of Research Libraries (ARL) Statistics and Measurement Committee and the ARL Research Library Leadership and Management Committee initiated the ARL New Measures Initiative, which encompasses a variety of projects including LibQUAL+® (Cook, 2002b), DigiQUAL™, E-Metrics (Kyrillidou & Giersch, 2004), and MINES for Libraries (Kyrillidou, Olshen, Franklin & Plum, 2006), all sensitive to alternative service quality metrics.

One of these measures, LibQUAL+®, is a "total market survey" intended to help librarians understand user perceptions, and thus improve service quality and better meet patron information needs.

A total-market survey is one of the 11 ways of listening to users elaborated by Len Berry (1995), and implies (a) benchmarking against the service performance of alternative service providers, and (b) measuring perceptions of both users and nonusers to explore potential reasons for the nonuse of services.

LibQUAL+® has been used to collect data from more than 600,000 users at more than 800 institutions. LibQUAL+® has been used in various language variations in the United States, Canada, Australia, England, France, Ireland, Scotland, the Netherlands, Switzerland, Denmark, Finland, Norway, Sweden, Egypt, the United Arab Emirates, and South Africa.

#### Evaluating the Integrity of Service Quality Assessment Data

When we collect data about library service quality, we cannot simply assume that our quantitative numbers or our qualitative comments have sufficient integrity that the data merit any attention whatsoever. No data are perfect. The question, then, is whether our data are reasonably sufficient to answer the questions we wish to pose regarding library service quality.

Two questions must be considered with respect to quantitative data (e.g., surveys of user perceptions). These two questions are relevant irrespective of whether the assessment tool is new (e.g., a locally-developed survey designed for one time use), or an existing tool, such as LibQUAL+®, which has been subjected to several dozen published studies investigating the psychometric integrity of its scores (cf. Thompson & Cook, 2002; Thompson, Cook & Heath, 2003; Thompson, Cook & Kyrillidou, 2005; Thompson, Cook, & Thompson, 2002).

Thompson (2003, pp. 4-7) explained these two questions using the analogy of weighing oneself on a bathroom scale every morning. The same analogy will be used here.

#### Purposes of the Present Paper

The purpose of the present paper is to provide a user-friendly, conversational presentation that explains how you can evaluate the integrity or trustworthiness of library service quality assessment data. Two major score integrity concerns, (a) score reliability and (b) score validity, are presented in an accessible manner. And the use of the software, SPSS, to compute the related statistics is illustrated using actual data.

#### #1 Score Reliability: Do My Scores Measure Anything?

Many of us weigh ourselves each morning on a bathroom scale. Sometimes on a given day we are happy with the result. On other occasions, however, we may be less than thrilled. On days such as this many of us then acquiesce to an impulse to reweigh ourselves in an attempt to obtain a more favorable outcome. If your second score is half a pound lighter, you may irrationally feel somewhat happier, and stop weighing yourself.

But alternatively,

...if your second weight measurement yields a score 25 pounds lighter than the initial measurement, rather than feeling happy, you may instead feel puzzled or perplexed. If you then measure your weight a third time, and the resulting score is 40 pounds heavier, you probably will question the integrity of all the scores produced by your scale.

It has begun to appear that your scale is exclusively producing randomly fluctuating scores. In essence, your scale measures "nothing." That is, measurement protocols measure "nothing" when the scores they produce are completely unrelated to any and all systematic or nonrandom dynamics... When measurements yield scores measuring "nothing," the scores are said to be "unreliable." (Thompson, 2003, p. 4)

Assessments that measure absolutely nothing (i.e., are perfectly random) are quite useful. For example, we commonly use tools that yield perfectly unreliable scores in buildings called "casinos." Or parents who obsess about fairness may assign household chores to their children by randomly drawing paper slips out of a hat. We also use such tools to produce remarkably representative samples by randomly selecting which voters will complete a Gallup Poll, or which university students and faculty will complete LibQUAL+®.

But when we want to know users' (or potential users') perceptions of library service quality, which we presume to be reasonably nonrandom and stable (at least over the course of a few minutes), we want our assessment scores to have as little randomness as possible. Of course, we recognize that perfect reliability is illusive: even the atomic clock maintained by the U.S. Naval Observatory loses a second every 400 years! But we want our library service quality assessment data to be at least Goldilocks

"good enough".

The criterion for acceptable score reliability is context specific. When we are using scores to decide which hospitalized patients to disconnect from life support, we will accept very, very little randomness. When we are deciding which preschoolers will have gold versus silver stars pasted on their foreheads as they leave school each day, our standards may be somewhat relaxed, because the consequences of a misjudgment are much less severe.

Of the many coefficients that can be used to quantify score reliability (see Thompson, 2003), the most commonly used is the coefficient called Cronbach's alpha (Cronbach, 1951). Theoretically, coefficient alpha would be 1.0 if the scores had no random influences, and 0.0 if the scores were purely random. When alpha is less than 0.0 (i.e., negative), and especially less than -1.0, the scores are without question compromised (see Thompson, 2003). In social science research, alpha coefficients of at least 0.70 are often considered acceptable (Nunnally, 1978).

#### Estimating Cronbach's alpha

The computation of Cronbach's alpha is relatively straightforward using software such as SPSS. The 22 core LibQUAL+® items for American English have variable names such "AS01A\_pr", "IC02ABpr", and "LP03ABpr". The commands required to obtain alpha coefficients for the (a) Service Affect, (b) Library as Place, (c) Information Control, and (d) total LibQUAL+® scores can be typed into the SPSS syntax window:

```
reliability variables=
  AS01A_pr IC02ABpr LP03ABpr AS04ABpr IC05ABpr
  AS06A_pr IC07ABpr LP08A_pr AS09A_pr IC10ABpr
  AS11A_pr LP12ABpr AS13A_pr IC14ABpr AS15A_pr
```

```

IC16ABpr LP17A_pr AS18ABpr IC19ABpr IC20ABpr
LP21A_pr AS22ABpr /
scale(serv aff)=
AS01A_pr AS04ABpr AS06A_pr AS09A_pr AS11A_pr
AS13A_pr AS15A_pr AS18ABpr AS22ABpr /
scale(libplace)=
LP03ABpr LP08A_pr LP12ABpr LP17A_pr LP21A_pr /
scale(info con)=
IC02ABpr IC05ABpr IC07ABpr IC10ABpr IC14ABpr
IC16ABpr IC19ABpr IC20ABpr /
scale(LibQUALt)=
AS01A_pr AS04ABpr AS06A_pr AS09A_pr AS11A_pr
AS13A_pr AS15A_pr AS18ABpr AS22ABpr
LP03ABpr LP08A_pr LP12ABpr LP17A_pr LP21A_pr
IC02ABpr IC05ABpr IC07ABpr IC10ABpr IC14ABpr
IC16ABpr IC19ABpr IC20ABpr /
model=alpha/statistics=descriptive/summary=total .

```

and then executed.

Table 1 presents the Cronbach's alpha coefficients for scores on the three scales and the total protocol across 9 languages from the Session #1, 2006 LibQUAL+® administration. Note that reliability varies somewhat across data sources (e.g., different cultures, different points of time of measurement), a finding that reinforces again the important point that tests are not reliable, and instead scores have this property (Thompson, 1994; Thompson & Vacha-Haase, 2000). Thus, never say "the test is reliable" and do not refer to "the reliability of my test." Talk instead about the reliability of your scores.

---

INSERT TABLE 1 ABOUT HERE

---

### Controlling Score Reliability

What do we do if our scores do not have sufficient reliability for our purposes? The answer to this question requires us to understand the basic factors that drive score reliability. The biggest influence on score reliability is score "spreadoutness" or dispersion (see Reinhardt, 1996). For an accessible treatment of



score dispersion or variability, see Thompson (2006, chapter 3).

Scores tend to be more reliable when the scores in a dataset are more dissimilar from each other. For example, scores ranging from "1" to "5" for a dataset involving 300 library users will tend to be less reliable than scores ranging from "1" to "99" for 300 users.

Various methods can be used to try to increase score "spreadoutness." For example, changing a response format for 10 items from "yes-no" (with a corresponding potential total score of 0 to 10) to "1"-to-"5" (with a corresponding potential total score of "10" to "50") can yield greater score variability.

Another way potentially to increase score variability is simply to add more items. For example, the potential score range (i.e., 40) if people answer 10 items using a "1"-to-"5" response format is "10" (i.e., 1x10) to "50" (i.e., 5x10), but the potential score range (i.e., 80) is "20" (i.e., 1x20) to "100" (i.e., 5x20) if people use the same response format to respond instead to 20 items.

Notice in Table 1 that scores on the total LibQUAL+® protocol tend to be considerably more reliable than scores on the Service Affect scale, and especially the Library as Place scale. This reflects the fact that the total scores involve 22 items, Service Affect involves 9 items, and Library as Place involves only 5 items.

#### Item Analysis

However, score reliability will not be equal even for all assessments containing a given identical number of items. Some

items are simply better than others. We can determine which items are performing best by conducting an "item analysis." Furthermore, bad items can actually not just not help score reliability, but actually lower score reliability, so we want to eliminate bad items whenever possible, especially during the development of new measures when bad items are quite frequently present.

Table 2 presents the item analysis results produced by the previous SPSS syntax for the 56,799 American English participants from the Session #1, 2006 LibQUAL+® administration. There are two primary coefficients generated by item analyses.

---

INSERT TABLE 2 ABOUT HERE

---

Item Discrimination. Logically, if I weighed myself one morning on 22 bathroom scales, and 21 scales yielded an estimate of 185 pounds, and one scale yielded an estimate of 273 pounds, I would suspect that the last scale was broken. We expect scores from the individual variables used to estimate a total score to be highly correlated with each other, and with the total score as well.

The statistic that measures these dynamics is called "item-to-total-score correlation" or "item discrimination". We want this value to approach +1.0. We definitely don't want items with discrimination coefficients such as 0.0, or -0.25.

However, there is a complication. If we correlated the scores (ranging for each person from "1" to "9") on LibQUAL+® item #1, "AS01A\_PR", with scores on the total protocol (ranging from 1x22 = "22" to 9x22 = "198"), we would overestimate the correlation,

because the total scores themselves include the scores on item #1, "AS01A\_PR". This inflates our estimated characterization of how well the items are functioning together to yield a single score.

The fix is to correlate the scores on LibQUAL+® item #1, "AS01A\_PR", with scores on the total protocol excluding item #1 and using only items 2 through 22, with total scores now ranging from  $1 \times 21 = "21"$  to  $9 \times 21 = "189"$ ). This is called a "corrected item discrimination" coefficient, and is computed quite painlessly in SPSS for each item in turn.

We want the item discrimination coefficients to be positive and approach +1.0. According to Table 2, the item "AS15A\_PR", "Employees who understand the needs of the users", was the best item (corrected discrimination coefficient = +0.7877). The worst item was "IC02ABPR", "Making electronic resources accessible from home or office" (corrected discrimination coefficient = +0.5789). Of course, all these 22 items had reasonable discrimination coefficients, because LibQUAL+® is not a new measure in the early stages of development. These 22 items have already been rigorously vetted across a series of analyses and data sources.

Coefficient alpha-if-Deleted. A related item analysis statistic reported by SPSS is alpha-if-item-deleted. As in love, we can detect the best item by determining which loss makes us feel the most pain (e.g., most worsens the score reliability if not used).

Deleting bad items will actually improve score reliability, so the worst item is the item that when not used most improves score reliability. Bad items are commonly encountered when measures are

first developed. However, in the present example, no item deletions result in improved score reliability. The best items were items "AS15A\_PR", "Employees who understand the needs of the users", and "AS18A\_PR", "Willingness to help users" (i.e., alpha-if-item-deleted = 0.9559), because there is the greatest gap (albeit a very, very small gap) between +0.9559 and the actual reliability for 22 items of 0.96.

These results, involving no large gaps between reliability for scores on all 22 items and reliabilities when given items are deleted, suggest that deleting given items would have little impact on the reliability of the total scores, and thus perhaps the protocol could be shortened without much consequence. Survey participants might appreciate a shorter protocol! However, the (a) reliability of the subscale scores also must be considered, along with (b) changes in the implicit 9-to-8-to-5 weighting of the three dimensions if some items were deleted, when considering dropping items.

#### #2: Score Validity: Do My Scores Measure the Right Something?

Once we establish score reliability, score validity becomes of interest. Validity asks whether scores measuring something measure the correct something, and only the correct something. Returning to our bathroom scale example,

Let's presume that upon repeated uses on a given morning your bathroom scale (to your possible disappointment) repeatedly yields the same estimate of your weight: 200 pounds. This evidence suggests that the scores may be reliable. However, if you

inferred from your score(s), "Gosh, I must be brilliant, because an IQ of 200 is quite high," questions of score validity might arise! (Thompson, 2003, p. 6)

Of course, presuming our library service quality assessment is intended to measure "something," if we determine that the scores are insufficiently reliable, questions of validity are then rendered irrelevant.

There are many, many statistical methods to help evaluate whether our scores, given that they measure something, measure the correct something, and only the correct something (i.e., score validity). But one useful statistical analysis related to these issues is called "factor analysis" (see Thompson, 2004, for a relatively readable treatment that uses LibQUAL+® data in all examples). As Nunnally (1978) noted, "factor analysis is intimately involved with questions of validity.... Factor analysis is at the heart of the measurement of psychological constructs" (pp. 112-113).

Factor analysis answers questions such as:

1. Do the relationships among responses indicate the presence of the expected number of item groupings or factors (e.g., for LibQUAL+®, three)?
2. Do items measure the intended factors, and only the intended factors?

For our data, the required SPSS syntax is:

```
factor variables=  
  AS01A_pr AS04ABpr AS06A_pr AS09A_pr AS11A_pr  
  AS13A_pr AS15A_pr AS18ABpr AS22ABpr  
  LP03ABpr LP08A_pr LP12ABpr LP17A_pr LP21A_pr
```

```

IC02ABpr IC05ABpr IC07ABpr IC10ABpr IC14ABpr
IC16ABpr IC19ABpr IC20ABpr /
print=univariate initial rotation kmo fscore /
criteria=factors(3) iterate(75)/
extraction=pc/rotation=varimax .

```

Table 3 reports the coefficients produced by this analysis.

---

INSERT TABLE 3 ABOUT HERE

---

The tabled results suggest that three factors emerged, as expected. And as a general rule, the three factors consist of the expected variables. Thus, the present results are supportive of a conclusion that LibQUAL+® scores are valid.

Of course, the ultimate proof of the validity pudding is whether the scores are useful in improving patron perceptions of library service quality (see Cook, 2002a; Heath, Kyrillidou & Askew, 2004). And it also must be remembered that consistently about 40% of LibQUAL+® participants write comments to help guide library service quality improvement! It can be mathematically proven that:

40% x 600,000 participants = 240,000 comments!!!

#### Summary

When we collect library service quality assessment data, we cannot assume that our scores have sufficient integrity to guide appropriate action. Indeed, bad data can lead to bad decisions that actually hurt service quality. We must evaluate whether our quantitative data sufficiently measure something (i.e., are reliable), and primarily measure the correct something (i.e., are valid).

We cannot assume that tools that function well in one location

will necessarily function well in another location. And we cannot assume that tools that function well at one point in time will necessarily remain useful indefinitely. We ought always empirically check our assumptions about the quality of our data whenever we try to characterize service quality (Kyrillidou, 2006).

The present paper has provided some guidance on using SPSS for reliability and validity analyses of library service quality assessment data. Deeper understanding of these applications can be derived from personal experience working with real data, or from the numerous training venues offered by the Association for Research Libraries, including the ARL Service Quality Evaluation Academy: <<http://www.arl.org/stats/academy07.html>>.

References

- Berry, L. (1995). On great service: A framework for action. New York: The Free Press.
- Cook, C. (Guest Ed.). (2002a). Library decision-makers speak to their uses of their LibQUAL+™ data: Some LibQUAL+™ case studies. Performance Measurement and Metrics, 3.
- Cook, C. C. (2002b). A mixed-methods approach to the identification and measurement of academic library service quality constructs: LibQUAL+™. (Doctoral dissertation, Texas A&M University, 2001). Dissertation Abstracts International, 62, 2295A. (University Microfilms No. AAT3020024)
- Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. Psychometrika, 16, 197-334.
- Heath, F., Cook, C., Kyrillidou, M., & Thompson, B. (2002). ARL index and other validity correlates of LibQUAL+™ scores. portal: Libraries and the Academy, 2, 27-42.
- Heath, F., Kyrillidou, M., & Askew, C. (Eds). (2004). Libraries act on their LibQUAL+™ findings: From data to action. Journal of Library Administration, 40, 1-239.
- Kyrillidou, M. (2006). Service quality: A perceived outcome for libraries. In P. Herson, R.E. Dungan, & C. Schwartz (Eds.), Revisiting outcomes assessment in higher education (pp. 351-366). Westport, CN: Libraries Unlimited.
- Kyrillidou, M. & Giersch S. (2004). Qualitative analysis of ARL e-metrics participant feedback about the evolution of measures for networked electronic resources. Library Quarterly, 74, 423-440.



- Kyrillidou, M. & Heath, F. (2004). The starving research library user: Relationships between library institutional characteristics and Spring 2002 LibQUAL+™ scores. Journal of Library Administration, 40, 1-11.
- Kyrillidou, M., Olshen, T., Franklin, B., & Plum, T. (2006). MINES for Libraries™: Measuring the impact of networked electronic services and the Ontario Council of University Libraries' Scholar Portal (Final Report). Washington, DC: Association of Research Libraries.
- Kyrillidou, M. & Young, M. (2005). ARL statistics 2003-2004. Washington, DC: Association of Research Libraries.
- Nunnally, J.C. (1978). Psychometric theory (2nd ed.). New York: McGraw-Hill.
- Reinhardt, B. (1996). Factors affecting coefficient alpha: A mini Monte Carlo study. In B. Thompson (Ed.), Advances in social science methodology (Vol. 4, pp. 3-20). Greenwich, CT: JAI Press.
- Thompson, B. (1994). Guidelines for authors. Educational and Psychological Measurement, 54, 837-847.
- Thompson, B. (Ed.). (2003). Score reliability: Contemporary thinking on reliability issues. Newbury Park, CA: Sage.
- Thompson, B. (2004). Exploratory and confirmatory factor analysis: Understanding concepts and applications. Washington, DC: American Psychological Association.
- Thompson, B. (2006). Foundations of behavioral statistics: An insight-based approach. New York: Guilford.
- Thompson, B., & Cook, C. (2002). Stability of the reliability of

LibQUAL+™ scores: A "Reliability Generalization" meta-analysis study. Educational and Psychological Measurement, 62, 735-743.

Thompson, B., Cook, C., & Heath, F. (2003). Structure of perceptions of service quality in libraries: A LibQUAL+™ study. Structural Equation Modeling, 10, 456-464.

Thompson, B., Cook, C., & Kyrillidou, M. (2005). Concurrent validity of LibQUAL+™ scores: What do LibQUAL+™ scores measure? Journal of Academic Librarianship, 31, 517-522.

Thompson, B., Cook, C., & Thompson, R.L. (2002). Reliability and structure of LibQUAL+™ scores: Measuring perceived library service quality. portal: Libraries and the Academy, 2, 3-12.

Thompson, B., Kyrillidou, M. & Cook, C.C. (2006). On-premises library versus Google™-like information gateway usage patterns and perceptions across time and cultures: A LibQUAL+® study. Manuscript submitted for publication.

Thompson, B., & Vacha-Haase, T. (2000). Psychometrics is datametrics: The test is not reliable. Educational and Psychological Measurement, 60, 174-195.

Table 1  
 Reliability Analysis for the 22 Core LibQUAL+® Items  
 for the First Session 2006 Data

Language	n	Scale			LibQUAL+®
		Service Affect	Library as Place	Information Control	
American English	56,799	.94	.89	.91	.96
British English	12,004	.93	.84	.89	.95
Dutch	783	.92	.79	.87	.92
Swedish	1,177	.92	.78	.86	.93
European French	213	.93	.81	.85	.92
German	605	.93	.80	.87	.93
Norwegian	318	.94	.77	.89	.95
Finnish	791	.94	.80	.87	.94
Danish	554	.89	.80	.83	.91

Table 2  
 Item Analysis for the 22 Core LibQUAL+® Items  
 for the American English ( $n = 56,799$ ) First Session 2006 Data

Item	Corrected Item- Total Correlation	alpha if Item Deleted
AS01A_PR	.6777	.9571
AS04ABPR	.6862	.9570
AS06A_PR	.6961	.9569
AS09A_PR	.7573	.9562
AS11A_PR	.7586	.9562
AS13A_PR	.7641	.9561
AS15A_PR	.7877	.9559
AS18ABPR	.7822	.9559
AS22ABPR	.7546	.9562
LP03ABPR	.6362	.9578
LP08A_PR	.6388	.9577
LP12ABPR	.6839	.9571
LP17A_PR	.7197	.9566
LP21A_PR	.6313	.9578
IC02ABPR	.5789	.9582
IC05ABPR	.6578	.9573
IC07ABPR	.6789	.9571
IC10ABPR	.7150	.9567
IC14ABPR	.7262	.9566
IC16ABPR	.7475	.9563
IC19ABPR	.7779	.9560
IC20ABPR	.6793	.9571

Note. The alpha for total scores using all 22 core items was 0.96.

Table 3  
Principal Components Rotated to the Varimax Criterion  
for the American English ( $n = 56,799$ ) First Session 2006 Data

Core Item	Factor		
	I	II	III
AS01A_PR	<u>.70817</u>	.27205	.18901
AS04ABPR	<u>.70586</u>	.25481	.22757
AS06A_PR	<u>.79575</u>	.19513	.20437
AS09A_PR	<u>.75687</u>	.30560	.24241
AS11A_PR	<u>.71666</u>	.35712	.24209
AS13A_PR	<u>.80682</u>	.24598	.26048
AS15A_PR	<u>.72885</u>	.36712	.27006
AS18ABPR	<u>.77614</u>	.31365	.25939
AS22ABPR	<u>.65144</u>	.38843	.28220
LP03ABPR	.21944	.20264	<u>.79694</u>
LP08A_PR	.24396	.20670	<u>.76924</u>
LP12ABPR	.29757	.23651	<u>.75522</u>
LP17A_PR	.27837	.33786	<u>.73355</u>
LP21A_PR	.21730	.28958	<u>.70209</u>
IC02ABPR	.23967	<u>.71535</u>	.10501
IC05ABPR	.28599	<u>.69785</u>	.21529
IC07ABPR	.35004	<u>.51167</u>	.37900
IC10ABPR	.30704	<u>.73377</u>	.25650
IC14ABPR	.35444	<u>.57419</u>	.39755
IC16ABPR	.38047	<u>.66629</u>	.30473
IC19ABPR	<u>.41062</u>	<u>.65297</u>	.33541
IC20ABPR	.24650	<u>.68862</u>	.32109

**Note.** The first two letters of the item names indicate which scale an item was intended to measure: "AS" = Service Affect; "LP" = Library as Place; "IC" = Information Control. The next two characters are the item numbers for the 22 core items as they are presented to library users. Pattern/structure coefficients greater than |0.40| are underlined.

## APPENDIX A: Factor Analyses for Other Languages

Table A.1  
Principal Components Rotated to the Varimax Criterion  
for the British English ( $n = 12,004$ ) First Session 2006 Data

Core Item	Factor		
	I	II	III
AS01B_pr	<u>.71930</u>	.22918	.18546
AS04ABpr	<u>.67411</u>	.20948	.21970
AS06B_pr	<u>.79873</u>	.16269	.15555
AS09B_pr	<u>.73084</u>	.29617	.22610
AS11B_pr	<u>.68014</u>	.34518	.20430
AS13B_pr	<u>.80084</u>	.20541	.23182
AS15B_pr	<u>.72842</u>	.33624	.24272
AS18ABpr	<u>.77046</u>	.28500	.24545
AS22ABpr	<u>.62645</u>	.36246	.24168
LP03ABpr	.20923	.18332	<u>.77722</u>
LP08B_pr	.18917	.15905	<u>.77043</u>
LP12ABpr	.31911	.24112	<u>.70271</u>
LP17B_pr	.28317	.30757	<u>.74640</u>
LP21B_pr	.16086	.27362	<u>.57155</u>
IC02ABpr	.15778	<u>.68903</u>	.09388
IC05ABpr	.22477	<u>.69164</u>	.18088
IC07ABpr	.39290	<u>.46465</u>	.35721
IC10ABpr	.27456	<u>.71342</u>	.24222
IC14ABpr	.33186	<u>.56972</u>	.34676
IC16ABpr	.36015	<u>.64087</u>	.27700
IC19ABpr	<u>.41981</u>	<u>.62502</u>	.30715
IC20ABpr	.26093	<u>.67417</u>	.26933

Note. The first two letters of the item names indicate which scale an item was intended to measure: "AS" = Service Affect; "LP" = Library as Place; "IC" = Information Control. The next two characters are the item numbers for the 22 core items as they are presented to library users. Pattern/structure coefficients greater than  $|0.40|$  are underlined.

Table A.2  
Principal Components Rotated to the Varimax Criterion  
for the Dutch ( $n = 783$ ) First Session 2006 Data

Core Item	Factor		
	I	II	III
AS01DUpr	<u>.75935</u>	.18138	.09297
AS04DUpr	<u>.71829</u>	.18965	.12052
AS06DUpr	<u>.77226</u>	.13378	.13034
AS09DUpr	<u>.71532</u>	.31963	.13918
AS11DUpr	<u>.69137</u>	.30076	.18416
AS13DUpr	<u>.81804</u>	.16932	.13866
AS15DUpr	<u>.61999</u>	.28551	.27791
AS18DUpr	<u>.78983</u>	.25233	.11445
AS22DUpr	<u>.62557</u>	.25149	.16077
LP03DUpr	.16858	.11452	<u>.75944</u>
LP08DUpr	.19228	.17063	<u>.64881</u>
LP12DUpr	.16299	.19485	<u>.76655</u>
LP17DUpr	.11588	.17115	<u>.75786</u>
LP21DUpr	.08362	.07617	<u>.61838</u>
IC02DUpr	.06885	<u>.62303</u>	.08320
IC05DUpr	.16874	<u>.75956</u>	.11227
IC07DUpr	.32444	<u>.42798</u>	.27110
IC10DUpr	.28018	<u>.72240</u>	.12762
IC14DUpr	.33184	<u>.64774</u>	.17048
IC16DUpr	.25342	<u>.72266</u>	.17192
IC19DUpr	.29775	<u>.73775</u>	.12157
IC20DUpr	.24713	<u>.63909</u>	.19478

Note. The first two letters of the item names indicate which scale an item was intended to measure: "AS" = Service Affect; "LP" = Library as Place; "IC" = Information Control. The next two characters are the item numbers for the 22 core items as they are presented to library users. Pattern/structure coefficients greater than |0.40| are underlined.

Table A.3  
Principal Components Rotated to the Varimax Criterion  
for the Swedish ( $n = 1,177$ ) First Session 2006 Data

Core Item	Factor		
	I	II	III
AS01S_pr	<u>.76593</u>	.12645	.12804
AS04S_pr	<u>.52470</u>	.10189	.34934
AS06S_pr	<u>.81172</u>	.15285	.15573
AS09S_pr	<u>.74876</u>	.25418	.17100
AS11S_pr	<u>.69287</u>	.29780	.16239
AS13S_pr	<u>.81047</u>	.22757	.20035
AS15S_pr	<u>.71297</u>	.33658	.22727
AS18S_pr	<u>.73009</u>	.30363	.19160
AS22S_pr	<u>.60265</u>	<u>.40143</u>	.20105
LP03S_pr	.22334	.16191	<u>.74231</u>
LP08S_pr	.19480	.16377	<u>.74856</u>
LP12S_pr	.30975	.34151	.29081
LP17S_pr	.20708	.30133	<u>.73135</u>
LP21S_pr	.19219	.28574	<u>.65182</u>
IC02S_pr	.13758	<u>.63253</u>	.08474
IC05S_pr	.18453	<u>.67754</u>	.19145
IC07S_pr	.35060	<u>.43321</u>	.26647
IC10S_pr	.21090	<u>.71491</u>	.14886
IC14S_pr	.29896	<u>.57717</u>	.33791
IC16S_pr	.18220	<u>.72541</u>	.17677
IC19S_pr	.33584	<u>.68713</u>	.21165
IC20S_pr	.18259	<u>.64987</u>	.17770

Note. The first two letters of the item names indicate which scale an item was intended to measure: "AS" = Service Affect; "LP" = Library as Place; "IC" = Information Control. The next two characters are the item numbers for the 22 core items as they are presented to library users. Pattern/structure coefficients greater than |0.40| are underlined.



Table A.4  
Principal Components Rotated to the Varimax Criterion  
for the **Continental French** ( $n = 213$ ) First Session 2006 Data

Core Item	Factor		
	I	II	III
AS01FRpr	<u>.84536</u>	.11175	.14820
AS04FCpr	<u>.59351</u>	.30711	.18482
AS06FCpr	<u>.81476</u>	.10336	.03965
AS09FRpr	<u>.86183</u>	.17454	.07780
AS11FCpr	<u>.78718</u>	.16572	.14603
AS13FRpr	<u>.83942</u>	.27375	.10446
AS15FCpr	<u>.80584</u>	.23019	.16077
AS18FRpr	<u>.72416</u>	.29665	.15072
AS22FRpr	<u>.47491</u>	<u>.45675</u>	.26049
LP03FRpr	.23207	-.02023	<u>.74665</u>
LP08FRpr	.12247	.25205	<u>.51784</u>
LP12FRpr	.05868	.07029	<u>.84943</u>
LP17FRpr	.08890	.26106	<u>.72989</u>
LP21FCpr	.10711	.26583	<u>.71608</u>
IC02FCpr	.22093	<u>.75080</u>	-.09459
IC05FCpr	.13405	<u>.52284</u>	.14240
IC07FCpr	.32747	<u>.57281</u>	.18741
IC10FCpr	.17461	<u>.75691</u>	.06935
IC14FCpr	.23470	<u>.48328</u>	<u>.40724</u>
IC16FRpr	.12342	<u>.71837</u>	.23587
IC19FCpr	.17996	<u>.56458</u>	.37643
IC20FRpr	.19017	<u>.67116</u>	.24981

**Note.** The first two letters of the item names indicate which scale an item was intended to measure: "AS" = Service Affect; "LP" = Library as Place; "IC" = Information Control. The next two characters are the item numbers for the 22 core items as they are presented to library users. Pattern/structure coefficients greater than |0.40| are underlined.

Table A.5  
Principal Components Rotated to the Varimax Criterion  
for the German ( $n = 605$ ) First Session 2006 Data

Core Item	Factor		
	I	II	III
AS01GEpr	<u>.73050</u>	.15067	.18209
AS04GEpr	<u>.64399</u>	.16748	.27712
AS06GEpr	<u>.80651</u>	.10656	.14570
AS09GEpr	<u>.74907</u>	.29244	.18236
AS11GEpr	<u>.65231</u>	<u>.41312</u>	.09902
AS13GEpr	<u>.85047</u>	.22064	.17284
AS15GEpr	<u>.72689</u>	.37183	.12593
AS18GEpr	<u>.79287</u>	.24323	.17900
AS22GEpr	<u>.67398</u>	.34968	.10061
LP03GEpr	.11385	.16892	<u>.80730</u>
LP08GEpr	.10003	.13522	<u>.80646</u>
LP12GEpr	.23421	.29251	<u>.68329</u>
LP17GEpr	.17213	.19777	<u>.76820</u>
LP21GEpr	.18713	.05518	<u>.49747</u>
IC02GEpr	.15638	<u>.66469</u>	.02596
IC05GEpr	.18697	<u>.72074</u>	.19147
IC07GEpr	.30726	<u>.45185</u>	.32101
IC10GEpr	.18484	<u>.73561</u>	.12694
IC14GEpr	.24787	<u>.65352</u>	.24219
IC16GEpr	.26375	<u>.72112</u>	.21460
IC19GEpr	.36775	<u>.68382</u>	.21400
IC20GEpr	.19882	<u>.69239</u>	.11748

Note. The first two letters of the item names indicate which scale an item was intended to measure: "AS" = Service Affect; "LP" = Library as Place; "IC" = Information Control. The next two characters are the item numbers for the 22 core items as they are presented to library users. Pattern/structure coefficients greater than |0.40| are underlined.

Table A.6  
Principal Components Rotated to the Varimax Criterion  
for the Norwegian ( $n = 318$ ) First Session 2006 Data

Core Item	Factor		
	I	II	III
AS01NOpr	<u>.71414</u>	.34249	.20717
AS04NOpr	<u>.73926</u>	.26584	.18324
AS06NOpr	<u>.78132</u>	.27884	.19796
AS09NOpr	<u>.76852</u>	.37120	.08125
AS11NOpr	<u>.68079</u>	<u>.41921</u>	.11038
AS13NOpr	<u>.77204</u>	.28385	.16208
AS15NOpr	<u>.68904</u>	.38809	.11577
AS18NOpr	<u>.83024</u>	.28658	.11620
AS22NOpr	<u>.60968</u>	.23111	<u>.45580</u>
LP03NOpr	.23806	<u>.50671</u>	<u>.46313</u>
LP08NOpr	.07658	.35504	<u>.72721</u>
LP12NOpr	.30106	<u>.54949</u>	.20079
LP17NOpr	.17785	<u>.68505</u>	<u>.43873</u>
LP21NOpr	.19346	.05951	<u>.77124</u>
IC02NOpr	.26783	<u>.55339</u>	.09842
IC05NOpr	.32649	<u>.56784</u>	.24484
IC07NOpr	<u>.54496</u>	<u>.43071</u>	.10643
IC10NOpr	.36407	<u>.74051</u>	.13593
IC14NOpr	.35175	<u>.71971</u>	.12097
IC16NOpr	.36822	<u>.69522</u>	.12643
IC19NOpr	<u>.44274</u>	<u>.65286</u>	.19399
IC20NOpr	<u>.52822</u>	<u>.53155</u>	.11115

Note. The first two letters of the item names indicate which scale an item was intended to measure: "AS" = Service Affect; "LP" = Library as Place; "IC" = Information Control. The next two characters are the item numbers for the 22 core items as they are presented to library users. Pattern/structure coefficients greater than |0.40| are underlined.

Table A.7  
Principal Components Rotated to the Varimax Criterion  
for the Finnish ( $n = 791$ ) First Session 2006 Data

Core Item	Factor		
	I	II	III
AS01FIpr	<u>.79684</u>	.15234	.17523
AS04FIpr	<u>.68432</u>	.19241	.26108
AS06FIpr	<u>.83545</u>	.18645	.14360
AS09FIpr	<u>.75794</u>	.24111	.15014
AS11FIpr	<u>.73830</u>	.32829	.14678
AS13FIpr	<u>.84250</u>	.15732	.18871
AS15FIpr	<u>.77118</u>	.27452	.22210
AS18FIpr	<u>.82217</u>	.22168	.18602
AS22FIpr	<u>.67314</u>	.27725	.21747
LP03FIpr	.26883	.24311	<u>.66116</u>
LP08FIpr	.16851	.16869	<u>.80798</u>
LP12FIpr	.24731	.34770	.22448
LP17FIpr	.22761	.24967	<u>.82526</u>
LP21FIpr	.20648	.13313	<u>.75796</u>
IC02FIpr	.08546	<u>.70073</u>	.00627
IC05FIpr	.15962	<u>.71227</u>	.17398
IC07FIpr	.31617	<u>.43444</u>	.30733
IC10FIpr	.19682	<u>.77721</u>	.12192
IC14FIpr	.35417	<u>.58414</u>	.27129
IC16FIpr	.39574	<u>.67772</u>	.23373
IC19FIpr	.39109	<u>.67926</u>	.21691
IC20FIpr	.13682	<u>.74190</u>	.19503

Note. The first two letters of the item names indicate which scale an item was intended to measure: "AS" = Service Affect; "LP" = Library as Place; "IC" = Information Control. The next two characters are the item numbers for the 22 core items as they are presented to library users. Pattern/structure coefficients greater than  $|0.40|$  are underlined.

Table A.8  
Principal Components Rotated to the Varimax Criterion  
for the Danish ( $n = 554$ ) First Session 2006 Data

Core Item	Factor		
	I	II	III
AS01DApr	<u>.67479</u>	.25166	.02982
AS04DApr	<u>.61525</u>	.05196	.25990
AS06DApr	<u>.75537</u>	.14520	.10009
AS09DApr	<u>.71515</u>	.30694	.05136
AS11DApr	<u>.67333</u>	.38447	.06528
AS13DApr	<u>.77136</u>	.09036	.19458
AS15DApr	<u>.69241</u>	.33309	.16425
AS18DApr	<u>.67637</u>	.36542	.07514
AS22DApr	<u>.46815</u>	.37655	.15468
LP03DApr	.15846	.09150	<u>.76374</u>
LP08DApr	.10269	.10146	<u>.65668</u>
LP12DApr	.31133	.15208	<u>.68637</u>
LP17DApr	.13285	.23160	<u>.73246</u>
LP21DApr	-.03409	.16951	<u>.74211</u>
IC02DApr	.03016	<u>.66488</u>	.06455
IC05DApr	.21650	<u>.65483</u>	.11662
IC07DApr	.30777	<u>.47462</u>	.20481
IC10DApr	.19052	<u>.71139</u>	.04421
IC14DApr	.33211	<u>.52906</u>	.22687
IC16DApr	.35078	<u>.63544</u>	.17099
IC19DApr	.33093	<u>.57311</u>	.21758
IC20DApr	.20673	<u>.62855</u>	.22422

Note. The first two letters of the item names indicate which scale an item was intended to measure: "AS" = Service Affect; "LP" = Library as Place; "IC" = Information Control. The next two characters are the item numbers for the 22 core items as they are presented to library users. Pattern/structure coefficients greater than  $|0.40|$  are underlined.