

# Report of the Research Department

Johnson O'Connor Research Foundation  
Human Engineering Laboratory  
Johnson O'Connor Research Support Corporation

2017

# Goals of the Research Department

1. Isolating aptitudes and studying their role in various occupations.
2. Developing accurate measures of aptitudes.
3. Investigating the role of aptitudes in education.
4. Evaluating age and sex differences and the effect of practice on test performance.
5. Studying the processes involved in the acquisition of knowledge.
6. Developing accurate measures of knowledge.
7. Communicating research findings to the public.

[jocrf.org](http://jocrf.org)

## From The President

It has been a whirlwind year at the Johnson O'Connor Research Foundation. I was proud to take up the mantle of the presidency from my esteemed predecessor, David Ransom. We embarked on two major projects right out of the gate: re-recording all of our audiovisual tests, and replacing the old bargraph program.

The new audiovisual recordings are the work of many years and many people. Kurt Conover, former Vice-President of the Foundation and current board member, trimmed and simplified the scripts for the audiovisual tests, and these were largely the scripts that we used for the new recordings. Tommy Jensen recorded several JOCRF staff members (mostly Allison Potter, test administrator in Dallas) giving the new instructions, and then worked painstakingly to stitch together the newly recorded instructions with the old pitches, tones, and rhythms of the auditory tests, and created new slides for Silograms, Number Memory, and Memory for Design. The resulting recordings are shorter, simpler, and more modern in look and feel.

The new bargraph program has been a major focus. This program is the central tool of our organization, and the importance of getting it right cannot be overstated. We met with many, many software development companies before settling on a Denver-based company that works exclusively with nonprofits. The new program will incorporate all of our disparate systems into one cohesive whole, and facilitate data collection by the research department and sharing across labs. For researchers, this will allow for faster access to data, and more efficient reporting. For test administrators, in addition to improved efficiency and less paperwork, there will be a brand new, shiny report to give to clients.

Every test administrator, summarizer, aptitude consultant, lab director—anyone who gives tests—is a researcher. With that in mind, we are working to bring the testing staff and the research staff together into closer collaboration. This includes ensuring that research findings are disseminated to those who give and interpret the tests for our clients. To that end, our Research Director, Rusty Burke, summarized the recent research on Foresight at a recent lab director's meeting, and is putting together a document that summarizes the accumulated research findings for every one of our tests, to use as a tool in summary training (and for all of us).

Our researchers, Dave Schroeder and Linda Houser-Marko, shared their research activities with the rest of the Foundation through use of a webcam at the fall 2017 board meeting, and, a few months later, through a company-wide web conference call. We plan to make this a regular feature. In addition, the new Best Practices team, comprised of both testing and research staff, will provide ongoing oversight of the standardization of the administering and scoring of tests. This is a collaborative effort to ensure that research is getting the most accurate data for analysis, and our clients are getting the most accurate information about their aptitudes.

All in all, 2017 was quite a year, and I look forward to 2018!



*Anne Steiner*

# From the Director of Research

Casa Wilson and Emma Haraseth, the Foundation's social media coordinators, have been doing a wonderful job of bringing interesting articles from the worlds of work and education to our staff, alumni, and others who follow us on Facebook, Twitter, and other platforms. As I read through these, it seems to me that a common thread to much of the career advice out there is this: For careers now, and increasingly so in the future, change will be the norm, which will require you to know your own strengths so you can choose wisely among your opportunities. "The future of work might be in lifelong learning.... We're entering a stage where retraining will be the day-to-day world that people live in" (TheAtlantic.com). "To stand out and increase your success and happiness at work, focus on your talents not your title" (Forbes.com). "Successfully intelligent people... accomplish goals by determining which strengths and weaknesses they've got and, as a great mentor might tell you to do, capitalizing on the strengths or compensating for the weaknesses" (Inc.com). "Competence passion: We all get excited when we're doing something we're good at" (TheLadders.com). "Passion builds over time when you do something you're good at" (Lifehacker.com). Stories are rife with references to the "gig economy," and to workers frequently changing roles within their companies.

Seventy-five years ago, Johnson O'Connor was urging those who came to him for testing to turn away from the idea of finding a "job," "an undertaking of a defined or restricted character," and instead to look for "a tantalizing problem," "attacking the frontier of human understanding." Just as he saw in 1943 that "the more defined a job becomes by repetition the more certainly will an automatic machine sometime do it both faster and with greater precision than the human being," we now see that jobs which were in high demand, commanding nice salaries, will inevitably be taken over by computers, or outsourced, or otherwise dwindle in demand or prestige, while newer jobs, based on ideas which were unknown only a few years before, will become the newest hot tickets to success. O'Connor's solution, now echoed by career counselors, consultants, and human resource managers around the world, was succinctly expressed in what I have always found to be the most inspiring words from his published writings:

*"The philosophy of the Human Engineering Laboratory stresses the need of surveying one's own capabilities, not with some fixed job in mind, but with the aim of making that peculiar contribution to the world of*

*which one alone is capable, of planning life from the beginning about one's aptitudes, of reaching constantly for progress to give them ampler expression."*

How heartening then, are the results from our first one-year follow-up of persons tested! (Alison White's report is on p. 7.) "The majority of our alumni indicated that their aptitudes are something they think or even talk about on a daily basis." This means that they have a good start on the kind of self-awareness of personal strengths that can guide them through the new world of career choices, making their own unique contributions. I am even more struck by the fact that, when asked how they have used their test results, the highest percentage of responses was for "Understanding myself," chosen by nearly 80% of the alumni. This was nearly double the percentage who expected to use their testing results in this way. This, and "Understanding and communicating with others," were the benefits of testing that most exceeded their expectations. To my mind, this bodes very well for their future flexibility in responding to the rapidly changing demands of the world of work.

This is reinforced by results from the current five-year follow-up survey. (Our follow-up program is now set to reach out to alumni at one year after testing, and then at five-year intervals.) Linda Houser-Marko reports on p. 6 that client ratings of their own "person-job fit" were very strongly correlated with believing themselves to have the skills and abilities for the job, with finding the job tasks satisfying, and with overall satisfaction with their career choice. This certainly supports the idea that a knowledge of one's own aptitudes can be a major factor in career satisfaction and success.

Of course, an important underpinning to the self-knowledge that comes from aptitude testing is the confidence that the abilities will not change appreciably over time. Dave Schroeder's report of our ongoing long-term stability studies, then (p. 4), is encouraging. While, as one would expect, there is some variation in the results for different tests, overall it seems that there is very little likelihood of substantial changes in a person's scores over the years.

2017 marked the tenth anniversary of our first foray into studies involving brain imaging. That collaboration with Dr. Richard Haier, which involved brain scanning of forty JOC testing alumni, ultimately resulted in at least five journal articles, collectively cited by more than 150 other articles. Dr. Haier introduced us to Dr. Rex Jung, with whom we have now engaged in collaborative studies for six years (with thus far four

journal articles, cited 29 times, and several conference presentations). In our newest study, which will get underway in 2018, we will be testing and scanning 225 subjects over a period of three years, hoping to gain further insights into the relationships between abilities and brain structures. Dr. Jung's 2015 article in *Frontiers in Psychology*, "Quantity yields quality when it comes to creativity: A brain and behavioral test of the equal-odds rule," produced important insights into our Foresight test, showing it to be related not only to creativity, but, as we have long believed, to thinking about one's future. This was important empirical validation, and has led to further work on our part. In last year's report, I discussed the work of Kelsey Bakas and a number of staff volunteers in creating a complete database of Foresight responses by 336 test subjects. We found a strong relationship between the total number of responses given by individual test-takers and the number of less frequently given and unique responses. In 2017, five staff members gave creativity ratings to all those responses, and we created "creativity" scores.

Our raters were tough—a very small percentage of responses were given high ratings, which undoubtedly affects results. We did find very strong relationships between the frequency with which a response was given and its creativity rating: in particular, unique responses tended to get much higher ratings. Those who scored in the top quarter of the sample on the Foresight test had a significantly greater percentage of "creative" responses than did those who scored in the bottom quarter. All these results will be reported in *Statistical Bulletins* in the coming year. It is our hope that our latest collaboration with Dr. Jung will yield equally useful insights into other of our tests. As O'Connor exhorted us to do, we will continue to apply our aptitudes to "attacking the frontier of human understanding, a vast unknown region for the born pioneer." Few undertakings can provide greater satisfaction.

*Rusty Burke*

---

---

## Research Staff



**Russell E. Burke**, Research Director, joined the Foundation in 1983 in New Orleans, and served as Director in Houston before moving to Washington, D.C., where he has served as both a summarizer and Director before taking on his current role guiding the Foundation's research efforts.

**David H. Schroeder**, Research Manager, joined the Research Department in August 1984. He has a B.S. from the University of Illinois and an M.S. from Colorado State University, as well as an M.A. and a Ph.D. in personality psychology from The Johns Hopkins University.



**Linda S. Houser-Marko**, Researcher, joined the Research Department in October 2010. She has a B.A. from Gustavus Adolphus College in Minnesota and a Ph.D. in social and personality psychology from the University of Missouri. She has published research on the self, identity, and motivation.

**Alison V. S. White**, Research Assistant, first joined the Foundation in 2011 and worked in the Atlanta and Chicago labs as a test administrator before transitioning to her current role in the Research Department. Alison holds a degree in psychology from Georgia State University.

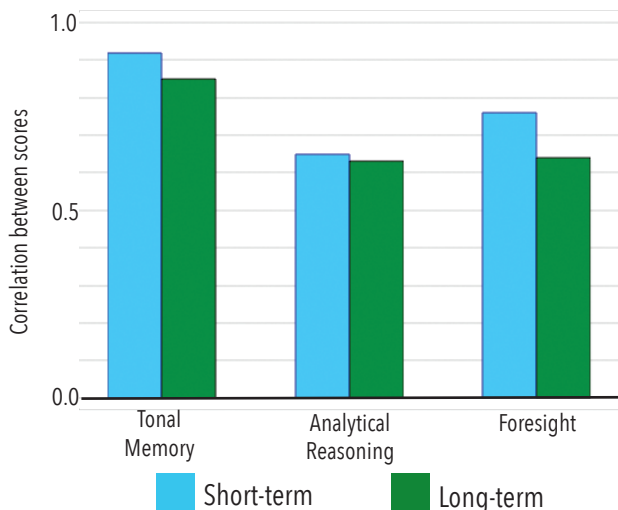


## Long-Term Stability of Aptitudes

For a number of years, we have been studying the long-term stability of scores on our tests in an effort to demonstrate that aptitudes are enduring individual differences. In 2017 David Schroeder, Research Manager, analyzed the results of a study of our Number Facility test. A total of 460 examinees took retests of Number Facility; for 146 of the examinees, the interval between testings was less than one year, and we referred to those cases as the “short-term sample” for the study; the other 314 examinees took the retest after intervals of 1 to 26 years. For the latter group (the

to see, but the long-term correlation is almost as high as the short-term correlation. For Foresight, the short-term correlation is midway between the short-term correlations for Tonal Memory and Analytical Reasoning, and the long-term correlation shows a little more decline in stability with the longer time interval. Overall, we feel that the results of these studies show strong support for our belief that people’s standing on aptitudes tends to endure over time.

### Stability Coefficients



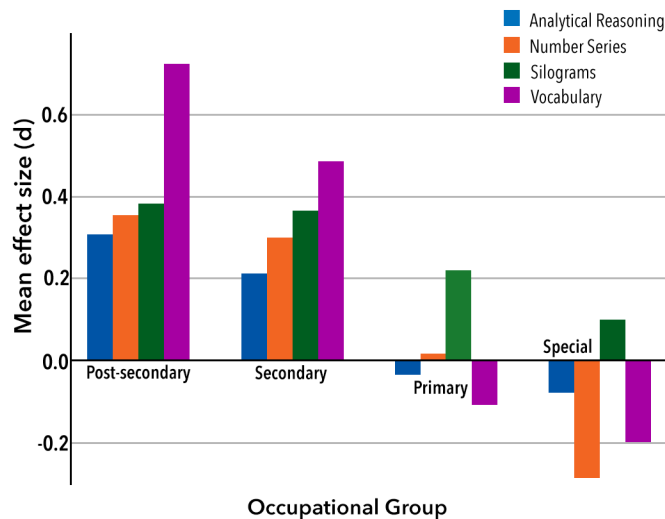
“long-term sample”), examinees’ scores correlated .65 with their corresponding scores on the original testing. For the short-term sample, the correlation between testings was .68. From these results, we concluded that there is relatively little degradation in the rank order of scores with the passage of time, since the .65 value is rather close to the .68 value, although we would also note that the short-term value does not show as good an agreement with the original scores as we would like to see. Schroeder will report these results in a 2018 Statistical Bulletin.

With the completion of the study of Number Facility, we have now evaluated the stability of scores for 18 of our tests. Schroeder also conducted a review of the findings for all of the tests, and he will present the results in another 2018 Statistical Bulletin. The findings for selected tests are shown in the accompanying figure. As can be seen, Tonal Memory shows high correlations for both the long-term and short-term samples. The results for Analytical Reasoning are similar to the results for Number Facility: the short-term correlation is a little lower than we would prefer

## Occupations in Education

Also in 2017, Chris Condon, former researcher in the Research Department and current trustee, and David Schroeder completed their study of the aptitude patterns of persons in the fields of primary, secondary, postsecondary, and special education. Postsecondary educators tend to score above the general mean on a number of our tests, including Analytical Reasoning, Number Series, Silograms, and English Vocabulary (see the accompanying figure). For secondary educators, the pattern is somewhat similar but not as strong, with statistically significant elevations on Number Series, Silograms, and English Vocabulary, in addition to Foresight. Primary educators did not have significantly high scores on any of our standard-battery tests, but they did score above the general mean on the Social scale of the Self-Directed Search, the vocational interest test that we give. Special educators were similar to primary educators on most scales, but they were significantly below the mean on Structural Visualization. Condon and Schroeder reported these findings in Technical Report 2017-1, *Occupations in Education*.

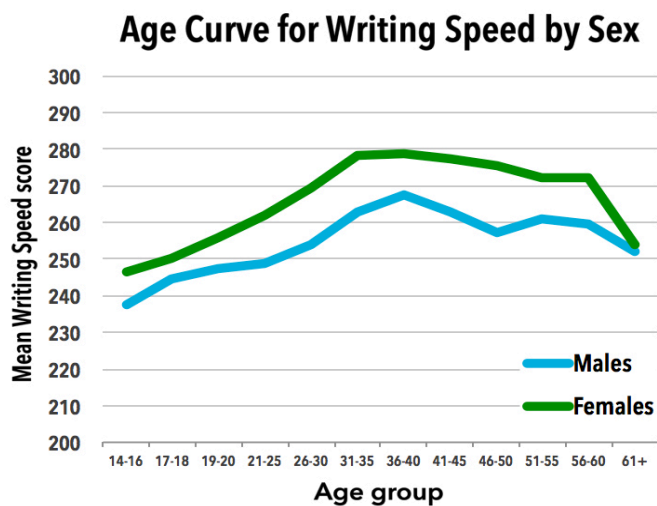
### Scores for Occupations in Education on Four Foundation Tests





## Writing Speed

Also in 2017, David Schroeder performed a series of analyses on scores on the Foundation's Writing Speed test. The primary function of the Writing Speed test in the Foundation's test battery is to help us interpret scores on our Ideaphoria test, but first Schroeder looked at general relationships between Writing Speed and sex, age, and the other Foundation tests. As shown in the accompanying figure, females tend to score higher than males on Writing Speed, and scores tend to increase with age up to about the mid-30s, after which they show a moderate decline. Regarding other Foundation tests, Writing Speed has a relatively high correlation with Ideaphoria (.59), moderate correlations with Foresight and Graphoria (.32 and .29), and lesser correlations with a number of other Foundation tests.



With regard to Ideaphoria, the primary issue is whether examinees' rates of writing speed distort their scores on Ideaphoria, which is intended to measure flow of ideas. Schroeder found that relatively few examinees write for the entire 10 minutes on Ideaphoria. That is, if one uses their Writing speed scores to project how many words examinees could write in 10 minutes, few of our examinees score at or near their potential maximum based on their Writing Speed performance.

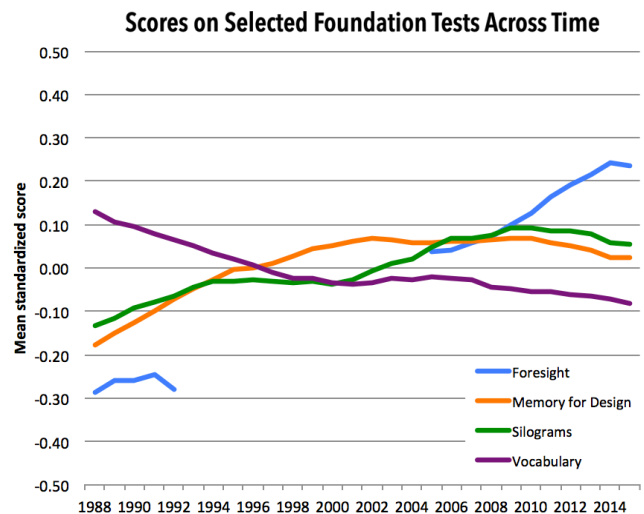
As to whether Writing Speed still causes a distortion in Ideaphoria scores, with faster writers having an unjustified advantage over slower writers, Schroeder examined this by comparing the validity of Ideaphoria scores adjusted for Writing Speed (that is, partialled Ideaphoria scores) with the validity of raw (unpartialled) scores on Ideaphoria. It appears that unpartialled Ideaphoria scores are equal to or slightly more valid than scores adjusted for Writing Speed. The implication of this finding is that high-Ideaphoria persons write faster naturally (perhaps as a way to get their many ideas onto paper) and that speed of handwriting does not distort scores on Ideaphoria.

Schroeder expects to reports his findings on Writing Speed in a couple of Statistical Bulletins in 2018.

## Test Scores Across Time

David Schroeder continued to examine trends across time for scores on our tests in 2017. The outside research community has devoted quite a bit of attention to an upward trend in IQ scores across the mid- and late-Twentieth Century, and we have observed gains in scores on our tests that use figural stimuli, including Memory for Design and especially Foresight. In recent years, outside researchers have reported a leveling off and possible decline in IQ performance in developed countries, and we appear to be seeing some analogous patterns on our tests. In the accompanying figure, we show trends in scores for several of our tests from 1988 to 2015. Foresight has shown the greatest gain among our tests, but even that trend appears to have discontinued. Memory for Design and Silograms have shown more-moderate gains followed by recent declines, and English Vocabulary has been declining for a number of years.

In summary, although there are important differences in the patterns we are finding for different aptitudes, there does appear to be a broad trend involving the end of a period of growth and possibly a degree of decline in performance on some of our tests. Schroeder presented some of these findings at the annual meeting of the Association for Psychological Science (APS) in 2017, and he will elaborate on our findings at the APS meeting in 2018.



## Ongoing Follow-up Studies

For the past few years Linda Houser-Marko, Researcher, has been conducting follow-up surveys of clients who tested at the Foundation several years ago. We have been sending out follow-up survey questionnaires at five and ten year intervals after testing. We offer a free follow-up appointment for respondents to review their aptitudes as an incentive to complete the surveys, and many have benefited from those appointments.

The follow-up survey responses have been increasing in numbers. The ten-year survey that went to clients from 2007 received more than 300 responses; and the five-year survey that went to clients from 2012 received more than 700 responses. The average response rate was 15%.

With these follow-up surveys we are able to look more deeply into the relationships between aptitudes and related outcomes—education and occupation decisions, satisfaction with work and career activities, and the degree to which an occupation “fits” with a person’s aptitudes. The notion of “person-job fit” has been explored in academic vocational research, and the hypothesis is that when a person’s aptitudes fit with the demands of their job, they have better job performance, and greater job satisfaction. (See the figure for a theoretical model of these relationships).

Career satisfaction is an important, ultimate criterion which is most likely determined by many factors.

However, the Foundation asserts that aptitudes and how they fit with a person’s chosen career have an important role in career satisfaction.

The analyses of the survey responses are ongoing, but following are some results from the most recent five-year follow-up survey. Respondents indicated the field of their current job by choosing from a list of twenty-five options.

The most often reported occupation fields were business, marketing, education, finance,

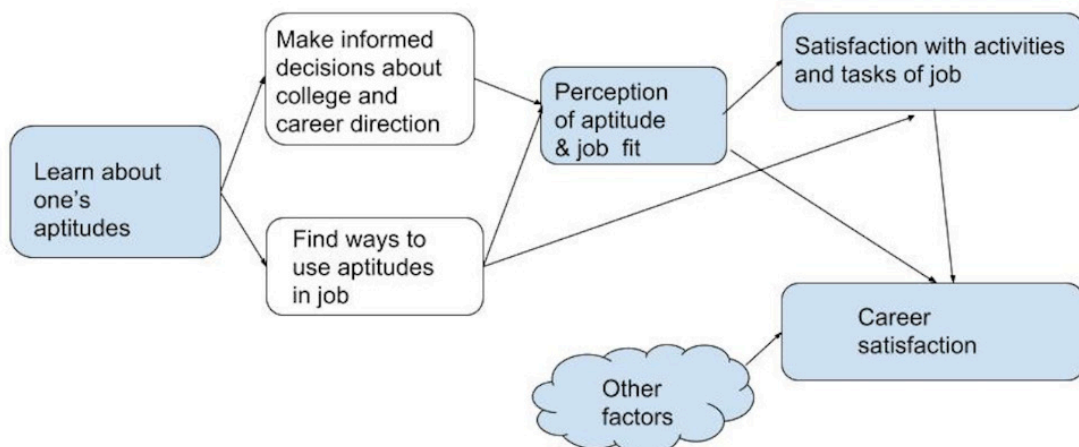
health sciences, and arts & communication (in descending order). The science, technology, engineering, and math (STEM) related fields, while notable, were less frequently reported with technology and information technology being the most frequent fields that were reported.

For career satisfaction by field, it was notable that people who worked in non-profits had the highest ratings, and people in administration and support services had the lowest ratings. All other fields did not differ in career satisfaction ratings, with a mean of slightly higher than the mid-point of the scale.

Client ratings of their own person-job fit correlated with: their perception that they had the skills and abilities for their job at  $r = .44$ , thinking the tasks of their job were satisfying at  $r = .75$ , and overall career satisfaction at  $r = .69$ . Career satisfaction also correlated with thinking the activities and tasks of their job were satisfying at  $r = .74$ .

In general, respondents who were tested five years ago currently, on a scale of one to five:

- Are mostly in the age range of 21 to 31 years old
- Have been in their current job for 1 to 14 years, with a mean of 3 years
- Think about and talk about their aptitudes “somewhat”
- Are “quite a bit” able to find ways to use their aptitudes
- Think that their college major fits “moderately” well with their aptitudes
- Think that their current employment fits “moderately” with their aptitudes
- Think the activities and tasks of their job are “moderately” satisfying
- Think that they have the skills and abilities for their job “quite a bit”
- Are “moderately” satisfied with their career





## Surveying our One-Year Alumni

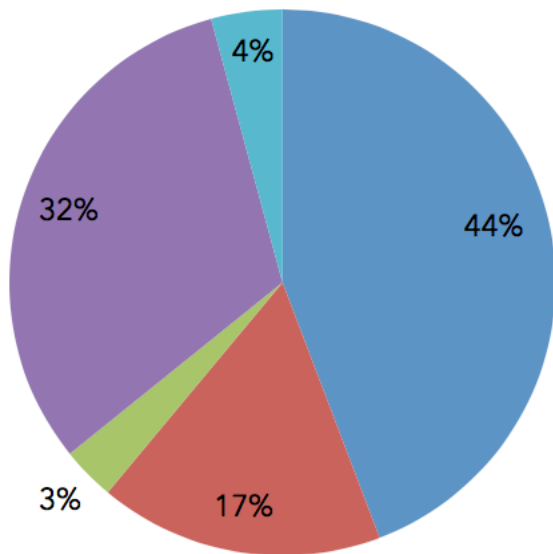
In 2017 we began surveying our clients around a year after their summary appointment. Since we also survey clients five and ten years after their results session, this survey is the first step in our longitudinal research of our clients. Over time we hope to be able to use the data gained from these surveys to better advise clients on occupational fields, academic studies, and avocational activities that others with similar patterns have found satisfying.

### What are they doing now?

309 alumni participated in the One Year survey. Many of those clients (44%) were currently enrolled in an educational program, which they told us was their primary focus right now. Another group (17%) had very recently enrolled in an educational program, and 3% had recently finished an educational program. Another group of clients (31%) were currently working (including part-time work, internships, and self-employment), while 4% were either retired or taking a break from working.

When we asked clients what has happened since their testing, responses were fairly evenly split among the given options: speaking with a guidance or

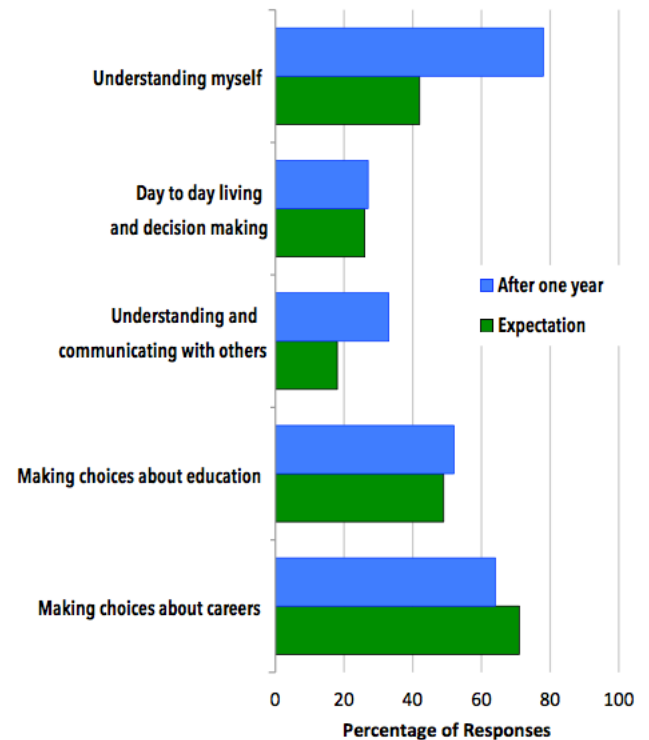
### One Year after Testing



- Currently enrolled in an educational program
- Newly enrolled in an educational program
- Recently finished an educational program
- Currently working
- Retired or taking a break

career counselor, taking a new class, changing majors, applying for/enrolling in a new study program, quitting their old job or starting a new one (or apprenticeship or internship), starting a new hobby, volunteering, or rediscovering an interest that they had previously put aside. Some clients indicated that the way they think about their activities had changed as a result of their testing. Others found that they didn't need to make any changes to their current path.

### How have clients been using the results of their testing?



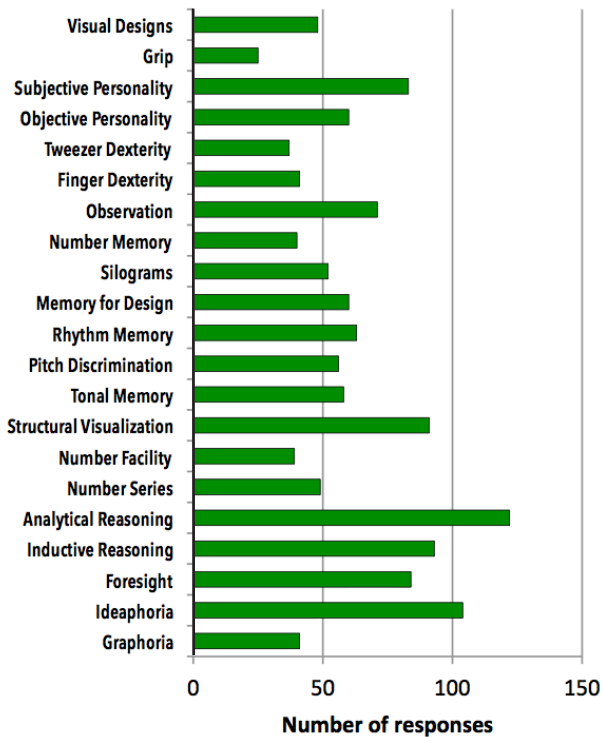
We asked clients whether they felt their aptitudes are something they think about regularly. The majority of our alumni indicated that their aptitudes are something they think or even talk about on a daily basis. In fact, less than a quarter (17%) of our survey respondents said that they very rarely thought about their aptitudes or that they felt the question was not applicable to them.

Some of the questions for this survey are similar to questions on the survey we send out shortly after testing. We hope that by visiting some of the same questions on each of our surveys we can track how clients change over time. One such question asked clients to tell us how they have used the results of their testing so far after one year, that can be compared to how they expected to use their results.

As anticipated, making choices about careers,

making choices about education, and knowing themselves better are the top three ways that clients expected to use their results, as well as the top three ways that clients say they are currently using their results. The percentage of clients who said they used their results in order to better understand themselves changed the most, from 42% to 78% who say they have been putting that understanding into practice during the year since their testing.

**What aptitudes are clients focusing the most on?**



Which aptitudes clients are focusing the most on varies quite a bit, presumably depending upon their individual patterns. Analytical Reasoning received the most attention, something we may want to keep in mind if we decide to update our client materials. Personality, Ideaphoria, Inductive Reasoning, and Structural Visualization are among the top contenders.

**Until next time...**

We'll be catching up with these clients again, when they are approaching their five-year anniversary with us. At that time, we expect that many clients will have wrapped up their current educational program or internship, and we look forward to finding out how satisfied and successful they consider themselves, and whether or not they are still thinking about their aptitudes fairly regularly.

## Study: Comparing STEM-oriented versus people-oriented fields on two aptitudes and interests

The following study was a result of a subset of the follow-up surveys of clients five or ten years after they tested at Johnson O'Connor. Houser-Marko looked at what occupational field the respondents had gone into several years after testing, the levels of two aptitudes, and the respondents' vocational interests as gathered at the time of testing. This study was presented at the annual meeting of the Association for Psychological Science that took place in Boston in 2017.

This study included adults ranging in age from 20 to 64 who had come in for testing at one of the JOCRF testing centers. Follow-up data were from 539 participants for the five-year follow-up, and 370 participants for the ten-year follow-up, for a total of 909 participants.

Respondents indicated the field that they were working in from a list of options, and fields were coded as people-oriented fields and STEM-oriented fields (or other).

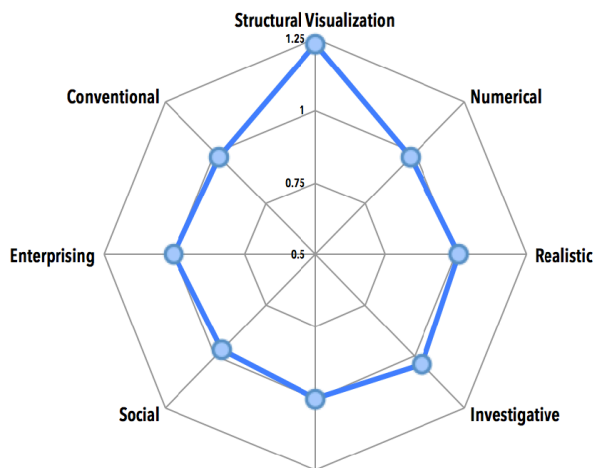
The figure on the left shows that people with high Structural Visualization and Investigative interests were more likely than persons with other patterns to be in the STEM-related fields. It should be noted that Structural Visualization and Numerical

aptitude are correlated, and in these models, one or the other might dominate the model.

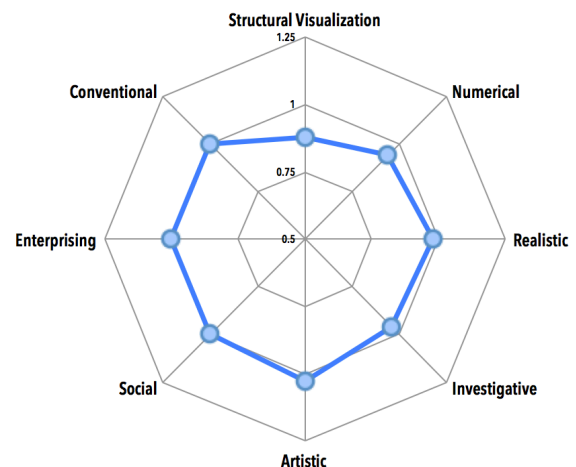
To look at those working in people-oriented fields, there was a negative effect for Structural Visualization such that clients with high scores on SV and Investigative interests had lower odds of being in people-oriented fields, and greater Artistic interests had higher odds.

Structural Visualization was the most important aptitude for the STEM-oriented fields. Investigative interests played an important role for both males and females in STEM fields. Notably for the people-oriented fields, Artistic interests were a positive predictor, Investigative interests were negative, and surprisingly, Social interests did not show any effect.

The next focus for this project will be to look at perceptions of person-environment fit and how they relate to aptitudes and interests, as noted in the previous section of this report. Also, we plan to look at career satisfaction as an ultimate outcome to see how aptitudes, interests, and person-environment fit might relate to it.



STEM-oriented Fields



People-oriented Fields

For these charts: The labels of the spokes are Structural Visualization and Numerical (a mean of Number Series and Number Facility), and interests from the self-directed search. A logistic regression model was used to predict whether a person was in the target occupational fields or not. The result is an odds ratio for each measure. An odds ratio of 1 can be thought of as the score being no more or less likely to predict membership in the target group. If the line intersects at a value higher than 1, the odds are greater that a person with a high value for that measure will be in the target group. If the line intersects at a value less than 1, the odds are less that a person with that characteristic would be in the target group.

## Dissemination of Research Findings

In recent years we have made it a practice to present findings from our research in scholarly outlets such as professional conferences and journals. In 2017 we made two presentations at the annual meeting of the Association for Psychological Science, which was held in Boston. Dr. Linda Houser-Marko presented "A Longitudinal Study of Abilities and Interests in STEM- and People-Oriented Fields." In this presentation, she uses data from our follow-up surveys to compare scores for examinees who ultimately went into STEM and people-oriented occupations. Dr. David Schroeder presented "Secular Trends in Specific Abilities: Understanding the Flynn Effect," in which he discussed changes in mean scores on some of our tests in recent decades. After the conference, Houser-Marko and Schroeder submitted their presentations to the Open Science Framework's database, where they can be retrieved by other researchers. Finally, Dr. Nikolaus Bezruczko, a former consultant for the Research Department, and Schroeder presented "Artistic-Judgment Aptitude Factors Correlate Significantly With Increased Gray Matter" at the annual meeting of the American Association for the Advancement of Science. In this poster session, they reported on neuroimaging findings regarding brain areas related to our Visual Designs test, which they had published in 2016 in the journal *Psychology & Neuroscience*. The P&N article has already been cited in a meta-analysis of artistic-judgment studies that was published in the APA journal *Psychology of Aesthetics, Creativity, and the Arts*.

Also in 2017, Dr. Rex Jung, with whom we are collaborating on further neuroimaging studies of our tests (see p. 3), edited a scholarly book titled *The Cambridge Handbook of the Neuroscience of Creativity*, in conjunction with his co-editor, Dr. Oshin Vartanian. Another collaborator of ours, Dr. Richard Haier (see our annual reports for 2007-12), published the book *The Neuropsychology of*

*Intelligence*. In this book, he reviews contemporary scholarship on broad intellectual ability ("intelligence") and research linking it to brain structure and function.

Previous articles by Dr. Jung and his associates on research that we sponsored have continued to receive attention in scholarly circles in 2017. The Jung et al. article in *Frontiers in Psychology* in 2015 has now been viewed 8,997 times and cited in 13 other scholarly articles. The 2014 PLoS ONE article by Dr. Jung and his team has been viewed by 3,564 persons and cited 10 times.

Other scholarly work sponsored by us continued to have impact in 2017. Our 2010 article with Dr. Haier and his associates in *BMC Research Notes* has now been viewed by 12,659 persons and cited 20 times in other articles, while our 2012 *BMC* article by Dr. Schroeder and others has been viewed by 1,846 persons and cited 3 times. In addition, our 2009 article with Haier and others in *Intelligence* has been cited 78 times, and our 2010 article with Dr. Cheuk Tang and others in *Intelligence* has been cited 58 times.

With regard to earlier publications, Dr. Schroeder's 2004 article with Drs. Timothy Salthouse and Emilio Ferrer in *Developmental Psychology* has now been cited in 133 scholarly publications, including a recent meta-analysis of practice effects, and his article with Salthouse in *Personality and Individual Differences* has been cited 71 times. Our 2001 *Intelligence* article by Dr. Scott Acton, a former research assistant in the Research Department, and Dr. Schroeder has been cited 63 times.

In 2018 Dr. Houser-Marko will present "Perceived Person-Job Fit and Relative Abilities and Interests for Popular Occupational Fields" at the annual meeting of the Association for Psychological Science, where Dr. Schroeder will present "Declines in Cognitive-Ability Scores: A Negative Flynn Effect?".

## 2017

### Technical Reports

2017-1 Occupations in Education, C. Condon, D. Schroeder

### Statistical Bulletins

2017-1 Poster Presentation for the 29<sup>th</sup> Annual Association for Psychological Science Convention, Linda Houser-Marko

2017-2 A Neuroimaging Study of the Visual Designs Test, David Schroeder

2017-3 Tweezer Dexterity Test Changes and New Norms for Worksample 18 KA, Linda Houser-Marko, David Schroeder

## Presentations

Houser-Marko, L. S., & Schroeder, D. H. (2017, May). *A longitudinal study of abilities and interests in STEM and people-oriented fields*. Poster session presented at the annual meeting of the Association for Psychological Science, Chicago.

Schroeder, D. H. (2017, May). *Secular trends in specific abilities: Understanding the Flynn Effect*. Poster session presented at the annual meeting of the Association for Psychological Science, Chicago.

Bezruczko, N., & Schroeder, D. H. (2017, February). *Artistic-judgment aptitude factors correlate significantly with increased gray matter*. Poster session presented at the annual meeting of the American Association for the Advancement of Science, Boston, MA.

## 2016

### Statistical Bulletins

2016-1 Preliminary Results for the Cognitive Ability Scales From the Revelle/Condon Project Collaboration, *Linda Houser-Marko*

2016-2 Frequency and Creativity Scores for Foresight, Wks. 307 AQ, *Rusty Burke, Kelsey Bakas*

2016-3 Age Curve for the Analytical Reasoning Test, *David Schroeder, Linda Houser-Marko*

2016-4 Age Curve for the Number Facility Test, *David Schroeder, Linda Houser-Marko*

2016-5 Results from the Decade Study of Examinees from 2005, *Linda Houser-Marko*

2016-6 Poster Presentation for Association for Psychological Science Convention, *Linda Houser-Marko*

2016-7 Internal Analysis of Number Memory, *David Schroeder*

### Publications

Bezruczko, N., Manderscheid, E., & Schroeder, D. H. (2016). MRI of an artistic judgment aptitude construct derived from Eysenck's K factor. *Psychology & Neuroscience*, 9, 293-325. doi: <http://dx.doi.org/10.1037/pne0000064>

Ryman, S. G., Yeo, R. A., Witkiewitz, K., Vakhtin, A. A., van den Heuvel, M. P., de Reus, M., Flores, R. A., Wertz, C. R., & Jung, R. E. (2016). Fronto-parietal gray matter and white matter efficiency differentially predict intelligence in males and females. *Human Brain Mapping*, 37, 4006-4016. doi: 10.1002/hbm.23291

Yeo, R. A., Ryman, S. G., Thompson, M. E., van den Heuvel, M. P., de Reus, M. A., Pommy, F., Seaman, B., & Jung, R. E. (2016). Cognitive specialization for verbal vs. spatial ability in men and women: Neural and behavioral correlates, *Personality and Individual Differences*, 102, 60-67. doi: 10.1016/j.paid.2016.06.037

### Presentations

Houser-Marko, L. S. (2016, May). *Spatial ability and the STEM majors: Where do females with high spatial ability go?* Poster session presented at the annual meeting of the Association for Psychological Science, Chicago.

Schroeder, D. H. (2016, May). *The Flynn Effect: Is it continuing in the United States?* Poster session presented at the annual meeting of the Association for Psychological Science, Chicago.

## 2015

### Statistical Bulletins

2015-1 Analysis of Experimental Inductive Reasoning Items, Wks. 164 X10 (2014), *David Schroeder*

2015-2 Theatre Artists' Aptitudes Study: Results for WA and an Online Survey of Theatre Artists, *Scott Barsotti, Linda Houser-Marko, Rusty Burke*

2015-3 Scores on Writing Speed Across Time, *David Schroeder*

2015-4 Analysis of Experimental Inductive Reasoning Items, Wks. 164 X11 (2014-15), *David Schroeder*

2015-5 1-4 Versus 0-6 Scoring for Inductive Reasoning, *David Schroeder*

2015-6 Theatre Artists' Aptitudes Study: Aptitudes, *Linda Houser-Marko*

2015-7 Analysis of Experimental Inductive Reasoning Items, Wks. 164 X12 (2015), *David Schroeder*

## Publications

Jung, R. E., Wertz, C. J., Meadows, C. A., Ryman, S. G., Vakhtin, A. A., & Flores, R. A. (2015). Quantity yields quality when it comes to creativity: A brain and behavioral test of the equal-odds rule. *Frontiers in Psychology, 6*:864. doi: 10.3389/fpsyg.2015.00864

## Presentations

Houser-Marko, L. S., & Schroeder, D. H. (2015, September). *Shedding light on intelligence, creative fluency, and creative achievement*. Paper presented at the annual meeting of the International Society for Intelligence Research, Albuquerque, NM.

Schroeder, D. H. (2015, September). *Heritability of specific cognitive abilities*. Paper presented at the annual meeting of the International Society for Intelligence Research, Albuquerque, NM.

# 2014

## Statistical Bulletins

2014-1 Inter-Trial Improvement of Scores on Silograms, *Rusty Burke*

2014-2 Sex Differences in Variability for Non-Cognitive Foundation Tests and SDS Scales, *David Schroeder*

2014-3 Mean Sex Differences for Foundation Tests and SDS Scales, *David Schroeder*

2014-4 Analysis of Standard Inductive Reasoning Items, Wks. 164 OA, *David Schroeder*

2014-5 Analysis of Latest Set of Experimental Inductive Reasoning Items, Wks. 164 X\* (2013-14), *David Schroeder*

2014-6 Heritability/Familiarity Studies of the Foundation's Aptitude Tests, *David Schroeder, Mikako Nakajima*

2014-7 Mean Percentiles for Individual Test by Lab and Test Administrator, *Linda Houser-Marko*

2014-8 Sensory Discrimination in Relation to a General Factor of Cognitive Ability, *David Schroeder, G. Scott Acton*

2014-9 Poster Presentation at Behavioral-Genetics Conference, *David Schroeder*

2014-10 Long-Term Stability for English Vocabulary, *David Schroeder*

2014-11 Analysis of Experimental Inductive Reasoning Items, Wks. 164 X9 (2014), *David Schroeder*

2014-12 Number of Aptitudes Per Examinee, *David Schroeder*

2014-13 The Distributions of Times for Color Discrimination, *David Schroeder*

## Publications

Jung, R. E., Ryman, S. G., Vakhtin, A. A., Carrasco, J., Wertz, C., & Flores, R. A. (2014). Subcortical correlates of individual differences in aptitude. *PLoS ONE, 9*(2): e89425. doi: 10.1371/journal.pone.0089425

## Presentations

Schroeder, D. H. (2014, June). *Resemblance for twins on a battery of ability tests*. Poster session presented at the annual meeting of the Behavior Genetics Association, Charlottesville, VA.

Houser-Marko, L. S., & Schroeder, D. H. (2014, May). *Three musical ability tests as they relate to cognitive measures and musical experience*. Poster session presented at the annual meeting of the Association for Psychological Science, San Francisco.





## Trustees

Wendy Bigelow  
Richard Bowker  
Richard Brehler  
Alice Campbell  
Chris Condon  
Kurt Conover  
Timothy Fitzgerald  
Ellen Leifer  
Francis McConochie  
David Ransom  
Gary Smoke  
Anne Steiner  
Frank Stowell  
Jeffrey Wyatt

## Officers

Anne Steiner, *President*  
Russell Burke, *Vice-President and Director of Research*  
Thomas Jensen, *Vice-President and Director of Operations*  
Timothy Fitzgerald, *Treasurer and Secretary*  
Alice Campbell, *Assistant Treasurer*  
Wendy Bigelow, *Assistant Secretary*

## Research Staff

Russell Burke, *Director*  
David Schroeder, *Manager*  
Linda Houser-Marko, *Researcher*  
Alison White, *Research Assistant*

## Testing Offices

Atlanta ♦ Boston ♦ Chicago  
Dallas ♦ Denver ♦ Houston  
Los Angeles ♦ New York  
San Francisco ♦ Seattle  
Washington, D.C.

**161 East Erie Street, Suite 304**  
**Chicago, Illinois 60611**  
**312.943.9084**  
**[research@jocrf.org](mailto:research@jocrf.org)**