The Emergenetics Profile Technical Report

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Introduction

The value of a self-reported personality test depends on its usefulness.

Academic studies usually address personality in extremely comprehensive terms. In the late 19th and early 20th centuries, for example, personality investigators based theories on the human lexicon. Sir Frances Galton, as one example, in the late 1800's extracted about 1,000 personality-related words from the thesaurus; and, in the early 1900's, Allport and Odbert identified roughly 4,000 adjectives using a dictionary. By eliminating synonyms, Cattell proposed 171 personality factors which he eventually reduced to 16. In the late 1950's, Tupes and Christal's analysis showed personality items could be statistically clustered into 20-30 sub-factors arranged into five meta-domains referred to as the Five Factor Model (FFM).

However, even the FFM personality taxonomy does not represent settled science. Investigators continue to debate whether there is a unified theory of personality; whether personality is based on temperament, environment, social factors, or heredity; whether it is stable or situational; or, whether models with three, six, or more factors are better. What is clear, though, is the average lay person finds comprehensive personality taxonomies exceptionally difficult to apply.

Hogan (Hogan, R, 1991) has long argued the utility of a generalized personality instrument depends on its practicality. Hogan and colleagues have also argued that nomological web clustering should be the basis for personality and its assessment as opposed to the FFM process of granular lexical analysis. Hogan also suggested that by forming clusters of homogeneous personality variables that demonstrate high construct and criterion-related validity, one can identify a practical Socioanalytic framework that provides more actionable information than FFM trait analysis.

An informal review of personality instruments used in personal development workshops typically fall into one of three categories: diagnostic, academic, or lay-designed instruments. While diagnostic instruments such as the MMPI are commonly (mis)used in business environments, they are not applicable to healthy people (Drayton, 2009). Academically-developed instruments tend to define the entire personality domain and can be difficult to apply (e.g., CPI, B5 or HEXACO personality taxonomies; Gough, 1956; Barrick & Mount, 1991; Ashton et al., 2004). Lay-designed instruments, including the most commonly used workshop

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surveys, often fail to meet minimal professional test development standards, have unsupported theories, poor test-retest reliabilities, and/or weak to non-existent validity (Pittenger, 2005). Faced with the current personality-survey market, the Emergenetics authors felt there was a widespread need for a simple, yet robust, personality tool that followed professional test development standards.

They began with a comprehensive review of decades of academic investigations; their extensive personal experience with job analyses; a review of job-related factors measured in assessment-centers (Tupes & Christal, 1961; Hogan, DeSoto, & Solano, 1977; Schmidt & Hunter, 1981; Holland, 1985, 1992; Costa & McCrea, 1988, 1992; Barrick & Mount, 1991, 2012; Hogan, 1991; Kinder & Robertson, 1991); research data from Sperry and Gazzaniga's study of corpus callosotomy patients; and, monozygotic and dizygotic twin studies conducted at the University of Minnesota.

The resulting survey items were assembled to form a nomological and empirical approach to behavior based on simplified verifiable observation. Unlike comprehensive theories like the FFM which includes all nuances of the personality domain, Emergenetics measures fundamental preferences for thinking and acting at a situational level. Mills and Johnson (1978) and Hogan (1982), referred to this as Socioanalytic theory, suggesting specific human behaviors evolved as people learn to get along with each other, gain status, secure power, and understand their place in the world. They suggest that human behavior follows a set predictable patterns representing how people want to present themselves to others.

The following Venn diagram represents a simplified visual overlap between theories.
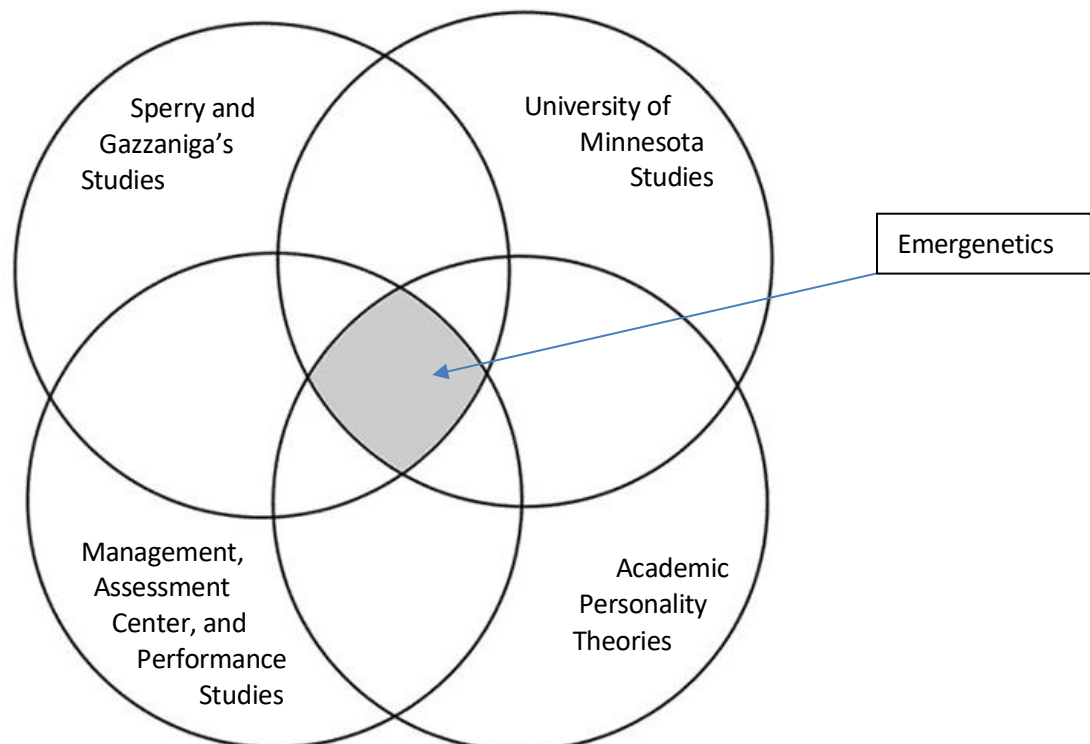
The following are examples of nomological items gathered during the research phase of development.

- Enjoys problem solving and figuring out how things work
- Likes investigating problems
- Enjoys learning
- Likes working with analytical tools
- Prefers to follow rules
- Works within established guidelines
- Tends to be methodical
- Is skeptical of new and untried ideas
- Likes being organized and cautious
- Enjoys working with others in close collaboration
- Shows empathy and caring for others
- Considers how other people feel
- Enjoys new or unconventional ideas
- Enjoys generating new ideas

- Bases decisions on intuition rather than rigorous analysis
- Is outgoing and expressive
- Starts conversations easily with strangers
- Enjoys recognition and admiration
- Feels comfortable in group settings
- Is driven and competitive
- Perceived as pushy
- Willing to argue a point of view
- May act or talk without thinking
- Not discouraged by obstacles

- Accommodates most situations
- Is easy-going
- Feels comfortable with uncertainty
- Seldom gets upset by unexpected events

A nomological network provides a robust model that encourages participants to think of their Profiles as useful patterns that influence, but not necessarily constrain, personal interactions. As with all self-descriptive instruments, the Emergenetics Profile does not necessarily predict specific skills; however, when delivered in combination with an interactive workshop, participants are exposed to:

- Basic tools to improve job performance and improve communication.
- Basic motivational drivers within a work environment.
- Strengths and interests based on a heightened knowledge of personal preferences.
- How behavior affects others and translate this knowledge into more confidence and self-acceptance when working with others.
- Ways to build a collaborative organizational workforce.
- Tools for engaging in meaningful dialogue and information about the way they go about work.

Professional Development of an Instrument

A reputable survey should meet the following criteria as outlined in the Standards for Educational and Psychological Testing (AERA, APA, NCME, 1999, 2014):

- Items that load on a specific factor must be consistent with each other and with the factor score.
- Factors within the test that are associated with each other should correlate, and ones that are independent should not.
- Scores on the survey should directly relate to the content, construct, or criterion it is supposed to measure.
- Items should resemble "legitimate" questions.
- To an extent justified by the intended uses of the survey, steps should be taken to keep scores and scoring methods secure from tampering or observation by unauthorized people, detect and prevent faking (whether good or bad), and limit the ability of users to be 'coached' how to make results more favorable. Since, these concerns apply mainly to instruments used for high-stakes' selection, compensation, or other administrative decisions (Society for Industrial Organizational Psychology, 2003), and not personal development, they did not factor heavily into the development of the instrument.

Following the guidelines outlined above, the authors assembled lists of nomological items, constructed questionnaires, administered them to participants attending personal development workshops, factor-analyzed the results, examined scree-charts, and identified discrete factors that were both statistically and rationally related. After multiple edits, items tended to cluster into seven specific homogenous item composites or HICS (i.e., a combination of rational and empirical items that define a specific personality space; Hogan, 1983). Items with suitable inter-item reliabilities within each HIC were retained based on their ability to define a utility-based nomological factor. Dysfunctional and socially undesirable items such as neuroticism, morality, ethics, and so forth, were outside the scope of the survey were excluded from the analysis.

Since, the intent of the Profile was to provide robust and useful comparison between and among individuals, raw scores for each HIC were converted into normative percentiles. Because there is a tendency for many personality profiles to confound thinking preferences with behavioral preferences, we report them separately; furthermore, being an internal process (and to partially correct for survey-response bias) the four thinking preferences are additionally represented as a percentage-mix. This provides the subject with a robust model that accounts for what the subject considers important, how these preferences interact, and how strongly how he or she presents these preferences in a relationship as follows.

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EMERGENETICS® | PROFILE

SAMPLE PROFILE

HOW YOU THINK: PERCENTAGES

ANALYTICAL = 26%
- Clear thinker
- Logical problem solver
- Data driven
- Rational
- Learns by mental analysis

CONCEPTUAL = 23%
- Imaginative
- Intuitive about ideas
- Visionary
- Enjoys the unusual
- Learns by experimenting
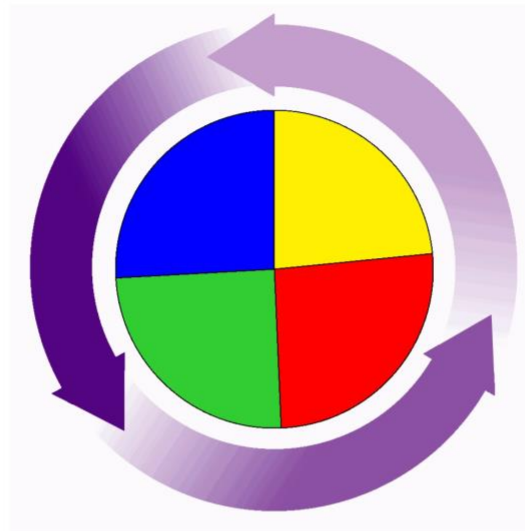
STRUCTURAL = 25%
- Practical thinker
- Likes guidelines
- Cautious of new ideas
- Predictable
- Learns by doing

SOCIAL = 26%
- Relational
- Intuitive about people
- Socially aware
- Empathic
- Learns from others

HOW YOU COMPARE TO THE GENERAL POPULATION

How you Think: Percentiles

Analytical	95
Structural	91
Social	95
Conceptual	86

How you Behave: Percentiles

Expressiveness — 69
Quiet | Introspective | Reserved | Talkative | Gregarious

Assertiveness — 61
Peacekeeping | Easygoing | Competitive | Forceful | Driving

Flexibility — 95
Focused | Firm | Adaptable | Accommodating | Welcomes Change

General Population 0 10 20 30 40 50 60 70 80 90 100

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The efficacy of a nomological taxonomy is illustrated a post-workshop survey of participants who completed Emergenetics Profiles between June 2012 and June 2015 (i.e., F=229, M=130).

1. When asked, "Since taking Emergenetics, I have used the results to…"
    o Gain a better understanding of myself (79.3%)
    o Understand better personal relationships (68.8%)
    o Understand my team better (63.8%)
    o Understand my significant other (29.3%)
    o Achieve success on a specific project (19.9%)
    o Explain to another how I approach work (18.5%)
    o Learn how to use my strengths more effectively (12.7%)
    o Earn a promotion (6.2%)
    o Referenced the Profile when I was worked-up about another person (5.8%).

2. When asked, "In my organization, Emergenetics is…"
    o Used across the organization (36%)
    o A tool to help work with peers (27.6%).
    o A common language we can all speak (25.8%)
    o Used by specific teams (18.5%)

3. When asked, "In your opinion, what is the most appealing part of Emergenetics…"
    o It's applicability in the workplace (14.5%)
    o It's simple interpretation (11.6%)
    o It's visual display (7.2%)
    o It's depth of description (1.8%)
    o All of the above (59.8%).

This survey suggests participants understand and use Emergenetics to:
- Improve job performance and communication.
- Understand basic preferences within a work environment.
- Illustrate how personal preferences can be perceived as either strengths or an opportunity to improve.
- Understand how personal preferences affect others.
- Build a collaborative organizational workforce.
- Engage in meaningful dialogue and information about the way individuals approach work activities.

As stated earlier, it is important to note that the Emergenetics Profile is a norm-based comparative tool…not a diagnostic analysis of personality type. Normative scoring helps people compare the intensity of their own personal preferences with a database of other people. There is no best or worst profile, only one that provides the subject with enough knowledge to understand how his or her preferences facilitate, or conversely, interfere, with what he/she attempts to achieve. Scores are re-normed biannually and adjusted to reflect the latest two-years of global data.

Technically, the current Emergenetics Profile includes:

- 100 items
- Seven Likert-scaled normative scored factors (with 8 – 14 items per factor)
- Within-factor inter-item reliabilities ranging between .71 and .83
- Ten-year test-retest reliabilities between .68 and .77
- Construct validation with FFM, convergent/discriminate validation, and face validity
- Four thinking-style preferences based on percentile strength (interpersonal measure) and percentage mix (intrapersonal measure)
- Three behavioral descriptions based on percentile strength (interpersonal measure)

Social Desirability and "Lie Scales"

Self-reported profiles have been criticized for relying on honesty and accurate self-awareness and often contain "internal consistency" scales to control faking. Although control of response sets is theoretically appealing, it presents certain problems because it is often difficult, if not impossible, to separate the desirability of personality-related items from their content. In fact, removing socially desirable items may make it difficult to measure traits that are themselves desirable in certain situations. Because of these concerns, and the fact the Profile is not presented within a high-stakes environment, social desirability scales were not included in the Profile. This in no way reduces its usefulness. Two large within-person studies found small differences in mean personality test scores when the first test was for selection purposes and the second was for developmental purposes or vice versa (Ellingson, Sackett, & Connelly, 2007). Together, the results suggested that under a wide array of realistic applicant scenarios, faking neither affects the criterion-related validity of personality tests nor the mean levels of performance in those selected.

Professional Test Developmental Criteria

Put simply, a professionally developed survey should:

- Include a useful theory of behavior (i.e., practical)
- Be stable (i.e., reliable)
- Accurately measure what it is supposed to measure (i.e., valid)

These processes are expressly described in the Standards for Educational and Psychological Testing, an internationally accepted digest of best survey practices.

Since the Emergenetics nomological (i.e., practical) approach was discussed earlier, the remainder of this report will discuss the analytical procedures followed.

1. Reliability

Reliability means the test delivers consistent score-results. This applies to both how the factor items are constructed and whether factor scores are consistent over time (e.g., inter-item and test-retest reliability).

1a. Inter-item Reliability

Internal integrity of a survey begins by examining Cronbach's Coefficient-Alpha for each factor. Coefficient-Alpha refers to the average of all possible inter-item and split-half correlations, both strong and weak, without relying on single indicators of reliability which may contain large amounts of error (Cronbach, 1951). Inter-item reliability is a measure of how well individual item scores correlate with the overall factor score. The inter-item reliabilities of the Emergenetics Profile (N= 89,101) range from $r=.71$ to $r=.83$ and are shown in the following table:

Emergenetics Factor	Coefficient Alpha
Analytical	.83
Structural	.71
Social	.76
Conceptual	.76
Expressiveness	.78
Assertiveness	.78
Flexibility	.79

N=89,101, average 8 - 14 items per factor, p<.01

1b. Test-Retest Reliability

Test-retest reliability refers to the stability of the survey over time; that is, whether survey scores remain the same if the test is taken more than once by the same person.

Long-term relationships with clients allowed us the rare opportunity to examine test-retest reliability over a span of ten years. This study indicated whether profile factors are stable over time.

The study included 307 subjects (F=191; M=117). The subjects completed their first profiles in late 1993. A second set of profiles was completed by the same subjects about 10 years later in 2003. Bivariate correlations had values between r=.68 and r=.77. A separate test-retest analysis using a one-way ANOVA showed five of the seven factors showed no statistically significant difference in scores.

Significance levels above .05 indicate any mean score differences between Time 1 and Time 2 are likely due to chance. This means Analytical (p<.140), Expressive (p<.534), Assertive (p<.104), and Flexibility (p<.535) show no statistically significant change. The mean increase in Structural (p<.020), is significant but the slight decrease in mean-score is negligible (i.e., 40.61 v. 38.17). The apparent increase in Conceptual (i.e., 54.37 v. 61.91) is probably due to a workshop-effect (i.e., participative activities that encourage creativity).

The first table shows the paired sample means, the second table shows a paired samples t-test.

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	T1 AnaTile	51.52	307	25.386	1.449
	T2 AnaTile	50.00	307	26.427	1.508
Pair 2	T1 StrTile	40.61	307	24.891	1.421
	T2 StrTile	38.17	307	27.364	1.562
Pair 3	T1 SocTile	46.49	307	24.110	1.376
	T2 SocTile	48.39	307	26.089	1.489
Pair 4	T1 ConTile	54.37	307	25.660	1.464
	T2 ConTile	61.91	307	26.695	1.524
Pair 5	T1 ExpTile	53.85	307	24.748	1.412
	T2 ExpTile	53.24	307	25.512	1.456
Pair 6	T1 AsrTile	57.94	307	23.692	1.352
	T2 AsrTile	56.18	307	23.962	1.368
Pair 7	T1 FlexTile	46.64	307	24.372	1.391
	T2 FlexTile	47.31	307	25.759	1.470

Paired Samples Test

		Paired Differences							
				Std. Error Mean	95% Confidence Interval of the Difference				Sig. (2-tailed)
		Mean	Std. Deviation		Lower	Upper	t	df	
Pair 1	T1 AnaTile - T2 AnaTile	1.518	17.954	1.025	-.498	3.534	1.481	306	.140
Pair 2	T1 StrTile - T2 StrTile	2.440	18.325	1.046	.382	4.498	2.333	306	.020
Pair 3	T1 SocTile - T2 SocTile	-1.902	17.921	1.023	-3.915	.110	-1.860	306	.064
Pair 4	T1 ConTile - T2 ConTile	-7.534	17.881	1.021	-9.542	-5.526	-7.383	306	.000
Pair 5	T1 ExpTile - T2 ExpTile	.606	17.062	.974	-1.310	2.522	.622	306	.534
Pair 6	T1 AsrTile - T2 AsrTile	1.762	18.935	1.081	-.364	3.889	1.631	306	.104
Pair 7	T1 FlexTile - T2 FlexTile	-.668	18.831	1.075	-2.783	1.447	-.621	306	.535

N=307

2. Validity

Validity means the test measures what it is intended to measure. There are many different measures of validity:

- Face validity
- Convergent/Discriminate validity
- Predictive and Concurrent Criterion validity
- Construct validity
- Content validity

Being a normative (i.e., non-criterion referenced) nomological instrument we will limit our examination to Emergenetics' face validity, convergent/discriminate validity, and construct validity.

2a. Face Validity

This refers to how subjects feel about the Emergenetics items. A random sampling of 412 subjects (M=182, F=230) were asked to rate, using a 1 to 5 Likert scale, "To what degree do you feel the items included in the

Emergenetics questionnaire reflect everyday behaviors and preferences?" The following table suggests 301 subjects (73%) agreed, 23.3% were neutral, and less than 4% disagreed. This suggests the thinking and behavioral items are face valid.

		Frequency	Percent
Valid	1 – Strongly disagree	2	.5
	2 – Disagree	13	3.2
	3 – Neither agree or disagree	96	23.3
	4 – Agree	246	59.7
	5 – Strongly agree	55	13.3

N=412

2b. Nomological Convergent/Discriminate Validity

This analysis examines relationships between factors by examining both convergent (agreement) and discriminant (non-agreement) correlations within the instrument, as well as with a second independent measure of the same factors. In other words, it evaluates the validity of factors within the Profile and outside the Profile (Society for Industrial Organizational Psychology, 2003; Furr & Bacharach, 2007). In this case, the second measure is an independent 3rd party survey.

It should be noted that behavior is seldom "pure". Like Venn diagrams, macro descriptions often cause some factor scores to share interdependence with one another. For example, social assertiveness (i.e., Expressiveness) and task assertiveness (i.e., Assertiveness) both contain items that are related to assertiveness even though their goals may be entirely different (e.g., stand-out socially vs. accomplish tasks). Some competitive instruments imply that once you know an individual's thinking preferences, you can use that same information to accurately predict their behaviors. For example, if you are analytical, it is often assumed you must also be quiet and thoughtful. We have found these assumptions to be problematic.

To help individuals isolate important personality preferences, we have designed Emergenetics to be a combination of two complimentary sections: 1) how a person prefers to think and process information; and 2) how he/she acts-out these preferences with others. As we noted earlier, personality factors are not always orthogonal making some behaviors covary with others; therefore, some correlations are higher than we would like. Nevertheless, we have included these factors because, in our experience, they help participants better-understand why observing someone's behavior is insufficient to predict their thinking preferences; and, likewise, why someone's thinking preferences provide insufficient data to predict their behavior.

The following tables represent a multi-trait multi-matrix network showing the correlations between the subject's responses for each factor (shown as a percentile) and mean-score ratings from at least three independent observers. Rater-scores greater than one standard deviation from the mean were excluded from the analysis.

As can be seen in the following tables, self-reported scores converge positively with mean rater observation scores: Analysis (r=.504, p<.000); Structure (r=.352, p<.007); Social (r=.636, p<.004);

Conceptual (r=.635, p<.000); Expressiveness (r=.563, p<.003), and Assertiveness (r=.752, p<.000). The Flexibility factor showed no statistically significant correlation (r=.221., p<.134).

Thinking Preferences v. Rater Observations

Convergent /Discriminate Multi-Trait Multi-Method Analysis

		Self Ana Percentile	Self Str Percentile	Self Soc Percentile	Self Con Percentile	Mean Ana Rating	Mean Str Rating	Mean Soc Rating
Self Str Percentile	Pearson Correlation	.199						
	Sig. (1-tailed)	.083						
	N	50						
Self Soc Percentile	Pearson Correlation	-.333	-.143					
	Sig. (1-tailed)	.009	.161					
	N	50	50					
Self Con Percentile	Pearson Correlation	.087	-.799	.174				
	Sig. (1-tailed)	.274	.000	.113				
	N	50	50	50				
Mean Ana Rating	Pearson Correlation	.504	.188	-.325	-.052			
	Sig. (1-tailed)	.000	.096	.011	.361			
	N	50	50	50	50			
Mean Str Rating	Pearson Correlation	.020	.352	-.224	-.333	.040		
	Sig. (1-tailed)	.445	.007	.063	.010	.393		
	N	48	48	48	48	48		
Mean Soc Rating	Pearson Correlation	-.216	-.463	.459	.379	-.333	-.171	
	Sig. (1-tailed)	.114	.003	.004	.015	.029	.170	
	N	33	33	33	33	33	33	
Mean Con Rating	Pearson Correlation	.002	-.673	.282	.635	-.281	-.428	.737
	Sig. (1-tailed)	.495	.000	.065	.000	.066	.012	.000
	N	30	30	30	30	30	28	21

Convergent-Discriminate Multi-Trait Multi Method Correlations-Behaving

		Exp Percentile	Asr Percentile	Flx Percentile	Mean Exp Rating	Mean Asr Rating
Convergent Self Asr Percentile	Pearson Correlation	.779				
	Sig. (1-tailed)	.000				
	N	50				
Self Flx Percentile	Pearson Correlation	.627	.246			
	Sig. (1-tailed)	.000	.043			
	N	50	50			
Mean Exp Rating	Pearson Correlation	.563	.650	.357		
	Sig. (1-tailed)	.003	.000	.047		
	N	23	23	23		
Mean Asr Rating	Pearson Correlation	.696	.752	.334	.614	
	Sig. (1-tailed)	.000	.000	.075	.017	
	N	20	20	20	12	
Mean Flx Rating	Pearson Correlation	.230	.184	.221	.381	.228
	Sig. (1-tailed)	.125	.178	.134	.100	.238
	N	27	27	27	13	12

2c. Validity: Contingency Analyses

A correlation coefficient is often misunderstood as probability. This is incorrect. Correlation is a mathematical process of fitting a line between two or more data points based on their mean and standard deviation. Using a grossly over-simplified example, a correlation of .50 simply tells us that a line can be drawn that minimizes the *plot distances* between roughly 25% of the data points (i.e., .5 squared). The remaining 75% of the data-scatter is technically referred to as "unexplained variance". On the other hand, a probability of .50 tells us there is a 50/50 chance that "A" happened because of "B". You could think of correlation as "line-fitting" while probability is the odds of predicting a specific occurrence.

Karl Pearson (the father of statistical analysis) argued that some variables are so comingled that, rather than calculating the correlation (i.e., line fitting) between data points, analysis would be better served by calculating probabilities (i.e., contingencies). He referred to this methodology as contingency analysis. Using the analogy of chips on a paint chart, Pearson argued that while paint colors were highly associated, they were also sufficiently important to be examined separately. Contingency analysis is widely used in survey research, business intelligence, engineering, and scientific research.

We believe that contingency analyses represents a better understanding of the nomological relationship between a thinking preference and a specific behavior.

Contingency data are shown in the following tables (N= 89,101). Raw data were collected for each of the seven Emergenetics factors, normalized using Z-Score transformations, and divided into equal thirds based on percentiles. In each table, the probability of an Expressive, Assertive, or Flexibility behavior was calculated for each thinking preference.

Referring to the highlighted numbers in Table 2, for example, of 27,151 participants who rated themselves as being in the top third of Analytical Thinking, 22.9% (6,221) rated themselves as being in the bottom third of Assertiveness; while 49.2% (13,355) described themselves as being in the top third of Assertiveness. Thus, it would seem, that people with strong Analytical preferences do not fit the stereotypical behavior pattern of being peacekeeping and calm.

Granular differences between individual subjects in each table illustrates why it's important to report all seven factors at the *contingency* level even though they might show covariance at the *correlational* level. Similar results can be found throughout the tables emphasizing the need for participants to hesitate forming conclusions about how people behave simply because they express a specific thinking preference.

Emergenetics Raw Score Contingency Analysis
(1= bottom 33%, 2 = mid 34-65%, 3= top 33%)

Table 1

Zscore (Analytical) (Binned) * Zscore (Expressiveness) (Binned) Cross tabulation			Zscore (Expressiveness) (Binned)			Total
			1	2	3	
Zscore (Analytical) (Binned)	1	Count	11508	8612	8141	28261
		% within Zscore (Analytical) (Binned)	40.7%	30.5%	28.8%	100.0%
	2	Count	10584	11845	11260	33689
		% within Zscore (Analytical) (Binned)	31.4%	35.2%	33.4%	100.0%
	3	Count	7424	8997	10730	27151
		% within Zscore (Analytical) (Binned)	27.3%	33.1%	39.5%	100.0%
Total		Count	29516	29454	30131	89101
		% within Zscore (Analytical) (Binned)	33.1%	33.1%	33.8%	100.0%

Table 2

Zscore (Analytical) (Binned) * Zscore (Assertiveness) (Binned) Cross tabulation

			Zscore (Assertiveness) (Binned)			
			1	2	3	Total
Zscore (Analytical) (Binned)	1	Count	14403	7207	6651	28261
		% within Zscore (Analytical) (Binned)	51.0%	25.5%	23.5%	100.0%
	2	Count	11323	10458	11908	33689
		% within Zscore (Analytical) (Binned)	33.6%	31.0%	35.3%	100.0%
	3	Count	6221	7575	13355	27151
		% within Zscore (Analytical) (Binned)	22.9%	27.9%	49.2%	100.0%
Total		Count	31947	25240	31914	89101
		% within Zscore (Analytical) (Binned)	35.9%	28.3%	35.8%	100.0%

Table 3

Zscore (Analytical) (Binned) * Zscore (Flexibility) (Binned) Cross tabulation

			Zscore (Flexibility) (Binned)			
			1	2	3	Total
Zscore (Analytical) (Binned)	1	Count	10353	10777	7131	28261
		% within Zscore (Analytical) (Binned)	36.6%	38.1%	25.2%	100.0%
	2	Count	9989	13859	9841	33689
		% within Zscore (Analytical) (Binned)	29.7%	41.1%	29.2%	100.0%
	3	Count	7261	10170	9720	27151
		% within Zscore (Analytical) (Binned)	26.7%	37.5%	35.8%	100.0%
Total		Count	27603	34806	26692	89101
		% within Zscore (Analytical) (Binned)	31.0%	39.1%	30.0%	100.0%

Table 4

Zscore (Social) (Binned) * Zscore (Expressiveness) (Binned) Cross tabulation

| | | | Zscore (Expressiveness) (Binned) | | | |
			1	2	3	Total
Zscore (Social) (Binned)	1	Count	18350	8133	2408	28891
		% within Zscore (Social) (Binned)	63.5%	28.2%	8.3%	100.0%
	2	Count	8788	13238	8812	30838
		% within Zscore (Social) (Binned)	28.5%	42.9%	28.6%	100.0%
	3	Count	2378	8083	18911	29372
		% within Zscore (Social) (Binned)	8.1%	27.5%	64.4%	100.0%
Total		Count	29516	29454	30131	89101
		% within Zscore (Social) (Binned)	33.1%	33.1%	33.8%	100.0%

Table5

Zscore (Social) (Binned) * Zscore (Assertiveness) (Binned) Cross tabulation

| | | | Zscore (Assertiveness) (Binned) | | | |
			1	2	3	Total
Zscore (Social) (Binned)	1	Count	14150	7598	7143	28891
		% within Zscore (Social) (Binned)	49.0%	26.3%	24.7%	100.0%
	2	Count	10641	9438	10759	30838
		% within Zscore (Social) (Binned)	34.5%	30.6%	34.9%	100.0%
	3	Count	7156	8204	14012	29372
		% within Zscore (Social) (Binned)	24.4%	27.9%	47.7%	100.0%
Total		Count	31947	25240	31914	89101
		% within Zscore (Social) (Binned)	35.9%	28.3%	35.8%	100.0%

Table 6

Zscore (Social) (Binned) * Zscore (Flexibility) (Binned) Cross tabulation

| | | | Zscore (Flexibility) (Binned) | | | |
			1	2	3	Total
Zscore (Social) (Binned)	1	Count	21587	6993	311	28891
		% within Zscore (Social) (Binned)	74.7%	24.2%	1.1%	100.0%
	2	Count	5638	19834	5366	30838
		% within Zscore (Social) (Binned)	18.3%	64.3%	17.4%	100.0%
	3	Count	378	7979	21015	29372
		% within Zscore (Social) (Binned)	1.3%	27.2%	71.5%	100.0%
Total		Count	27603	34806	26692	89101
		% within Zscore (Social) (Binned)	31.0%	39.1%	30.0%	100.0%

Table 7

Zscore (Structure) (Binned) * Zscore (Expressiveness) (Binned) Cross tabulation

| | | | Zscore (Expressiveness) (Binned) | | | |
			1	2	3	Total
Zscore (Structural) (Binned)	1	Count	7821	10067	13324	31212
		% within Zscore (Structural) (Binned)	25.1%	32.3%	42.7%	100.0%
	2	Count	9126	9246	8184	26556
		% within Zscore (Structural) (Binned)	34.4%	34.8%	30.8%	100.0%
	3	Count	12569	10141	8623	31333
		% within Zscore (Structural) (Binned)	40.1%	32.4%	27.5%	100.0%
Total		Count	29516	29454	30131	89101
		% within Zscore (Structural) (Binned)	33.1%	33.1%	33.8%	100.0%

Table 8

Zscore (Structure) (Binned) * Zscore (Assertiveness) (Binned) Cross tabulation

			Zscore (Assertiveness) (Binned)			
			1	2	3	Total
Zscore (Structural) (Binned)	1	Count	7060	8293	15859	31212
		% within Zscore (Structural) (Binned)	22.6%	26.6%	50.8%	100.0%
	2	Count	9628	8193	8735	26556
		% within Zscore (Structural) (Binned)	36.3%	30.9%	32.9%	100.0%
	3	Count	15259	8754	7320	31333
		% within Zscore (Structural) (Binned)	48.7%	27.9%	23.4%	100.0%
Total		Count	31947	25240	31914	89101
		% within Zscore (Structurale) (Binned)	35.9%	28.3%	35.8%	100.0%

Table 9

Zscore (Structure) (Binned) * Zscore (Flexibility) (Binned) Cross tabulation

			Zscore (Flexibility) (Binned)			
			1	2	3	Total
Zscore (Structural) (Binned)	1	Count	9389	12230	9593	31212
		% within Zscore (Structural) (Binned)	30.1%	39.2%	30.7%	100.0%
	2	Count	8523	10594	7439	26556
		% within Zscore (Structural) (Binned)	32.1%	39.9%	28.0%	100.0%
	3	Count	9691	11982	9660	31333
		% within Zscore (Structural) (Binned)	30.9%	38.2%	30.8%	100.0%
Total		Count	27603	34806	26692	89101
		% within Zscore (Structural) (Binned)	31.0%	39.1%	30.0%	100.0%

Table 10

Zscore (Conceptual) (Binned) * Zscore (Expressiveness) (Binned) Cross tabulation

			Zscore (Expressiveness) (Binned)			
			1	2	3	Total
Zscore (Conceptual) (Binned)	1	Count	16406	8729	4224	29359
		% within Zscore (Conceptual) (Binned)	55.9%	29.7%	14.4%	100.0%
	2	Count	8034	10784	8826	27644
		% within Zscore (Conceptual) (Binned)	29.1%	39.0%	31.9%	100.0%
	3	Count	5076	9941	17081	32098
		% within Zscore (Conceptual) (Binned)	15.8%	31.0%	53.2%	100.0%
Total		Count	29516	29454	30131	89101
		% within Zscore (Conceptual) (Binned)	33.1%	33.1%	33.8%	100.0%

Table 11

Zscore (Conceptual) (Binned) * Zscore (Assertiveness) (Binned) Cross tabulation

			Zscore (Assertiveness) (Binned)			
			1	2	3	Total
Zscore (Conceptual) (Binned)	1	Count	17562	7405	4392	29359
		% within Zscore (Conceptual) (Binned)	59.8%	25.2%	15.0%	100.0%
	2	Count	8843	9460	9341	27644
		% within Zscore (Conceptual) (Binned)	32.0%	34.2%	33.8%	100.0%
	3	Count	5542	8375	18181	32098
		% within Zscore (Conceptual) (Binned)	17.3%	26.1%	56.6%	100.0%
Total		Count	31947	25240	31914	89101
		% within Zscore (Conceptual) (Binned)	35.9%	28.3%	35.8%	100.0%

Table 12

Zscore (Conceptual) (Binned) * Zscore (Flexibility) (Binned) Cross tabulation

			Zscore (Flexibility) (Binned)			
			1	2	3	Total
Zscore (Conceptual) (Binned)	1	Count	14608	10807	3944	29359
		% within Zscore (Conceptual) (Binned)	49.8%	36.8%	13.4%	100.0%
	2	Count	7381	12412	7851	27644
		% within Zscore (Conceptual) (Binned)	26.7%	44.9%	28.4%	100.0%
	3	Count	5614	11587	14897	32098
		% within Zscore (Conceptual) (Binned)	17.5%	36.1%	46.4%	100.0%
Total		Count	27603	34806	26692	89101
		% within Zscore (Conceptual) (Binned)	31.0%	39.1%	30.0%	100.0%

2d. Construct Validity (i.e., Big Five Construct Correlation)

Construct validity refers to whether the survey evaluates a deep-seated construct such as emotional sensitivity or intelligence. Construct validity of the seven Emergenetics nomological factors was compared to the NEO-PI, a comprehensive lexical Big Five model published by Psychological Assessment Resources, Inc. This analysis represents the correlations between a well-respected trait-style instrument and the Emergenetics nomological taxonomy.

The NEO-PI was developed by Paul Costa and Robert McCrae (1987) based on personality research conducted in the 1950's showing that virtually all *language-based* personality traits tend to cluster into roughly 20 sub-groups, which in turn cluster into 5 meta factors. Because the NEO-PI covers the entire personality domain and is based on granular analysis of the human lexicon (as opposed to Emergenetics' seven nomological observations), we would expect Emergenetics' nomological constructs to correlate across several FFM lexical constructs.

The NEO-PI FFM lexical factors include:

1. Neuroticism (N): a compound score indicating the tendency to experience negative emotions such as fear, sadness, anger, disgust, embarrassment, and guilt.
   - N1 (high sub-factor score): general anxiety, phobias, tense, jittery
   - N2 (high sub-factor score): hostility, bitterness, anger, frustration
   - N3 (high sub-factor score): depression, guilt, sadness, hopelessness, loneliness
   - N4 (high sub-factor score): self-consciousness, sensitivity, inferiority, uncomfortable

2. Expressiveness (E): a compound score indicating preferences for liking people, being around large groups, being assertive and talkative, upbeat, energetic, and active.
   - E1 (high sub-factor score): warmth, affectionate, friendly, close attachments
   - E2 (high sub-factor score): gregarious, enjoys the company of others
   - E3 (high sub-factor score): dominant, forceful, social climbing
   - E4 (high sub-factor score): energy, active, fast moving, thrill seeker

3. Openness (O): a compound score indicating active imagination, aesthetic sensitivity, inner feelings, variety, curiosity, and independence.
   - O1 (high sub-factor score): fantasy, imaginative, daydreamer, creative
   - O2 (high sub-factor score): aesthetic, art, beauty, music, poetry
   - O3 (high sub-factor score): inner feelings, emotive, emotional depth and intensity
   - O4 (high sub-factor score): willingness, try new things, novelty, and variety

4. Agreeableness (A): a compound score indicating sympathy and eagerness to help
   - A1 (high sub-factor score): trust, honest, well-intentioned
   - A2 (high sub-factor score): straightforwardness, frank, sincere, ingenuous
   - A3 (high sub-factor score): altruistic, concern for others, generous, helpful
   - A4 (high sub-factor score): compliance, withdrawn, forgive, deference

5. Conscientiousness (C): a compound score indicating strong will, self-control, planning, organizing, purposefulness, and achievement.
   - C1 (high sub-factor score): competence, capable, sensible, prudent effective
   - C2 (high sub-factor score): order, tidy, well organized, planful
   - C3 (high sub-factor score): dutiful, ethical, conscientious, moral obligations
   - C4 (high sub-factor score): achievement oriented, aspirational, diligent, driven

Nomological Criticism of the FFM

Examining the NEO-PI factors, it is easy to see that personality analysis based on language can be complex. For one thing, in the real world, personality interactions rarely occur as a single word. They often occur as components of observable behaviors that vary with emotional state and situation (e.g., someone who is socially warm may concurrently be gregarious and forceful). Thus, researchers using person-descriptive sentences have concluded that although a FFM may be an interesting biologically-based human universal that generalizes across culture, language, gender, and type of assessment rating source; its analytical clustering technique has generated a considerable number of questions whether it should be used as universal taxonomy for predicting actual work behavior. Take, for example, the FFM Conscientiousness factor.

While the Conscientiousness factor may appear to be homogenous, it can be argued that it is actually an amalgam of multiple discrete activities (i.e., occupational competence, capability, sensibility, prudence, effectiveness, being orderly, tidy, well organized, planful, being dutiful, ethical, conscientious, having moral obligations, achievement oriented, aspirational, diligent, and driven). Thus, although the Conscientiousness meta factor is generally recognized as a strong predictor of job performance, its multiple traits make practical application as a personality construct problematic.

Correlations between the Emergenetics Nomological factors and NEO-PI Lexical Personality Traits

Correlating data between two discrete instruments is based on the presumption the factors measure similar domains. For example, if Profile X contains a factor called "Expressiveness" measured using Items A, B, and C, and, Profile Y also contains a factor called "Expressiveness" measured using Items D, E, and F, expecting the two Expressiveness scores to correlate can be challenging. For example, the Emergenetics nomological factors include:

1. Analytical (Ana): having a dominant interest in analytical thinking, problem solving, understanding complex subjects, and mental analysis.
2. Structure (Str): preferences for order, rules and regulations, stability, working with things, and avoiding risk
3. Social (Soc): affiliation with people, building friendships, social concerns, working in teams, seeking approval from others
4. Conceptual (Con): reliance on intuition, seeking new and different activities, abstract thinking, exploration
5. Expressiveness (Exp): Openly showing affection, being admired, seeking leadership, being competitive, impulsive, entertaining
6. Assertive (Asr): comfortable with ambiguity, competitive, argumentative, impulsive, assertive, easily bored
7. Flexibility (Flx): supporting others, even tempered, patient, personally supportive, avoiding confrontation, agreeable

To compare lexical constructs with nomological constructs, we used Stepwise factor analysis. Emergenetics Profile Percentiles were chosen as the independent variables. NEO-PI scores converted using Z-score transformations became the dependent variables.

Analytical Factor

Stepwise analysis shows the Analytical nomological factor is positively related to C4 (achievement, aspirations, diligence, and drive) and negatively related to E1 (being warm, affectionate, friendly, and having close attachments).

Stepwise EP Analytical Factor Analysis v. FFM Sub-factors

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.274[a]	.075	.065	24.075	.075	7.694	1	95	.007
2	.387[b]	.150	.132	23.200	.075	8.298	1	94	.005

Stepwise EP Analytical Factor v. FFM Sub-factor Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	17.057	11.936		1.429	.156
	C4	1.539	.555	.274	2.774	.007
2	(Constant)	52.977	16.964		3.123	.002
	C4	1.783	.541	.317	3.295	.001
	E1	-1.668	.579	-.277	-2.881	.005

a. Dependent Variable: Analytical

(N=97)

Structural Factor

The Emergenetics Structural factor incorporates preferences for rules and order. It correlates positively with FFM C2 (being orderly, tidy and planful). And, as expected, negatively correlates with O4 (willingness, try new things, novelty, variety); E3 (dominant, forceful, social climbing); and O2 (aesthetic, art, beauty, music, poetry). Overall, the nomological Structural factor shows strong positive correlation with the FFM orderliness factor, and as expected, negative association with less structured activities.

Stepwise EP Structural Factor v. FFM Sub-factors

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.543[a]	.295	.287	23.606	.295	39.660	1	95	.000
2	.648[b]	.420	.408	21.509	.126	20.428	1	94	.000
3	.708[c]	.502	.486	20.047	.081	15.210	1	93	.000
4	.738[d]	.545	.525	19.272	.043	8.633	1	92	.004

Stepwise EP Structural Factor v. FFM Sub-factor Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-6.655	8.737		-.762	.448
	C2	2.761	.438	.543	6.298	.000
2	(Constant)	43.643	13.683		3.190	.002
	C2	2.161	.421	.425	5.135	.000
	O4	-2.199	.487	-.374	-4.520	.000
3	(Constant)	65.381	13.918		4.698	.000
	C2	2.238	.393	.440	5.697	.000
	O4	-1.870	.461	-.318	-4.055	.000
	E3	-1.486	.381	-.290	-3.900	.000
4	(Constant)	72.989	13.628		5.356	.000
	C2	2.397	.381	.471	6.284	.000
	O4	-1.192	.500	-.203	-2.385	.019
	E3	-1.558	.367	-.304	-4.245	.000
	O2	-1.096	.373	-.233	-2.938	.004

a. Dependent Variable: Structural

N=97

Social Factor

The Emergenetics Social nomological factor evaluates concerns for others. It is positively associated with the traits of E1 (warmth, affectionate, friendly, close attachments); O3 (inner- feelings, emotive, emotional depth and intensity); and, N1 (general anxiety, phobias, tense, jittery). It has a negative correlation with A2 (straightforwardness, frank, sincere, ingenuous). While the FFM Neuroticism sub-factor is included in the analysis, it is outside the design intent of the Emergenetics profile to represent healthy nomological behaviors.

Stepwise EP Social Factor v. FFM Sub-factors

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.592[a]	.350	.344	20.673	.350	51.230	1	95	.000
2	.662[b]	.438	.426	19.333	.087	14.616	1	94	.000
3	.692[c]	.479	.462	18.707	.041	7.399	1	93	.008
4	.717[d]	.514	.493	18.169	.035	6.589	1	92	.012

Stepwise EP Social Factor v. FFM Sub-factor Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-37.105	12.721		-2.917	.004
	E1	3.646	.509	.592	7.158	.000
2	(Constant)	-57.122	12.998		-4.395	.000
	E1	2.587	.551	.420	4.694	.000
	O3	1.961	.513	.342	3.823	.000
3	(Constant)	-34.647	15.049		-2.302	.024
	E1	2.852	.542	.463	5.261	.000
	O3	1.726	.504	.301	3.426	.001
	A2	-1.079	.397	-.208	-2.720	.008
4	(Constant)	-47.573	15.459		-3.077	.003
	E1	3.352	.561	.544	5.971	.000
	O3	1.298	.517	.226	2.511	.014
	A2	-1.134	.386	-.218	-2.939	.004
	N1	.834	.325	.202	2.567	.012

Dependent Variable: Social

N=97

Conceptual Factor

The Emergenetics Conceptual factor incorporates preferences for new and innovative ideas. It positively correlates with the traits of O1 (fantasy, imaginative, daydreamer, creative); E3 (dominant, forceful, social climbing); O2 (aesthetic, art, beauty, music, poetry); and C3 (dutiful, ethical, conscientious, moral obligations). On the other hand, it is negatively correlated with C2 (order, tidy, well-organized, planful); and A3 (altruistic, concern for others, generous, helpful). This indicates the design intent of the nomological Conceptual factor to be open and innovative is consistent across related FFM traits.

Stepwise EP Conceptual Factor v. FFM Sub-factors

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.519[a]	.269	.262	24.348	.269	35.001	1	95	.000
2	.629[b]	.395	.382	22.266	.126	19.597	1	94	.000
3	.679[c]	.461	.443	21.139	.065	11.297	1	93	.001
4	.719[d]	.517	.496	20.106	.057	10.803	1	92	.001
5	.735[e]	.540	.515	19.736	.023	4.481	1	91	.037
6	.751[f]	.564	.535	19.312	.024	5.040	1	90	.027

Stepwise EP Conceptual Factor v. FFM Sub-factor Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	1.659	9.369		.177	.860
	O1	2.754	.466	.519	5.916	.000
2	(Constant)	53.033	14.425		3.676	.000
	O1	2.040	.455	.384	4.482	.000
	C2	-1.958	.442	-.380	-4.427	.000
3	(Constant)	32.803	14.959		2.193	.031
	O1	1.799	.438	.339	4.107	.000
	C2	-2.028	.420	-.393	-4.825	.000
	E3	1.346	.400	.259	3.361	.001
4	(Constant)	20.922	14.680		1.425	.157
	O1	1.308	.443	.246	2.955	.004
	C2	-2.170	.402	-.421	-5.397	.000
	E3	1.386	.381	.267	3.638	.000
	O2	1.206	.367	.253	3.287	.001
5	(Constant)	-2.927	18.291		-.160	.873
	O1	1.519	.446	.286	3.407	.001
	C2	-2.388	.408	-.463	-5.854	.000
	E3	1.226	.382	.236	3.214	.002
	O2	1.076	.365	.226	2.946	.004
	C3	1.201	.567	.167	2.117	.037
6	(Constant)	17.700	20.119		.880	.381
	O1	1.856	.461	.350	4.023	.000
	C2	-2.322	.400	-.450	-5.802	.000
	E3	1.039	.383	.200	2.715	.008
	O2	1.185	.361	.249	3.286	.001
	C3	1.658	.591	.230	2.804	.006
	A3	-1.520	.677	-.179	-2.245	.027

Dependent Variable: Conceptual
N=97

Expressive Factor

The Emergenetics Expressive factor is characterized by being open and socially forceful. It correlates with the FFM sub factor E3 (dominant, forceful, social climbing); O3 (inner- feelings, emotive, emotional depth and intensity); E1 (warmth, affectionate, friendly, close attachments): and, negatively with A2 (straightforwardness, frank, sincere, ingenuous). These correlations would suggest Emergenetics' Expressive behavior is aligned with the FFM sociability-related traits.

Stepwise EP Expressive Factor v. FFM Sub-factors

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
					Change Statistics				
1	.650[a]	.423	.417	19.757	.423	69.659	1	95	.000
2	.766[b]	.587	.578	16.811	.164	37.211	1	94	.000
3	.799[c]	.638	.626	15.814	.051	13.225	1	93	.000
4	.830[d]	.689	.675	14.749	.050	14.911	1	92	.000

Stepwise EP Expressive Factor v. FFM Sub-factor Coefficients

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	-7.046	7.478		-.942	.348
	E3	3.081	.369	.650	8.346	.000
2	(Constant)	-50.818	9.591		-5.299	.000
	E3	2.214	.345	.467	6.422	.000
	O3	2.582	.423	.444	6.100	.000
3	(Constant)	-72.982	10.888		-6.703	.000
	E3	2.190	.324	.462	6.750	.000
	O3	1.827	.449	.314	4.069	.000
	E1	1.640	.451	.262	3.637	.000
4	(Constant)	-45.326	12.426		-3.648	.000
	E3	1.929	.310	.407	6.223	.000
	O3	1.686	.420	.290	4.010	.000
	E1	1.951	.428	.312	4.555	.000
	A2	-1.237	.320	-.235	-3.862	.000

Dependent Variable: Exp
N=97

Assertiveness Factor

The Emergenetics Assertive factor addresses an individual's drive to accomplish a task as opposed to being open and socially assertive. It correlates positively with E3 (dominant, forceful, social climbing) and negatively with A4 (compliance, withdrawn, forgive, deference). This suggests the Assertive nomological factor correlates with the related rationally-associated FFM traits.

Stepwise EP Assertive Factor v. FFM Sub-factors

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics R Square Change	F Change	df1	df2	Sig. F Change
1	.706a	.499	.493	18.670	.499	94.435	1	95	.000
2	.750b	.562	.553	17.534	.064	13.715	1	94	.000

Stepwise EP Assertive Factor v. FFM Sub-factor Coefficients

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	T	Sig.
1	(Constant)	-14.437	7.067		-2.043	.044
	E3	3.390	.349	.706	9.718	.000
2	(Constant)	27.250	13.067		2.085	.040
	E3	2.675	.380	.557	7.035	.000
	A4	-1.449	.391	-.293	-3.703	.000

Dependent Variable: Assertiveness
N=97

Flexibility Factor

The Flexibility factor measures an individuals' efforts to get along with others. Scores correlate positively with E1 (being warm, affectionate, friendly, and having close attachments) and O2 (aesthetic, art, beauty, music, poetry). The positive relationship with E1 traits would be expected.

Stepwise EP Flexibility Factor v. FFM Sub-factors

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.622[a]	.386	.380	20.228	.386	59.830	1	95	.000
2	.656[b]	.431	.419	19.585	.044	7.341	1	94	.008

Stepwise EP Flexibility Factor v. FFM Sub-factor Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-43.182	12.448		-3.469	.001
	E1	3.856	.498	.622	7.735	.000
2	(Constant)	-49.143	12.251		-4.011	.000
	E1	3.325	.521	.536	6.384	.000
	O2	.983	.363	.228	2.709	.008

Dependent Variable: Flexibility

N=97

As mentioned earlier, the FFM Conscientiousness factor has a long history of validation with job performance. However, it must be emphasized Conscientiousness is also criticized for being a statistical artifact comprised of discrete activities (i.e., C1=competent/capable, C2=organized/planful, C3=ethical/moral, and C4=driven/diligent) as opposed to a collection of rationally homogenous traits.

This table shows the seven Emergenetics constructs regressed against the FFM Conscientiousness meta factor. The model shows statistically significant relationships with the Emergenetics Analytical, Expressiveness, and Conceptual nomological constructs.

Stepwise EP Factors v. FFM Conscientiousness

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics R Square Change	F Change	df1	df2	Sig. F Change
1	.271[a]	.074	.064	.96749586	.074	7.559	1	95	.007
2	.346[b]	.120	.101	.94826776	.046	4.892	1	94	.029
3	.464[c]	.215	.190	.90015542	.096	11.317	1	93	.001

Stepwise EP Factors v. FFM Conscientiousness Coefficients

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.	Correlations Zero-order	Partial	Part
1	(Constant)	-.539	.219		-2.458	.016			
	Ana	.011	.004	.271	2.749	.007	.271	.271	.271
2	(Constant)	-.961	.287		-3.344	.001			
	Ana	.011	.004	.263	2.712	.008	.271	.269	.262
	Ext	.008	.004	.214	2.212	.029	.225	.222	.214
3	(Constant)	-.614	.292		-2.103	.038			
	Ana	.010	.004	.258	2.803	.006	.271	.279	.257
	Ext	.015	.004	.384	3.660	.000	.225	.355	.336
	Con	-.012	.004	-.352	-3.364	.001	-.167	-.329	-.309

Dependent Variable: Zscore(C)
N=97

The next table shows the correlations between the FFM Conscientiousness sub-factors and the seven Emergenetics nomological constructs. Statistically significant relationships are shown across three of the four FFM factors (e.g., C1, C2, and C4). The C3 items (i.e., dutiful, ethical, conscientious, moral obligations) that are not part of the Emergenetics nomological constructs and have minimal relationships.

C Sub-factor Correlations

		Ana	Str	Soc	Con	Ext	Asr	Flx
C1	Pearson Correlation	.233	.015	.188	.060	.169	.155	.212
	Sig. (1-tailed)	.011	.441	.033	.280	.049	.065	.019
	N	97	97	97	97	97	97	97
C2	Pearson Correlation	.116	.543	.045	-.516	.027	-.043	.049
	Sig. (1-tailed)	.130	.000	.332	.000	.396	.337	.318
	N	97	97	97	97	97	97	97
C3	Pearson Correlation	.175	.017	.051	-.003	.072	.153	.166
	Sig. (1-tailed)	.043	.435	.310	.487	.243	.067	.052
	N	97	97	97	97	97	97	97
C4	Pearson Correlation	.274	-.137	.246	.128	.397	.363	.158
	Sig. (1-tailed)	.003	.090	.008	.105	.000	.000	.061
	N	97	97	97	97	97	97	97

The next table shows the seven Emergenetics nomological factors correlated with the FFM trait meta-factors. As shown, there are statistically significant relationships between all Emergenetics nomological factors and most of the FFM lexical factors. This suggests the seven Emergenetics nomological factors correlate with, but are less complex and easier to use, than lexical theory.

FFM Meta Factor Correlations

	Ana	Str	Soc	Con	Exp	Asr	Flex
N	.003	.218	.088	-.118	.006	-.049	-.137
	.979	.032	.391	.251	.955	.632	.182
	97	97	97	97	97	97	97
E	-.032	-.342	.486	.269	.731	.554	.457
	.754	.001	.000	.008	.000	.000	.000
	97	97	97	97	97	97	97
O	-.077	-.517	.459	.547	.446	.223	.471
	.455	.000	.000	.000	.000	.028	.000
	97	97	97	97	97	97	97
A	-.105	.029	.028	-.027	-.195	-.365	.170
	.308	.777	.788	.790	.056	.000	.096
	97	97	97	97	97	97	97
C	.271	.201	.178	-.167	.225	.203	.192
	.007	.048	.082	.103	.027	.046	.060
	97	97	97	97	97	97	97

N=97

2e. Validity: Independent Rater

One of the principles taught in the Emergenetics workshops is that, to be useful, individual preferences should not only be self-evident, but observable by independent third parties. Thus, we investigated correlations between self-reported data and independent observers. 83 targets who had previously completed Emergenetics surveys were asked to select between 2-11 independent observers to rate using a 1-7 Likert scale based on short descriptions of the seven Emergenetics factors. Data from targets with less than three raters were excluded from the final analysis, remaining rater scores were examined for inter-rater consistency. Individual ratings exceeding one standard deviation from the mean were eliminated on an item-by-item basis to minimize outliers. Rater observations were also employed in the Multi-Trait-Multi-Method analysis presented earlier. Results shown below suggest the seven Emergenetics' factors are easily recognized.

**Correlations between Emergenetics Percentile Scores
and Average Ratings by Observers.**

Analytical	Pearson Correlation	.504
	Sig. (1-tailed)	.000
	N	50
Structural	Pearson Correlation	.352
	Sig. (1-tailed)	.007
	N	48
Social	Pearson Correlation	.459
	Sig. (1-tailed)	.004
	N	33
Conceptual	Pearson Correlation	.635
	Sig. (1-tailed)	.000
	N	30
Expressiveness	Pearson Correlation	.563
	Sig. (1-tailed)	.003
	N	23
Assertiveness	Pearson Correlation	.752
	Sig. (1-tailed)	.000
	N	20
Flexibility	Pearson Correlation	.221
	Sig. (1-tailed)	.134
	N	27

Normative Scores and Demographic Differences

Because organizations tend to expand across all cultures and countries, regardless of the local environment, they share similar expectations for employee behavior and performance objectives even within the same company, department, city, or country. Because it's increasingly important for people to understand and utilize their individual differences in a global work environment, the Emergenetics Profile questionnaire raw scores are converted to global norms that are revisited bi-annually. The Emergenetics Profile allows individual to individual comparisons regardless of culture, occupation, or demographic background.

The authors' experience with job analysis also suggests that job titles are generally a poor indicator of job requirements and business necessity as outlined in the Department of Labor Uniform Guidelines on Employee Selection Procedures. Therefore, job data are not included in this analysis. Note: although basic demographic data are contained in the following four tables, in no way does the group mean infer an individual's score.

In the following chart, of 28,816 subjects, 7,275 reported age. Mean percentile scores are reported below. In the following ANOVA table this data is reported by raw score. The data suggest that age has a mixed effect: Assertiveness ($F=9.661$, $p<.000$), Social ($F=1.23$, $p<.003$), Flexibility ($F=4.350$, $p<.001$ and Expressiveness ($F=7.0661$, $p<.000$)

Percentile Means by Subjects Reporting Age

Age		Conceptual	Analytical	Structural	Social	Expressiveness	Assertiveness	Flexibility
Under 21	N Valid	120	120	120	120	120	120	120
	Mean	48	42	57	57	50	45	46
	Std. Deviation	27	27	27	27	30	28	30
21 – 30	N Valid	1485	1485	1485	1485	1485	1485	1485
	Mean	47	50	51	49	49	46	44
	Std. Deviation	26	29	26	27	27	27	28
31 – 40	N Valid	2512	2512	2512	2512	2512	2512	2512
	Mean	49	51	50	48	49	49	45
	Std. Deviation	26	28	26	26	28	27	27
41 – 50	N Valid	2034	2034	2034	2034	2034	2034	2034
	Mean	50	51	49	47	48	47	47
	Std. Deviation	26	28	27	26	27	27	27
51 – 60	N Valid	927	927	927	927	927	927	927
	Mean	49	50	52	48	46	43	48
	Std. Deviation	26	27	26	26	28	27	27
61 – 70	N Valid	185	185	185	185	185	185	185
	Mean	45	50	55	46	46	42	45
	Std. Deviation	27	28	26	25	27	27	27
71 – Up	N Valid	12	12	12	12	12	12	12
	Mean	48	57	44	40	44	42	38
	Std. Deviation	25	30	29	31	24	19	31

N = as shown

ANOVA

Raw Score Based on Age

		Sum of Squares	df	Mean Square	F	Sig.
RawAna	Between Groups	2965.458	5	593.092	1.233	.291
	Within Groups	3606203.820	7497	481.020		
	Total	3609169.278	7502			
RawSoc	Between Groups	7872.862	5	1574.572	3.584	.003
	Within Groups	3439548.479	7830	439.278		
	Total	3447421.341	7835			
RawStr	Between Groups	2536.744	5	507.349	1.092	.363
	Within Groups	3574348.454	7692	464.684		
	Total	3576885.198	7697			
RawCon	Between Groups	4242.950	5	848.590	1.926	.087
	Within Groups	3403537.368	7723	440.701		
	Total	3407780.319	7728			
RawFlex	Between Groups	9940.654	5	1988.131	4.350	.001
	Within Groups	3520444.414	7702	457.082		
	Total	3530385.069	7707			
RawAsr	Between Groups	21716.288	5	4343.258	9.661	.000
	Within Groups	3438357.114	7648	449.576		
	Total	3460073.402	7653			
RawExp	Between Groups	16428.923	5	3285.785	7.066	.000
	Within Groups	3546936.078	7628	464.989		
	Total	3563365.001	7633			

N = 7,275

In the next set of data, percentile scores are reported based on Gender. The first chart shows means and standard deviations. The ANOVA chart following shows some strong F-statistics and modest normative differences between the genders particularly in the raw Emergenetics Social (F=21.337, p<.000) and Conceptual factors (F=14.730, p<.000). This would suggest that males and females tend to describe themselves slightly differently.

Percentile Means by Subjects Reporting Gender

		Female		Male	
		Mean	Std. Deviation	Mean	Std. Deviation
Factor	Analytical	46	11	52	11
	Social	60	9	58	9
	Structural	37	8	34	8
	Conceptual	52	9	54	9
	Expressiveness	56	10	55	10
	Assertiveness	57	11	60	11
	Flexibility	60	10	58	10

N=48,125

ANOVA Raw Score Based on Gender

		Sum of Squares	df	Mean Square	F	Sig.
RawAna	Between Groups	2387.212	1	2387.212	4.943	.026
	Within Groups	3970891.725	8223	482.901		
	Total	3973278.936	8224			
RawSoc	Between Groups	9410.627	1	9410.627	21.377	.000
	Within Groups	3770085.704	8564	440.225		
	Total	3779496.331	8565			
RawStr	Between Groups	3274.967	1	3274.967	7.059	.008
	Within Groups	3922134.751	8454	463.938		
	Total	3925409.718	8455			
RawCon	Between Groups	6485.163	1	6485.163	14.730	.000
	Within Groups	3727298.190	8466	440.267		
	Total	3733783.353	8467			
RawFlex	Between Groups	1851.733	1	1851.733	4.021	.045
	Within Groups	3881275.257	8428	460.522		
	Total	3883126.990	8429			
RawAsr	Between Groups	2459.542	1	2459.542	5.405	.020
	Within Groups	3810082.614	8373	455.044		
	Total	3812542.156	8374			
RawExp	Between Groups	2565.371	1	2565.371	5.469	.019
	Within Groups	3909392.932	8335	469.033		
	Total	3911958.303	8336			

N =48,125

Of 20,144 subjects only 6,672 reported ethnicities. While most of the mean percentile differences are relatively slight, the accompanying ANOVA table shows some strong F-statistics in six of the seven Emergenetics factors: Analytical (F=60.830, p<.000), Structural (F=35.845, p<.000), Social (F=15.177, p<.000), Expressiveness (F=39.842, p<.000), Assertiveness (F=135.437, p<.000), Flexibility (F=94.039, p<.000).

Percentile Means by Subjects Reporting Ethnicity

Ethnicity			Concent	Anacent	Strcent	Soccent	Expcent	Asrcent	Flxcent
African American	N	Valid	170	170	170	170	170	170	170
	Mean		48	58	55	48	46	46	53
	Std. Deviation		24	24	25	26	24	23	25
Asian	N	Valid	2673	2673	2673	2673	2673	2673	2673
	Mean		48	45	52	46	45	39	41
	Std. Deviation		26	28	26	28	28	26	28
Caucasian	N	Valid	3317	3317	3317	3317	3317	3317	3317
	Mean		49	53	47	47	49	50	47
	Std. Deviation		25	26	26	24	27	26	25
Hispanic	N	Valid	512	512	512	512	512	512	512
	Mean		52	61	53	53	55	56	55
	Std. Deviation		24	26	25	26	24	25	27

N =As shown

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Ana raw	Between Groups	31292.610	3	10430.870	60.830	.000
	Within Groups	1143406.206	6668	171.477		
	Total	1174698.816	6671			
Str Raw	Between Groups	9611.075	3	3203.692	35.485	.000
	Within Groups	602013.682	6668	90.284		
	Total	611624.757	6671			
Soc Raw	Between Groups	4731.608	3	1577.203	15.177	.000
	Within Groups	692961.550	6668	103.923		
	Total	697693.158	6671			
Con Raw	Between Groups	1162.702	3	387.567	4.338	.005
	Within Groups	595733.931	6668	89.342		
	Total	596896.632	6671			
Ex Raw	Between Groups	16112.996	3	5370.999	39.842	.000
	Within Groups	898899.167	6668	134.808		
	Total	915012.163	6671			
As Raw	Between Groups	51798.364	3	17266.121	135.437	.000
	Within Groups	850064.139	6668	127.484		
	Total	901862.503	6671			
Flx Raw	Between Groups	38853.382	3	12951.127	94.039	.000
	Within Groups	918321.469	6668	137.721		
	Total	957174.851	6671			

The greatest normative differences in self-reported scores can be attributed to level of education. Indeed, the higher the reported level, the greater the difference in Analytical (F=24.1.1), Structural (F=23.631), and Conceptual (F=27.011). There are lesser differences in Social (F=2.323), Flexibility (F=8.52), Assertiveness (F=12.603), and Expressiveness (F=10.54). This suggests higher education leads to substantial changes in responses, particularly increasing preferences for analysis, organization, and greater interpersonal assertiveness.

Percentile Means by Subjects Reporting Education

Education			Conceptual	Analytical	Structural	Social	Expressiveness	Assertiveness	Flexibility
Advanced Degree	N	Valid	2345	2345	2345	2345	2345	2345	2345
	Mean		54	59	48	49	51	52	48
	Std. Dev.		25	26	26	26	27	26	26
College Degree	N	Valid	2870	2870	2870	2870	2870	2870	2870
	Mean		49	50	50	48	48	47	45
	Std. Dev.		26	28	26	26	27	27	27
Some College	N	Valid	768	768	768	768	768	768	768
	Mean		47	49	55	49	47	46	50
	Std. Dev.		25	27	26	25	26	26	27
HS Diploma	N	Valid	670	670	670	670	670	670	670
	Mean		45	36	52	46	46	40	42
	Std. Dev.		26	27	27	28	29	27	29
Vo-Tech	N	Valid	371	371	371	371	371	371	371
	Mean		42	38	54	43	43	35	39
	Std. Dev.		28	29	29	28	28	27	28
Some HS	N	Valid	156	156	156	156	156	156	156
	Mean		43	41	59	46	46	42	44
	Std. Dev.		28	27	26	29	29	29	30

N = As shown

ANOVA

Education

		Sum of Squares	df	Mean Square	F	Sig.
RawAna	Between Groups	57082.939	5	11416.588	24.101	.000
	Within Groups	3534235.362	7461	473.695		
	Total	3591318.301	7466			
RawSoc	Between Groups	5102.379	5	1020.476	2.323	.041
	Within Groups	3418380.224	7783	439.211		
	Total	3423482.603	7788			
RawStr	Between Groups	54027.399	5	10805.480	23.631	.000
	Within Groups	3497956.563	7650	457.249		
	Total	3551983.962	7655			
RawCon	Between Groups	58389.569	5	11677.914	27.011	.000
	Within Groups	3319936.989	7679	432.340		
	Total	3378326.558	7684			
RawFlex	Between Groups	19497.187	5	3899.437	8.542	.000
	Within Groups	3497769.083	7662	456.509		
	Total	3517266.270	7667			
RawAsr	Between Groups	28313.143	5	5662.629	12.603	.000
	Within Groups	3414609.795	7600	449.291		
	Total	3442922.938	7605			
RawExp	Between Groups	24440.421	5	4888.084	10.554	.000
	Within Groups	3512554.858	7584	463.153		
	Total	3536995.279	7589			

Conclusion

The data suggests the Emergenetics nomological approach to personality differences cuts across multiple lexical personality theory factors; shows construct convergent/discriminate validity; scores are relatively stable across age, but differ with gender, and ethnicity; and, rise substantially with education. Subjects report Emergenetics has robust utility in real-world applications. Separation of thought preferences and behaviors provides a simple way for lay users to better understand interpersonal and intrapersonal differences yet is simpler for the lay person to understand and apply.

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