



Develop Organizations Through People!

Research Report



**Research Report on the
persolog® Personality
Factor Model
Norwegian Results**

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Develop Organizations Through People!

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Diploma in
Educational Science

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Dear Sir or Madam,

The development of the D, I, S and C based persolog® Personality Factor Profile has a history of 16 years of research in the German-speaking area. The study has always been aiming at improving the reliability of the profile and the development of the respective know-how.

The current comprehensive study was launched in Norway 2015. We put a particular focus on the basic principles of the persolog® Personality Factor Profile. After a three year research period we can now come up with the latest results regarding the reliability and validity of Norwegian version of the persolog® Personality Factor Profile.

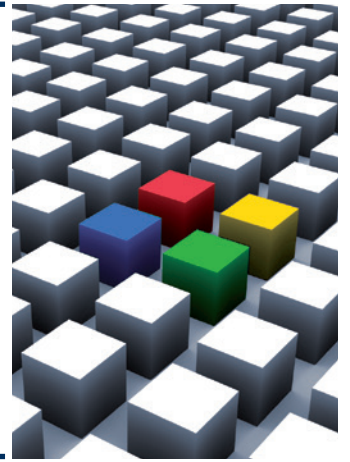
This means that we can present a validated version of the profile. We have intensified our contacts with the University of Koblenz/Landau, Germany, since 2000. The statistical techniques that are applied are chosen in consultation with Dr. Alstötter-Gleich. The data is processed and interpreted in close cooperation. We defined a research procedure for the German-speaking area which is binding for all partners of the persolog GmbH worldwide. In doing so, we are not only increasing our methodical competence but are also gaining a better insight into cultur-based differences in behavior. By applying uniform procedures, we can make sure that the profiles correspond to each other in all languages.

Special thanks go to Dr. Altstötter-Gleich for her commitment and her dedicated work with our model. Furthermore, I would like to thank each reader who helped us to collect data which made the research possible. During the past three years a total of 406 people have participated in the statistical research study for the persolog® Personality Factor Profile in the Norwegian-speaking area alone. Without their continuing willingness to support our study, these results would not have been obtainable.

Yours sincerely,

Friedbert Gay
CEO persolog Ltd

Development of the Model and Theoretical Background



The persolog® Personality Factor Profile was developed from 1970–1972 at the University of Minnesota. In contrast to the MMPI (Minnesota Multiphasic Personality Inventory, Hathaway and McKinley, 1951) already known at that time, Professor Dr. John Geier was given the task to develop a program that would help the managing staff of the university to recognize and overcome performance deficits.

One of the main results was Geier's Personality Factor Profile, a model that reflects the behavior of people in specific situations, particularly at work (outside of clinics). Professor John Geier used parts of his dissertation ("Perceptual Trait") as a basis during which he came across a book by Harvard professor William Moulton Marston, a student of Hugo Münsterberg, entitled "Emotions of Normal People". William Moulton Marston's research area was focused on the individual differences of people. From the very beginning, Geier was aiming at enabling the test persons to fill out the profile alone, to evaluate it and to interpret it themselves – at the time this was a novelty. Geier experimented with different inquiry methods and finally decided for a forced-choice format with 24 theory-driven item blocks.

From 1989 to 1994 he continued to revise the Personality Profile System essentially. He involved his colleagues from the University of Minnesota to review the system as a team. His long-term research partner Dorothy Downey supported his research and development. The persolog® Personality Factor Profile was complemented with 5 discovery steps with the corresponding strategies for action. The theoretical approaches of Erich Fromm (non-productive – productive characters), Alfred Adler (The Concept of Compensation) and Martin Fishbein (Attitude Research) also influenced the profile.

Thus, the persolog® Personality Factor Profile combines a psychological perception model with the action model and is a tool for measuring situational behavior (social-cognitive personality theory according to Mischel [see Shoda, Mischel and Wright, 1994]).

The Basic Behavioral Dimensions of the Personality Factor Model

Following Marston, Geier assumed that human behavior and experience is determined by the perception of the environment on one hand, and by the person's basic tendency to react to the environment on the other hand. While Marston described the perception component with the terms friendly/hostile, Geier assumed that people evaluate their environment on the basis of its stressfulness. Therefore, he chose the two terms stressful vs. pleasant or not stressful. He also modified Marston's reaction component: Instead of describing reactions on the basis of how strong or weak an individual feels in comparison to his environment, Geier used the description determined/reserved.

Combining both axes results in four behavioral prototypes which are allocated certain characteristics. Four letters D, I, S and C – stand for the four basic behavioral patterns: dominant, influencing, steady and cautious.

Dominant behavioral style

The combination "stressful and assertive" was assigned the characteristics "dominant" (dominance¹) and "directive".

Influencing behavioral style

The combination "non-stressful and assertive" leads to characteristics "influencing" (inducement²) and "interactive", which describe the ability to prompt other people to do something or to influence them.

Steady behavioral style

When the concepts "non-stressful and non-assertive" are combined, the results are "steady" (submission³) and "supportive".

Cautious behavioral style

The connection of "stressful and non-assertive" results in the characteristics "cautious" (compliance⁴) and "corrective".

¹Marston's word for the behavioral dimension D from 1928

²Marston's word for the behavioral dimension I from 1928

³Marston's word for the behavioral dimension S from 1928

⁴Marston's word for the behavioral dimension C from 1928

Individuals with a dominant and initiative behavioral style perceive themselves as stronger than their environment. Steady and cautious individuals perceive themselves as weaker than their environment, which results in a factual-oriented and supporting behavior.

Individuals with a dominant and cautious behavioral pattern perceive their environment as rather hostile, i. e. they tend to perceive situations as stressful/straining, while individuals with an influencing and steady behavioral pattern perceive their environment as rather friendly, resulting in a pleasant/non-stressful perception.

Geier developed items on the basis of the theoretical model with which four behavioral tendencies can be described and captured. An overview of extracts of the questionnaire will give you an impression of these items.

Description of the Four Dimensions of Individual Behavior

Each person possesses parts of the four behavioral styles that have been discussed: dominant, influencing, steady and cautious, but to different extents. The basic type results from the behavioral style that is strongest – which is the largest value in the diagram. The column in which it occurs (D, I, S or C) indicates the strongest tendency.

Dominant

Persons with high dominant behavior seek challenges and want to be better than others. They make quick decisions, aim for direct results, are good at solving problems, claim authority and take over the leadership. Dominant people question prevailing circumstances and provide new impulses. Their behavior in team processes can lead to conflicts.

Dominant persons do not like to be supervised, avoid lengthy discussions and prefer direct answers. They need people who complement them, who test risks, act cautiously, check details in order to prepare decisions and show sensitivity for the needs of others.

Influencing

Influencing persons are ready to help, like to make contact, can entertain well and spread enthusiasm. They speak well and clearly. Influencing people get satisfaction from working with other people. They take care to make a positive impression.

The environment should give them the feeling of being popular and offer them the opportunity to communicate things to other people. Furthermore, it should allow friendly contacts to be made in a pleasant working atmosphere.

Influencing persons need complementary people who prefer to be concerned with things more than with people, who are direct, prefer facts, concentrate on tasks they can approach systematically and who monitor themselves. In addition, influencing people need specific deadlines because they like to work on many things at the same time and quickly lose sight of their own goals. They should try to be more objective in their decision making and appear more decisive.

Steady

Patience, loyalty and consistency are characteristics of steady persons. They are excellent listeners who can have a calming effect on people when necessary. Steady persons concentrate on tasks, love their familiar environment and follow defined or accepted work patterns. They develop strength when given the opportunity to specialize. They need an environment that guarantees security and well ordered work flows in a clearly laid out and defined area of responsibility. Appreciation for themselves as individuals and their accomplishments is just as important for them as respect for their private sphere and integration into a group.

Persons characterized by steadiness develop best in a well organized environment among dependable colleagues whose capability they trust. Knowing what contribution they makes to success is just as necessary for them as the request to generate and verbalize ideas.

Cautious

Cautious persons submit to rules, conduct themselves diplomatically, follow instructions and observe norms. Cautious persons pay attention to details, think critically and check everything for accuracy.

People with high C need an environment in which proven procedures are adhered to. The members of this environment must be "ready to compromise", understand basic rules not as absolute obligations, but rather as orientation and be able to make quick decisions.

Cautious persons needs concrete work instructions and goals which require a high degree of precision, as well as periodic evaluation of their performance, in order to develop fully.

Empirical Research of the persolog® Personality Factor Profile

Studies Conducted in the USA

1. Kaplan, Sylvan (1983): The Kaplan Report. A study of the validity of the Personal Profile System. Inscape Publishing Inc., Minneapolis. The Personal Profile System was investigated for construct validation with the following test procedures, which also demonstrate construct and/or predictive validity: WAIS (Wechsler, D. 1995); MBTI (Myers, I.B. Myers-Briggs, 1962), 16 PF (Cattell, R.B., Eber, H.W. and Tasuoba, M.M. 1970), MMPI (Dahlstrom, W.G., Welsh, G.S. and Dahlstrom, L.E. 1975), SCII (Strong, E.K. and Campbell, D.P. 1981).
2. Kaplan, Sylvan (1984): The Winchester Report. The validity of the Child's Profile, Personal Profile System, Youth Development Profile and the Action Projection System. Inscape Publishing Inc., Minneapolis. Conducted by Kaplan, Sylvan J., Ph.D. WAIS (Wechsler, D. 1955), EAT (Education Abilities Test 1978), HTP (Buck, J.N. 1948); CPQ (Porter, R.B. and Cattell, R.G.1975); HSPQ (Cattell, R.B., and Cattell, M.D.L.1975); MBTI (Myers, I.B. Myers-Briggs 1962).
3. McGlennon, Timothy W., University of Minnesota. (1989): An independent study of the constructs in the Personality Factor Profile for Geier Learning International, Inc., Minneapolis, MN. "Development and Psychometric Properties of the Personality Factor Profile." Conducted by Timothy W. McGlennon, Biomedical/Behavioral Science Statistical Consultant..
4. Lange Allan L. (1992): A study of the constructs in the Personal Profile System. Inscape Publishing Inc., Minneapolis. A Comparative Study of the Adult Personality Inventory (Krug, Samuel E. Ph.D.), developed according to the 16 PF by Raymond Cattell. Conducted by Allan L. Lange, Ph.D.
5. McGlennon, Timothy W., Alfred Adler Institute (2000): An independent study of the constructs of the Personality Factor Profile Online for Geier Learning International, Inc., Minneapolis, MN. "Geier Criterion Group Patterns as Defined by Jungian Four Letter Temperament Type." Conducted by Timothy W. McGlennon, Biomedical/Behavioral Science Statistical Consultant.

German Studies of Reliability

After the persolog GmbH (former DISC Training GmbH) had obtained the exclusive rights for marketing the DISC model, it began statistical research in the German-speaking area (Germany, Austria, Switzerland). The first reliability study was conducted in 1994, in which 280 people participated. In this study, internal consistency Cronbach's Alpha coefficients lay between 0.71 and 0.81. A second study followed in 1996. 360 respondents participated in this study. Cronbach's Alpha lay between 0.72 and 0.85.

In 2000, another measurement of reliability quality was conducted. In addition, for the first time a Test-Retest study was carried out. The goal of this study was to examine new items in order to modify the version with 24 words and create a version with 28 words. 1,111 people participated in this study. 710 people participated in the Test-Retest analysis which was conducted in 2001. In this case, internal consistency Cronbach's Alpha lay between 0.82 and 0.92.

German Study of Validity

After a change of models in 2004, the fifth study of reliability was launched. This study should prove the validity of the model for the first time. The procedure took place in several stages. First, the original items were examined for reliability quality. 1,029 people participated in this study. Several items were modified and a second reliability study was carried out. In this second pilot-study 1,305 people were questioned. This resulted in a validity study including the Big-Five-based Revised NEO Personality Inventory NEO-PI-R, in which 442 people participated. Since there were obvious possibilities for improvement, the items were reevaluated. Also in this case, the study was based on the scales of NEO-PI-R. 1,093 people participated in the most recent reliability study and 451 people participated in the validity study. Validity of the word groups (ipsative measurement) was examined with the short version of the Big-Five-inventory BFI-K (Form S) in a Test-Retest study.

Norwegian Study of Reliability and Validity

The Norwegian Version of the questionnaire was developed between 2012 and 2015 in cooperation with persolog® Norway under the direction of Albert Hoekstra and John Oyvind Livden.

When developing the questionnaire, it is not only important to follow the basic principles, but also to have in mind that the content context should be relevant and adequate for the Norwegian population. This quality requirement must be ensured by accurately translating and re-translating the questionnaire. The items of the questionnaire need to depict the same for the Norwegian culture as in the original language.

The scope of work included:

1. A close conceptual cooperation between persolog Headquarter Germany and persolog Norway. The goal for the Norwegian language was to properly convey the theoretical concept of the persolog® Personality Factor Profile (here: short sentences and adjectives).
2. Pretesting. The goal was to test the language of the Norwegian questionnaire in specific target groups. This phase was used to recognize and modify questions that caused difficulties in understanding.
3. Problem-oriented translatability assessment and advance translation. The goal was to systematically test the items of the questionnaire with regard to their applicability and translatability for the Norwegian-speaking region.

This workflow included three studies with 1600 participants in total (N = 1200 for Reliability and N = 406 for Validity). The different studies led to changes in the semantic structure of the items and to the current version of the questionnaire. This version was then used as the basis for executing further test specific data analysis.

Method

Examination of the Quality of Items Measurement

by Dr. Christine Altstötter-Gleich, University of Koblenz-Landau

Random Sample

In 2015, data from a total of 406 participants in Norway were collected, between age 14 and 77 years, while 401 people were of full age. The most important socio-demographic information about the people questioned is collected in Table 1.

The data show an image of the sample taken that corresponds to the target group of the persolog® Personality Factor Profile in terms of gender, age, level of education and profession. Therefore, the results reported elsewhere based on this sample can be considered as quite representative for the population for whom the application of the persolog® Personality Factor Profile is normally of interest in Norway.

**Table 1:
Socio-Demographic
Information about the
Total Sample**

Questions		Number of Participants (N)
Total		406
Gender	male	42%
	female	55%
	no information	3%
Age	Average	36.6
	Standard deviation	13.0
Education	Ingen utdannelse	1.2%
	Ungdomsskolen	2.5%
	Videregående	24.4%
	Folkehøyskole	3.0%
	Høyskole	38.2%
	Universitet	20.9%
	Annet	5.9%
	no information	3.9%
Training	Jorbruk	1.2%
	Industri	2.0%
	Helsevesenet	9.4%
	Utdanning	13.3%
	Teknikk	3.4%
	Anlegg / bygg	2.0%
	Transport og logistikk	1.2%
	Shipping and Offshore	3.0%
	Annet	57.9%
	no information	6.7%
Professional groups	Finance/Banking/Insurance	17%
	Processing industry/Printing industry/ Whole and retail sales/Trades	20%
	Transport and traffic	1%
	Health and social work	7%
	Services	36%
	Non-profit and other	19%

Measurement Surveys

The participants were invited to answer two online surveys. The **Norwegian Version of the persolog® Personality Factor Profile** was used. Participants worked on the statements (questionnaire-part Most) and adjectives (questionnaire-part Least). Each item had to be evaluated using a 6-point Likert-type response scale ranging from 1 (does not describe me at all) to 6 (describes me very well). Afterwards, the mean scores and a standard deviation were determined separately for the statements and adjectives in order to obtain total values of the dimensions D (Dominance), I (Initiative), S (Steadiness) and C (Cautiousness).

For each of the four dimensions, there were two groups of items available. The first group consists of statements such as “I want to win”(D), “I like to make contacts”(I), “I give others a hand”(S) or “I am disciplined”(C). The second group consists of adjectives such as “assertive”(D), “communicative”(I), “understanding”(S) or “precise”(C).

To assess the construct validity of the persolog® Personality Factor Profile (Norwegian Version) the **Norwegian version of the NEO-PI-R** (Ostendorf & Angleitner, 2004) was used. This questionnaire was developed originally by Paul Costa and Robert McCrae (1992) entitled “Revised NEO Personality Inventory (NEO-PI-R). The NEO-PI-R is a 240-item questionnaire that assesses the five main personality dimensions of the Big-Five-Factor Model, one of the widespread models in differential psychology.

It postulates five main personality dimensions which can be classified into six facets (see Table 2). On the basis of the NEO-PI-R essential personality qualities in interpersonal areas, attitudes, perception and motivation can be captured and described.

Dimensions	Facets
Neuroticism	Anxiety, Angry hostility, Depression, Self-consciousness, Impulsiveness, Vulnerability
Extraversion	Warmth, Gregariousness, Assertiveness, Activity, Excitement Seeking, Positive emotions
Openness to Experience	Openness to fantasy, Openness to aesthetics, Openness to feelings, Openness to action, Openness to ideas, Openness to values
Agreeableness	Trust, Straightforwardness, Altruism, Compliance, Modesty, Tender-mindedness
Conscientiousness	Competence, Order, Dutifulness, Achievement striving, Self-discipline, Deliberation

**Table 2:
Dimensions
and Facets
of the NEO-PI-R**

Data Analyses

The statistical analyses which were conducted can be divided into three areas: Dimensionality, reliability and validity.

Dimensionality

Firstly, it was investigated whether the statements or adjectives of the persolog® Personality Factor Profile which are intended to measure one of the dimensions Dominant, Influencing, Steady or Cautious, are actually based on one of the common factor in the Dimensionality. In order to determine this, for the statements or adjectives respectively one of the four dimensions were accounted using the Factor Analysis with SPSS 24.0.

As an indicator for one-Dimensionality, first the eigenvalue of the first factor is compared to all other possible factors. The greater the difference between the eigenvalues of the first and second factors, the more it can be assumed that the items analyzed measure a common dimension characteristics (a so-called factor). An eigenvalue can be as large as the number of the analyzed items. From the statistic's perspective, only factors with eigenvalues of 1.00 or higher are considered worth analyzing.

In order to support the decision, further parallel analysis according to Horn (1965) was implemented. In the framework of this analysis, the eigenvalues from the sample data were compared with eigenvalues which were generated from a Factor Analysis of completely random data. Eigenvalues which are greater than those acquired through the analysis of random data are considered as significant.

In a further step, the loadings of the items on the first factor were determined. According to the rules of interpretability of relevant factor loads compiled in Fabrigar, Wegener, McCallum and Strahan (1999), it was analysed whether all items had loadings greater than 0.4.

Reliability

In order to evaluate reliability – the question of how much the scales of the persolog® Personality Factor Profile are affected by measurement errors – the internal consistencies of the scales developed from the D, I, S and C items were calculated. The calculated coefficient (Cronbach's Alpha) accepts values between 1 (no measurement errors) and 0 (exclusively measurement errors). In general, the reliability should be as high as possible. The lowest limit for the acceptable usability of an instrument is a reliability score of 0.7. Values smaller than 0.8 are classified as low, values between 0.8 and 0.9 as mid, and values above 0.9 indicate high reliability (see for example Bühner, 2006).

Validity

Whereas reliability represents the degree of accuracy of a result, the degree of validity can be used to determine what a test measures in terms of its content. Validity coefficients are used to determine whether a test measures what it assumes to measure. They are usually correlations which indicate the strength of the connection between two measurements. Similar to reliability coefficients, correlation coefficients can have values between 1 and 0. However, their level must be interpreted differently. Most important are considerations of content concerning which connections with other test procedures a test that is being tested for validity should show. Correlations which are at 0.5 are considered as high, those around 0.3 as mid-range and those at 0.1 as low (see Cohen, 1977).

The sign in front of the correlation coefficient must also be taken into consideration when an interpretation should be done. If it is positive, the following could be assumed: When values of one measurement increase, the values of the other measurement will also increase. However, if the sign is negative, this could be assumed: When the values of one measurement increase, the values of the other measurement decrease.

Results for the Dominant Items

The consideration of the eigenvalue distribution of Factor Analysis of Dominant items (21 statements and 20 adjectives) results for both item-groups in the classical picture of a eigenvalue distribution, which indicates a single main factor. In addition, by means of parallel analysis it can be determined that for both item-groups only the first factor has a higher value than factors which were generated from random numbers. The level/scores of the factor loadings of the Dominance items analysed ranges between 0.79 for the highest loading and 0.46 – except for one item of the adjective item-group which is below the limiting value of 0.4 with a factor loading of 0.14.

In summary, it can be concluded that the items combined in both Dominance scales are each supported by a single common dimension, and that their loadings in these dimensions meet the scientific criterion of interpretability.

Table 3
Dimensionality and
Reliability of the
Dominant Items

Dominant	Eigenvalue of the First factor	Eigenvalue of the Second Factor	Lowest Loading	Cronbach's Alpha
Statements	9.7	1.4	0.53	0.94
Adjectives	8.6	1.5	0.14	0.92

This first positive judgement is supported by the assessment of reliability made by scores of Cronbach's Alpha. This coefficient displays high values for the statements (Cronbach's Alpha = **0.94**), as well as for the adjectives (Cronbach's Alpha = **0.92**). These findings support the conclusion that both Dominance subscales are affected only slightly by measurement error.

The correlation of the two Dominance subscales with the facets of the NEO-PI-R collected in Table 4 should make clear, that with the aid of the Dominant items a dimension can be measured not only formally, but that this can also be interpreted as a Dominance dimension in terms of content validity. For improved interpretation the correlations within the five main dimensions Neuroticism, Extraversion, Openness, Agreeableness and Conscientiousness of NEO-PI-R have been organized according to size. Significant coefficients are colored.

Corresponding to their level and sign, the correlations show the following picture: The more Dominance people ascribed to themselves with the items of the persolog® Personality Factor Profile, the more active and assertive they describe themselves in NEO-PI-R, and the higher they assessed their achievement striving and their competence. At the same time, increased Dominant values correspond with values for lower vulnerability, anxiety and self-consciousness on the NEO-PI-R scales. Finally, people with high Dominant values are more inclined to describe themselves as warm, as excitement-seeking, as dutiful and self-disciplined.

This correlation matrix confirms the validity of the Dominant items, because it corresponds very well with the description of this dimension which is presented in the context of the persolog® Personality Factor Model. According to it, people having high values on the Dominant scale are characterized by an active behavioral style, goal-orientation, independence, assertiveness and by the desire to measure themselves against others.

The correlation coefficient between both D item-groups is **0.90**. This high value makes evident that the statements and adjectives measure comparable personality qualities not only formally, but also in terms of content.

	Statements	Adjectives
Neuroticism	-0.33	-0.33
Vulnerability	-0.55	-0.48
Anxiety	-0.33	-0.33
Self-consciousness	-0.31	-0.31
Depression	-0.20	-0.20
Angry hostility	-0.16	-0.06
Impulsivity	-0.03	-0.02
Extraversion	0.54	0.51
Activity	0.54	0.51
Assertiveness	0.51	0.49
Warmth	0.45	0.37
Excitement-seeking	0.35	0.41
Gregariousness	0.25	0.20
Positive emotions	0.28	0.25
Openness to experience	0.23	0.21
Openness to values	0.22	0.13
Openness to feelings	0.21	0.17
Openness to actions	0.20	0.20
Openness to ideas	0.20	0.21
Openness to aesthetics	0.11	0.09
Openness to fantasy	0.03	0.03
Agreeableness	0.12	-0.04
Altruism	0.28	0.14
Trust	0.26	0.18
Complaisance	-0.18	-0.29
Modesty	-0.09	-0.20
Straightforwardness	0.09	-0.01
Tendermindedness	0.07	-0.03
Conscientiousness	0.48	0.37
Achievement striving	0.59	0.52
Competence	0.55	0.46
Dutifulness	0.46	0.35
Self-discipline	0.42	0.34
Order	0.10	0.02
Deliberation	-0.03	-0.07

Table 4:
Correlation of the
Dominant Item-Groups
with the Facets of
NEO-PI-R

Results for the Influencing Items

The Influencing item-groups include 17 statements and 19 adjectives. Both indicate an eigenvalue distribution that points to a single main factor for each. The parallel analyses conducted come to the conclusion that only the first factor respectively has a higher eigenvalue than factors based on random numbers. The loadings of the Influencing items range between a highest leading of 0.82 and the lowest value at 0.25, which was held by one adjective.

First, these results seem to show that the items of each respective scale are supported by a common latent dimension. Second, the loadings of all items meet the criterion of interpretability.

In addition, the reliability analysis by Cronbach's Alpha resulted in a value of **0.94** for the statements as well as **0.93** for the adjectives. This can be considered as high. It indicates that measurement was only slightly affected by measurement errors.

Table 5:
Dimensionality and Reliability of the Influencing items

Influencing	Eigenvalue of the First Factor	Eigenvalue of the Second Factor	Lowest Loading	Cronbach's Alpha
Statements	8.7	1.3	0.49	0.94
Adjectives	8.8	1.3	0.25	0.93

In Table 6 the correlations between both item-groups of Influencing items and the facets of the NEO-PI-R are combined. Accordingly, they show high correlation primarily with facets of Extraversion. The more people assess themselves as Influencing on the items of the persolog® Personality Factor Profile, the more they described themselves as warm, having positive emotions, active and gregarious. This correlation pattern corresponds very well with the characteristics which are ascribed to people with high values on the Influencing dimension according to the persolog® Personality Factor Profile: openness, friendliness, the tendency to encourage others, to include and understand them – which can be considered as proof for the validity of the items.

The correlation patterns for the adjectives and the statements are very similar. That can be interpreted to the effect that both item-groups measure the same qualities in terms of content. These findings are supported by the fact that their intercorrelation is **0.91**.

	Statements	Adjectives
Neuroticism	-0.26	-0.18
Vulnerability	-0.34	-0.26
Self-consciousness	-0.33	-0.26
Angry hostility	-0.23	-0.20
Anxiety	-0.21	-0.15
Depression	-0.16	-0.08
Impulsiveness	0.07	0.12
Extraversion	0.76	0.71
Warmth	0.76	0.74
Positive emotions	0.62	0.58
Activity	0.60	0.53
Gregariousness	0.57	0.51
Assertiveness	0.41	0.37
Excitement-seeking	0.34	0.36
Openness to experience	0.34	0.33
Openness to feelings	0.42	0.44
Openness to values	0.24	0.19
Openness to actions	0.24	0.20
Openness to ideas	0.09	0.09
Openness to aesthetics	0.28	0.25
Openness to fantasy	0.11	0.16
Agreeableness	0.35	0.36
Altruism	0.49	0.53
Trust	0.41	0.41
Tendermindedness	0.25	0.28
Straightforwardness	0.22	0.19
Modesty	0.01	0.00
Complaisance	0.00	0.02
Conscientiousness	0.35	0.28
Achievement striving	0.47	0.42
Competence	0.42	0.39
Dutifulness	0.40	0.36
Self-discipline	0.28	0.21
Order	0.03	-0.05
Deliberation	-0.07	-0.09

Table 6:
Correlation of the
Initiative Item-Groups
with the Facets of the
NEO-PI-R

Results for the Steady Items

The two item-groups of this dimension contain 19 statements and 19 adjectives. Their eigenvalue distribution corresponds to the pattern that can be expected when the items are based on a one single main factor. The parallel analyses conducted come to the conclusion that only the first factor respectively has a higher eigenvalue than factors based on random numbers. The steadiness items range in loading between 0.87 (highest loading) and 0.37 (lowest loading).

The Dimensionality analysis indicates clearly the single Dimensionality of both item-groups. The levels of the loading all exceed the value of 0.40, except for one item. However, because its not far from 0.40, there is no reason to be concerned about the item-interpretability.

The positive results of the Dimensionality examination were supplemented by measurement of reliability coefficient with Cronbach's Alpha – which is high for both groups at a value of **0.94** for the statements and **0.95** for the adjectives. A low effect from measurement errors can be assumed for the statements as well as for the adjectives.

Table 7:
Dimensionality and Reliability of the Steady items

Steady	Eigenvalue of the First Factor	Eigenvalue of the Second Factor	Lowest Loading	Cronbach's Alpha
Statements	9.4	1.2	0.42	0.94
Adjectives	10.1	1.1	0.37	0.95

The content validity was examined through the correlations between the Steady item-groups and the facets of the NEO-PI-R, which are displayed in Table 8. In the forefront, there are high connections of the dimension Steady with various aspects of agreeableness, extraversion and conscientiousness.

The higher the test persons assess their steadiness by means of the statements or adjectives, the more they also assess their own altruism and claim to be warm and dutiful. At the same time, they describe themselves as trusting, open to feelings and tenderminded. In the context of the persolog® Personality Factor Profile people with high Steadiness values are described as predictable, dependable and cooperative. Above all, the high connections with the facets of agreeableness justify this characterization and support a positive assessment of the validity of the scales.

The correlation patterns of both item-groups correspond very well. Furthermore, with a correlation coefficient at the level of **0.92** it can be assumed that both item-groups measure the same content.

	Statements	Adjectives
Neuroticism	-0.15	-0.14
Angry hostility	-0.31	-0.31
Vulnerability	-0.26	-0.24
Anxiety	-0.11	-0.10
Self-consciousness	-0.07	-0.04
Depression	0.00	0.02
Impulsiveness	0.01	0.00
Extraversion	0.41	0.34
Warmth	0.64	0.61
Positive emotions	0.35	0.30
Gregariousness	0.31	0.24
Activity	0.25	0.17
Excitement-seeking	0.17	0.17
Assertiveness	0.06	0.00
Openness to experience	0.23	0.22
Openness to Feelings	0.34	0.33
Openness to Aesthetics	0.24	0.22
Openness to Values	0.19	0.19
Openness to Ideas	0.09	0.09
Openness to Fantasy	0.06	0.04
Openness to Actions	0.02	0.01
Agreeableness	0.59	0.56
Altruism	0.71	0.69
Trust	0.45	0.41
Tendermindedness	0.38	0.35
Straightforwardness	0.32	0.30
Modesty	0.27	0.25
Complaisance	0.21	0.23
Conscientiousness	0.37	0.35
Dutifulness	0.53	0.52
Competence	0.40	0.38
Achievement striving	0.32	0.28
Self-discipline	0.19	0.16
Deliberation	0.13	0.17
Order	0.07	0.03

Table 8:
Correlation of the
Steady Item-Groups
with the Facets of the
NEO-PI-R

Results for the Cautious items

The group of cautious items is composed of 15 statements and 18 adjectives. Their eigenvalue distribution corresponds to the pattern that can be expected when the items are based on a one single main factor. The parallel analyses conducted come to the conclusion that only the first factor respectively has a higher eigenvalue than factors based on random numbers. The cautious items range in the loading between 0.79 (highest loading) and 0.33 (lowest loading).

The Dimensionality analysis indicates clearly the single Dimensionality of both item-groups. The levels of the loading all exceed the value of 0.40, except for one item. However, because its not far from 0.40, there is no reason to be concerned about the item-interpretability.

The positive results of the Dimensionality examination were supplemented by measurement of reliability coefficient with Cronbach's Alpha, which is high for both groups at a value of 0.89 for the statements and 0.93 for the adjectives. Both values approach the value of 0.90, above which reliability can be considered as high. The effect of measurement errors can be considered satisfactorily low for both groups of Cautious items, and no significant distortion of the measurements through errors is to be feared.

**Table 9:
Dimensionality
and Reliability of the
Cautious items**

Cautious	Eigenvalue of the First Factor	Eigenvalue of the Second Factor	Lowest Loading	Cronbach's Alpha
Statements	6.36	1.41	0.33	0.89
Adjectives	8.4	1.9	0.47	0.93

The correlation with the facets of the NEO-PI-R gives a clear answer to the question whether or not the items measure the content that they suppose to measure. As the name of the D, I, S and C scale which is behind the concept of the items clearly states, high correlations should be found with the facets of the dimensions of the same name in the NEO-PI-R in order to verify the validity of the items. An inspection of the values collected in Table 10 shows that these expectations are met. For the higher people's values in the facets consciousness of duty, love of order, competence and self-discipline are, the more they ascribe to themselves the characteristics the persolog® Personality Factor Model describes as Cautious. At the same time, people with high Cautious values assess themselves as low in vulnerability.

The positive assessment of validity of both item-groups for determining cautious is supported by the fact that their correlation patterns compare very well and they correlate with each other at a value of 0.85. These findings support the conclusion that both item-groups measure the content of the same dimension.

	Statements	Adjectives
Neuroticism	-0.08	-0.14
Impulsiveness	-0.22	-0.17
Vulnerability	-0.21	-0.31
Angry hostility	-0.10	-0.12
Self-consciousness	0.09	0.00
Depression	0.03	0.00
Anxiety	-0.03	-0.10
Extraversion	-0.00	0.12
Warmth	0.20	0.28
Assertiveness	-0.11	0.03
Gregariousness	-0.07	0.01
Excitement-seeking	-0.05	0.03
Activity	0.03	0.14
Positive emotions	-0.01	0.07
Openness to experience	0.03	0.20
Openness to actions	-0.19	-0.02
Openness to aesthetics	0.16	0.22
Openness to feelings	0.14	0.24
Openness to fantasy	-0.17	-0.07
Openness to ideas	0.12	0.24
Openness to values	0.01	0.17
Agreeableness	0.25	0.25
Altruism	0.34	0.33
Tendermindedness	0.21	0.16
Straightforwardness	0.16	0.20
Trust	0.12	0.19
Modesty	0.11	0.08
Complaisance	0.06	-0.01
Conscientiousness	0.60	0.62
Dutifulness	0.62	0.65
Competence	0.46	0.52
Deliberation	0.45	0.40
Order	0.45	0.37
Self-discipline	0.34	0.35
Achievement striving	0.32	0.42

Table 10:
Correlation of the
Cautious Item-Groups
with the Facets of the
NEO-PI-R

Summary Consideration of the Results in terms of Dimensionality, Reliability and Validity of the D, I, S and C Items

The worth of items for measuring personality characteristics can be judged according to a series of criteria.

1. It must be verified that items which are supposed to measure a specific characteristic demonstrate qualities which support the conclusion that a common character dimension underlies them, and that they represent this to a sufficient degree.
2. It must be verified that a measurement by means of scales which are composed of these kinds of items can be made with sufficient exactness in the sense of the lowest possible distortion through measurement errors.
3. It must be made clear that with respect to content that the scales measure what they are supposed to measure.

If the eigenvalues obtained in the context of a Factor Analysis show a distribution according to which the first factor has a significantly larger eigenvalue than the second, then this is an initial indication that criterion 1 is met. In addition, if a parallel analysis indicates that only the first factor has an eigenvalue which is greater than the eigenvalue that analysis of random data would produce, and if the individual items have loadings to this factor which are greater than 0.4, it can be assumed with a high degree of certainty that these items can be considered as indicators of a common dimension and that they represent it very well.

Four of the eight scales investigated here (two per behavioral dimension) meet the very strict criteria in an exemplary fashion. In the other scales, only one or two items are slightly under the standards being applied. However, the deviations observed are so slight and the standards applied are so strict that no serious distortion of measurement quality can be assumed.

The second criterion holds that reliability of item-groups which are intended to measure a personality characteristic should approach the value of 1 as closely as possible. But one cannot assume that this is realistic. For in this case the measurement error would equal zero. Even with physical values this is only to be expected in extremely controlled laboratory conditions.

Values above 0.9 are considered very good. Seven of the eight scales investigated here are significantly greater than this very strict criterion. With reliability coefficients of 0.89 for the statements, the item-group for capturing Cautious comes slightly under the value of 0.9. However, it still lies within a range that supports the statement that the scales of the persolog® Personality Factor Profile are only slightly affected by measurement errors and thus are very reliable.

The results of the first two criteria of measurement worth of the D, I, S and C items investigated here are collected in Table 11.

Whereas the first two criteria of value target formal aspects of items and scales, the third criterion – validity – is related to aspects of content. Basically, one expects correlations between the scales being tested and scales already established. These correlations indicate that regarding content, the scales actually measure what they claim to measure.

Table 11:
Dimensionality and Reliability of the D, I, S and C Items

	Eigenvalue of the First Factor	Eigenvalue of the Second Factor	Lowest Loading	Cronbach's Alpha
Dominant				
Statements	9.7	1.4	0.53	0.94
Adjectives	8.6	1.5	0.14	0.92
Influencing				
Statements	8.7	1.3	0.49	0.94
Adjectives	8.8	1.3	0.25	0.93
Steady				
Statements	9.4	1.2	0.42	0.94
Adjectives	10.1	1.1	0.37	0.95
Cautious				
Statements	6.36	1.41	0.33	0.89
Adjectives	8.4	1.9	0.47	0.93

All eight D, I, S and C scales analyzed meet this criterion in an ideal manner. The correlation patterns for Dominant, Influencing, Steady and Cautious are presented in Table 12. For each behavioural dimension the six highest correlation coefficients are marked with strong colors. Cells with characteristics having correlation coefficients of at least 0.3 are highlighted with somewhat weaker colors. This value is the threshold for significant connections between the respective characteristics.

In high agreement with the description of the dimension in the manual of the persolog® Personality Factor Model, the correlation pattern of Dominant is characterized by high psychic stability (negative correlation with the facets of Neuroticism). At the same time, there are high values for the facets of Extraversion, which are less related to social and more toward task-oriented personality characteristics. Task-orientation is also reflected by the correlation with the facets performance and self-ascribed competence in the dimension Cautious. The rather low values for partial aspects of agreeableness support this impression.

On the other hand, the pattern in the dimension Influencing is clearly marked by Extraversion, which is not only related to task-orientation, but also to other people. This is also described in the persolog® Personality Factor Model manuals as a typical characteristic of the Influence dimension. In this connection, the high correlations with facets of openness and characterization through high impulsiveness and low prudence are also coherent.

The correlation pattern of the dimension Steadiness is characterized by high connections to almost all facets of Agreeableness. This corresponds to the basic characteristics of people with high Steadiness values described in the manuals. It makes evident that also for these items the intended content measurement can be empirically supported.

Although the scales for Cautious relating to the formal criteria 1 and 2 do not achieve quite the same degree of quality as the other scales, this is not the case with respect to their content. As expected, the highest correlations can be found with precisely those facets of the NEO-PI-R that are intended to register Cautious. This orientation is supported by the negative correlation with the scales impulsiveness and hunger for experience.

Aside from a few insignificant exceptions, the correlation patterns of the two subscales (statements and adjectives) correspond to one characteristic. It can be concluded that they are very comparable with respect to content. This is supported by the respective correlation coefficients of the subscales for one dimension.

Table 12:
Correlation of
D, I, S and G
Item-Groups
with the
Facets of the
NEO-PI-R

	Dominant		Influencing
	Statements	Adjectives	Statements
Neuroticism	-0.33	-0.33	-0.26
Vulnerability	-0.55	-0.48	-0.34
Anxiety	-0.33	-0.33	-0.21
Self-consciousness	-0.31	-0.31	-0.33
Depression	-0.20	-0.20	-0.16
Angry hostility	-0.16	-0.06	-0.23
Impulsivity	-0.03	-0.02	0.07
Extraversion	0.54	0.51	0.76
Activity	0.54	0.51	0.60
Assertiveness	0.51	0.49	0.41
Warmth	0.45	0.37	0.76
Excitement-seeking	0.35	0.41	0.34
Gregariousness	0.25	0.20	0.57
Positive emotions	0.28	0.25	0.62
Openness to experience	0.23	0.21	0.34
Openness to values	0.22	0.13	0.24
Openness to feelings	0.21	0.17	0.42
Openness to actions	0.20	0.20	0.24
Openness to ideas	0.20	0.21	0.09
Openness to aesthetics	0.11	0.09	0.28
Openness to fantasy	0.03	0.03	0.11
Agreeableness	0.12	-0.04	0.35
Altruism	0.28	0.14	0.49
Trust	0.26	0.18	0.41
Complaisance	-0.18	-0.29	0.00
Modesty	-0.09	-0.20	0.01
Straightforwardness	0.09	-0.01	0.22
Tendermindedness	0.07	-0.03	0.25
Conscientiousness	0.48	0.37	0.35
Achievement striving	0.59	0.52	0.47
Competence	0.55	0.46	0.42
Dutifulness	0.46	0.35	0.40
Self-discipline	0.42	0.34	0.28
Order	0.10	0.02	0.03
Deliberation	-0.03	-0.07	-0.07

Influencing	Steady		Cautious	
Adjectives	Statements	Adjectives	Statements	Adjectives
-0.18	-0.15	-0.14	-0.08	-0.14
-0.26	-0.26	-0.24	-0.21	-0.31
-0.15	-0.11	-0.10	-0.03	-0.10
-0.26	0.07	-0.04	0.09	0.00
-0.08	0.00	0.02	0.03	0.00
-0.20	-0.31	-0.31	-0.10	-0.12
0.12	0.01	0.00	-0.22	-0.17
0.71	0.41	0.34	0.00	0.12
0.53	0.25	0.17	0.03	0.14
0.37	0.06	0.00	-0.11	0.03
0.74	0.64	0.61	0.20	0.28
0.36	0.17	0.17	-0.05	0.03
0.51	0.31	0.24	-0.07	0.01
0.58	0.35	0.30	-0.01	0.07
0.33	0.23	0.22	0.03	0.20
0.19	0.19	0.19	0.01	0.17
0.44	0.34	0.33	0.14	0.24
0.20	0.02	0.01	-0.19	-0.02
0.09	0.09	0.09	0.12	0.24
0.25	0.24	0.22	0.16	0.22
0.16	0.06	0.04	-0.17	-0.07
0.36	0.59	0.56	0.25	0.25
0.53	0.71	0.69	0.34	0.33
0.41	0.45	0.41	0.12	0.19
0.02	0.21	0.23	0.06	-0.01
0.00	0.27	0.25	0.11	0.08
0.19	0.32	0.30	0.16	0.20
0.28	0.38	0.35	0.21	0.16
0.28	0.37	0.35	0.60	0.62
0.42	0.32	0.28	0.32	0.42
0.39	0.40	0.38	0.46	0.52
0.36	0.53	0.53	0.62	0.65
0.21	0.19	0.16	0.34	0.35
-0.05	0.07	0.03	0.45	0.37
-0.09	0.13	0.17	0.45	0.40

Further Measurement Quality of the Norwegian Questionnaire

Summarizing the reported results of the D, I, S and C items, it can be stated that they have very good measurement qualities. Formally as well as regarding content, they meet high expectations. In any case, there is need for the optimization of the adjectives used for registering Cautious. Yet, the following should be realized: The quality criteria in the framework of this study were set very high. That's why it can be tolerated when some of the items fall short of the criteria as slightly as the items on cautious did.

We would also like to point out the further psychometric qualities of the persolog® Personality Profile:

Objectivity

The objectivity of a survey is given when the results are independent of the respective test person. This is ensured by standardized procedural and evaluation conditions, which are given in the persolog® Personality Factor Profile at hand (for more information see Table 1).

Economy

The persolog® Personality Factor Profile can be evaluated for the individual person as well as for groups, requires little material and can be handled easily. Time of implementation is approx. 12 minutes, time for evaluation (paper-based) approx. 15 minutes, time for online-based evaluation 5 minutes.

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About the Authors of the persolog® Personality Factor Profile

Prof. Dr. Geier was an US-American Psychologist who dedicated his work mainly to one goal: the development of human personality. He wanted to support people in exhausting their full potential – in order to utilize their full capacity to act.

The basis of his research was the idea of “learning with learning instruments”, which bridges scientific theory with a pragmatic approach in professional and private life.

His scientific career led him to numerous universities: He was dean at the University of Arizona, professor at the University of Minnesota and co-founder of the Department of Health Management and Policy at the University of Michigan.

Furthermore, Geier was a successful entrepreneur: He founded Performax Systems International, was the first CEO of Carlson Learning Companies and brought into being Geier Learning International.

In the course of his career, Geier developed numerous instruments on the subject of **personality development**. For him, it was very important that the instruments’ user was able to fill them out, evaluate and interpret them on his own. At that time, this way of proceeding was revolutionary – today, it’s completely agreed upon.

Geier’s striving for innovation was also the foundation for the Personality Model’s success. Geier developed the model in cooperation with Prof. Dorothy Downey. Their aim was to support people in developing and reflecting themselves, in order to achieve their goals in life.

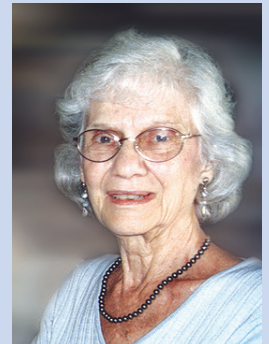
The Personality Factor Model works with the four Behavioral Dimensions Dominance, Influence, Steadiness and Cautiousness and their 20 subsequent mixed types. It presumes that in a specific situation every person shows one – or more – of these Behavioral Dimensions. Consequently, the Personality Factor Model is based on a situational approach and does everything but putting people in certain pigeonholes – out of which they won’t escape during their whole lives.

For Geier, this was the most important use of the Personality Factor Model: Many other instruments on the market give their user a final and irreversible verdict on what kind of person he is. In contrary, the Personality Factor Model is based on the conviction that continuous development is possible – by allowing new perspectives, by analyzing one’s own behavior, by searching – and finding – answers to the questions: Who am I? And where do I want to go?

Until his death in 2009 Prof. Dr. Geier lived his passion: supporting people in their personal development. Prof. Dr. Downey lives and works near Los Angeles, California.



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