

# German Validation Addendum

to Everything DiSC® Research Report for *Everything DiSC Workplace®* Assessment

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## German Validation: Everything DiSC Workplace®

The purpose of this **supplement** is to expand the Everything DiSC® (in German known as Everything DiSC®) Research Report for Adaptive Testing Assessment by Inscape Publishing (2012), with validation results from research conducted on Everything DiSC Workplace® assessment in German. Included in this supplement are descriptions of the translation and validation of the German DiSC Workplace Adaptive Testing (AT) items and Continua Scale items. For information about the background and research on Everything DiSC and the circumplex representation of the DiSC® model, including information about the validation process, please consult the ***Everything DiSC Research Report for Adaptive Testing Assessment by Inscape Publishing*** (hereafter referred to as the AT Research Report).

## Description of the German Validation

### Population

From December 7<sup>th</sup> to December 22<sup>nd</sup> 2011, a total of 514 German speaking men (54.7%) and women (45.3%) responded to a total of 228 items. The tested items belonged to a pool of potential items for Everything DiSC products including *Everything DiSC Workplace*, and items used on the Continua Scale in the *Everything DiSC Comparison Report*. Members of survey panels in Germany (N=402) included 56% men and 44% women, in Switzerland (N=61) there were more women than men (55% women and 45% men), and in Austria (N=57) the gender composition was 55% men and 45% women. The participants were contacted to participate through e-mail invitations. To ensure a representative sample, the largest group of data which was from Germany was weighted on: gender, age (18-64 years) and geography based on national quotas (see Table 1).

**Table 1. Everything DiSC® Assessment Development German Sample Demographics**

<b>Gender</b>	Male	54.7%
	Female	45.3%
<b>Age</b>	18-34	31.7%
	35-49	41.6%
	50-64	26.7%
<b>Education</b>	Grundschule, Hauptschule	6.4%
	Gymnasium, Realschule, Gesamtschule	25.3%
	Berufliches Gymnasium/ Fachgymnasium	2.3%

	Gymnasiale Oberstufe, Fachoberschule	9.7%
	Fachschule/ Berufsfachschule, Berufsschule	28%
	Fachhochschule, Kunsthochschule/ Musikhochschule, Technische Hochschule/ Pädagogische Hochschule	13.2%
	Universität, (Diplom, Magister, Bachelor, Master)	12.6%
	Universität, (Promotion)	1.9%
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<b>Citizenship</b>	German	74.5%
	Swiss	11.1%
	Austrian	11.3%
	Southern European	1.4%
	Other	1.8%
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<b>Employment</b>	Employee (non-managerial)	52.1%
	Mid-level manager	16.9%
	Top-level manager	4.5%
	Self-employed	14.4%
	Student/Apprentice/Trainee	10.3%
	Unemployed/Job-seeking	.8%
	Other	1.0%
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<b>N=514</b>		

## Translation of Items

The quality of the translation of the items was ensured through a six step process; 1) The items were translated by a professional translator from English (source language) to German (target language). It was a requirement that the translator's native language was the target language. 2) A second professional translator, also a native speaker of the target language was tasked with back-translating the items from target language to source language. 3) The original items and the back-translated items were reviewed by three bilingual subject matter experts. 4) In situations where there were differences in meaning/connotations between the source and the back-translation was fed back to the first translator. 5) The translator assessed the differences and, when appropriate, stated why a word should remain the same or substituted it with a more suitable word to match the meaning of the original English item. 6) In situations where extra input was needed to aid the translation, the development team was contacted to establish the intended meaning/connotation of an item. When translating the items into German, the last step was necessary once and it is interesting to note that based on later data analysis the item that required step six was not included as a final pool item.

## Reliability Measure: Internal Consistency for Workplace Items

The AT Research Report includes an overview of the validation of the DiSC® assessment, stressing the importance of testing internal consistency. Analysis of the internal consistency was performed on the German items and is documented below. This analysis evaluates the degree of correlation among questions that profess to measure the same thing. That is, each of the eight scales in the DiSC® model is measured using a series of different items (i.e. questions in the form of statements, such as *I am direct* (in German: ***Ich bin direkt***), *I tend to be calm* (in German: ***Ich bin eher ruhig***), *I want things to be exact* (in German: ***Ich möchte, dass alles fehlerfrei ist***), *I am lively* (in German: ***Ich bin lebhaft***). Researchers recognize that if all of the items on a given scale (e.g., the D scale) are in fact measuring the same thing (e.g. Dominance), they should all correlate with each other to some degree. In other words, all of the items on a scale should be consistent with each other. A statistic called Cronbach's alpha is generally regarded as the best method when evaluating internal consistency. This analysis was performed on the German data to ensure that the construct developed and tested on a US population was possible to adapt to a German speaking population using the translated items and the German, Austrian, Swiss test groups. Hence, in order to leave room for local changes, the number of items tested is much larger than the number of items used in the US sample. As expected the results show that the best fit of items for the 8 DiSC scales in English and German is similar but not identical. This explains minor differences between the German and US construction of the scales, which for instance can be seen in the difference in number of extra items on the SC and CD scale for responses with high variance (table 3; table 3 in the AT Research Report).

Cronbach's alpha expresses the degree of consistency as a specific number, which varies between 0 and 1. If the value of alpha is 0 then there is no relationship among the items/statements that have been grouped as a scale. On the other hand, if all the statements in an assessment measure in an identical fashion, then the value of alpha will be 1.0, which indicates absolute internal consistency. Cronbach's alpha is calculated separately for each of the assessment's eight DiSC scales.

The following guidelines are frequently used to evaluate the quality of a scale's internal reliability: alpha values above .70 are generally considered acceptable and satisfactory. Alpha values above .80 are usually considered quite good, and values above .90 are considered to reflect exceptional internal consistency. In fact, alpha values that are too high may indicate that the items on a scale are redundant or too similar, suggesting that the respondent is asked to respond to the same thing many times repeatedly, resulting in no new information about the respondent being provided. Alpha

coefficients were calculated for the German sample (N=514). The demographics of this group are found in Table 1. The scales on the Everything DiSC® instruments demonstrate good-to-excellent internal consistency, as shown by the alpha values listed in Table 2. All reliabilities are well above .70, with a median of .85.

**Table 2. Internal consistency of the *Everything DiSC*® Scales in German**

Scale	Number of items	Cronbach's Alpha
<b>DI</b>	9	.88
<b>I</b>	7	.90
<b>IS</b>	9	.85
<b>S</b>	10	.85
<b>SC</b>	12	.86
<b>C</b>	11	.76
<b>CD</b>	12	.83
<b>D</b>	8	.85
<b>N=514</b>		

Analyses was also performed to understand the impact of the extra, adaptive questions that respondents receive if there is a large amount of variation within their responses to a single scale's item. That is, if the variance in a respondent's ratings to the items on one scale is above a certain level ( $SD > .95$  on the scale based on standardized scores), the respondent is given 5 to 8 extra items that continue to measure the trait assessed by the scale. For convenience, all items that the respondents receive are called "base items" and the items that only inconsistent responders receive are called "extra items".

Table 3 shows the internal reliabilities for only those respondents who gave the most inconsistent responses to a given scale's items, measured by a high degree of response variance. In other words, these are respondents whose scale preferences seemed the most unclear. In the first bold column are the alphas for those respondents using both the base items and extra items (which reflects how these respondents are measured in the actual assessment). In the second bold column are the alphas for those respondents using only the base items. With only the base items, the median alpha in the German speaking sample for individual with high variance is .60. The median alpha when the extra items are included is .77. By comparing these two columns, we can see that the internal consistency

is much higher for these unclear respondents when they receive the extra items. In essence, these extra items are used to further gauge the target trait when the normal assessment has produced unclear or variable results.

**Table 3. Alpha coefficients for high variance respondents**

Scale	With extra items			Without extra items			% receiving extra items
	Alpha	N	# items	Alpha	N	# items	
<b>DI</b>	<b>.78</b>	160	14	<b>.63</b>	160	9	31
<b>I</b>	<b>.76</b>	119	12	<b>.57</b>	119	7	23
<b>IS</b>	<b>.73</b>	154	14	<b>.59</b>	154	9	30
<b>S</b>	<b>.80</b>	164	15	<b>.67</b>	164	10	32
<b>SC</b>	<b>.79</b>	145	18	<b>.68</b>	145	12	28
<b>C</b>	<b>.71</b>	215	18	<b>.47</b>	215	11	42
<b>CD</b>	<b>.79</b>	206	20	<b>.65</b>	206	12	40
<b>D</b>	<b>.77</b>	158	13	<b>.55</b>	158	8	31

### Construct Validity: Scale Intercorrelations for Workplace Scales

As part of examining the construct validity of the DiSC® Scales, the German item scores from each respondent on the eight DiSC scales were examined. The DiSC model proposes that adjacent scales (e.g., Di, and i) will have moderate correlations. That is, these correlations should be considerably smaller than the alpha reliabilities of the individual scales. For example, the correlation between the SC and S scale (.34) should be substantially lower than the alpha reliability of the SC (.86) or S (.85). Moreover, scales that are theoretically opposite (e.g., i and C) should have strong negative correlations (-.60). Table 4 shows data obtained from a sample of 514 respondents who completed the Everything DiSC assessment in German. The correlations among all eight scales show strong support for the model. That is, moderate positive correlations among adjacent scales and strong negative correlations are observed between opposite scales.

**Table 4. Scale Inter correlations**

	DI	I	IS	S	SC	C	CD	D
DI	<b>.88</b>							
I	.39	<b>.90</b>						
IS	-.02	.46	<b>.85</b>					
S	-.43	-.07	.39	<b>.85</b>				
SC	-.61	-.51	-.15	.34	<b>.86</b>			
C	-.37	-.60	-.41	-.15	.35	<b>.76</b>		
CD	-.07	-.29	-.48	-.37	-.13	.35	<b>.83</b>	
D	.40	.12	-.27	-.52	-.58	-.12	.32	<b>.85</b>

Cronbach's alpha reliabilities are shown in bold along the diagonal, and the correlation coefficients among scales are shown within the body of the table. Correlation coefficients range from -1 to +1. A correlation of +1 indicates that two variables are perfectly positively correlated such that as one variable increases, the other variable increases by a proportional amount. A correlation of -1 indicates that two variables are perfectly negatively correlated, such that as one variable increases, the other variable decreases by a proportional amount. A correlation of 0 indicates that the two variables are completely unrelated. N=514, as shown in Table 1.

## Reliability Measure: Internal Consistency for Continua Scales in German

*The Everything DiSC® Comparison Report* allows any two Everything DiSC participants to see their similarities and differences in six out of nine areas. These scales were also constructed on the German items and below are the research findings. As this is a supplement, please consult section 7 (Comparison Report Research) in the Adaptive Testing Assessment for information on the background of the scales and selection of the six out of nine possible continua.

Alpha internal reliability coefficients were calculated for each of the nine continua, as shown in Table 5, using a sample of 514 German speaking participants. These coefficients range from .68 to .83, with a median reliability of .76. Therefore, these scales demonstrate acceptable to excellent internal consistency. This finding suggests that each of these continua scales is measuring a single, unified construct.

**Table 5. Alpha Coefficients of the Continua Scales in German**

Continua Scale in English	Continua Scale in German	Number of items	Alpha
Patient - Driven	<i><b>Geduldig – Getrieben</b></i>	9	.77
Soft-spoken - Forceful	<i><b>Zurückhaltend - Energisch</b></i>	13	.83
Outgoing - Private	<i><b>Extrovertiert - Zurückgezogen</b></i>	7	.83
Calm - Energetic	<i><b>Ruhig – Tatkräftig</b></i>	10	.82
Skeptical - Accepting	<i><b>Skeptisch - Akzeptierend</b></i>	11	.68
Daring - Careful	<i><b>Wagemutig – Vorsichtig</b></i>	5	.71
Tactful - Frank	<i><b>Taktvoll – Freimütig</b></i>	12	.74
Accommodating - Strong-willed	<i><b>Entgegenkommend – Willensstark</b></i>	11	.68
Lively – Reserved	<i><b>Lebhaft - Reserviert</b></i>	10	.81

**N=514**

## Summary

Analysis of data collected on the German version of the Everything DiSC® adaptive testing assessment using German, Swiss, and Austrian participants indicate that the development of the assessment was successful. The findings show support of the **eight DiSC® Scales**, which are used as the basis of the Everything DiSC Workplace® profile, and the **nine Continua Scales** used in the Everything DiSC Comparison Report (***Vergleichsbericht***).

- With high Cronbach's alphas (.76-.90) for the eight DiSC scales, the **reliability** of the instrument is shown to be very satisfactory. The assessment is adaptive and these reliability measures are the result of analysis on the scale that only includes the base items. Moreover, the results include all responses, even responses from individuals who will receive the extra items to increase the precision of their score on a specific DiSC scale. Hence, this is a conservative measure as dependent upon the scale, somewhere between 23 and 42 percent of the respondents show high variance and will be asked to respond to extra items, in order to receive a DiSC scale score based on responses from both base and extra items.



- The **internal reliability** coefficients of the instrument on the nine Continua Scales were in the just acceptable to good range, with Cronbach's alphas ranging from .68 to .83, and a mean of .76.
- The construct **validity** of the eight DiSC® scales, indicated by scale intercorrelations, supports the circumplex structure of the DiSC model. Using German data previous findings on the Everything DiSC® assessment in English were confirmed, with adjacent scales showing moderate correlations and opposite scales showing strong negative correlations, as predicted by the model.
- Further analysis on the circumplex structure including correlations between the Everything DiSC scales and the scales of the NEO PI-R and 16PF® are thoroughly documented in the AT Research Report.