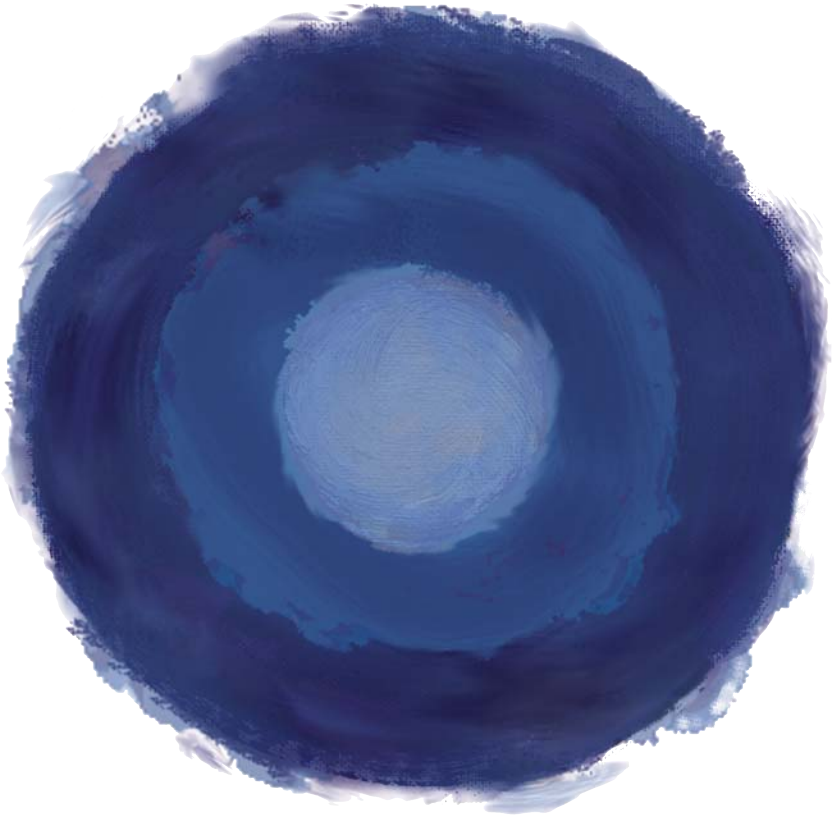

DiSC® Indra™

Research Report

By Pamela Cole and Kathleen Tuzinski

inscape publishing

The *DiSC® Indra*™
Research Report

Pamela Cole
Kathleen Tuzinski

DiSC® Indra™ Research Report

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DiSC® Indra™ Research Report

Introduction

This research report is the culmination of Inscape Publishing's 25-year commitment to the ongoing research and development of one of the most popular models of human behavior. The DiSC® Model was created over 75 years ago by William Moulton Marston, a physiological psychologist. His deep understanding of the interaction between individuals and their environment resulting in four well-known behavioral types, defined a breakthrough model of human behavior that remains just as valid today as it was in 1928.

This report details the development of DiSC instrumentation that started in the 1940s and continued on in similar fashion through the 1990s in the form of the *Personal Profile System®*. It then describes in great detail the development of the newest DiSC assessment available on the market today. *DiSC Indra™* (IN-Depth Relationship Assessment) is the product that resulted from the integration of the DiSC Model with Interpersonal Psychology. Interpersonal Psychology is a branch within psychology that focuses on the interpersonal relationships between two or more individuals, using a research-based model of interpersonal interaction called the Interpersonal Circle.

This report will demonstrate the strong conceptual overlap that has existed between the Interpersonal Circle and the DiSC Model for decades. Up to this point, these two systems have existed side by side without anyone realizing the immense potential that could be gained by linking the two systems together. *DiSC Indra* represents this link. Through its detailed feedback reports, *DiSC Indra* provides concrete, accurate feedback regarding the obstacles that are likely to be encountered in relationships among people with differing DiSC types. Thus, its greatest potential is the ability to reduce interpersonal conflict and increase effectiveness and understanding between two or more individuals.

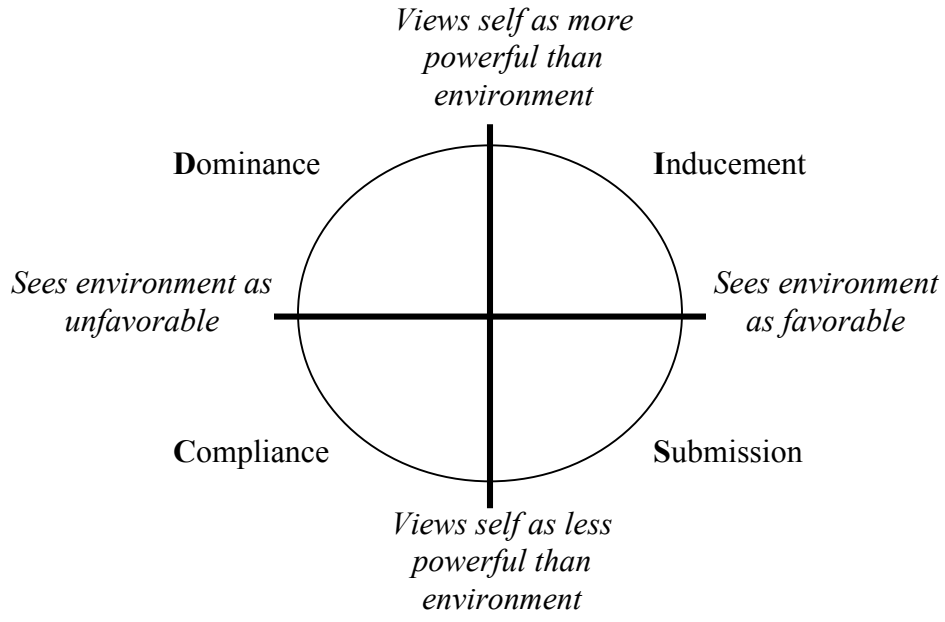
History of DiSC®

Marston's Model

The DiSC® Model of Behavior was first proposed in 1928 by William Moulton Marston, a physiological psychologist, in a book entitled "Emotions of Normal People." Like many psychologists of his time, Marston made a deliberate decision to focus only on psychological phenomena that were directly observable and measurable through objective means. His primary interest was in theories of emotions and the physical manifestations of emotional states. From his careful research, Marston theorized that the behavioral expression of emotions could be categorized into four primary types, stemming from the person's perceptions of self in relationship to his or her environment. These four types were labeled by Marston as Dominance (D), Inducement (I), Submission (S), and Compliance (C). He created a model that integrated these four types of emotional expression into a two-dimensional, two-axis space.

The first dimension was the person's perception of the environment; specifically, whether it was seen as favorable or unfavorable. The second dimension was the person's perception of their own power within the environment; specifically, whether they viewed themselves as more powerful or less powerful than the environment. Combined into one model, these two dimensions give rise to the four DiSC behavioral types (or styles), as seen in the model below.

Figure 1. Marston's Original DiSC Model



The four types represent, then, a combination of the person's perception of the favorableness of their environment, coupled with their perception of their power over the environment.
Dominance: Perceives oneself as *more powerful* than the environment, and perceives the environment as *unfavorable*.
Inducement: Perceives oneself as *more powerful* than the environment, and perceives the environment as *favorable*.
Submission: Perceives oneself as *less powerful* than the environment, and perceives the environment as *favorable*.
Compliance: Perceives oneself as *less powerful* than the environment, and perceives the environment as *unfavorable*.

Marston himself had little interest in theoretical concepts of personality or temperament. Thus, he never created a psychological instrument to measure his DiSC® model. However, other academicians and researchers developed DiSC-based instruments. Development of the DiSC theory, model, and measurement continues on to the present day. Although the labels for the four types have changed over time, the constructs as Marston understood them have endured relatively unchanged from his original conceptions of them.

The Instrument Developers

The history of DiSC instrument development began in the 1940s with an Industrial Psychologist by the name of Walter V. Clarke. Clarke built a test for use in personnel selection called the Activity Vector Analysis (see Clarke, 1956). He didn't intentionally set out to build an instrument based on the DiSC theory, as his approach was almost purely empirical (i.e., letting the data speak for itself) rather than theoretical (i.e., looking for something specific in the data). Following the "lexical approach" that was popular at that time (John, Angleitner, & Ostendorf, 1988; Saucier & Goldberg, 1996), Clarke identified a list of adjectives that were commonly used in describing others. He collected information on the adjectives using a checklist format, on which people are asked to check the specific words that describe them. After collecting and analyzing the data on this instrument, he discovered that the four factors produced from the data (aggressive, sociable, stable and avoidant) sounded a lot like DiSC. Clarke concluded that the data could be best explained by Marston's model of human behavior.

He scored the instrument in the following manner. He asked participants to complete the checklist twice, the first time responding by checking "any words I have heard others use to describe me" and the second time, responding by checking "any words that I feel honestly describe me." The scores on the four scales, measured twice, were integrated into a single score for each scale ("composite self"), then ipsatized and plotted as a profile. The distance between the highest and lowest plotting points was divided into nine equal intervals regardless of the actual distance between the points. A segment number from 1 to 9 was assigned to each scale. The four-digit segment scores were then plotted

as clusters in three-dimensional space, where distance between the clusters represented a measure of similarity. The clusters that came closest to each other were grouped into a mega-cluster (or pattern). Fifteen such mega-clusters (or patterns) emerged. It was these 15 basic patterns that formed the basis for interpretation of scores.

About ten years later, a staff member of Walter Clarke Associates developed a version of this assessment for John Cleaver, which they called Self D*i*scription. It began like the AVA as an adjective checklist, but evolved into a 24 tetrad, forced-choice instrument. Presumably, the forced choice aspect of the instrument was introduced to minimize the influence of socially desirable responding. Factor analyses of the Self D*i*scription produced two factors that closely approximated the underlying axes of Marston's model, lending considerable empirical support not only to the structure of the model he proposed, but to Clarke's earlier claim that a DiSC®-based instrument could be created.

In the 1970s, John Geier, a faculty member in the University of Minnesota's Department of Health Sciences, used Self D*i*scription to create the original *Personal Profile System®* (PPS). Since the PPS used the same 24 tetrads and items that appeared in the original Self D*i*scription, Geier's main contribution was not so much in the area of instrument development, but in furthering the understanding of the 15 basic patterns discovered by Clarke. Geier collected pattern descriptions through clinical interviews with hundreds of people. By extracting behavioral information from those interviews, he provided richer descriptions of these 15 patterns that had come to be known as the Classical Profile Patterns.

Furthering research on the PPS, Inscape, in conjunction with DiSC expert Pamela Cole, aimed to improve the instrument that had basically remained unchanged since 1959. New items were added, non-functioning items were removed, and the overall reliability of the instrument increased. The new PPS was named the *Personal Profile System* 2800 Series (PPS 2800), referring to the new number of tetrads (28). Published in 1994, this version of the PPS is still used today, although it has since been renamed *DiSC Classic*.

From Marston up to present, the understanding of the DiSC model has continued to evolve. Since 1994, new knowledge has been gained about what the DiSC model represents, and along the way a new piece has been added to the story. It is a body of research and practice that has existed side by side with DiSC, and it holds much promise for existing DiSC practitioners. It was hinted at by the early writings on DiSC (for example, Cleaver wrote about it), and by integrating it into DiSC, we are brought closer to actualizing the immense potential that lies within the DiSC system of behavior. This piece is the field of Interpersonal Psychology.

Interpersonal Psychology

Interpersonal Psychology started with neo-Freudian therapist Harry Stack Sullivan, who believed that a person's behavior is not simply driven by situational demands or by internal motivations; rather, it is driven by the bi-directional influence that exists between the person and another individual within the context of a relationship. Behavior is almost always bi-directional (reflecting the mutual influence two individuals have upon one another) rather than unidirectional. Thus, Sullivan believed that to understand human behavior fully, one also had to understand the interpersonal context in which it was manifested. Like Marston, Sullivan never operationalized his concepts by creating an assessment. Timothy Leary (1957) and his colleagues, interested in operationalizing Sullivan's concepts, started by observing the interaction patterns that occurred among individuals in group psychotherapy.

Leary discovered that the two dimensions of power and affiliation could explain most of the interaction patterns he observed. In other words, the dynamics of the interpersonal interaction was primarily one of negotiating power—"you are more (or less) powerful than me"—and affiliation—"this is going to be a close (or distant) relationship." Furthermore, they discovered that if they mapped all the interpersonal variables they observed on these two dimensions, the interpersonal variables formed a continuous circle around these two dimensions. Stated another way, each of the interpersonal variables represented a unique combination of power and affiliation, the two underlying dimensions. In the example shown below, Variable 1 (for example, Aggressive) would represent equal combinations of a high need for control with a low need for affiliation, and Variable 2 (for example, Talkative) would represent equal combinations of a high need for control with a high need for affiliation.

Figure 2. An Example of the Interpersonal Circle

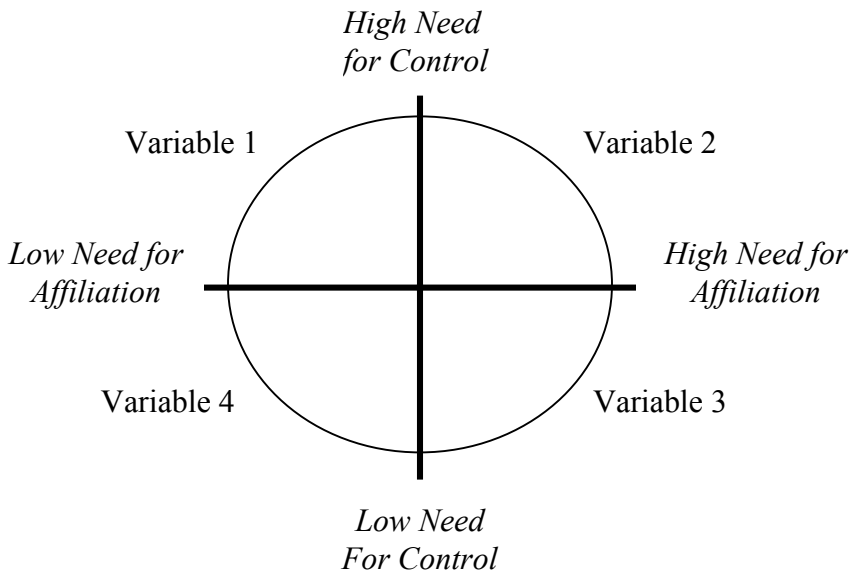


Figure 2 is a highly simplified version of the actual Interpersonal Circle. The Interpersonal Circle really exists as a highly developed psychometric model called a circumplex. A circumplex is built from two orthogonal (at right angles to each other) underlying dimensions, or axes, that together define a set of variables with a very specific ordering along the circumference (Guttman, 1954). The circumplex is not the same as a four-quadrant model, nor is it necessarily implied when variables are represented within a circle. A circumplex is a more sophisticated system than anything else available in DiSC®-based assessment today.

Leary and his associates created the first measure of the Interpersonal Circumplex, the Interpersonal Check List (ICL, Laforge & Suczek, 1955). Since then, many more circumplex-based instruments have been built for the assessment of interpersonal behavior (SASB, Benjamin, 1996; CLOIT-R, Kiesler, 1987; IMI: IIA, Kiesler & Schmidt, 1991; IAS-R, Wiggins, 1995). The Interpersonal Circle has proven itself over time to be a very robust model.

The Convergence of DiSC® with Interpersonal Theory: *DiSC Indra*™

Rationale

DiSC Indra™ is, at the most basic level of understanding, the application of the mathematical rules of a circumplex to DiSC. So why would we be interested in creating a circumplex model out of DiSC? The reason is that in its optimal form, the DiSC Model would most likely be a circumplex. If one compares Marston's two underlying axes of perceived Power relative to one's environment and perceived Favorability of the environment to the Interpersonal Circle's two axes of Power and Affiliation, it is easy to see the striking similarities between them. First, the comparison between the two Power axes is relatively straightforward. Second, one only needs to make a small inference to go from perception of the environment's Favorability to whether one tends to Affiliate or Detach with one's environment. It is likely that the choice to Affiliate or Detach is preceded by one's perception of whether the environment is Favorable. Thus, it is a natural response to detach from others if you see the environment as antagonistic or unfavorable, just as it is natural to affiliate with others if you see the environment as favorable. We are not the first to realize the connection between DiSC and the Interpersonal Circle. Cleaver's group, for example, upon examining the data from the Self-D*i*scription instrument (the precursor to the PPS), commented on the similarities between Marston's Model and that of Leary and his associates (see Donelly, Norbert E., & Mahan).

In addition to the strong *conceptual* link between the two models, the in-house data at Inscape also revealed a strong *empirical* link. Data analyses of a number of DiSC® instruments, both US-based and international, strongly hinted at a bipolar, two-axis (or two-dimensional) model. What this means is that Marston's model was more than just a picture – it represented a *true mathematical model that has been re-created by statistical analysis of the data,* just like the Interpersonal psychologists had found. This is truly amazing, considering that Marston never collected data on psychological instruments to test his hypothesis.

So why would we create a new DiSC assessment? By integrating it with an entire branch of psychology specifically focused on interpersonal relationships, we can bring the application of DiSC to a whole new level—that is, to the level of the relationship itself.

DiSC® Indra™ Instrument

DiSC Indra™ is a self-report instrument that asks people to rate themselves on 150 interpersonal adjectives (for example, "warm," "cooperative," "competitive," "detached"). Ratings are collected in a 5-point rating scale. Currently, because of the highly technical nature of the scoring algorithms, the instrument is only available in an online version.

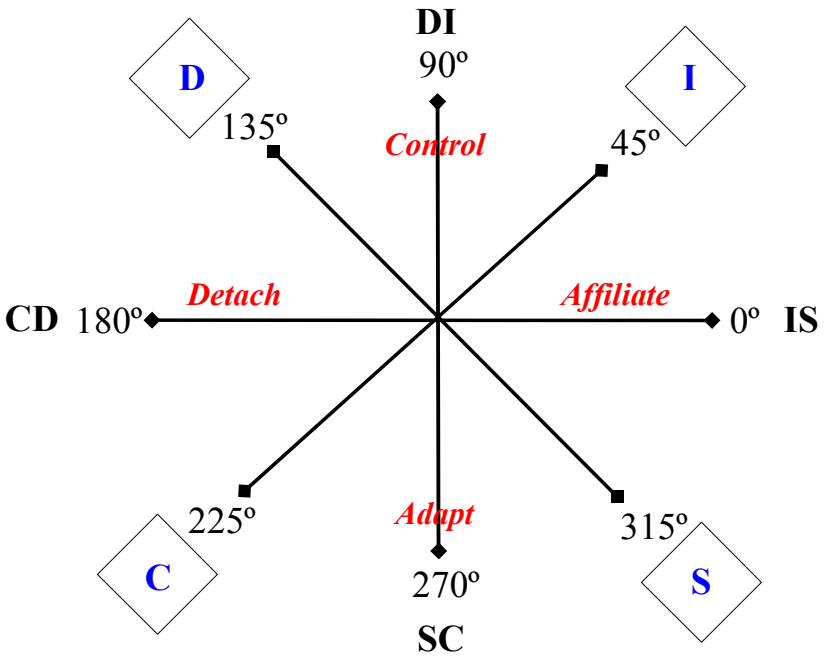
Scoring of the instrument occurs at three levels: item, octant, and resultant vector. Each level will be described in turn. First, there are 150 total item scores, which are a combination of individual responses and the location of the item in the two-axis interpersonal space. This leads to a unique Item Map for each person. Second, there are eight octants, or DiSC scales, which result from summing (through vector algebra) neighboring items. The octant themselves are the "pure" DiSC types—D, I, S, C—plus their combinations—DI, IS, SC, CD. Third, there is just one resultant vector, which results from summing (once again, through vector algebra) all item scores.

The interpretation of a person's responses is focused at two levels: the octant pattern (or shape) and the location and length of the resultant vector. The shape of the octant pattern indicates the "typicality" of the person's profile (in other words, the "goodness of fit" of that pattern to the average or expected pattern, which indicates how similar an individual might be to others of the same type). The location of the resultant vector categorizes a person into one of 16 possible patterns that occur around the DiSC Circumplex (these types are represented in Figure 7 on page 26). The length of the resultant vector indicates how flexible one's behavioral style is likely to be. The longer the vector, the more likely this person will find it difficult to use more than one interpersonal style. A shorter vector length might indicate a more flexible behavioral style. Finally, vector length might also indicate intensity of behaviors that are expressed (longer being more intense).

DiSC® Indra™ Feedback Reports

The feedback reports are available for three levels of interpretation: the individual, the dyad (two individuals) and the group. Each report opens with a DiSC® Interpersonal Map, which shows the location of the individual(s) on the DiSC Circumplex. For a quick definition of terms, the "DiSC Circumplex" is a mathematical model that forms the basis for the mathematical computations leading to item, octant, and resultant vector scores (see Figure 3 below). The "DiSC Interpersonal Map" is where the item, octant, and vector scores for one or more individuals are displayed in the feedback reports.

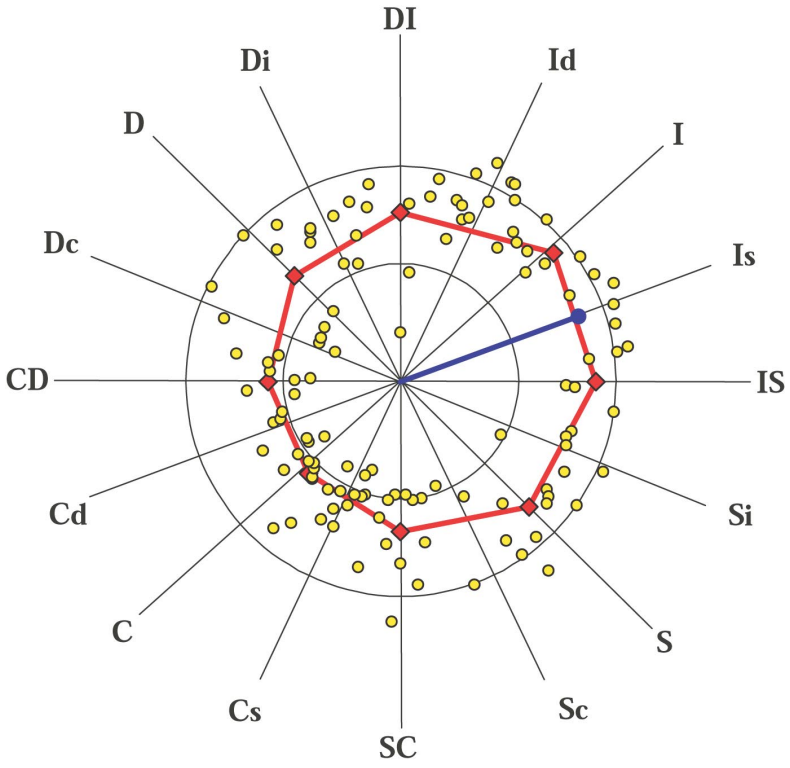
Figure 3. The DiSC Circumplex



The DiSC® Interpersonal Map

DiSC® Indra™ displays a person's DiSC Interpersonal Style on the two dimensions of Control-Adapt and Affiliate-Detach. The combination of the two dimensions form 16 patterns, with each style representing a specific combination of the two dimensions of Control and Affiliation. The four "pure" styles—D, I, S, C—represent the four Classic combinations of the bipolar Control and Adapt dimensions. Dominance (D) represents equal combinations of Control and Detach, Influence (I) represents equal combinations of Control and Affiliate. Steadiness (S) represents equal combinations of Affiliate and Adapt. Conscientiousness (C) represents equal combinations of Adapt and Detach. Figure 4 is an example showing one person's DiSC Interpersonal Map.

Figure 4. The DiSC Interpersonal Map



PPS and the Interpersonal Map

DiSC Indra retains continuity with the PPS 2800 product line. The Classical Patterns can be roughly located on the circumplex as the alpha research sample (where participants responded to both the PPS 2800 and *Indra*) has already demonstrated. Evidence for this can be seen in Figures 5a and 5b in the research section.

DiSC® Indra™ Research

Pre-Alpha Phase

There were a total of three phases in the research. In the first phase, the pre-Alpha phase, two DiSC®-based instruments with archival data were used for the analyses. The *Personal Profile System®* (PPS) is a forced choice instrument consisting of 112 items placed in groups of four. It is administered by asking the respondent to choose from each word group one item that most describes him/her and one item that least describes him/her. *Points of View* (POV) is an instrument that consists of 90 statements collected on a five-point rating scale that measures nine lower-order scales based on the four higher-order dimensions of DiSC (for example, Direct and Decisive are two subscales that make up the D higher-order dimension). The main differences between PPS and POV is that the former uses a forced choice format rather than a rating scale, measures four higher order dimensions rather than nine lower-order dimensions, and uses single-word adjectives rather than verb-based statements.

Using a sample size of N=5612, a correlational analysis of the POV data suggested some interesting relationships among the nine subscales, pointing to some conceptual overlap among the nine. More specifically, there was evidence for some positive relationships between the D and I, I and S, and S and C subscales. Furthermore, there were negative relationships between the I and C, and D and S subscales. Perhaps not surprisingly, these interrelationships among the nine subscales carried through to relationships among the four higher-order dimensions. So, between the D and S dimensions there was a negative correlation, as there was between the I and C dimensions. Furthermore, there were positive correlations between D and I, I and S, and S and C. This pattern of interrelationships, particularly between D and S and between I and C, was faithfully replicated in the correlations among the dimensions of the PPS (on a sample of N=23,286), even though it is a different DiSC-based instrument measuring words (rather than phrases) in a forced choice (rather than rating scale) format.

This pattern of interrelationships among both the higher- and lower-order scales strongly suggests that an underlying psychological model consisting of four relatively independent dimensions was not an appropriate reflection of what was really going on in the data. Rather, there was more evidence leaning in the direction of a circular model, one that placed D and S, and I and C opposite from each other, and D and I, I and S, S and C, and C and D next to each other. In a preliminary analysis of 12 factors produced from the POV data, in which the factors were run through a program that placed factors around a circle depending on their intercorrelations (CIRCUM, see Browne, 1992 for a description of this program), a clear circumplex structure emerged. Factors consisting of D and I items fell on one hemisphere of the circle, and factors consisting of S and C items fell on the other hemisphere. In addition, factors representing “blends” of the four dimensions (D with I, I with S, and so on) fell in the spaces between.

If two perpendicular lines were drawn across the circle, one would bisect DI and SC, and the other would bisect IS and CD. At this point, the decision was made to pursue the development of an instrument that would capitalize on the natural relationships among the four dimensions, and place them in a context where a circumplex structure would be optimized.

Alpha Phase

Purpose

The main purpose of the Pre-Alpha phase of research was to try to identify, using a combined approach of data analysis of a rating scale version of the PPS (N=414) with an extensive literature review, the existing items that fit very well within a circumplex structure. The ultimate goal of the Alpha phase was to fill in the gaps in the circumplex where new items were needed to build a true circumplex. Through a highly iterative process of data analysis of the PPS, combined with a thorough examination of the extensive literature on statistical circumplex models, interpersonal theory, the lexical tradition, and the Five Factor Model of Personality (see bibliography for an abbreviated list of articles that were consulted during this project), we gained the historical clarity that was necessary in order to proceed with item development. Along the way, some decisions were made that placed the product on a different path from some of Inscape's preceding instruments. For example, the decision was made to use words rather than phrases for the items, mainly to be in keeping with the rich lexical tradition that formed the basis of almost all of the consulted literature (particularly, the literature on the Five Factor Model of Personality). Also in keeping with this tradition, the items are measured on a rating scale.

In preparation for the Alpha data collection, item development was driven equally by theoretical and empirical approaches. The extensive literature review pointed to some potential conceptual gaps in the current item set, and data analyses supported these observations. To facilitate the data analysis, a proprietary program was written that projected the items onto a circumplex based on their association with the two underlying factors. From this "item map," it was possible to identify which areas needed further coverage, and thus, new items were written to cover these areas. A total of 83 new items were written, and added to the existing 112 items of the PPS. The full item set (195) was placed on a 5-point rating scale and administered to a sample of 305 individuals. This same sample was also administered the PPS. The demographics of the Alpha sample can be seen in Table 1. Ten percent of respondents (N=30) did not provide demographic information. From the people who provided demographic information, we were able to discern that the sample was 62% female, fairly well educated (82% had a least a college degree), and primarily Caucasian (91%). We decided that in the next phase of data collection, more effort was needed towards recruiting males and people of color.

Table 1. Demographic Characteristics of Alpha Respondents (N=305)

Gender	Male	38%
	Female	62%

Age	18-25	4%
	26-35	18%
	36-45	35%
	46-55	32%
	56 and older	11%
Heritage	African American	4%
	Asian American	2%
	Caucasian	91%
	Hispanic	1%
	Native American	1%
	Other	2%
Education	Some high school	<1%
	High School graduate	2%
	Technical/Trade School	3%
	Some College	14%
	College graduate	47%
	Graduate/Professional degree	35%
Employment	Secretarial/Clerical	6%
	Executive	14%
	Mid-Level Management	16%
	Supervisory	2%
	Professional	30%
	Mechanical/Technical	2%
	Customer Service	3%
	Sales	3%
	Health Care Worker	1%
	Teacher/Educator	10%
	Other	14%
Industry	Manufacturing	8%
	Finance/Insurance/Real Estate	10%
	Public Administration	2%
	Wholesale/Retail Trade	2%
	Business Services	31%
	Educational Services	21%
	Health Services	6%
	Transportation/Utilities	2%
	Other	18%
Location	United States	99%
	Canada	1%

Objectives of Alpha Data Analysis

There were three main objectives in the analysis of Alpha data. The first objective was to assess the item map to determine how well the gaps, previously identified during the Pre-Alpha Phase, had been covered. The second objective was to assess how well the data overall fit an underlying model of circumplex structure. The third objective was to determine the relationship between the PPS (specifically, the 15 Classical Profile Patterns) and a circumplex representation of DiSC®. The results of each will be discussed in turn.

First objective. To identify how well the item gaps were filled, the data were run through the proprietary circumplex analytical program (CAP) to create an item map. From this initial item map, it was determined that a very common type of response set (for rating scale data) was present in the data: social desirability. Social desirability bias (or socially desirable responding) occurs when people tend to provide favorable impressions of themselves through their responses. Although occasionally people may be fully aware and deliberate in their desire to give a favorable impression, more often it is an unconscious process that leads them to avoid endorsing adjectives with negative connotations. Rather than removing negative words, as such words are necessary in this instrument in order to ensure complete item coverage around the circle, we determined it would be necessary to minimize the effects of social desirability bias using other means.

To reduce the effects of social desirability, the average rating each person assigned across all their items was subtracted from each of their item scores. This process, called "ipsatizing," is a common method for removing this bias, and it has been employed by a number of circumplex researchers. After the items were ipsatized, they were once again mapped to a circumplex structure using CAP. This time, all areas around the circle (except for one area spanning about 45 degrees) were well covered by the item set. Two indices were used for determining whether or not to keep an item for the final instrument: the item's angular location and its communality. Both indices are dependent on how well the item is associated with either one or both of the underlying axes of the model (measured by a correlation with the axes). If the item is not associated with either one of the axes, the communality will be low, indicating that the item measures something other than the constructs represented by this two-factor model. Communalities range from 0.0 to 1.0. Any item that had a communality less than .15 was dropped, unless it was in an area where item coverage was already very thin. In addition, any areas that had too many items (so, for example, three items all located at 80 degrees) were thinned out to avoid overrepresentation of any one area.

From these item deletions, a total of 146 items were retained for the Beta instrument. It was determined at that point that further item development was needed to fill in some gaps created from the circumplex (in particular, the CD and IS areas). Nevertheless, reliabilities of the eight scales (octants) created from the final item pool of the Alpha were very good, ranging from .79 for the CD scale to .92 for the D scale.

Second Objective. To assess how well the data fit an underlying model of circumplex structure, a number of indices were used. Most of these will be described in more detail when we get to the final instrument in the Beta section. One result will be described here. A very important qualification for determining whether the data structure is circular is if the intercorrelations among the octants match an expected correlation matrix if the structure was perfectly circular. Tables 2 and 3 display the intercorrelation matrices for an ideal circulant matrix (Browne, 1992; Guttman, 1954; Wiggins, Steiger, & Gaelick, 1981) and Table 4 shows the matrix produced from the Alpha data. The eight scales represented in each table represent octants that define 45-degree ranges around the circle. In Table 4, the first scale (the "origin") is represented by the D octant. The two neighboring octants are DI and CD. As the scales move farther away from the origin in both directions on the circle, the correlation between them should get increasingly smaller, moving towards zero at 90 degrees apart, and becoming negative from 90 to 180 degrees apart (the farthest distance that two scales can be). Thus, the nearest neighbors should have the highest positive correlation, and opposites should have the highest negative correlation. In Table 2, this corresponds to a pattern of correlations where the first diagonal (R_1) off the main diagonal have the highest correlations, followed by the second (R_2), then the third (R_3), and finally, the fourth (R_4). Table 3 shows the expected correlations one would receive from a perfect circumplex. R_1 at 45 degrees apart produces an average correlation of .42, R_2 at 90 degrees produces an average correlation of .03, R_3 at 135 degrees produces an average correlation of -.36, and R_4 at 180 degrees produces an average correlation of -.73.

Table 2. Representation of circulant correlation matrix

Scale	D	DI	I	IS	S	SC	C	CD
D	1.00							
DI	R_1	1.00			where $R_1 > R_2 > R_3 > R_4$			
I	R_2	R_1	1.00					
IS	R_3	R_2	R_1	1.00				
S	R_4	R_3	R_2	R_1	1.00			
SC	R_3	R_4	R_3	R_2	R_1	1.00		
C	R_2	R_3	R_4	R_3	R_2	R_1	1.00	
CD	R_1	R_2	R_3	R_4	R_3	R_2	R_1	1.00

Table 3. OLS[a] population estimates for an ideal circulant matrix (adapted from Wiggins, 1995)

Scale	D	DI	I	IS	S	SC	C	CD
D	1.00							
DI	.42	1.00			estimate = .42 > .03 > -.36 > -.73			
I	.03	.42	1.00					
IS	-.36	.03	.42	1.00				
S	-.73	-.36	.03	.42	1.00			
SC	-.36	-.73	-.36	.03	.42	1.00		
C	.03	-.36	-.73	-.36	.03	.42	1.00	
CD	.42	.03	-.36	-.73	-.36	.03	.42	1.00

[a]OLS = ordinary least squares (Steiger, 1980).

Table 4. Correlation Matrix from the Alpha Data Scales (N=274)

Scale	D	DI	I	IS	S	SC	C	CD
D	1.00							
DI	.44	1.00			α = .58 > -.04 > -.61 > -.84			
I	-.07	.73	1.00					
IS	-.67	.05	.54	1.00				
S	-.89	-.56	-.09	.60	1.00			
SC	-.62	-.88	-.64	.04	.63	1.00		
C	-.12	-.77	-.80	-.48	.08	.66	1.00	
CD	.74	-.05	-.48	-.78	-.67	-.18	.32	1.00

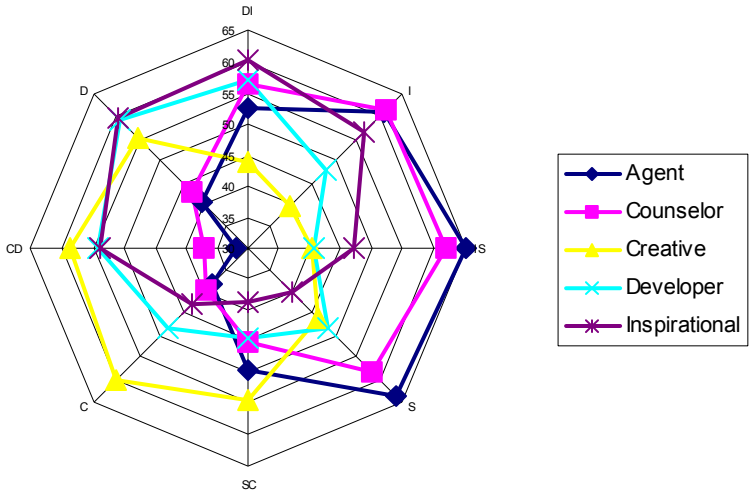
From the correlation matrix produced from the Alpha Data Scales, it is clearly evident that the structure, although not perfectly circulant (a nearly impossible ideal), follows the rules of circumplex structure. The correlations follow the expected pattern, and although the *magnitude*s of the correlations do not match the expected magnitudes, they come fairly close. It would be difficult to envision this version of DiSC® as anything but circular in structure given this pattern of intercorrelations.

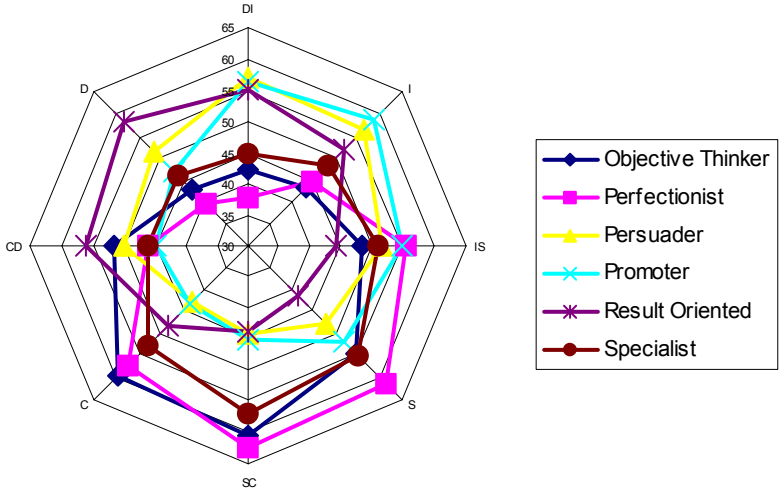
Third Objective. To determine the relationship between the 15 Classical Profile Patterns and a circumplex representation of DiSC, scores on the Alpha research instrument and on the PPS were compared for each person in the sample. In other words, a person's octant pattern and resultant vector from the research instrument were compared to their Classical Profile Pattern from the PPS. These comparisons were assessed against what would be expected given the model. For example, someone who has a Perfectionist pattern in the PPS (an SC pattern) should have a DiSC vector somewhere around 270 degrees, and a DiSC contour (octant pattern) of someone with a DiSC vector in that range. This would be a pattern where the highest octant scores fell in the range of 248-292 degrees and the lowest scores were opposite the highest scores in the range of 68-112 degrees (DI).

Given all the potential factors that play into this correspondence between *Indra*™ and the PPS (including different response formats between the instruments and different sets of items), a correspondence of 50% would be considered very good. Of the patterns that can be located on the *DiSC*® *Indra* model with an acceptable level of accuracy (that is, all patterns except Appraiser [IC], Achiever [SD], Practitioner [ISC], and Investigator [SCD]), each had very good correspondence with the resultant vector location. In addition, the octant patterns followed a nice circulant structure, with the highest and lowest points in the predicted locations. See Figures 5a and 5b for the correspondence between Classical and Octant Patterns.

A note should be made here about the Classical Profile Patterns that are not theoretically predicted by the *DiSC Indra* model. Because only about 8% of the US population is predicted to be an IC, SD, ISC or SCD pattern, it is difficult at this point to get enough of these individuals from our relatively small Alpha sample to accurately locate these patterns on the model. Presumably when Clarke originally produced these patterns from a cluster analysis, these types were prevalent enough to warrant a pattern assignment. It is mostly likely that these types were produced by the double focus the participants had when completing the assessment (taking it once from the "public self" perspective and once from the "private self" perspective). The prevalence of these types would presumably go down with only one response focus, as the PPS instructs people to use. Thus, the appearance of these types from the PPS is more likely to suggest a double response focus, which might happen if the person has a strong set of values that challenges their natural behavioral style, or perhaps the person is experiencing some degree of role conflict. These are only speculations, however, and further research is needed to substantiate them.

Figures 5a and 5b. Aggregated Octant Patterns for Individuals with the Same Classical Profile Pattern





Summary

To summarize the findings from the Alpha phase of research, the following conclusions can be made. First, there is strong evidence pointing to the circular structure of DiSC®. The two underlying factors, first identified by Marston, and what we refer to as Control and Affiliation, have been replicated empirically for the first time as reported in this research report. These two factors, when placed orthogonally to each other, create a circular space where each angular location represents a unique combination of these two underlying factors. Furthermore, the locations of 195 adjectives have been identified in relation to these two factors and placed on this map for establishing octant ranges for the scoring of the instrument. Many of the original adjectives of the PPS have been mapped in this space.

Second, the compatibility of the Alpha research instrument with the PPS is good. Users of the PPS, once they become acquainted with a circular representation of DiSC, should have no trouble transitioning to *Indra*™. Because the resultant vector location and octant patterns match well with the areas suggested by the high points of the Classical Profile Patterns, there should be little resistance to feedback from this new instrument by users already familiar with the PPS.

Beta Phase

Purpose

The purpose of the Beta Phase was twofold. It was an attempt to replicate the Alpha findings on a larger and more representative sample, and it was a chance to try some new items in an attempt to get better measures of certain areas of the circle. Furthermore, a larger and more representative sample than the Alpha was needed for the purposes of standardizing scores for the final version of the instrument.

In preparation for the Beta data collection, 55 new items were written with the goal of filling those gaps in the item map produced from the CAP during the Alpha Phase. A new instrument was created for the Beta Phase that combined the 146 good items from the Alpha with the new items. The full item set (201) was once again placed on a 5-point rating scale and administered to a sample of 811 individuals. During the respondent recruitment process, efforts were taken to ensure a more ethnically diverse sample and a 50/50 male to female ratio. The demographics of the Beta sample can be seen in Table 5. The sample was 51% female, and 10% African American, 1% American Indian, 2% Asian American, 78% Caucasian, and 6% Hispanic American. The gender ratio was nearly 50/50, and the ethnic proportions were better than the Alpha Data in reflecting Census 2000 figures. Given the mix of occupation, employment, and education levels it is safe to assume that this sample is representative of the general working population.

Table 5. Demographic Characteristics of Beta Respondents (N=811)

Gender	Male	49%
	Female	51%
Age	Under 18	<1%
	18-25	15%
	26-35	17%
	36-45	26%
	46-55	29%
	56-60	13%
Heritage	African American	10%
	American Indian	1%
	Asian American	2%
	Caucasian	78%
	Hispanic	6%
	Other	2%
Education	Some high school	1%
	High School graduate	5%
	Technical/Trade School	2%
	Some College	24%
	College graduate	35%
	Graduate/Professional degree	33%
Employment	Secretarial/Clerical	4%
	Executive	11%
	Mid-Level Management	13%
	Supervisory	3%
	Professional	34%
	Mechanical/Technical	2%
	Customer Service	3%
	Sales	6%
	Health Care Worker	1%
	Teacher/Educator	6%
	Skilled Trades	2%
	Student	6%
	Self-Employed	1%
	Homemaker	1%
	Other	7%
Industry	Manufacturing	9%
	Finance/Insurance/Real Estate	8%
	Public Administration	11%
	Wholesale/Retail Trade	4%
	Business Services	26%
	Educational Services	15%
	Health Services	7%
	Transportation/Utilities	5%
	Other	15%
Location	Central Region	15%
	Western Region	6%
	Eastern Region	24%

Southern Region	43%
Pacific Region	1%
Other	11%

Objectives

There were two main objectives in the analysis of Beta data. The first objective was to assess how well the good items identified in the Alpha Phase fared in a second data collection, and to test the items that had just been written. The second objective was to assess how well the data, collected on a second sample, fit an underlying model of circumplex structure. In many ways the Beta Phase was an empirical and conceptual replication of the Alpha Phase, with the added step of determining not just *whether* but *how well* the data fit a circumplex structure. A further objective was to use this sample as the standardization sample for the final instrument (i.e., "norming" it for actual use), and assessing the distribution of patterns within the sample.

Item Development

The first objective was to assess how well the Alpha items and the new items performed on a second sample. Items were removed for any one of the following reasons: if the item had a low communality, if the item reduced the reliability of the scale, and if the item was determined to be too socially desirable (indicated by a high mean rating from the sample). A new criterion was also implemented, which if applied to the Alpha set might have also reduced the number of good items. Any item that was determined to require a high reading level (college) was removed.

A total of 150 items were retained for the final instrument. 111 of the good items from the Alpha Phase were found to be acceptable for the final instrument. That means that 74% of the final instrument consists of items that successfully survived two rounds of item refinement. The rest of the final instrument (39 items, or 26%) was comprised of items that made it through only one round of item refinement. Ongoing item analysis will continue upon the release of this instrument to ensure that all items remain successful in future samples.

The reliabilities of the final scales are shown below. These are very similar to the Alpha reliabilities, and all are quite good.

Table 6. Reliabilities (Internal Consistency) of the Beta Scales (N=811)

Scale	Cronbach's α
D	.84
DI	.91
I	.93
IS	.84
S	.80
SC	.88
C	.91
CD	.70

Assessing Circumplexity

To assess how well the data fit an underlying model of circumplex structure, a number of indices were used. First, the correlation matrix was checked for circulant structure, just as the matrix from the Alpha data had been. Second, the scales were assessed for how they functioned when forced into a circumplex structure. The following tables display the results.

Table 7. Correlation Matrix from the Beta Data Scales (N=811)

Scale	D	DI	I	IS	S	SC	C	CD
D	1.00							
DI	.49	1.00			β = .56 > -.04 > -.59 > -.83			
I	-.04	.67	1.00		estimate = .42 > .03 > -.36 > -.73			
IS	-.53	.02	.54	1.00				
S	-.77	-.55	-.08	.56	1.00			
SC	-.54	-.91	-.71	-.08	.52	1.00		
C	-.06	-.70	-.90	-.62	-.02	.68	1.00	
CD	.54	-.09	-.49	-.73	-.59	.00	.48	1.00

Table 7 shows the matrix of scale correlations for the Beta sample. It also compares the expected relationships based on an ideal circulant matrix to the Beta relationships. Once again, the correlation matrix very strongly indicates that the relationships among the eight scales are those of a circumplex. The magnitude of the correlations are just as good as what was observed in the Alpha sample, and demonstrates that the circulant structure was replicated in a second sample.

Tables 8a and 8b display the characteristics of the DiSC® Beta scales after factor analysis (Principal Components combined with Procrustean Rotation to desired rotation). Starting with Table 8a, the two Target Loading columns contain the expected factor loadings of the octants on the two underlying factors, given a perfect circumplex. The two Actual Loading columns contain just that—the actual loadings of the octants on the two underlying factors, produced from the factor analysis. The fact that the actual loadings are so similar to the target loadings is further evidence for the circumplex structure of the eight DiSC scales.

Table 8a. Characteristics of the DiSC® Beta Scales: Factor Loadings (after Kiesler et al., 1997)

Octant	Target Loading: CON	Target Loading: AFF	Actual Loading: CON	Actual Loading: AFF
D	0.707	-0.707	0.616	-0.654
DI	1.000	0.000	0.947	0.076
I	0.707	0.707	0.707	0.628
IS	0.000	1.000	0.019	0.913
S	-0.707	0.707	-0.637	0.670
SC	-1.000	0.000	-0.959	-0.065
C	-0.707	-0.707	-0.709	-0.645
CD	0.000	-1.000	0.029	-0.885

Table 8b displays the predicted and actual angles of the DiSC® Scales. Both columns are computed directly from the actual and target loadings using simple trigonometry. The deviation column shows how much the actual angle differs from what would be expected given a perfect circumplex. The mean displacement of these scales (2.63) is lower than many of the Interpersonal-based instruments currently available. The last column, vector length, is a measure of how well the scale measures the specific combination of the two underlying axes at its corresponding angular location. These can range from 0 to 1.0. A length of more than .80 is very good, and above .90, it is exceptionally good. The mean vector length of .86 indicates that these scales are doing very well measuring what they were intended to measure.

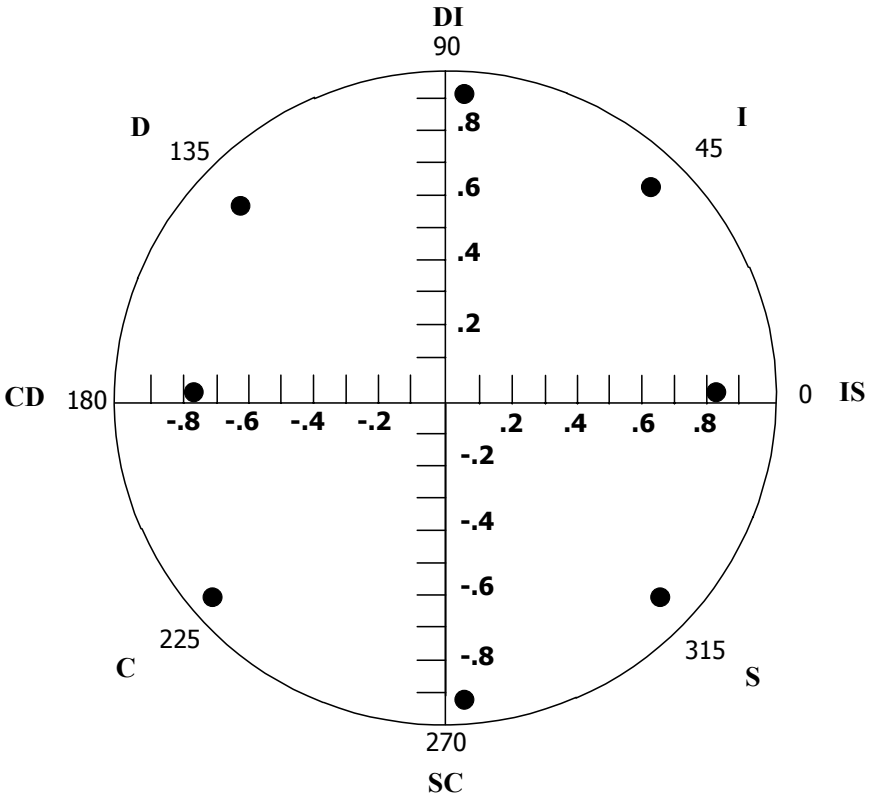
Table 8b. Characteristics of the DiSC Beta Scales: Angular Locations (after Kiesler et al., 1997)

Octant	Actual Angle	Predicted Angle	Deviation	Vector Length
D	137	135	2	.81
DI	85	90	-5	.90
I	48	45	3	.90
IS	1	0	1	.83
S	316	315	1	.85
SC	266	270	-4	.92
C	228	225	3	.92
CD	178	180	-2	.78

Mean displacement from theoretical location = 2.63
Mean vector length = .86

Another very important point to make about vector length is that it is most desirable to have all the vector lengths be approximately equal, so that all the blends around the circumference are being measured equally well. To get a better picture of this, the vector lengths and angular locations are shown on the Graph below. If you connected the dots, a near perfect circle would be drawn.

Figure 6. Circumplex Structure of *DiSC® Indra™* (N=811; Adapted from Wiggins, Trapnell, & Phillips, 1988)

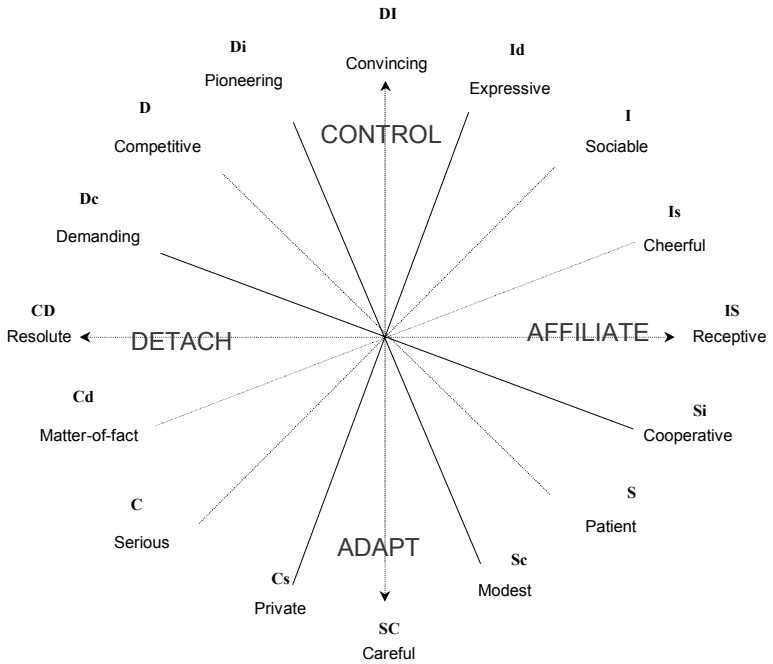


DiSC® Indra™ Patterns

The PPS has 15 Classical Profile Patterns. *DiSC® Indra™* also has its own set of Patterns, which have been defined differently from those of the PPS. The Classical Patterns represent Walter V. Clarke's original cluster analysis of the Self-D*i*scription data, and they represent the types that appeared most frequently in his samples. Thus, he derived them empirically (through the data) rather than theoretically (from the model). The patterns of *DiSC Indra* represent the opposite approach. They have been derived theoretically (from the model) rather than empirically (through the data). However, this does not mean that the patterns should be different. In fact, there is good reason to believe that it would be entirely possible to create a map that overlays the Classical Patterns on top of the *Indra* map, as demonstrated with the Alpha data. Larger samples will be needed to assess the precise angular ranges of *Indra* corresponding to the 15 PPS Classical Patterns.

The 16 *Indra* patterns arising from the model are defined by their angular locations. Like the Classical Patterns, the *Indra* patterns have been named for the concepts they represent. Figure 7 shows the pattern names and locations. In addition to the adjective descriptors, the corresponding DiSC combinations are shown. The upper and lowercase letters represent the relative mix of the two constructs. For example, Cd, the Matter-of-Fact Interpersonal Style, is a CD pattern characterized by more influence from the C domain than from the D domain. What should be very clear from this picture is the continuous nature of the DiSC model.

Figure 7. The Sixteen *DiSC® Indra™* Patterns



Finally, Table 9 shows the frequency of *DiSC® Indra™* patterns in the Beta sample. Notice how representative this sample is for the 16 patterns. This is not to be confused with population statistics.

Table 9. Frequencies of *DiSC® Indra™* patterns in the Beta Sample (N=811)

Pattern Number	DiSC Pattern	Description	Frequency (%)
1	D	Competitive	5.8
2	Di	Pioneering	5.7
3	DI	Convincing	6.7
4	Id	Expressive	9.0
5	I	Sociable	7.4
6	Is	Cheerful	7.0
7	IS	Receptive	6.4
8	Si	Cooperative	5.0
9	S	Patient	3.7
10	Sc	Modest	7.4
11	SC	Careful	5.2
12	Cs	Private	6.4
13	C	Serious	7.8
14	Cd	Matter-of-fact	7.2
15	CD	Resolute	4.9
16	Dc	Demanding	4.4

A Note about Gender Differences

Because certain interpersonal instruments show some gender differences in scores, the possibility of gender differences in *DiSC Indra* was explored. Gender differences were assessed, and they were found to be rather small (see Table 10). The decision was made not to norm the scales for men and women separately.

Table 10. Percent of Variance in the Beta Scales Due to Gender (N=811)

Scale	Percent of Variance Accounted for by Gender
D	0.7%
DI	0.0%
I	4.6%
IS	7.0%
S	1.8%
SC	0.7%
C	4.9%
CD	3.3%

Conclusion

This research report described the integration of the DiSC® Model with the concepts and methods of Interpersonal Psychology. The result of this integration is *DiSC Indra*™, a mathematically precise model that helps people to measure and explore the interpersonal dynamics of their relationships. *DiSC Indra* can be used in any setting where interpersonal effectiveness is key to the successful performance of individuals and teams.

Inscape conducted three phases of research involving a total of 30,826 subjects to develop and refine the *DiSC Indra* Model. In the process, over 200 articles and book chapters in the areas of interpersonal theory, personality, the five-factor model, and circumplexical models were consulted. It is only because of the scope of this research project that we can claim that *DiSC Indra* is the most sophisticated DiSC assessment available on the market today.

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