PRISM – Factor Structure and Internal Consistency

When using any psychometric instrument, it is essential to know that the tool you are using will always elicit consistent and reliable response even if questions were replaced with other similar questions. When you have a variable generated from such a set of questions that return a stable response, then your variable is said to be reliable.

In statistics and research, **internal consistency** is a measure based on the correlations between different items on the same test (or the same subscale on a larger test). It measures whether several items that propose to measure the same general construct produce similar scores.

Although *PRISM* is a neuroscience tool and not designed or marketed as a 'psychometric' instrument, it was tested as such by the University of Kent in the United Kingdom over a two-year period, 2006-2007. The project, led by Dr Tendayi Viki, a Chartered Psychologist and lecturer at the University, comprised three studies involving 276 university students and 298 employees, both management and non-management, from a wide variety of commercial organizations and public services. Over 20 per cent of the employee participants did not have English as their first language. A key part of that research was to examine correlations between behaviour preferences associated with brain functional structures, as defined by the *PRISM* Model of Human Behaviour, and personality traits as identified by traditional psychometric measurements.

Dr Viki's Report concludes:

The *PRISM* Model of Human Behaviour uses well established neuroscientific findings about brain structure and functions to represent the metaphorical interaction and relationships between the right hemisphere (Green and Blue) and left hemisphere (Gold and Red) of the brain, plus the front half of the brain - the frontal cortex (Gold and Green) and the rear half of the brain - the posterior cortex (Red and Blue). In addition, the Model takes into consideration the impact on behaviour of the brain's sub-cortical structures such as the limbic system – our emotional centre. To facilitate understanding, *PRISM* uses colours. The colours are Red, Blue, Green and Gold. Each colour is used to represent the intensity of one dimension of a person's preferred behavioural style in the work environment. According to the *PRISM* model, these preferences can be generally grouped into four broad categories. These are the categories that are represented by the four colours.

Red: Individuals with a preference for this mode of behaviour tend to follow a pre-established or pre-programmed order. They are controlling by nature, extremely effective at executing routine, sequential tasks, and most highly motivated to learn procedural applications, which have a clear and immediate use and are presented to them in an organised, step-by-step manner. The key characteristic of *Red* is that the individuals are driven *to control their environment and successfully complete tasks regardless of the circumstances*. In this regard, they are far less relationship focused in comparison to the other colour groups.

Blue: Individuals with a preference for this mode are adept at reading non-verbal communications. Sensitive to rhythms and subtle shifts in mood, shade or tone, they are highly attuned to what is going on with others and they put a premium on facilitating harmonious interactions. Not surprisingly, they

are unsurpassed at monitoring the emotional climate of an individual or group. Their thinking is real, rather than conceptual. Invariably, their interests are in the human rather than the technical aspects of any problem. Their fundamental goal is to create harmony, connectedness and good will in the community. The key characteristic of *Blue* is that the individuals are driven *to maintain good relations with others and among others within the work environment.*

Green: Individuals with a preference for this mode excel in the perception of possibilities, patterns and relationships that are not obviously visible. Novelty (especially, new ideas and concepts) are highly appealing to these individuals. Individuals who display a preference for this mode tend to be imaginative, metaphoric, visioning, creative, risk-taking and spatial. Their focus is on inventing and experimenting. Their underlying assumptions are that: the way things have been done in the past is probably not the best way; new ideas, whether in their own field or someone else's, can be a source of inspiration or insight. The key characteristic of *Green* is that the individuals are *highly innovative and creative, and also free-spirited and fun-loving.*

Gold: Individuals with a preference for this mode are adept, not only at linking ideas together by means of their logical connections, but also at separating entire systems into their component parts. They record information by key concepts, allowing for easier transfer and application from one area or field to another, and are most interested in general operational principles, which assist in the effective use of resources and facilitate technical problem solving and decision-making based on logic. Individuals who display this preference tend to be logical, mathematical or quantitative, analytical, diagnostic, structural and functional. Their focus is on solving problems and making decisions. The key characteristic of *Gold* is that the individuals are *highly logical, accurate and analytical.*

It is important to note that the *PRISM* model also breaks up each colour into two sub-categories. For Red the subcategories are Focusing (confrontational, impatient) and Delivering (hard-driving, single-minded). For Green the subcategories are Innovating (Creative, Imaginative) and Initiating (fun-loving, free-spirited). For Blue the subcategories are Supporting (patient, caring) and Coordinating (consultative, consensus-seeking). Finally, for Gold the subcategories are Evaluating (analytical, prudent) and Finishing (thorough, perfectionist).

The *PRISM* Scale

The *PRISM* scale was developed to assess individuals' work behavioural preferences in order see how high or low they score on the four colour categories. The scale is not a classification tool in the traditional sense. In other words, the tool is not used to classify individuals into only one colour category. The *PRISM* model recognises that individuals will have characteristics from all four colours to a greater or lesser extent. However, the goal of assessment is to examine which one of those colour groups is their most preferred behavioural mode. The main goal of the current research project was to establish the *PRISM* scale's psychometric characteristics. First, the goal was to identify words or items that could be useful in assessing each colour mode. Second, we wanted to use factor analyses to show that the items used in the *PRISM* scale could be classified into the four subscales identifiable as Green, Red, Gold and Blue. Finally, we wanted to examine whether the *PRISM* subscales were reliable and internally consistent. Developing a scale that has the four colour factors clearly identifiable and high in internal consistency is an important first step in the *PRISM* scale validation process.

Findings

Factor analysis was performed on the data using SPSS. This analysis was performed by requiring the programme to search for four factors using the Varimax rotation. After dropping low-loading and highly cross-loading items, this analysis produced the pattern of four factors that are consistent with the *PRISM* model. Factor loadings ranged from .39 to .81 across all four factors. These factors are clearly identifiable as Red, Green, Blue and Gold. The word items assessing each colour are also clearly related to each subscale providing some face validity for the theoretical underpinnings of the *PRISM* model. The factor-loadings above are quite good and the fact that the four predicted factors actually emerged from this data is fantastic as well.

We also ran reliability analyses using Cronbach's Alpha. This analysis produced results indicating very high levels of internal consistency for the subscales. For all the four-colour subscales the reliability scores were above .90. This is a very high level of internal consistency. We also analysed the data using the eight PRISM subscales (two per colour group), and these were also highly reliable with internal consistency scores above .80. Overall, these findings give us confidence about the internal consistency of the *PRISM* subscales and suggest that *PRISM* is a highly reliable measurement instrument (see Table 1 and Table 2 below).

Table 1: Internal Consistencies for the Four Colours

Factor	Cronbach's Alpha
Red	.942
Green	.925
Gold	.936
Blue	.925

Table 2: Internal Consistencies for the Eight Subscales

Factor	Cronbach's Alpha
Focusing	.926
Delivering	.896
Innovating	.918
Initiating	.862
Supporting	.887
Co-ordinating	.881
Evaluating	.860
Finishing	.912

Finally, we ran correlational analyses on the data. Although, there were some unexpected results (e.g. the negative relationship between Red and Gold, albeit this may the result of brain functional specialisation issues highlighted by the *PRISM* Model), the findings were generally consistent with the *PRISM* model. For example, Red and Blue were significantly negatively correlated as would be expected (r = -.42, p<.01). Green and Blue were positively correlated as expected in the *PRISM* model (r = .40, p<.01; see Table 3 below for full details). We also ran correlational analyses on the eight subscales. The findings of this analysis generally supported the *PRISM* model. The strongest correlations we obtained were between any two sub-scales that belonged to the same colour group.

These correlations were quite strong (all were .61 and above; see Table 4 below for full details).

Table 3: Correlations among the Four Colours

Correlations

		Green	Blue	Red	Gold
Green	Pearson Correlation	1	.404**	.040	.162*
	Sig. (2-tailed)		.000	.627	.049
	N	149	149	149	149
Blue	Pearson Correlation	.404**	1	-.416**	.435**
	Sig. (2-tailed)	.000		.000	.000
	N	149	149	149	149
Red	Pearson Correlation	.040	-.416**	1	-.241**
	Sig. (2-tailed)	.627	.000		.003
	N	149	149	149	149
Gold	Pearson Correlation	.162*	.435**	-.241**	1
	Sig. (2-tailed)	.049	.000	.003	
	N	149	149	149	149

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 4: Correlations among the Eight Subscales

Correlations

		Green Initiating	Green Inovating	BlueSupport	Blue Coordinate	RedFocusing	RedDelivering	Gold Evaluating	GoldFinishing
GreenInitiating	Pearson Correlatio	1	.623**	.371**	.427**	.438**	.341**	.211*	.018
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.010	.832
	N	148	148	148	148	148	148	148	148
GreenInovating	Pearson Correlatio	.623**	1	.311**	.481**	.418**	.561**	.388**	.287**
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.000	.000
	N	148	148	148	148	148	148	148	148
BlueSupport	Pearson Correlatio	.371**	.311**	1	.536**	-.090	.344**	.242**	.311**
	Sig. (2-tailed)	.000	.000		.000	.278	.000	.003	.000
	N	148	148	148	148	148	148	148	148
BlueCoordinate	Pearson Correlatio	.427**	.481**	.536**	1	.057	.403**	.235**	.209*
	Sig. (2-tailed)	.000	.000	.000		.490	.000	.004	.011
	N	148	148	148	148	148	148	148	148
RedFocusing	Pearson Correlatio	.438**	.418**	-.090	.057	1	.365**	.453**	.289**
	Sig. (2-tailed)	.000	.000	.278	.490		.000	.000	.000
	N	148	148	148	148	148	148	148	148
RedDelivering	Pearson Correlatio	.341**	.561**	.344**	.403**	.365**	1	.473**	.618**
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000	.000
	N	148	148	148	148	148	148	148	148
GoldEvaluating	Pearson Correlatio	.211*	.388**	.242**	.235**	.453**	.473**	1	.605**
	Sig. (2-tailed)	.010	.000	.003	.004	.000	.000		.000
	N	148	148	148	148	148	148	148	148
GoldFinishing	Pearson Correlatio	.018	.287**	.311**	.209*	.289**	.618**	.605**	1
	Sig. (2-tailed)	.832	.000	.000	.011	.000	.000	.000	
	N	148	148	148	148	148	148	148	148

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Correlations between *PRISM* scores and Emotional Intelligence elements

	Inn	Init	Sup	Co	Foc	Del	Fin	Eval
Self-awareness	-.04	.32 [3]	.11	.42 [3]	-.46 [3]	.07 [2]	-.30 [3]	-.06
Emotional resilience	-.19 [2]	.31 [3]	.17	.37 [3]	-.43 [3]	.22 [3]	-.32 [3]	-.06
Social-awareness	-.09	.12	.24 [3]	.13	-.22 [2]	.06	.01	.02
Self-motivation	-.16 [1]	.22 [3]	.05	.22 [3]	-.05	.13	-.13	-.09
Influence	-.07	.31 [3]	.07	.24 [3]	-.11	.05	-.32 [3]	-.29 [3]
Intuition	.07	.14	-.19 [1]	-.02	.06	-.14	-.30 [3]	-.29 [3]
Consistency	.-02	-.02	.06	.14	-.20 [2]	.18	.22 [2]	.19 [1]

[1] = significant at .05 level
[2] = significant at .01 level
[3] = significant at .001 level

Separate studies relating to Emotional Intelligence and the Self Awareness Analysis, which measures 'The Big Five', provide the following Alpha coefficient scores:

Elements	Alpha
Extraversion	.87
Agreeableness	.70
Conscientiousness	.75
Emotional Stability	.81
Openness to experience	.65

Elements	Alpha
Self-awareness	.71
Emotional resilience	.64
Social awareness	.77
Self motivation	.63
Influence	.62
Intuition	.58
Consistency	.60