

SmartAid relief-team staffing: Testing raters in KSAO dimension reduction

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This poster describes early steps in research programmes intended to infuse relevant industrial psychology principles into online and overseas volunteerism (Atkins & Foster-Thompson, 2009).

These so-called "SmartAid" principles are a subset of those associated with the new sub-discipline of Humanitarian Work Psychology (HWP), which is simultaneously the *work psychology* of humanitarian organisations and the *general psychology* of aid (e.g., poverty-relief, disaster-relief, and related / coincident phenomena, e.g., poverty-driven migrations). For further details of HWP, please see <http://www.humworkpsy.org>

SmartAid is focused on improving the selection of online and onsite aid workers for both disaster relief and poverty relief. SmartAid's premise is that volunteers fail when they lack cultural knowledge, technical expertise or are unable to cope with the stress or work overload in a foreign culture away from their normal support structures.

SmartAid is developing a system for online testing of potential volunteers by measuring aid-relevant Knowledge, Skills, Abilities and Other characteristics (KSAOs), attributes and personality based *team-role predispositions* - - e.g., being the resource-finder (or supply-scrouter) versus being the completer-finisher (or endgame) versus the creative-initiator (or idea-hammer), etc. SmartAid's online process will make team assignments more effective by taking into account the potentially unique contributions of each team member (...for staffing aid-teams with the most appropriate mix of individuals for a given project).

In this poster, we describe our efforts to develop online selection methods affordably for charities. An examination of the KSAO literature, but with particular consideration to the work of humanitarian volunteers being assigned to personality-diversified teams, led us to consider Raymark, Schmitt, & Guion's (1997) Personality-Focused Performance Requirements Form (PPRF), and Belbin's (1996) use of Cattell's 16 PF traits. SmartAid had to write additional items to augment the PPRF in order to fully encompass the 16PF traits applied by Belbin. SmartAid focused on PPRF work analysis given the lack of published evidence for Belbin's approach having a clear work analysis foundation.

Belbin team-role predispositions (see Table 1) can be estimated by various weighted sums of personality scores. Thus, those studying Belbin teams have produced methods & formulae for using personality test scores in assigning candidates to particular project teams, in some instances using weighted subsets of Cattell 16PF scores (...since Belbin had used Cattell's 16PF taxonomy in developing his model). But, work analysis data is a legal prerequisite to workplace personality testing - - thus our efforts here.

Table 1. Belbin team roles.

	Team role	Strengths	Allowable weaknesses
Action oriented roles	Shaper	<ul style="list-style-type: none"> Challenging, dynamic, thrives on pressure The drive and courage to overcome obstacles 	<ul style="list-style-type: none"> Prono to provocation Offends people's feelings
	Implementer (so-called 'worker')	<ul style="list-style-type: none"> Disciplined, reliable, conservative and efficient Turns ideas into practical actions 	<ul style="list-style-type: none"> Incremental in his/her thinking Does not respond to new possibilities
	Completer finisher	<ul style="list-style-type: none"> Patience, conscientious, anxious Searches out errors and omissions Delivers on time 	<ul style="list-style-type: none"> Inclined to worry unduly Reluctant to delegate
People oriented roles	Co-ordinator (Chairman)	<ul style="list-style-type: none"> Mature, confident, a good chairperson Clarifies goals, promotes decision-making, delegates well 	<ul style="list-style-type: none"> Can often be seen as manipulative Offloads personal work
	Teamworker	<ul style="list-style-type: none"> Co-operative, mild, perceptive and diplomatic Listens, judges, swears fiction 	<ul style="list-style-type: none"> Indecisive in crunch situations
	Resource investigator	<ul style="list-style-type: none"> Extrovert, enthusiastic, communicative Explores opportunities Develops contacts 	<ul style="list-style-type: none"> Over-optimistic Lower interest once initial enthusiasm has passed
Cerebral roles	Plant	<ul style="list-style-type: none"> Creative, imaginative, unorthodox Solves difficult problems 	<ul style="list-style-type: none"> Ignores incidents Too pre-occupied to communicate effectively
	Monitor evaluator	<ul style="list-style-type: none"> Sober, strategic and discerning Sees all options Judges accurately 	<ul style="list-style-type: none"> Lacks drive and ability to inspire others
	Specialist	<ul style="list-style-type: none"> Single-minded, self-starting, dedicated Provides in-depth knowledge and skills in rare supply 	<ul style="list-style-type: none"> Contributes only on a narrow front Deals on technicalities

To facilitate the above-mentioned Belbin-like considerations, we have expanded and adapted the Raymark, et al, PPRF to provide richer coverage of personality, hopefully adequate to address all Cattell 16PF dimensions relevant to Belbin team-roles.

METHODS

A panel of eleven graduate and senior undergraduate business psychology and human resource management (HRM) majors first rated our augmented set of 187 items in terms of relevance to the Cattell 16PF traits. They then repeated the process in rating the degree to which this relevance was unique to the *targeted trait* of the 16PF versus Cattell's other traits (...in other words, our panel simulated the dimension reduction logic of an oblique exploratory factor analysis - - akin to principal axis factoring via direct oblimin or PAF/do).

In other words, our eleven-rater panel produced two sets of inter-related ratings. Inter-rater agreement (IRAwg) was assessed separately for the two sets of ratings using James, Demaree, & Wolf's (1993) Method 1. For relevance ratings, IRAwg averaged at .58 (SD = .207). For the unique or "distinctive" relevance ratings, IRAwg averaged at only .44 (SD = .321). As these agreement indices were less than satisfactory, a second study had to be conducted to assess the degree to which this panel-simulated factor analysis would predict actual PAF/do outcomes.

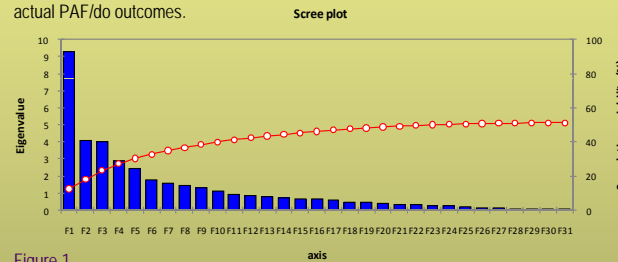


Figure 1.

Thus, the panel's data were used to select 60 key items for a subsequent factor analysis. For this subsequent exploratory factor analysis (via Principal Axis Factoring/direct oblimin or PAF/do), 175 psychology students were asked to identify one highly familiar occupation (that was not a typical student-related job) and rate the degree to which each of 60 personality-related competencies was crucial for success in that job.

RESULTS

Second sample size (N = 175) was sufficient to allow distinguishable pairs and triplets of 16PF factors to emerge in sequential EFA runs, with omnibus EFA predictably evincing the Big Five (Openness, Conscientiousness, Extraversion, Agreeableness, Neuroticism).

Pairs of example items from each of these subsets of the SmartAid-expanded PPRF

*-2 = A = Very Likely Harmful -1 = B = Maybe Harmful 0 = C = Not Relevant +1 = D = Helpful +2 = E = Essential
EFFECTIVE PERFORMANCE IN THIS VOCATION REQUIRES THE PERSON TO BE ABLE TO ...

- 61 think freely and liberally while experimenting with various ideas, approaches, or solutions **O**
- 46 suggest new products, product lines, or new types of services
- 63 work effectively and consistently, with little or no supervision **C**
- 64 complete work independently with successful or quality outcomes
- 28 interact with others in social situations where the person is representing the organization **E**
- 30 attract new clients or customers through friendly interactions
- 51 settle disputes among subordinates or co-workers through negotiations and compromise **A**
- 52 negotiate with people outside organization to settle conflict through agreement on organization's behalf **N**
- 55 hold self accountable for quality or performance deficiencies
- 56 be constantly self-critical before, during, and after making decisions

Direct oblimin rotations of the principal axis factors dramatically improved the Cronbach alpha "internal consistencies" for Big Five factors 2, 4 and 5 (these first being 0.62, 0.63, and 0.46 respectively, improving to 0.84, 0.73, and 0.84, while leaving other factors in excess of 0.8).

Scree plot and cumulative variance accounted for within the omnibus EFA shown in Figure 1 (...with larger decrements after dominant 5 factors). Example illustrate structure and typical items.

While the panel's relevance-rating task was very different than the larger sample's task of actually using PPRF-like items for a simulated work analysis, logical relations still evinced here. In particular, the panel's *unique-relevance* ratings correlated significantly with EFA pattern loadings (r = .323, p = .006) more so than with the traditional relevance ratings (r = .266, p = .021). The two types of panel ratings shared over half of the observed ratings variance (r-square = 58 percent).

	Structure Matrix				
	1	2	3	4	5
q+47	.965				
q+45	.726				
q+61	.583				
q+46	.498				
q+63		.772			
q+64		.752			
q+65		.602			
q+57			.684		
q+56			.670		
q+55			.598		
q+30				-.816	
q+31				-.594	
q+28				-.585	
q+29				-.581	
q+48					-.732
q+50					-.666
q+51					-.617
q+49					-.585

Extraction Method: Principal Axis Factoring.
Rotation Method: Oblimin with Kaiser Normalization.

The panel's correlations with the EFA pattern loadings appear to have outperformed all but one rater (e.g., median rater correlation for distinctive relevance ratings to EFA loads = .097, mean = .115, inter-quartile range = .233-.035 compared to above-mentioned panel performance at r = .323 (see Figure 2), 95 percent confidence interval for difference = -.302 < d < -.114, t = -4.9, p < .001).

Conveniently optimizing the predictive power of the panel's ratings (...deleting the worst 3 of 11 raters then using a prediction surface with both relevance and distinctiveness ratings and their interaction), multiple R = .48, F = 5.5, and each of the three regression weights (two mains and their suppressor interaction) decidedly achieve p < .05.

CONCLUSIONS: While our previously reported inter-rater agreements for this panel (Atkins, 2009) were similarly lack-luster-to-moderate, the correlations just mentioned may be sufficient to justify further examination of this more affordable route for initial deployment of SmartAid work analysis questionnaires. The SmartAid research agenda advances now towards fuller coverage of KSAO domains relevant to aid work, and parallel development of volunteer-assessments matched to SmartAid work analysis instrumentation. Once deployed online, numbers of SmartAid volunteers will (near-to-mid-term) be sufficient for psychometric analyses to proceed along conventional standards of rigor (e.g., adjustments to subscales can be achieved empirically vice sole reliance on expert panels).

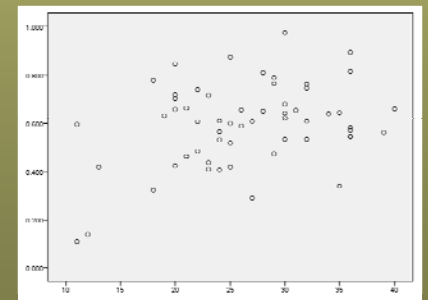


Figure 2. Panel's total "Unique Relevance" ratings

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- Atkins, S. (2006). Worker vocational fit from the perspective of personality-focused job analysis. In R. J. Harvey (Chair), *Making ivory tower job analysis useful in the real world*. Symposium at Society of Industrial/Organisational Psychologists, Dallas, Texas; Belbin, R. M. (1996). Team roles and a self-perception inventory, chapter in Bilsberry, J. Ed). *The effective manager: Perspectives and Illustrations*. Thousand Oaks: Sage, pp. 182-189.
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