

THE IMPORTANCE OF FACTORS IN Q METHODOLOGY:  
 STATISTICAL AND THEORETICAL CONSIDERATIONS

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Underlying conventional applications of factor analysis, in both R and Q studies, is the implicit (and frequently explicit) assumption that factor size, measured statistically, is equivalent to substantive or theoretical importance. As illustrated hypothetically in this table, variables

Variables	Factors	
	X	Y
1	.9	.0
2	.8	.1
3	.7	.1
4	.1	.7
5	.0	.6
EV	1.95	0.87
%TV	39.0	17.4

1-3 define factor X and 4-5 define Y. (In Q-technique studies, the variables are Q sorts; in R, variables are scales, traits, or items.) The eigenvalue (EV) is often taken as a measure of factor strength, or importance, and is calculated by summing the squared factor loadings: For factor X,  $EV = .9^2 + .8^2 + \dots = 1.95$ . An equivalent measure is the percent of total variance accounted for (%TV), which is calculated by dividing EV by the number of variables--for factor X,  $\%TV = 1.95/5 = 39$ . As conventionally employed, these figures carry the implication that X is more important than Y inasmuch as it accounts for a greater percent

of the variability among the traits or Q sorts.<sup>1</sup>

Despite widespread use, this procedure is of limited importance in R method; its vacuity for Q methodology is even more apparent and is demonstrable both in situations (1) in which Q sorts for several persons are factored, and (2) in which a single person provides several Q sorts under multiple conditions of instruction. Fundamental to both is the proposition that *the significance of Q factors is not defined objectively (i.e., statistically), but theoretically in terms of the social-psychological situation to which the emergent factors are functionally related.*

THE MULTI-SUBJECT CASE  
(or, "One Q Over the Cuckoo's Nest")

In a study<sup>2</sup> of decisionmaking among team-members of a psychiatric ward, a 50-item Q sample was administered to the 13-member team composed of psychologists, nurses, aides, and the ward physician, the latter being the team leader. The resulting four-factor solution, displayed in Table 1, shows the mental health specialists in agreement (factor A) and the nurses divided into factions (factors A, B, C); the ward physician defines his own factor (D), hence maintains a point of view distinct from the views of the other members of the team over whom he presides. From a purely statistical standpoint, factor D is least important (%TV = 7.5) especially when compared to the more numerous factor A (%TV = 27.2); in fact, D would not even have been extracted according to the rule that all factors must have

(1) Eigenvalue size is also often used to determine the number of factors to be extracted: Typically, only those with EV = 1.00 are acceptable. Hence, Y is insufficiently strong and would not be extracted. This practice is also suspect.

(2) Co-directed by Dr. Michael Rohrbaugh, Department of Psychiatry, Albany Medical College of Union University, Albany, New York.

eigenvalues in excess of unity. Yet from a political standpoint, factor D is the most important since it represents the view of the ultimate policymaker, the ward physician, whose decisions were final in spite of the size of his opposition.

TABLE 1  
Structure of Decisionmaking

Team Members	Factor Loadings <sup>a</sup>			
	A	B	C	D
psychologist	X			
psychologist	X			
nurse	X			
psychologist	X			
social worker	X			
nurse assistant		X		
nurse		X		
nurse		X		
nurse aide		X		
nurse		X		
nurse assistant			X	
nurse assistant			X	
physician				X
Eigenvalues	3.53	2.09	1.48	0.97
% Total Var	27.2	16.1	11.4	7.5

<sup>a</sup> X designates significant loadings.

The major conflict in the ward team was between the psychologists and the physician (with the nurses caught in the middle), and the flavor of the atmosphere can be gained through an examination of some of the statements which distinguished the contending parties (factor scores for A and D respectively):

The doctor, nurse, psychologist, and social worker should share equally in team decisionmaking. +5 0

All team members should be involved in +3 -3

various forms of individual and group psychotherapy.

A good mental health atmosphere cannot be maintained unless there is order on the ward. -3 +5

Certain information about patients should not be shared with nonprofessionals in nursing and PM & R [physical medicine and rehabilitation]. 0 +4

The physician's view generally emphasized secrecy, control, and hierarchy, whereas the therapeutic counterelite advanced themes of equality and participation. Examination of factors B and C indicated that the team leader's authority was also bolstered informally--i.e., whatever factor D lacked in statistical strength and sheer numerosity was more than compensated by formal authority, covert moral support, and lack of cohesion in the opposition.<sup>3</sup> Needless to say, the therapeutic environment was not optimal.

#### THE SINGLE CASE

The significance of factors in the single case is illustrated in McKeown's (1975) intensive study of Kari-Aaron, a deeply disturbed 21-year-old woman (named Kari) who often experiences a psychological metamorphosis into a male (named Aaron), especially when homosexual attractions for other women are aroused, e.g., when she expresses her desire to seduce her female therapist. The youngest of four

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(3) It is frequently assumed that orthogonal factors are independent of one another in a behavioral sense as well, but behaviors which are statistically uncorrelated may nevertheless be functionally related, as when one person's cruelty stimulates another person's benevolence. Q factors represent separate classes of behavior, but it does not follow that they are noninteractional.

children, Kari was the first girl born into her family for several generations; her father wanted another boy, especially after the death of one son, and even now refers to her as 'my number three son.' She developed masculine interests (woodworking, electrical wiring) and a tough exterior ('Only sissies cry,' she says); her only girlfriend abandoned her following a homosexual overture. She has a history of self-inflicted wounds, and was briefly hospitalized after a suicide threat. Her mother has been generally accepting of her with qualifications, whereas her father is rejecting, yet it is with the father primarily that she desires a warm relationship.

Using the 70-item Adjective Q-set for Nonprofessional Sorters (Block, 1961), Kari described 35 images and object relationships of self and others, the factor structure for 14 of which is shown in Table 2. *Factor A* represents Kari's ideal self and her positive transference to her therapist, as well as her conception of the kind of person she thinks her parents would like her to be; the items characterizing this factor include considerate, friendly, and likeable. The benefit of becoming Aaron is that Kari can, to some extent, approximate her own ideal. *Factor B* represents Kari's self, which is characterized by items such as timid, confused, unworthy, and anxious; the factor also represents her feelings when she is beset by fear, guilt, and depression. *Factor C* is Kari's angry self (assertive, frank, hostile), and encompasses her negative transference onto a disliked psychiatrist. It is noteworthy that this intrusive image is partly descriptive of Aaron, and it is only as Aaron that Kari can be assertive. (It is also to be noted that Aaron is a derivative of Karron, the name Kari's parents use when she misbehaves.)

*Factors D and E* are defined, respectively, solely by Kari's perceptions of her father and mother's perceptions of her. D and E are therefore of least importance from a statistical standpoint, yet from Kari's standpoint they are crucial and, in combina-

TABLE 2  
Kari's Self-Other Relationships

Conditions of Instruction	Factor Loadings <sup>a</sup>				
	A	B	C	D	E
ideal self	X				
therapist (female)	X				
father's ideal for me	X				
mother's ideal for me	X				
Aaron	X		X		
Aaron perceives me	-X	X			
self		X			
fearful self		X			
guilty self		X			
depressed self		X			
psychiatrist (male)			X		
angry self			X		
father perceives me				X	
mother perceives me					X
Eigenvalues	13.18	4.89	2.60	1.06	0.74
% Total Var	37.7	14.0	7.4	3.0	2.1

<sup>a</sup> X designates significant loadings.

tion with factor A (Kari's idealizations), render factors B and C necessary.<sup>4</sup> Factors D and E are the parameters of Kari's double-bind which give rise to her anger (factor C) and depression (B). Her parents wish her to be like factor A (friendly, likeable), but her mother perceives her in actuality like E (an imaginative and intelligent bohemian rather than a warm daughter), whereas her father perceives her like D (sarcastic, tactless, stubborn). Rather than serving as a healthy aspiration, therefore, Kari's ideal self (factor A) is a constant reminder of her unworthiness and failure to measure up to parental expectations. This leads to guilt and depres-

(4) The same factor interaction therefore applies in the single case as in the multi-subject case (see footnote 3).

sion (B). It also generates anger (C) which, denied direct outlet, can only be expressed through Aaron.

### CONCLUSION

The statistical strength of factors, in R as well as Q, is a function of sampling considerations--i.e., of the selection of persons or conditions of instruction in Q, and of the selection of traits or tests in R. In both cases, sampling is theoretical rather than systematic, and the magnitude of eigenvalues is therefore epiphenomenal. In the multi-subject case above (Table 1), had only one or two psychologists been sampled, factor A would have been statistically weaker. In the single-case study (Table 2), factor A was statistically strong only for the arbitrary reason that the investigator happened to instruct Kari to describe a larger number of idealized images. (Likewise in R method: Whereas respondents may be randomly sampled, the traits measured are not; eigenvalues associated with R factors therefore say less about reality than about the scientist's proclivity for selecting some classes of variates rather than others.)

The real importance of Q factors is functionally related to the social-psychological context, and their theoretical importance is related to the laws of behavior as summarized by Stephenson (1974)--e.g., that some factors are self-referred and some are not (*James' Law*), that self-referred factors are homologous with lived experience (*Parloff's Law*), that changes in interactional respects must be in relation to existing factors (*Perlin's Law*), that personality emerges and manifests itself in terms of multiple me-you dynamisms (*Sullivan's Law*), and so forth. As Stephenson (1953: 29) earlier said, "The importance of Q-technique lies more in these psychological applications than in any of the statistical devices it employs or represents; and it would mean little or nothing if it were divorced from the methodological and psychological matters...in terms of which it gathers its meaning."

It is common practice to report that a factor or set of factors accounts for X percent of the total variance, but this is more habitual than informative. It is of course sometimes necessary to toss a statistical bone to the mastiffs which guard the professional journals, but until the nature of factors and their functional connections are described and understood *in situ*, there is little likelihood that a science of behavior will be noticeably advanced.

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*It is sufficient to show...that we can penetrate into matters with single individuals as our subjects and that, indeed, their study under conditions of gross averaging or the like for the sake of reaching statistical significance is entirely unnecessary and essentially foreign to, and destructive of, any sound scientific methodology. (W. Stephenson, The Study of Behavior, p.232)*