A three-mode factor analysis of the concept of novelty[1]

ALAN L. BERNSTEIN and FRANK W. WICKER,[2] Tufts
University, Medford, Mass. 02155

*Although psychologists have dealt with the concept of
novelty in divergent ways, suggesting that the concept might
be multidimensional, a factor analysis of Ss' ratings of 18
descriptive scales resulted in only one significant factor for
each of three modes of data variation. Thirty college students
were asked to rate five congruous and five incongruous animal
slides on a series of 18 adjective scales. A Tucker three-mode
factor analysis of the data was performed with adjectives,
slides, and Ss as the variables. In general, the results favored a
unidimensional concept of novelty and failed to indicate a
systematic basis for individual differences.*

Within the last two decades psychologists have become
interested in the construct of novelty and its implications for
both human and animal behavior. Alternative explanations
(e.g., Glanzer, 1958; Berlyne, 1960; Dember, 1960; Fiske &
Maddi, 1961) have been proposed to explain the empirical
data. Since these alternative explanations seem to deal with
the data in divergent ways using different types of constructs
(e.g., arousal, satiation, and expectancy), it can be questioned
whether novelty is best conceptualized as a uni- or
multidimensional variable. This question arises from a lack of
clarity as to whether alternative theorists are using different
terminology to describe essentially the same phenomenon or
whether they are describing different aspects of a multidimen-
sional phenomenon.

It is the purpose of the present study to test the
dimensionality of the concept of novelty and to determine the
importance of individual differences in Ss' judgments about
this concept.

MATERIALS
Projection slides of five congruous (realistic) and five
incongruous (novel or nonrealistic) animals were constructed
(see Fig. 1). The slides were projected from an automatic slide
projector onto a daylight screen. Eighteen 10-point adjective
scales which seemed to possess both theoretical and descriptive
appropriateness for defining the concept of novelty were used
to rate each slide (see the left hand column of Table 1).

PROCEDURE
Booklets of 10 separate response sheets, each containing the
18 scales, were handed out to Ss who were seated at several
long tables in a semidarkened room. Ss performed in groups of
three to seven and all were read a standard set of instructions
which asked them to rate each slide in terms of each of the
adjective scales listed on a page, placing a check mark in the
interval which they felt best described each of the stimuli.

The slides were shown one at a time in the same order for
all Ss. A given slide remained exposed until all Ss had
completed their rating of it.

The ratings for each adjective scale were scored from −4.5
to +4.5 and a three-mode factor analysis (Tucker, 1964) of the
data was performed, using a slightly modified version of a
program written by Walsh (1964). This analysis makes it
possible to infer the number of factors of "novelty" involved
in the adjective scale mode of data variation, the number of
factors involved in the stimulus slide mode, and the factorial
structure of the between-Ss variability. The method also
produces a three-dimensional "core" matrix which indicates
the relationship among the three types of factors obtained.

SUBJECTS
Thirty college students from an introductory psychology
course at Tufts University served as Ss. All had served in a

Table 1
Factor Loadings for the Adjective Pairs

Adjective Scales	Factor	
	A	B
phoney - authentic	−56.146	−11.048
simple - complex	27.878	−28.068
real - unreal	58.510	13.045
congruous - incongruous	60.094	− 1.856
silly - not silly	−46.331	−11.865
expected - surprising	39.638	− 1.897
normal - abnormal	62.183	2.305
novel - ordinary	−58.669	6.610
serious - funny	31.854	9.616
exciting - dull	−16.663	36.587
familiar - strange	61.565	− 5.687
imaginary - existing	−58.843	− 6.163
colorful - colorless	− 8.338	45.556
believable - make believe	60.984	1.049
typical - non typical	60.817	− .511
meaningless - meaningful	−19.632	−32.016
arousing - non arousing	−14.647	40.863
usual - unusual	60.803	− 2.561

verbal learning experiment just prior to taking part in the
present study.

RESULTS AND DISCUSSION
Table 1 gives the loadings on the first two factors for
adjective pairs. Although a plot of successive latent roots
seemed to indicate two distinct adjective factors accounting
for 68.3% (Factor A) and 12.2% of the variance (Factor B),
the mean rating on each adjective scale and its respective
loading on Factor B were correlated .85. This indicates that
Factor B was really a means factor which resulted from
applying principal components procedures to a matrix of
cross-products rather than to a matrix of correlations.
Loadings on this factor reflect the ratings of the "average"
stimulus. Factor A seemed to be a general congruity or
familiarity factor on which most of the scales had substantial
loadings.

Table 2 is a list of the factor loadings for the slides. The
proportion of variance accounted for by the two factors was
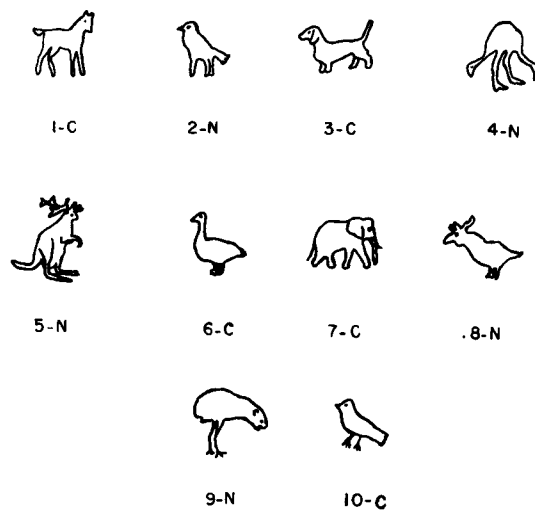

Fig. 1. The congruous (c) and the incongruous (n) stimulus material
used in the experiment. The numbers refer to the order of presentation.

Table 2
Factor Loadings for the Slides

Slide Number	Factor	
	A	B
1 (c)[a]	−42.715	42.724
2 (n)[b]	62.185	31.766
3 (c)	−40.480	37.511
4 (n)	75.830	20.066
5 (n)	76.101	22.861
6 (c)	−55.697	32.407
7 (c)	−57.045	26.368
8 (n)	79.649	22.056
9 (n)	75.997	23.008
10 (c)	−62.421	34.184

[a] *congruous animal*
[b] *incongruous animal*

Table 3
Core Matrix for Subject Factor A

		Slides	
		Factor A	Factor B
Adjectives	Factor A	19,428,385	94,037
	Factor B	− 217,161	5,311,498

66.5% and 14.7%, respectively. The first factor could clearly be characterized as a congruity-incongruity dimension whereas the second factor again seemed to be a means factor. Thus, for stimuli and slides, novelty seems to be a unidimensional variable.

The results of the factor analysis also seemed to indicate that only one factor should be retained for Ss. The first factor accounted for 67% of the variance, while successive orthogonal axes each accounted for less than 5%. Loadings on the first factor seemed to correspond to the mean judgments for an individual; hence, individual differences did not seem to reflect any large systematic deviation from the modal point of view.

The core matrix (Table 3) indicated that there was a very simple relationship between adjective and slide factors. The novelty factor for adjectives was highly related to the novelty factor for slides and the means factor for adjectives corresponded to the means factor for slides.

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Group E and Group C. In examining the recall protocols it was noted that not one S in Group E included the clustered recall of the last critical pair among the first four items recalled.

There were six two-member categories defined by the random pairing used for Group E. Category recall was defined by the appearance of at least one member of the category during recall. The mean category recall for Group E was 4.85 and for Group C, 5.60. The difference between groups was significant [F(1,38) = 13.92, p < .01].

Group C surpassed Group E in the number of words recalled. The mean recall for Group C was 11.55, compared to a mean recall of 10.40 for Group E. The difference between these means did not reach an acceptable level of statistical significance [F(1,38) = 3.31]. The clustering advantage demonstrated in Group E was not accompanied by a similar advantage in correct recall.

There were very few outside-list intrusions or repetitions of list words during recall. The combined means of such responses per S were .35 for Group E and .45 for Group C.

The present results demonstrated that input contiguity provided a sufficient basis for clustering during free recall. Similar results have been obtained by Greenhouse (1967), who found that temporal grouping of three and four unrelated words led to clustering of these words during recall. However, Greenhouse also reported advantages in number of words recalled following temporal grouping during presentation, a result which did not obtain in the present experiment.

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