A multidimensional scaling evaluation of alternative models in personality impression formation[1]

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This experiment was designed to evaluate simple arithmetic models of personality impression formation by utilizing a representative method of stimulus presentation and a rigorous scaling technique—multidimensional successive intervals. The Ss judged the similarity between their impressions of pairs of hypothetical stimulus people described by trait adjectives. Four well-defined, stable dimensions emerged, against which predictions from Simple Adding and Averaging models were evaluated. Results indicated that more sophisticated models are required when the judgment task becomes more complex.

Generality of previous findings supporting arithmetic models of impression formation may be limited by unrepresentative stimulus and response conditions. One of these possibilities was examined in a recent study which demonstrated support for an arithmetic model under a wide array of stimulus parameters (Partington, 1967). To date, however, effects of response conditions have received little attention. The majority of investigators have asked Ss to indicate their impressions of hypothetical people by means of absolute judgments along predetermined response dimensions. Conclusions from such procedures are limited by the validity of a number of assumptions, including the following: E has provided relevant response dimensions; Ss understand what is implied by the given dimensions; and Ss are able to form and express their impressions through absolute judgments along such dimensions. Although the first two assumptions are unanswered empirical questions, there is reason to doubt the third assumption. For example, evidence from studies of concept formation indicates that it is more characteristic to note resemblances among concepts than to note features that identify a single concept (cf. Deese, 1967).

Some way of determining experimentally how Ss form impressions of others is needed. Particularly useful would be a method which closely approximates typical cognitive activity in impression formation and yet provides precise data against which alternative quantitative models might be fitted. The paired-comparisons design for multidimensional successive intervals scaling (Messick, 1956) was used in this study for several reasons. It orients Ss to make discrimination judgments while not binding them to a priori response dimensions. Furthermore, it allows for the objective determination of common dimensions of perceived similarity underlying judgments. Finally, and most important for evaluating models, it reveals a relative ordering of stimuli on the obtained dimensions.

Method

Forty male undergraduates performed the judgment task in small groups. To create a realistic set, a tape recorded interview was presented before each session. For illustrative purposes, Ss were shown traits chosen by "experts" to describe the interviewee. The Ss were instructed that these experts had identified characteristic traits of each of the hypothetical people, which were presented to Ss. The Ss were then required to form impressions of pairs of hypothetical people and rate their similarity on a 9-point scale. Stimuli represented all possible pairings (n (n-1) /2) of 20 hypothetical people developed in a former study (Partington, 1967). They included four different personality subgroups (Dominant, Affiliative, Orderly, and Endurant) each of which comprised five quantitatively varied stimuli as follows: One "high (H+)" stimulus person described by six adjectives characteristic of one pole of a personality dimension, another "high (H-)" person described by six adjectives characteristic of the opposite pole of the same dimension, one "medium (M+)" person described by three adjectives from one of these poles, and two "mixed (Mx+- and Mx-+)" stimulus people described with bivalent information. For each of these more complex people, three adjectives represented one pole of the dimension, and three the other. These two people differed in terms of the order in which the adjectives were presented in their descriptions.

Results and Discussion

The largest four dimensions from the multidimensional scaling of Ss' similarity ratings were retained for Varimax rotation after inspection of the distribution of latent roots. Table 1 shows projections of the hypothetical people on these four rotated dimensions. These represent scale values in terms of the ways in which the stimuli were perceived as similar or different. The characteristic of perceived similarity underlying each dimension may be inferred from the personality content of the hypothetical people with the largest absolute projections. Thus, the four dimensions reflect Dominance, Affiliation, Orderliness, and (less clearly) Endurance, respectively. They are considered stable since coefficients of congruence between the first four matched dimensions yielded by independent analyses of random halves of the total sample were .90, .99, .82, and .95.

Table 1. Projections of Hypothetical People on Each of Four Rotated Dimensions.

	Stimuli	Dimensions 1	2	3	4
Dominant	H^+	2.3	–0.2	0.4	0.4
	M^+	1.7	–0.3	0.5	0.7
	Mx^{+-}	0.3	0.1	–0.1	0.0
	Mx^{-+}	–0.3	–0.1	–0.3	0.0
	H^-	–2.2	0.1	0.1	–0.3
Affiliative	H^+	0.0	1.8	–0.1	–0.1
	M^+	–0.1	1.9	–0.1	–0.2
	Mx^{+-}	–0.1	0.4	–0.5	0.0
	Mx^{-+}	–0.1	–0.6	–0.2	–0.2
	H^-	–0.3	–2.1	–0.2	1.4
Orderly	H^+	0.6	0.3	2.4	0.1
	M^+	0.5	0.3	1.7	1.5
	Mx^{+-}	0.2	–0.3	0.0	0.3
	Mx^{-+}	–0.5	0.0	–0.4	0.0
	H^-	–0.9	–0.4	–2.9	–0.2
Endurant	H^-	–1.9	–0.5	–0.9	–0.8
	M^-	–0.2	–0.1	0.1	–2.3
	Mx^{-+}	–0.2	–0.4	–0.1	–0.2
	Mx^{+-}	0.1	–0.2	–0.2	0.2
	H^+	1.2	0.0	0.7	–0.1

To evaluate simple arithmetic models of impression formation in light of these results it is necessary to compare the rank ordering of similarity predicted by such models against the obtained ordering of hypothetical people for each personality subgroup along the dimension most relevant to their personality content. Both Simple Averaging and Adding predict extreme positive projections for H+ and extreme negative projections for H-. They would both predict neutral (zero) projections for Mx+- and Mx-+ stimuli. However, Averaging predicts equal projections for H+ and M+ while Adding predicts more extreme projections for H+ than for M+.

After a careful evaluation of predictions made by these alternative models in comparison with observed data, it is concluded that no simple arithmetic model provides a satisfactory approximation to the data. For example, neither Averaging nor Adding predict the primacy effects suggested by signs of projections for the Mx+- and Mx-+ stimuli on all four dimensions. Further, although an Adding strategy is suggested by the order of H+ and M+ stimuli on Dimensions 1 and 3, Averaging appears closer to results on Dimension 2, while the order of projections on Dimension 4 is embarrassing to both models.

These findings pose an interesting paradox since a previous study using the same basic set of stimuli and comparable Ss firmly supported Simple Averaging (Partington, 1967). The most plausible explanation for these differences is that the judgment-analytical procedures were not comparable. The former study involved analysis of variance of absolute numerical judgments along response dimensions determined by E. The present study involved multidimensional scaling of judgments of similarity between stimulus pairs. It is likely that the present procedure enabled Ss to make finer differentiations, since stimuli were presented in pairs, and also to express greater response variability, since they were allowed to decide for themselves whichever dimensions of similarity seemed most appropriate for each rating.

These findings and interpretations suggest a possible inverse relationship between the fit of simple arithmetic models and the representativeness of judgment tasks. When Ss' responses are arbitrarily channelled, arithmetic models appear to approximate modal responses of a group. However, when Ss are allowed more cognitive freedom, simple models appear to be less useful. This suggests that a number of quantified "dynamic" or interactional models may be required to understand the complex behavior of impression formation. It also implies that each be evaluated under widely varying conditions of stimulus presentation and response modes.

References

DEESE, J. Meaning and change of meaning. *Amer. Psychologist*, 1967, 22, 641-651.

MESSICK, S. J. Some recent theoretical developments in multidimensional scaling. *Psychometrika*, 1956, 21, 1-15.

PARTINGTON, J. T. Generality of the simple averaging model in personality impression formation. *Psychon. Sci.*, 1967, 8, 339-340.

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