Isolation and perceptual organization in incidental learning

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When isolated by contrasting color and size, the middle syllable in a 9-item list was recalled more often in both intentional (INT) and incidental learning (INC). An isolation effect in INC also occurred at position 2, when items 2, 5 and 9 were isolated. None was found when items 4, 5, and 6 were isolated, but only in the latter condition did many Ss accurately perceive (describe) the objective list-structure. Those who did (in both INT and INC) subsequently recalled fewer syllables than Ss who had not grouped according to the objective visual structure. This was also the case for recall of isolated items only. Findings support an isolation effect in INC, but are not consistent with a Gestalt interpretation that isolation effects are contingent upon perception of structure or sub-structure engendered by visual isolation.

Though the von Restorff or isolation effect apparently can occur in incidental learning (INC) (Koyanagi, as cited in Wallace, 1965), several studies nevertheless failed to find superior INC recall of embedded items (e.g., Gleitman & Gillett, 1958; Postman & Phillips, 1954). Postman & Phillips (1954) interpreted the absence of an isolation effect in INC as opposed to the Gestalt principle of perceptual organization. However, Köhler (1958) disagreed with their interpretation of Gestalt theory as automatically predicting perceptual organization in INC. Rather, he cited organization as a psychological (or neural) fact, which mere distinction from neighboring items would not necessarily guarantee. For example, Ss shown Siegel's (1943) list of syllables and numbers, i.e., SSNSSSSNSNSNNNSNS, were said to describe what they saw as "one irregular sequence of items of two kinds" (Köhler, 1958, p. 314). But where Ss were instructed to learn (e.g., Postman & Phillips, 1954; Siegel, 1943), Köhler reasoned that objective structural changes such as SSNSSS might have been attended to, thus introducing the necessary sub-organization that produced superior recall of the embedded items.

If accurate perception of objective structure were necessary for sub-organization that then facilitates recall, Ss who perceive stimulus structure accurately should show superior recall to Ss who do not perceive the structure (or ignore it). The present study tested this prediction in both INC and intentional learning (INT) of nonsense syllables arranged in various sequences of color and size of type.

Method

The Ss were obtained from introductory psychology classes. One hundred and sixty (20 per cell) were assigned randomly to INT or INC conditions of learning and one of three differently structured lists or a

control. The lists contained the same order of nine syllables of 100% association value from Glaze's lists (Hilgard, 1941). The control list was typed in black caps; the other lists in black caps and small, red letters as follows: BBBBrBBBB, BrBBBrBBBr and BBBrrrBBB.

Syllables were presented on a Lafayette memory drum at a 4-sec. exposure duration. There were two exposures of the list, with a 1-1/2 min. intertrial interval. All Ss were told they would be shown the list one time, then asked to write a concise description that would "give someone reading it a clear picture of what you saw." No more than 1 min. was allowed for the description. For one-half of the Ss in each list-structure group, instructions for Trial 2 were to take a look at the list a second time, to see how accurate their description had been (INC). For the remaining half of the Ss instructions were to try to learn as many of the syllables as possible on Trial 2 (INT). At the end of Trial 2 all Ss were given 1 min. to write all the syllables they could remember. INC Ss were then questioned and were replaced if their answers indicated any prior knowledge or attempt to learn the syllables. Ss were also replaced if their list description involved reproduction of the syllables.

List descriptions were independently rated by the author and two Es. An S's description was rated "G" if there was accurate grouping according to objective list structure (color and size of type sequences). A description was rated "No G" if stimuli were not grouped according to objective list structure. Data were included for analysis only on Ss for whom at least two out of three raters agreed on "G" or "No G" ratings.

Results and Discussion

A 4 by 2 (list-structure by type of learning) analysis of variance in the number of items recalled indicated significantly greater recall in INT than in INC (6.4 vs. 4.8, $F=35.0$). Recall did not differ between list-structures. Isolation effects in INT and INC were assessed by comparing the proportion of Ss recalling the isolated item (red, lower case) with the proportion of control group Ss who recalled the corresponding item. In INT the proportions differed significantly only for the single item isolated in the middle of the list. (All 20 Ss recalled it correctly when isolated; 14 did when it was not.) The same isolation effect was just significant in INC (17 vs. 10). In addition an INC isolation effect occurred at position 2 in the BrBBBrBBBr list (16 vs. 8). The latter findings affirm an isolation effect in INC, as well as INT.

Surprisingly few Ss referred to color or size of type in their description of the list of syllables. Most of those

Table 1. Mean Syllables Recalled After Two List Exposures

Perception of List	Learning condition		Perception Means**
	INT (N)	INC (N)	
Accurate Grouping	5.9 (9)	3.6 (8)	4.8
No Grouping	6.7 (6)	6.1 (8)	6.4
Learning Means*	6.2	4.9	

* difference beyond .05 level of significance.

** difference beyond .01 level of significance.

who did were surprisingly inaccurate. In fact, of the 40 Ss shown each list there were only eight G Ss in BBBBrBBB, five in BrBBBrBBBr and 17 in BBBrrrBBB. Finding so few G Ss in stimulus conditions that produced isolation effects (BBBBrBBB and BrBBBrBBBr) in and of itself argues against any contingency between isolation effects and perception of structure. But only the BBBrrrBBB list produced a sufficient number of G Ss to warrant direct analysis of INT and INC recall as a function of G (> five Ss per cell). The mean number of syllables recalled in INT and INC by G and No G Ss, and the N on which each mean was based, are shown in Table 1. An analysis of variance, corrected for disproportionality (Snedecor, 1956), revealed significant effects due to learning (INT or INC) and perception (G or No G) ($F=6.51$ and $F=8.21$, respectively; $df=1/27$). The interaction effect was not statistically significant ($F=2.13$). The G Ss recalled fewer items than No G Ss. This also was the case when recall of isolated syllables only (those at positions 4, 5, and 6) were considered, i.e., a larger percent of No G Ss recalled each isolated item than G Ss did. This was especially pronounced in

INC, where 50% more No G than G Ss recalled the isolated item in each of the three positions.

Poorer recall by Ss who did not perceive the list according to objective visual structure than by Ss who did is opposite to expectation from Gestalt theory. Contrary to expectation, too, is the paucious number of Ss perceiving objective visual structure accurately, even when the same visual structure produced an isolation effect. Thus, present findings affirm the effect of isolation in incidental, as well as intentional learning. They oppose, however, Köhler's interpretation of such effects as contingent upon perception of structure or substructure engendered by visual isolation, per se. Instead, attention to structure may detract from the amount of attention to, and thus the learning of content.

References

- Gleitman, H., & Gillett, E. The effect of intention upon learning. *J. gen. Psychol.*, 1957, 57, 137-149.
- Hilgard, E. R. Methods of procedures in the study of learning. In S. S. Stevens (Eds.), *Handbook of experimental psychology*. New York: Wiley, 1951.
- Köhler, W. Perceptual organization and learning. *Amer. J. Psychol.*, 1958, 71, 311-315.
- Postman, L., & Phillips, Laura W. Studies in incidental learning: I. The effects of crowding and isolation. *J. exp. Psychol.*, 1954, 48, 48-56.
- Siegel, P. S. Structure effects within a memory series. *J. exp. Psychol.*, 1943, 33, 311-316.
- Snedecor, G. W. *Statistical methods*. (5th ed.). Ames: Iowa State College Press, 1956. Pp. 379-382.
- Wallace, W. P. Review of the historical, empirical, and theoretical status of the von Restorff phenomenon. *Psychol. Bull.*, 1965, 63, 410-424.