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ABSTRACT

After tachistoscopic exposure of a row of letters, recall functions show bowing and skewedness similar to the standard serial position curve that results from sequential presentation of elements. A similar curve is generated by recall of binary elements presented briefly and simultaneously. Prior investigators have interpreted this effect as an internal, post-exposure, sequential processing of the pattern from left to right as determined by reading habits. In this experiment, 48 children (16 from each of grades 2, 4, and 6) who read Hebrew as well as English were shown patterns of Hebrew letters, of English letters, and of binary elements. Recall of Hebrew letters showed right primacy. Recall of English letters showed left primacy. The report of binary patterns presented after language patterns showed a persistence of the directional sets established by the preceding language. When English and Hebrew patterns were mixed, the expected directionality was produced for each language, but recall of binary patterns after mixed language patterns showed neither left nor right primacy. The perceptual serial position phenomenon was shown to be a temporary perceptual set. References and figures are included. (Author/DE)

PERCEPTUAL SET AND LANGUAGE DIRECTIONALITY

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Abstract

After tachistoscopic exposure of a row of letters, recall functions show bowing and skewedness similar to the standard serial position curve that results from sequential presentation of elements. A similar curve is generated by recall of binary elements presented briefly and simultaneously. Prior investigators have interpreted this effect as an internal, post-exposure, sequential processing of the pattern from left to right as determined by reading habits. In this experiment, 48 children who read Hebrew as well as English were shown patterns of Hebrew letters, of English letters, and of binary elements. Recall of Hebrew letters showed right primacy. Recall of English letters showed left primacy. Report of binary patterns presented after language patterns showed a persistence of the directional sets established by the preceding language. When English and Hebrew patterns were mixed, the expected directionality was produced for each language, but recall of binary patterns after mixed language patterns showed neither left nor right primacy. The perceptual serial position phenomenon was shown to be a temporary perceptual set.

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It has become increasingly apparent that brief exposures of horizontal linear arrays are scanned sequentially during the time between presentation and recall (Glanzer, 1966; Harcum, 1967). The report of subjects (Ss) after brief and simultaneous presentation of elements in a row is surprisingly similar to the report of Ss recalling sequentially presented elements. In both situations the error curve is highest at a point just past the middle, lowest at the left and next lowest at the right end of a row or sequence. When recall is required after a single presentation of an array, too brief to permit eye-movement during exposure, the effect has been called the perceptual serial position phenomenon (PSP) by Glanzer (1966).

Several kinds of evidence support the sequential scanning hypothesis. In addition to the general similarity of the recall curves, it has been demonstrated that isolation effects directly analogous to those resulting from serial learning can be produced with tachistoscopic presentation (Harcum, 1965). Furthermore, the results are directly contrary to what would be expected from a consideration of the greater acuity of the central region of the retina (Mishkin and Forgays, 1952), and the error distribution is not a function of the width of pattern but of the number of elements in the array (Crovitz and Schiffman, 1965; Harcum and Skrzypek, 1965).

The internal scan hypothesis is entirely congruent with the growing acceptance of a sequential-storage model for instantaneous visual perception. Particularly convincing results were reported by Mewhort, Merikle, and Bryden (1969) who presented an array of English letters for 40 msec. followed by masking of the left or the right visual hemifield. Accuracy was more seriously affected by masking on the left, but as the delay between presentation and masking was increased the difference between left and right masking was reduced. Their interpretation was in terms of

transfer from iconic storage to short-term store (see Neisser, 1967), and depends implicitly on the habits of reading English from left to right.

Additional evidence that PSP is a function of reading habits was produced by Anderson (1946) who found that perception of Hebrew letters resulted in right primacy whereas perception of English letters resulted in left primacy. Using non-language, directionally-neutral binary arrays, Harcum and Friedman (1963) showed that Israeli Ss perceived from right to left. Apparently the effect of language directionality on perceptual primacy is a reliable phenomenon. This experiment was performed to determine the relative influences on PSP of development in reading ability and of temporarily induced perceptual sets.

Method

Subjects

The Vancouver Talmud-Torah School conducts regular English classes in the morning and Hebrew classes in the afternoon. All pupils in the school read both languages. Data reported here were produced by 48 Ss provided by the school; 16 from each of grades II, IV, and VI.

Materials and Apparatus

Three kinds of materials were required; Hebrew patterns, English patterns, and binary patterns. Each of the language patterns was a randomly generated array of consonants from one of the languages, or a direct transliteration of that array in the other language. No letter was repeated in any pattern and no two patterns had the same initial letter. For each language there were ten patterns, making two blocks of five. A S who had one block in the first language saw the other block in the second language. Each of fifteen binary patterns was an array of seven zeros with the elements either blackened or empty in a random sequence.

Patterns were typed on 2" X 2" slides in upper case type, and projected through a tachistoscopic shutter set at 1/5 sec. duration. The S was seated in a student desk facing a screen at a distance of about two feet. The patterns appeared eight

inches wide on a white screen with a black background

Procedures

Treatment combinations were randomly ordered within grade levels, and Ss were assigned to conditions as they were sent from classes. As each S appeared he was given the appropriate response sheet and asked to write on the back side, his name the date, and the time of day. The time this took was considered sufficient orientation to the situation and the reduced illumination. The overhead light was turned off leaving only the stray light from the projector. Further directions were given relative to the particular treatment, and in the time required for these instructions adaptation was adequate to enable S to mark the response sheet. The first slide was then shown, and the S was asked to demonstrate that he recognized it as the same as the first pattern or row on the answer sheet. This was the same for all conditions and even the second graders were able to understand the instructions.

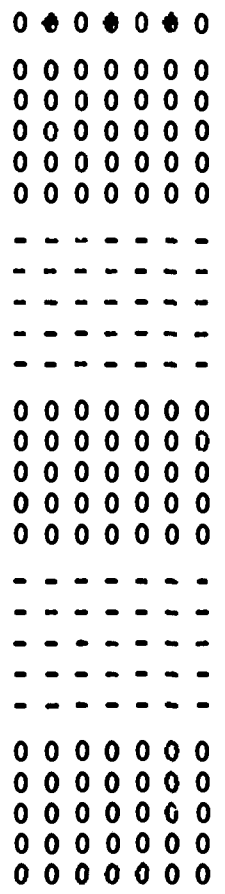

Fig. 1 Response sheet for blocked treatments

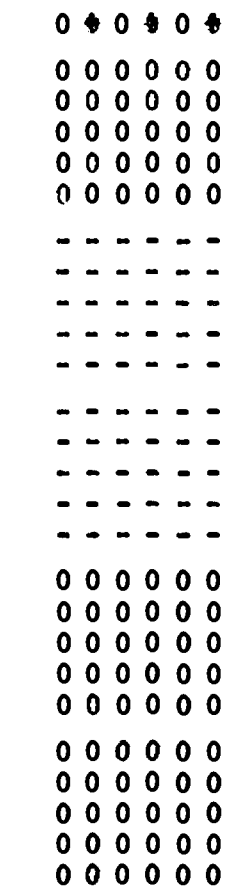

Fig. 2 Response sheet for alternated treatments

Two response sheets were required, one for the "blocked" or experimental treatments and another for the "alternated" or control treatments. The sheets are shown in Figures 1 and 2. On each of these sheets the first pattern is a practice pattern used to determine that S understands the instructions. Following the practice pattern are 25 patterns of seven elements each. The zeros were to be filled or empty matching the projected binary patterns. The spaces were to underline the alphabetic characters of the projected language patterns. In the blocked condition, five arrays in one language were shown consecutively. In the alternated condition, the same arrays were shown but with Hebrew and English arrays alternated. The independent variables were: grade level II, IV, or VI; patterns blocked or alternated; and Hebrew first (HE) or English first (EH).

Results and Discussion

Scores analyzed first were the numbers of correct responses at each serial position summed over blocks of five patterns for the blocked-language treatments. There were no effects of language order and no differences by grade level. Scores were better for binary patterns than for alphabetic patterns, $p < .01$. Positions were differentially difficult, $p < .01$. Of the two-way interactions, only that between blocks and positions was statistically significant, $p < .01$. There was also an interaction of blocks X position X language order, $p < .01$. Because the results of principal interest are the serial-position effects for groups with different language orders, these were analyzed for each block separately.

Figure 3 shows no serial position effects for either group prior to presentation of the alphabetic materials. The same lack of effect was found in the first

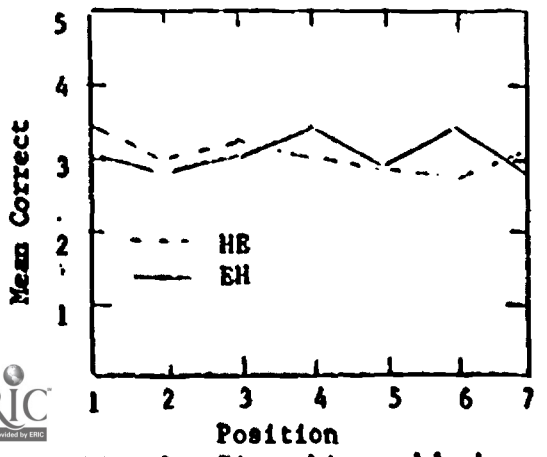

Fig. 3. First binary block

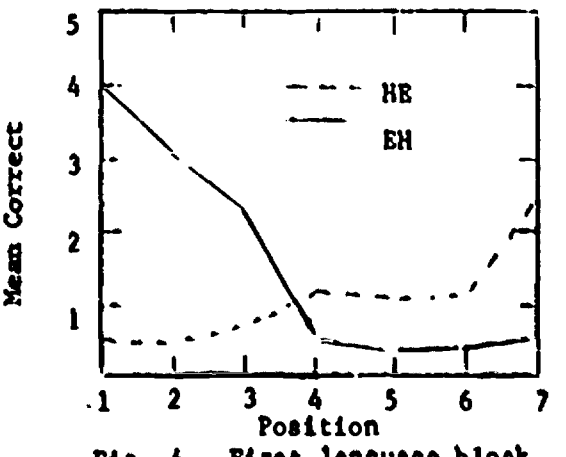

Fig. 4. First language block

block of binary patterns for the Ss who had the alternated language patterns. This lack of effect due to position is contrary to the results commonly reported, and is probably a consequence of the Ss being familiar with both Hebrew and English. In Figure 4 the typical serial position effect appears with strong left primacy for the EH condition and the usual bowed serial position curve for the HE condition. Figure 8 also shows the influence of language on the shape of the curve, with primacy effects stronger for English than for Hebrew patterns. These treatment X language interactions and also the superiority of English recall over Hebrew recall are convincing differences, $p < .01$.

Perhaps the most important result is seen in Figure 5 in which the treatment X position interaction indicates that Ss perceive binary patterns differently as a consequence of the difference in language experienced in the prior block, $p < .05$. This is of special interest because there was not a corresponding difference between these groups on the first group of binaries, and because the binary patterns themselves are neutral with respect to direction.

Figure 6 shows a language difference in serial position curves as was found in the second block, but here in the fourth block it is reduced. Also in Figure 8 the language effect is less than that of Figure 4. Both of these attenuations of the effect of language on primacy are interpreted here as the result of proaction from the changing languages within the experiment.

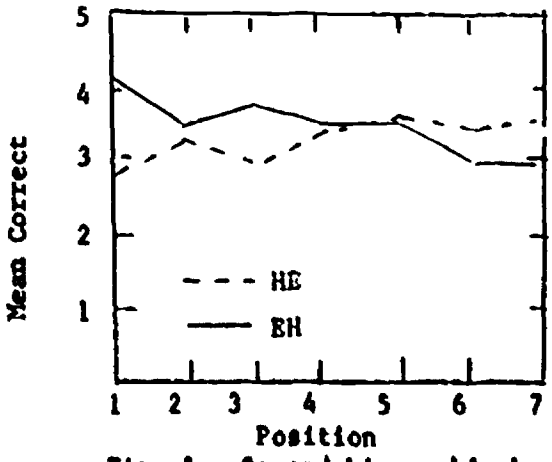

Fig. 5. Second binary block

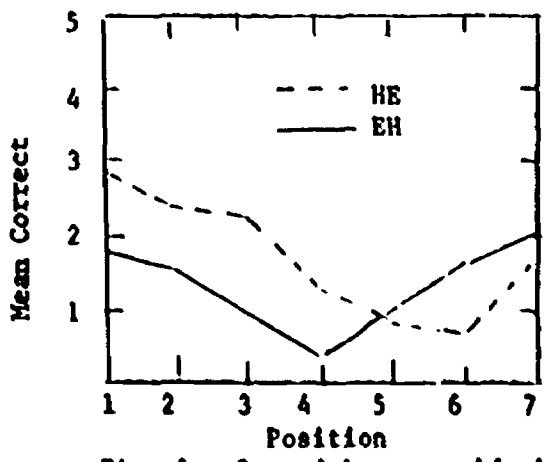

Fig. 6. Second language block

Finally, in the last blocks of binary patterns, shown in Figure 7, there is no demonstrable serial position effect. Again, the most parsimonious explanation is that both languages have been experienced in close temporal succession and the effects are mutually interfering.

One of the purposes of the experiment was to determine the effect of increased reading ability. Surprisingly there were no differences in mean correct responses according to grade level. Certainly there was a difference in their ability to read, but time scores were not kept and it is probable that the younger and slower Ss gave themselves more time to recall and record their responses and to prepare for the next exposure. The age variable should be examined with closer controls of time durations.

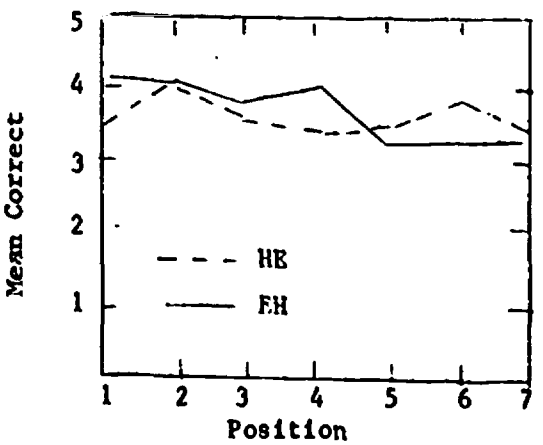

Fig. 7. Third binary block

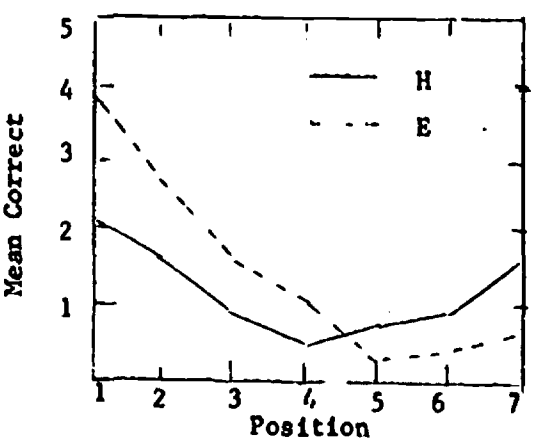

Fig. 8. Language patterns alternated

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