

and the use of cubical units having square units as their faces, and hence they establish numerical relations between entities of different dimensions. In fact, the ancient Babylonians used certain equations whose terms represent different dimensions. The developments of number and form are thus seen to have partly united long before the work of R. Descartes and others during the seventeenth century. The deep study of mathematical history tends to exhibit a much more gradual development of our subject than is commonly exhibited in the brief accounts which usually emphasize unduly the work of a few outstanding individuals.

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### ILLUSIONS IN PRINTED MATTER

THERE may be "nothing new under the sun" but only something new to the writer of this note. For that reason he is recording an observed phenomenon to discover whether others have also experienced it, perhaps long, long ago.

If typewritten copy is produced with the original form on thin or "onion-skin" paper and the carbon copy on similar paper, thus usually making the second copy blacker than the first and if this copy is "single spaced," preferably, but not necessarily, with no paragraph separations, or better yet, without paragraphing, the materials are supplied for an interesting perception. The top sheet should be rotated over the lower sheet to the left or to the right to the extent of an angle no greater than about  $20^\circ$ , but without displacement in any other manner. An angular rotation of  $5^\circ$  appears to be optimal under the conditions tested.

The blank spaces between words, and to some extent the dark blocks made by the words, will form ten or twelve concentric circles like ripples on the surface of a pond into which a pebble has been cast. In the present psychobiological state of the writer, these rings did not seem to move, but the center or focus of the rings can be made to move in a direction at right angles to the line of displacement of the top sheet.

While the phenomenon appears to be illusory, because the printed words and spaces are obviously of different lengths, the circles seem to be by measurement about one centimeter in increment of radius from center to periphery. The other illusory feature is, of course, the completion of the circumferences in the perception of the concentric circles: only intermittent cues from the spaces between the words are physically furnished or, putting it obversely, many printed words obstruct or interrupt the smooth course of the spaces.

It also remains to be explained why a slight shift of about  $5^\circ$  around an axis should produce fairly com-

plete circles, or at least partial circles, if the axis lies close to any one of the margins on the paper.

This brings to mind several other illusions observed in printed matter. Years ago a matter was referred to the writer concerning the bad alignment of a printed "letter-head" containing at the beginning of the address a number of 4's, thus

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A complaint had been registered with the printer regarding the improper assembly of the second line with respect to the first and third lines, so that the line in question seemed to be tilted downward at the left end. It was easy to show that the effect was due to the diagonal direction of the left portions of the three 4's, well known to psychologists as the Zöllner illusion and related also to the figures of Hering and Wundt. If the 4's had been printed in the type face which includes the script form, this difficulty would have been obviated.

A similar effect is noticed in those typewriters that include a triangular bracket to the right of the writing point into which a pencil is to be inserted for drawing horizontal lines on the paper moved by the carriage when released from one side to the other. Often the line, which has been typed half-way across the paper, appears to be dropping gradually to the right. The slanting side of the triangle is responsible in a similar way to the above for the distortion of the line away from its parallel relationship to the other lines.

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### CATALOGUE OF NORTH AMERICAN EARLY TERTIARY FOSSILS OF THE GULF AND ATLANTIC COASTAL PLAIN

THIS catalogue is prepared in a manner similar to the "Catalogue of North American Devonian Fossils" published by the Wagner Free Institute of Science in Philadelphia.

The Early Tertiary catalogue will contain descriptions and illustrations of the fossil invertebrates from the Paleocene, Eocene and Oligocene of the Atlantic and Gulf Coastal Plain of the United States. Each species will be described and illustrated on a card of heavy paper  $8\frac{1}{2}$  by 11 inches in size, fitting a letter file. The text of the cards will be printed; the figures will be printed by full-tone collotype process. Type specimens will be figured if available; if not, photographs of topotypes will be used wherever feasible. Photographs of topotypes will be used extensively as supplementary illustrations. Original descriptions will be quoted in every case. Additional remarks or complete redescriptions will be given where necessary.