

# Preparation of ambiguous stimulus materials

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The problem of ensuring that ambiguous figures are equally probable in the appearance of each of their two alternative and mutually exclusive aspects is discussed. Failure to consider this problem raises difficulties for interpretation of the results of experiments in which such figures are used. A method of preparing and evaluating the extent to which ambiguous figures are equivocal according to acceptable criteria is described and illustrated. This yields a new ambiguous figure, each alternative aspect of which becomes apparent with approximately the same frequency.

Certain difficulties are encountered when using ambiguous figures in experimental studies of perception and in related investigations. Principal among these is that of ensuring that the probability of appearance of each alternative and mutually exclusive aspect of the particular spatial pattern employed is the same. Should this condition not be achieved and if figures prove to be unequivocal, in the sense that the two aspects embodied within them become apparent with different frequencies, difficulties are raised in submission of the emergent-data to numerical analysis and in generalizing from them.

Both Leeper (1935) and Botwinick (1961) appreciated this problem. When considering the Boring (1930) "wife and mother-in-law" figure for use in his experimental studies, Leeper observed the aspect of the figure which depicts the face of the younger female, or "wife," to be dominant since it appeared to Ss upon 65 percent of occasions, the "mother-in-law" appearing on 35 percent. Accordingly, he prepared three "gypsy and rabbit" figures, one of which he considered to be truly ambiguous. Similarly, Botwinick prepared three versions of a "husband and father-in-law" figure closely resembling the "wife and mother-in-law." In one of these the "father-in-law" aspect was emphasized, the "husband" in the second, while neither was emphasized in the third. In an experimental study of this latter figure, 24 members of a sample of 51 Ss reported seeing the "husband" upon initial exposure and 27 the "father-in-law." Hence, Botwinick concluded that this figure was one equally probable in the appearance of each of its two aspects.

In the course of devising a large number of sets of ambiguous figures for use in experimental studies of figure-ground fluctuations, solution of the problem of preparing equally probable figures has been found a somewhat less simple matter than is implied in previous investigations. A number of pilot studies conducted with sets of three, five, and seven figures failed to reveal materials which were equivocal ac-

ording to acceptable statistical criteria. In view of this a technique has been standardized in which, having devised a spatial pattern which will reverse readily in aspect, 20 further drawings are made. In 10 of these drawings one aspect is emphasized increasingly, the other aspect being emphasized similarly in the remaining 10. In this way 21 drawings are made of each figure. Preliminary consideration by sophisticated Ss is allowed to determine: (1) a central member of each set of drawings in which both aspects are apparently equal in dominance, and (2) 14 further figures, seven on either side of the figure first selected, arranged in such a way that the incremental difference between each adjacent pair appears to be approximately the same. It may be noted that, even with this number of figures available, disagreement frequently arises as to which figures should be included in the final selection, and this necessitates the introduction of further modifications. Having obtained sets of 15 figures using this procedure, they are shown to individual Ss or to groups of Ss in random order, this order being changed for each individual or group studied. In each case an appropriate form of instructions is given.

A set of figures showing alternatively a "Man" or a "Girl" is illustrated in Fig. 1. These figures were prepared according to the procedure described above. An experiment conducted with 50 individual Ss, to each of whom these figures were presented in a different random order, yielded the results shown in Table 1. The figures entered in each cell of the table refer to the number of responses indicating the "Man" or the "Girl" to be seen upon initial exposure of each figure. The mean of a sampling distribution of 50 independent, equally probable, and mutually exclusive events is 25, its standard deviation reaching a value of 3.5. To the figure numbered 8 in this series of drawings, 28 responses indicating the "Man" to be seen were given, and 22 indicating the "Girl." Each of these values represents points 0.86 standard deviations from the mean of the relevant sampling distribution. On the appropriate null hypothesis, the probability of occur-

Table 1

The number of occasions upon which either the "Man" or the "Girl" were seen in the set of ambiguous figures	
Aspect	1 2 3 4 5 6 7 8* 9 10 11 12 13 14 15
"Man"	50 50 50 49 46 41 33 28 20 19 7 6 4 3 2
"Girl"	0 0 0 1 4 9 17 22 30 31 43 44 46 47 48

\*Figure Number 8 may be considered equi-probable in the appearance of the "Man" and "Girl" aspects.

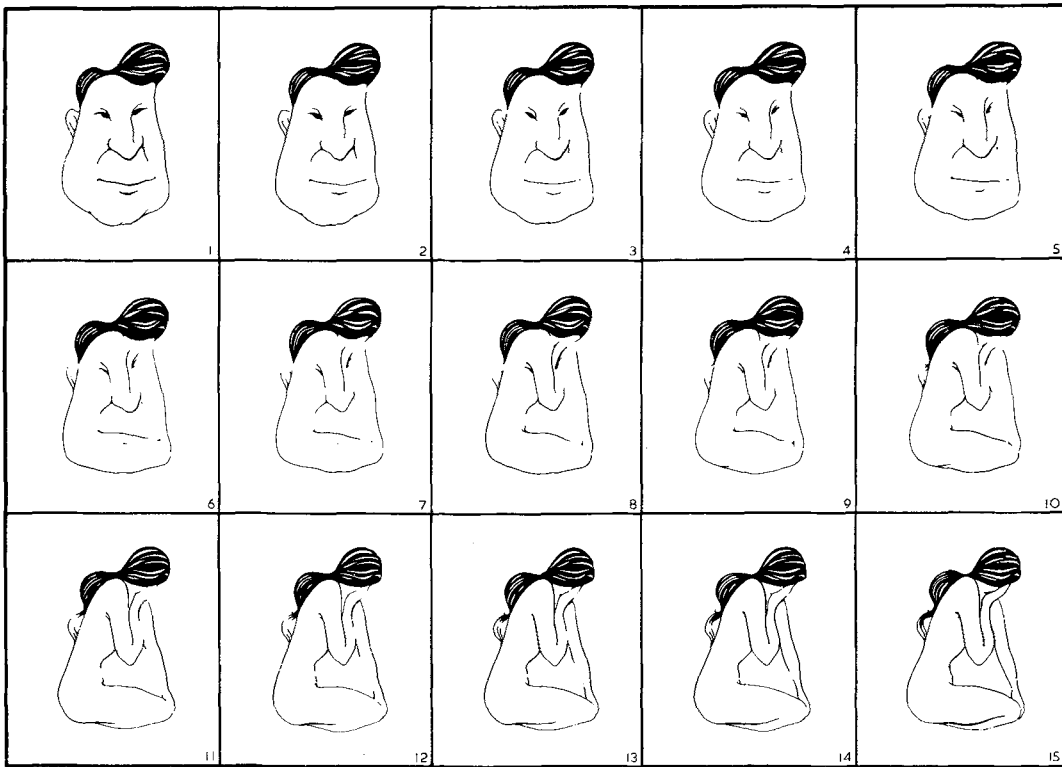


Fig. 1. The "Man" and "Girl" set of ambiguous figures.

rence of these values exceeds 0.25. Accordingly, it is reasonable to accept that the probability of appearance of either aspect of this figure is approximately the same.

**References**

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