*A TECHNIQUE FOR AUTOMATIC, RECYCLED,
SERIAL PRESENTATION OF UP TO 80
UNIQUE VISUAL STIMULI¹*

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Various methods have been used to provide displays for presentation of visual pattern stimuli to subjects in an operant conditioning program. In general, these methods have been limited in the total number of different stimuli that can be presented and in the ease of programming. A newly available commercial 35 mm slide projector is used to obviate these difficulties. The projector used is a 35 mm Kodak "Carousel" (about \$120) which has an 80-slide circular magazine, plus a "zero" position and a manual magazine advance switch. The image is back-projected onto a ground glass pecking key mounted in a pigeon station.

A pulse duration of 50 msec is used to advance the slide magazine. The maximum speed at which slides can be presented is 1 per sec.

The cost of slide preparation is completely dependent on the type of stimulus material used. At one extreme, highly precise, photographically processed materials can be used costing from 10 to 50 cents per slide. On the other extreme, patterns or figures can be hand drawn on any thin semi-rigid transparent material and fixed on standard cardboard mounts for a fraction of a cent per slide.

The basis of the programming equipment is a stepper which actuates two timers; one for operation of a food hopper, and the other to close contacts which automatically advance the projector magazine one position. Several contact arrangements are available on the timer. The one providing a closed condition during the time-out period was used. The timer was used to control contact closure time for operating the projector in order to make this time entirely independent of response duration.

As a result of the different number of stepper contacts and slide positions on the projector, the slides were programmed in four series of 20, each series being identical as to

location of slides requiring positive responses and those requiring no responses. The stepper is reset, then, after the 20th, 40th, and 60th magazine position. The problem is somewhat different for the 80th position. In addition to resetting the stepper it is necessary to advance the projector magazine one step to bypass its zero position. This is accomplished by a micro-switch mounted on the projector and actuated by the magazine when it advances from the 80th position to the zero position. The normally-open contacts of this switch parallel the manual advance switch in the same manner as the timer contacts, and, upon closing, automatically advance the magazine to the number one position. The entire sequence is repeated.

The 20-slide series is the maximum number that can be used with this projector and stepper. However, with two or more steppers cascaded, or a stepper with more positions, it is possible to use a 40-slide series or an 80-slide series. It is also possible to use less than 20 with one stepper provided the number used is a sub-multiple of 80.

In this application, programming was such that a correct response activated the food hopper and advanced the projector magazine. An incorrect response resulted in a 3-sec tone plus an additional delay of 3 sec before the projector magazine advanced. All responses had to be made within 3 sec from onset of the stimulus. If this did not occur, the projector magazine advanced.

The technique described is presently being used to study the development of concept formation in the pigeon using visual patterns. We are particularly interested in determining the invariant stimulus property in relatively high order concepts such as "cloudness" and "man-made".

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