NOTES

A behavioral seal: An apparatus alternative to behavioral observation of thumbsucking

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An apparatus alternative to the behavioral observation of thumbsucking is offered which eliminates many of the problems inherent in the latter. A description of construction and procedural use is provided, in addition to specific research and intervention possibilities that allow for more reliable and efficient data collection and treatment of thumbsucking.

The ubiquity of thumbsucking as a social and possibly physical (malocclusion) problem has received ample documentation (Traisman & Traisman, 1958; Roberts & Baird, Note 1). Fortunately, a variety of behavioral intervention techniques have been successful in eliminating the habit (Baer, 1962; Knight & McKenzie, 1974; Ross, 1975; Skiba, Pettigrew, & Alden, 1971). The primary method for assessment of thumbsucking has been behavioral observation, which has certain disadvantages. Attaining reliability may require considerable time and effort. In addition to being time consuming, *in vivo* observation tends to be frustrating, since it may be necessary to make observations at night while the subject is asleep when the probability of thumbsucking is high (Ross, 1975). Moreover, if the observer is not punctual in observing at each interval, the data is characterized by omissions. Such problems are more likely to occur with untrained observers with other things to do (e.g., parents at home). Lindsley and Lindsley (Note 2) recognized these problems and developed a "behavioral seal" (i.e., a sock fastened to the child's pajama sleeve with a basting stitch) to augment observations of thumbsucking.

We have developed an alternative that eliminates many of the difficulties of behavioral observation and improves upon Lindsley and Lindsley's "behavioral seal." The seal described here can be easily constructed from two readily available materials: litmus paper (nitrazine; phenolphthalein paper, E.R. Squibb & Sons, Inc.¹) and adhesive tape. Essentially, small squares of adhesive tape (e.g., 6 mm) are marked off on a strip of tape to be cut as needed. The squares are adapted and measured to the size of the subject's thumbnail. A hole (2 mm; indicated by solid circle in Figure 1) should be punched in the center of each square. Then, a slightly larger circle of litmus (3 mm; indicated by the dotted circle in Figure 1) can be placed on the tape covering the hole such that, when the seal is fixed to

the subject's thumb, the litmus lies between nail and tape. In operation, the litmus, which shows through the hole in the tape, differentially reacts to a variety of substances, allowing an observer to discriminate whether or not thumbsucking has occurred. For example, the litmus becomes gray² (pH = 6.0-6.5) when contacted by water in this city, blue (pH = 7.0-7.5) when contacted by saliva (as during the sucking response) of the pilot subject, brownish yellow (pH = 5.0-5.5) when contacted by grease and food during eating, and yellow (pH = 4.8) when contacted by the subject's urine. If subjected to a long period of sucking, as during nighttime observation, the litmus becomes white.

In order to insure accurate discriminability in individual cases, the pH balance of the subject's saliva, as well as other substances likely to contact the seal during data collection (e.g., water), should be assessed. This is done by affixing seals to respective digits on opposite hands and then exposing them to the various substances. After the seal is contacted by other substances (i.e., water, grease, urine), it still reacts differentially to saliva. The color-pH guide included with the litmus paper aids considerably in the discrimination process. Pilot work indicated reliable determination of the presence or absence of thumbsucking based on the differential reactivity of the seal.

With regard to accuracy, behavioral observation ignores the varying probability that the target response occurs during the interval between successive observations. However, by using the seal, one may merely check the seal at the designated intervals for discriminating signs of thumbsucking. The seal is thus more efficient

Figure 1. Behavioral seal in position on thumbnail.

than behavioral observation to the extent that one may use longer data intervals knowing that interim behavior will be detected. The seal also obviates the possibility that cues provided by the observer might allow the subject to refrain from responding while being observed. On the other hand, one must consider the possible reactive influences of the seal itself. Pilot observations suggest that, initially, the seal facilitates the child's awareness of his thumb entering his mouth; in this case it acts as a reminder not to thumbsuck. But, the diminution of the sucking response is temporary, with a quick return to baseline frequency. It appears that reinforcing physical sensations derived from thumb-sucking are neither abated nor enhanced by the presence of the seal.

The seal may not be ideal for research in which the sucking response is at a high frequency (as during initial baseline), and short observational intervals are selected. This situation calls for changing the seal almost as often as the response occurs. Although accuracy is improved, excessive changing of the seal is impractical. However, during intervention and postintervention, when the response rate is low, the seal becomes ideal even if short observational intervals are selected.

The major advantage of the seal is that one may assess responding even when the behavior is unobserved. Specifically, reinforcement may be made contingent on the color of the seal rather than on "thumb out of mouth at time of observation." This procedure avoids inadvertent reinforcement of undesirable behavior sequences that may occur with fixed-interval observation schedules (e.g., sucked thumb during the 14 min prior to the 15th min of the 15-min observational interval). Additionally, the seal permits a shaping paradigm in which very brief intervals of nonthumbsucking behavior are reinforced. As the intervals are increased, the seal may be faded in to replace constant surveillance by the observer.

REFERENCE NOTES

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NOTES

1. We were unable to obtain information regarding the safety or lack of safety of the oral ingestion of very small amounts of phenaphthazine, the dye used in nitrazine paper, from any of the following: Merck Index; Physician's Desk Reference; E. R. Squibb & Sons, Inc.; and Bureau of Medical Devices, Food and Drug Administration.

2. See guide provided with nitrazine paper that shows the various colors of the paper for each pH level.

(Received for publication January 10, 1978;
revision accepted April 11, 1978.)