

Construction and use of a simple, low cost token system specially designed for visually handicapped and deaf/blind persons.

FRANK J. MARONE, PH.D. - BEHAVIOR + TRAINING SPECIALIST  
CALIFORNIA SCHOOL FOR THE BLIND, FREMONT, CA

Token economies of various sorts have now been widely used for effective enhancement of task performance and achievement of behavioral improvements. The application of a token economy with students having sensory handicaps can present unique challenges. The media of many token systems can be indiscernible to students with limited or no vision (e.g., written "point" systems) or cumbersome (e.g., Peabody token chains). Others may require an amount of sophisticated concept development and/or manual manipulation skills that students requiring such systems often do not initially demonstrate (e.g., monetary exchange systems).

The demonstrated effectiveness of token economy systems in improving task performance, overcoming behavioral difficulties, and guiding interactions between change agents and individuals under their care suggest the utility of their application with sensory handicapped individuals with intensive instructional and behavioral needs. At the same time, the limitations mentioned above must be addressed. Reported here is a token economy structure and procedure that is effective, is easily learned by even totally blind and deaf individuals, is portable, and appears to promote generalization of task performance and behavioral improvements.

Construction of token "tube counter"

The materials used here are an easily constructed "tube counter" and standard poker chips. The tube counter is constructed from "PVC" pipe (1 7/8" outside diameter) with 3/16" walls, which is commonly available at "home improvement centers" for under \$ 0.40 per foot, and a short

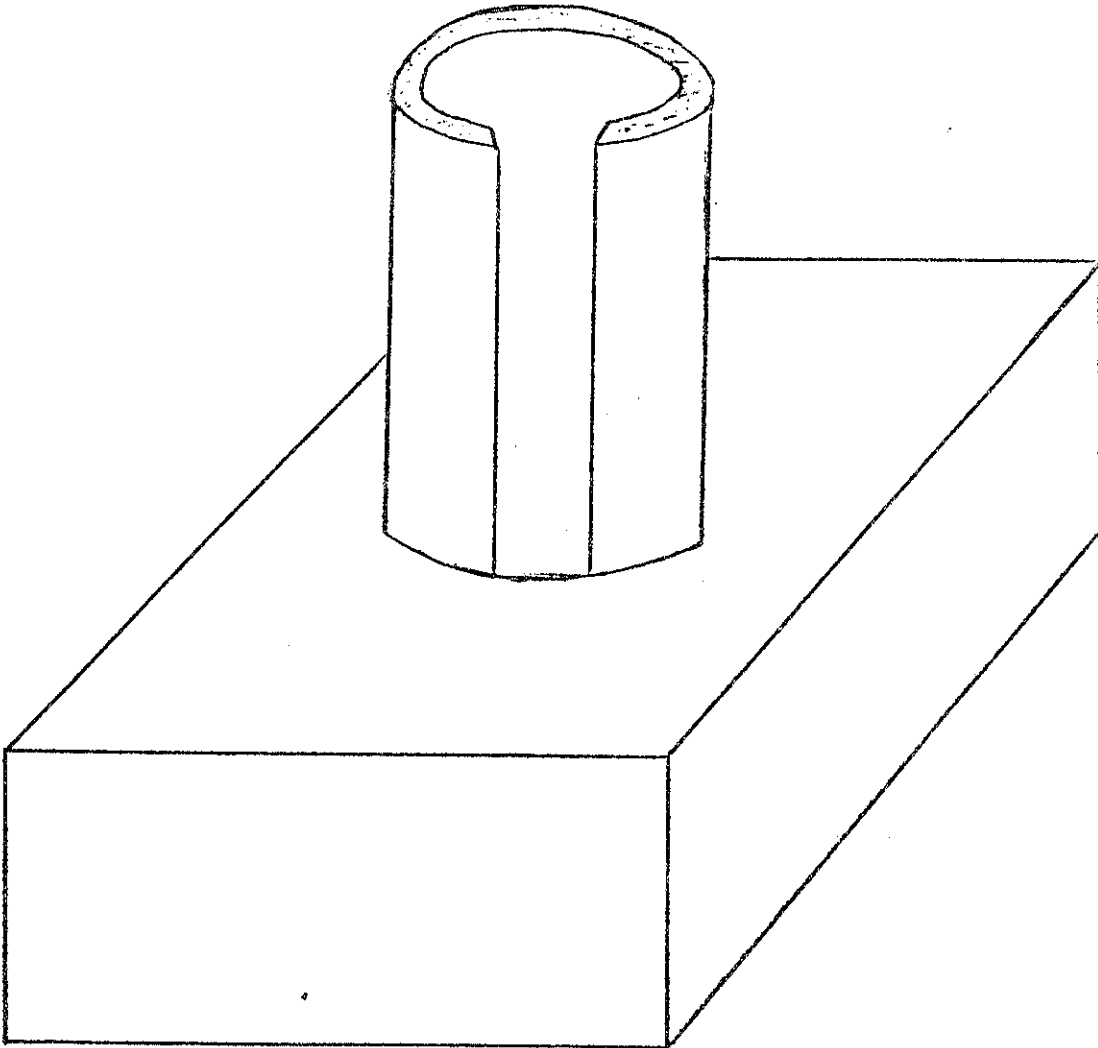
length of "two by four" wood ( $3 \frac{3}{8}$ " X  $1 \frac{1}{2}$ " ), which is often available free from lumberyard or home improvement center scrap bins and which is commonly available for purchase at these places for under \$0.30 per foot. Poker chips are commonly available at hobby or variety stores and at supermarkets for under \$3.00 per 100.

To construct a base for the counter, a piece of two by four  $3 \frac{3}{8}$ " long is cut, creating a square block measuring  $3 \frac{3}{8}$ " X  $3 \frac{3}{8}$ " X  $1 \frac{1}{2}$ ". The center of this block is located by drawing two intersecting diagonal lines across one of the  $3 \frac{3}{8}$ " X  $3 \frac{3}{8}$ " faces and marking their intersection. A well for inserting the PVC pipe into the base is made by cutting a hole into the base  $1 \frac{1}{8}$ " deep using a  $1 \frac{7}{8}$ " hole saw.

The length of PVC pipe to be inserted into the base depends on the maximum number of poker chips (tokens) it is designed to hold. A tube counter that holds 30 tokens has so far proven most versatile. A piece of PVC pipe (tube) the exact length as the height of the number of tokens to be used is cut so that when this length of pipe is stood on one end and filled with tokens, the tokens come up flush with or slightly above the sides of the tube. The length of a tube to accommodate 30 tokens is  $2 \frac{5}{8}$ ".

A slot is formed in the tube by cutting a  $\frac{3}{4}$ " wide strip of the pipe wall out of the pipe lengthwise. Rough edges and sharp corners may be smoothed with sandpaper. Finally, the tube is inserted into the well in the base until the lower end of the tube abuts the bottom of the well. This may require a slight squeezing of the pipe so that it fits easily inside the well. (See illustration, fig. 1.)

FIGURE 1



Procedure for use of the token tube counter

As with most token economies, the individual is first taught a token exchange. To accomplish this, the individual first sits or stands at a work table or desk. The tube counter is filled with tokens and placed on the table or desk within easy reach and on the side of the body of the individual's dominant hand. One token is removed and placed on the table in front of the base of the tube counter, i.e., between the student and the tube counter. A small amount of a previously identified concrete "back up" reinforcer is placed to the side of the tube counter further from the individual. Edible reinforcers have proven most workable at first. The amount of reinforcer available at this point is usually a very small part of the amount the individual would consume given free access.

The individual is guided to feel (and look at, if appropriate and easily accomplished) the token, the tube counter, and the reinforcer. Manipulation of each of these and consumption of the reinforcer is acceptable. Following this brief introduction, the individual is guided through the following sequence several times.

1. feel the slight depression at the top of the tube counter with one token missing
2. feel the token on the table immediately in front of the tube counter
3. pick up the token and place it into the tube counter; this may require the use of both hands, e.g., to locate the tube counter and simultaneously insert the token
4. feel the now flush surface at the top of the completely full tube counter

5. sign (say) "Full"

6. consume back up reinforcer

This sequence is repeated a small number of times (e.g., 3-5 times) before introducing the work task.

Second, the work task is introduced. One unit of a task that is made up of repetitive units (e.g., envelope stuffing) or the final step of a task that is made up of a sequence of steps (e.g., assembling a jigsaw puzzle) is identified and prepared. The individual is prompted or guided through this unit or final step, signs (says) "Finished", and then goes on to the token reinforcement sequence previously practiced (above). This procedure is repeated a small number of times (3-5) before expanding the work task.

Third, the work task is expanded. A second unit (repetitive task) or the immediately preceding task step (sequential task) is identified and prepared. The individual is guided through this unit or step, but then does not deposit the token into the tube counter and consume the reinforcer, as the task is not "Finished". Instead, the individual is instructed, verbally or in sign, "More work" and goes on to the final repetition or final task step. Following this, the individual goes on to the token reinforcement procedure. Further expansion is possible by repeating this process.

Fourth, mediating tokens are introduced. Further expansion of time of task performance can be achieved by the introduction of additional tokens. Before the individual begins work on several units or steps, more than one token is removed from the tube counter and placed on the table in

front of it. The individual is guided in feeling these. After several units or steps are completed, but when some still remain to be completed, the individual is prompted or guided to place one token into the tube counter. The individual does not go on to consume the reinforcer, however, because the work is not "Finished" and the tube counter is not "Full". The individual is instructed to do "More work", and the above procedure is repeated. The trainer insures that the insertion of the last token into the tube counter coincides with the completion of the last task unit or step. The individual then goes on to sign "Finished" and "Full" and to consume the back up reinforcer. A one-to-one correspondence between tokens and task units or steps is avoided, as it limits the number of task units or steps and complicates the job of the trainer and the student. *In fact, the greatest success so far has been achieved with a three token structure: "Beginning" (delivered after first task item); "Middle" (delivered approximately halfway through task); and, "End" (delivered at task completion).* The combination of these procedures and materials allows for rapid evolution to a natural worker/supervisor interaction. The individual works independently and is occasionally reminded by the trainer/supervisor to place a token into the tube counter at a variable but regular rate that insures that the final token coincides with task completion. Most often only a small proportion (fewer than 10) of the available tokens are actively used in a task. The remainder may be taped or glued together or replaced with an equal sized piece of wooden dowel, plastic tube, or even a paper wad, so that if the tube counter is spilled, picking it up is of minimum difficulty.

Examples of successful application of token tube counter

The tube counter and procedure described above have been applied to learning and behavior improvement goals with five students. The descriptions presented below illustrate a few of these applications. The data bases vary from anecdotal to formal with reliability checks. None of these were intended as experimental tests.

EXAMPLE #1. Amy is a 20 year old woman traditionally classified as *moderately* retarded, totally deaf, with one eye removed, and vision estimated at approximately 20/40 in the remaining eye. Amy is a residential student at a school for blind individuals with a several year history of aggression towards others, property destruction, self injurious behavior, and poor task performance. The token tube counter described here was introduced in an effort to improve her performance and behavior during a vocational task, recycling of aluminum cans. This task included rinsing, draining, and then crushing cans flat using a screw vice. Amy received six one-hour sessions, one each week, of training to perform this task. At the start of training, she required physical and/or verbal (sign) cueing on at least 50% of the steps involved in completing part of the task, crushing only. At this point, only this part of the task was focused on because it took so long to accomplish any amount of performance. At this point, Amy exhibited instances of self injurious, destructive, or aggressive behavior at a combined rate of greater than once every five minutes. One staff person was required to be present to cue and supervise throughout the work period, or Amy's performance was zero. By the end of training, Amy performed the entire task of rinsing, draining, and rinsing 24 aluminum cans independently. Supervision and token delivery occurred in a natural supervisory fashion. At approximately 10 minute intervals, a supervising staff person would enter the

work room, look over Amy's work, and cue her to insert a token into her token tube. At the end of the task, Amy independently (i.e., without cueing from or presence of supervising staff person) placed the last token into the token tube and consumed her reinforcer. This was followed by a break. At this point, Amy exhibited instances of self injurious, destructive, or aggressive behavior at a combined rate of less than once per work session. The token tube counter was subsequently introduced into the early morning self care sequence that Amy was required to perform in the dormitory. Without additional training, she demonstrated retention of the skills involved in the use of the token tube itself. She demonstrated task performance gains and behavior improvement consistent with that shown during the vocational task described above.

EXAMPLE #2. Karl is a 20 year old man traditionally classified as *moderately* retarded, totally blind and with unmeasurable slight hearing in one ear. He has a several year history of aggressive and destructive behavior and poor task performance. The token tube counter described here was included in all tasks of a three week summer program occurring at his home. One of these, envelope stuffing, was one in which Karl already had experience performing using the tube counter. On first presentation of this task at home, an environment in which Karl had never engaged in this activity <sup>and in which the token tube had never previously been used,</sup> he demonstrated retention of the skills involved in the use of the token tube itself. He likewise showed rapid progress in performance of the task itself. At the start of training, Karl placed 10 pre-folded letters into individual business envelopes one at a time, in approximately 15-20 minutes. At the end of 15 sessions, he was independently folding in thirds 30 8 1/2" X 11" letter papers and placing these one at a time into individual business envelopes, in



approximately 15-20 minutes. He independently completed the final token insertion and self reinforcement procedure. The token tube was also utilized in training Karl in performance of novel leisure skills, sorting of playing cards ("solitaire") and taking a walk around the block. At the start of training, he was sorting 20 playing cards into five number categories, on a board constructed for this purpose, with regular cueing to ensure accuracy. At the end of 15 sessions, he was sorting 52 playing cards (an entire deck) into 13 categories (Ace through King) independently with an error rate of less than 2%. He persisted at this task for 30-45 minutes, until finished, up from 10-15 minutes at the start of training. He independently completed the final token insertion and self reinforcement procedure. At the start of training, Karl walked around the block with "sighted guide" assistance and/or verbal and physical cues or reinforcers approximately twice per minute, and/or requests for assistance approximately once per minute. His movement was marked by extended periods (1-5 minutes) during which he stood in one place and engaged in a variety of nonrelevant behaviors (e.g., rocking, shouting). One circuit around the block required 30-45 minutes. At the end of 15 sessions, Karl was walking around the block with a combined total of cues, reinforcers, and requests for assistance of fewer than once every three minutes. Periods of stopping were reduced, and his walking speed increased, enough that one circuit around the block required 15-20 minutes. During this task, tokens were handed to Karl periodically. He carried them in his pants pocket and completed the token exchange procedure on returning home. During this three week period, Karl's problem behaviors were exhibited at a combined total of less than one per day.

It is important that Amy and Karl demonstrated quick and easy learning of a variety of tasks under the structure of the token tube, some apparent generalization, reduction of problem behaviors, and achievement of independent performance of both learning tasks and use of the token tube. Both of these students, and others with which this system has been used, have in the past met with trainer refusals to work with them because of their high frequency and high intensity problem behaviors and their apparent need for frequent and continuing guided assistance, exacerbating the problems of aggression toward others and dependence on trainers. The next step should be experimental test of the utility and limits of the token tube counter system. Specifically to be answered are questions such as: How does performance guided by this system compare with that utilizing other more traditional systems? What are the contributions of factors such as rate of token delivery? What is the importance of a correlation between task completion and filling of the token tube? It is hoped that these and other questions can be answered in future reports.

END - RAUGH DRAFT #1

8/20/87 - F. Marone