# TOILET TRAINING FOR INTELLECTUAL DISABILITY

## ANALYSIS OF THE STAGES OF DEVELOPMENT AND PROCEDURES FOR DESIGNING PROGRAMS

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### Abstract

*The developmental sequence of bladder and bowel control is outlined and the deficiencies in this sequence which are frequently experienced by people with intellectual disabilities are described. Guidelines are provided for designing toilet training programs which are appropriate to the developmental stage and the requirements of the subject and his environment.*

### Introduction

The developmental sequence of bladder and bowel control appears to be substantially the same for all children whether they are disabled or not. However, many people with intellectual disabilities do not proceed smoothly through the sequence, even when the usual methods are used by parents and other caregivers to help such people develop this control. In addition, some people with intellectual disabilities have neurological or physical deficiencies which lead to further disruptions in the sequence. Consequently, one finds a number of adults with severe or profound intellectual disabilities who have still not learned control of their bladder and bowel functions adequately.

Our culture adds further learning tasks to that of acquiring bladder and bowel control. We require that people eliminate in one category of place -the toilet -and learn how to find it. We aIso require that people learn to remove and replace pants, flush toilets, use toilet tissue and wash their hands. There are a number of complex discriminations and motor sequences involved in these behaviours which add further to the learning difficulties experienced by people with severe and profound intellectual disabilities.

There are additional difficulties involved in joining together the controlling of internal physiological processes, and the discriminations and motor patterns which deal with place and clothing. Consequently, one finds a number of people with severe and profound intellectual disabilities who can control their bladder and bowel functions, but cannot get themselves to the toilet or deal adequately with clothing, or who can perform these socially required sequences, but continue to have accidents.

Carefully designed toilet training programs, using operant principles, can help people with

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intellectual disabilities learn some or all of these skills. The first report of operant principles applied to toilet training for this group was by Blackwood (1962). His results were not encouraging, since a group which received systematic training improved no more in toileting behaviour than a control group receiving no systematic training. However, since then, a number of studies have reported improvements in toilet behaviour for most of their subjects. In general the methods used over the last decade have ranged from a simple system of positive reinforcement for voiding in the toilet (Chopra, 1973; Colwell, 1969; Dayan, 1964; Hundziak et al., 1965; Kimbrell et al., 1967; Levine & Elliott, 1970: Marshall, 1966; Spencer et al., 1968: Thompson & Grabowski, 1972; Watson, 1966; Waye & Melnyr, 1973; Wiesen & Watson. 1967; Yoder. 1966) to a complex combination of procedures aimed at establishing the entire chain of behaviours and discriminations required for self-toileting (Azrin, 1973; Azrin et al., 1971; Azrin & Foxx. 1971; Bettison et al., 1976; Dixon & Smith, 1976; Foxx & Azrin, 1973; Giles & Wolf, 1966; King & Turner, 1975; Litrownik, 1974; Passman, 1975; Smith et at., 1975; Tierney, 1973; Mahoney et al., 1971; Van Wagenen et al., 1969a, 1969b; Wright, 1975).

Although the more complex programs have improved considerably on the level of success achieved by the simpler programs, no analysis of the problems leading to failure has been attempted. Yet even the most complex programs do not appear to teach all subjects how to independently toilet themselves (Bettison et al., 1976; Tierney, 1973) and performance gains were frequently lost when subjects were returned to their original living conditions (Csarchuk, 1973; Rentfrow & Rentfrow, 1969). It is the thesis of this paper that a thorough understanding of bladder and bowel control and its development, when combined with the use of operant procedures, can overcome some of the problems faced by people with intellectual disabilities when we try to teach them to use and maintain toileting skills.

## Developmental sequence of bladder control

A number of authors have outlined the developmental sequence of bladder or bowel control in detail (Gershenfeld, 1943; Lovibond, 1964; Lovibond & Coote, 1970; Mahoney, 1973; McGraw, 1940; Muellner, 1958, 1960a, 1960b; Yates, 1970). There are also a number of discussions in the literature of the physiological and neurological processes involved in bladder and bowel functioning (Basmajian, 1962; Caldwell, 1975; Lovibond, 1964; Lovibond & Coote, 1970; Mahoney, 1973; Vincent, 1959, 1960, 1964, 1966; Yates, 1970). The following analysis is of the developmental sequence of bladder control alone in order to exemplify the developmental approach to program design. For this reason the analysis is simple. Those who wish for more detail are referred to the literature.

1. Infants begin life with reflex voiding of bladder and bowel (Muellner, 1960a, 1960b).This reflex is triggered by the filling of the bladder or bowel which then sets off rhythmical contractions and spontaneous voiding. Bladder and bowel capacity is small so that spontaneous voiding is frequent during the first few months of life (see Table 1).

2. As a result of the maturation of the parasympathetic nervous system most children learn to perceive stimulation from increasing bladder tension between 1 and 2 years of age (Muellner, 1960b). At this stage many children show behavioural signs of approaching voiding. With this awareness, the ability is acquired to "hold" urine for a brief time after the sensation of a full bladder is perceived, and bladder capacity is virtually doubled (see Table 1). Once this stage is reached children can learn to resist the urge to void long enough to get to the toilet. People who suffer from delayed maturation or deficient nervous system functioning may not develop this ability to perceive bladder tension, and this will interfere with the development of bladder control.

3. By three years of age most children have learned to hold urine for a considerable time when the bladder is full (Muellner, 1960x. 1960b). This requires the voluntary tensing of the perineal muscles in the crotch, which raises the bladder neck, and tightens the internal bladder sphincter (Muellner, 1958, 1960a, 1960b; Vincent, 1959, 1960, 1964, 1966). This further increases bladder capacity so that there is a marked drop in frequency of voiding and a greater quantity voided at each elimination (see Table 1).

Table 1. Frequency & quantity of urinary voiding distributed by age
Gershenfeld, 1943

| Age | Daily Frequency (Average) | Quantity (mls.) |
|---|---|---|
| 0- 3 months | 13.5 | 29.6 |
| 3-6 months | 10.0 | 29.6 |
| 6-12 months | 16.0 | 44.4 |
| 1-2 years | 12.0 | 59.2 |
| 2-6 years | 8.7 | 88.3 |
| 6-8 years | 7.4 | 148.0 |
| 8-11 years | 7.1 | 207.2 |
| 11-13 years | 7.9 | 222.0 |
| Adults | 7.0 | 192.4 |

4. Between 3-4 years of age the ability to voluntarily start the urine flow from a full bladder is acquired (Muellner, 1960a, 1960b). Before this stage, once the child has held back voiding, he or she cannot always start the flow at will but must wait until attention is taken by other things, when the perineal muscles will automatically relax and reflex voiding will occur. This incomplete voluntary control is clearly seen when a child is taken to the toilet, does not void, goes back to play, and immediately wets.

5. Voluntarily starting the stream from a full bladder requires combined pushing down of the thoracic diaphragm and tightening of the abdominal muscles (Muellner, 1960a, 1960b). Once a child acquires this ability (usually soon after four years of age) he will be able to invariably void within seconds of sitting on the toilet after resisting the urge to void long enough to get to the toilet. By this stage most children can also stop the urinary stream at will, and the bladder capacity is double what it was at the age of two years. As a result of these two new skills the occasional wet pants, which most toilet-trained toddlers experience, no longer occur and most children can control their urine during the night.

6. By six years of age most children have learned to voluntarily start the urinary stream from a less than full bladder (Muellner 1960a, 1960b). To do this they must co- ordinate the lowering of the perineal muscles with the use of the thoracic diaphragm and abdominal muscles. This new skill allows children to go to the toilet at almost any time and void, no matter how small an amount has accumulated in the bladder. By this stage children have again almost doubled their bladder capacity so that they should have no trouble holding urine during 12 hours of sleep. This is aided by the universal practice of inhibiting voiding for longer periods so that other activities are not interrupted (see Table 1).

It is likely that many people with intellectual disabilities who do learn to toilet themselves, with or without operant training programs, have developed most of the voluntary controls over bladder and bowel functions during the usual processes of development, without the aid of special training in the same way that most non-disabled people do (Muellner, 1960a, 1960b). It is also likely that some successfully trained subjects learn voluntary control indirectly during the training program. Failure to learn to maintain toileting skills, despite participation in sophisticated operant programs, may be for a number of reasons.

One such reason may be that the subject has not developed some or all of the voluntarycontrols outlined earlier (Muellner, 1960a, 1960b) and the training procedures do not tackle the problem of bringing reflex bladder and bowel functions under control. The subject may only learn these controls through direct training of bladder capacity, perception of bladder tension, or voluntary use of the diaphragm, abdominal and perineal muscles. Neurological impairment of the afferent or efferent pathways to the bladder or bowel, or physiological problems which prevent voluntary control may also lead to failure (Foxx & Azrin. 1973).

Many researchers regard these factors as indicators that the person is untrainable (Baumeister & Klosowski, 1965; Ellis, 1963; Foxx & Azrin, 1973; Hundziak et al., 1965). Rather than excluding such people from training, or regarding them as unavoidable failures, an assessment of their specific deficits in voluntary control could lead to the design of individualised programs aimed at giving them al least some independence.

## Program design

This analysis is supported by informal observation of subjects during an ongoing toilet training project which began, using a modified Foxx and Azrin program (1973), as an investigation of full independence training for people with intellectual disabilities in institutions (Bettison et al., 1976). It is currently being applied to individualised program design in two service units: an Intensive Training Unit for children with profound and severe intellectual disabilities in an institution and a Family Training Unit providing services for children WITH intellectual disabilities or autism living at home. The model for program design involves four stages: assessment, design of intervention procedures, intervention, and evaluation (Cunningham & Jeffree, 1971; Shearer & Shearer, 1972).

Intervention and evaluation involve the processes, common to most well-designed operant programs, of defining behavioural objectives, taking baseline records, applying the training procedures, and taking training and long term records for comparison with the baseline, using multiple baseline, reversal or control group designs. These processes are described in great detail In the experimental and clinical literature on behaviour modification and operant learning. However, the initial assessment, and the factors which lead to choice of intervention procedures, have not been given much attention. The following discussion concentrates on these two processes.

The initial assessment sets the direction for training, but what form it should take is not indicated by operant theory. Particular characteristics of the subject and his environment are selected for assessment and this selection is determined by the implicit or explicit theories of human behaviour and development held by the program designer. Most toilet training programs have rested on the assumption that all behaviour is learned, or can be taught, without reference to the considerable evidence that many behaviours can be learned only after some behavioural or physiological prerequisites have been met (M ussen et al., 1974).

The designing of interventions most appropriate for the training task are not clearly indicated by operant theory either. For example, operant theory gives no help when deciding how many steps are required to teach a complex chain of behaviour, nor does it show us the techniques which will elicit perception of bladder tension. Reference to developmental theory not only provides some guidelines for what should be taught, but also for the order in which skills are most easily learned.

*Assessment:* The initial assessment should establish a number of things: that the subject is not toilet trained, which of all the behaviours and physiological controls are absent, whether

there is any neurological or physical impairment in functions which are required for self-toileting, and what level of toileting skill would be allowed and supported by the subject's environment and the other people in it. All of these factors together determine whether a program is feasible and which behavioural objectives are reasonable and suitable within that subject's situation. Assessment under these conditions involves considerably more information than most published programs have outlined.

An initial interview with staff or parents can often specify how frequently the subject eliminates, as a rough indicator of bladder capacity, whether there are any behavioural signs that bladder tension is perceived, either before or at the completion of elimination, and whether the subject can hold urine briefly, indicated by only small amounts of urine in the pants when accidents occur. The child who can indicate the need for toileting is also clearly able to hold urine. Parents especially know whether the subject eliminates soon after sitting on the toilet; an indicator that there is voluntary control over starting the urinary stream. They can sometimes differentiate clearly between times when the subject's bladder is full and times when it is less than full, which further defines the amount of control which the subject has.

Information is also required about other relevant skills, for instance, whether the subject can find the pot or toilet himself, how much he can do by himself to get his pants up and down, seat himself, stay seated until elimination is finished, and how much help is needed with all these tasks. It is of equal importance to establish how many of the toileting skills parents or staff are wanting or willing to accept. Institutional organisation may prevent disabled residents from exercising full independence because doors are locked or staff are required to take a custodial role. It is pointless to provide training programs in these institutions until extensive administrative changes are made. Some parents also find it difficult to accept independent action from their disabled offspring, and it may be wise to aim at less than full independence until this difficulty is overcome.

On the basis of the interview, recorded observations of some or all of these aspects may be necessary. Bladder capacity can be measured by taking frequency counts of all eliminations, or by measuring the quantity voided. "Holding" ability can be derived from the length of time between eliminations, or by measuring the amount voided during accidents. Voluntarily starling the urinary stream is indicated by records of time intervals between sitting on the toilet and elimination. The ability to start the urinary stream from a less than full bladder may be indicated by large variations in the amounts voided during toileting. In addition, the skills which deal with place and clothing should be assessed by giving one clear verbal and gestural prompt for each task and recording whether the subject carries it out without assistance. This should be done several times in a number of different situations.

A medical examination may be indicated, especially if the subject is over 10 years and has not developed all the physiological controls. Checks should be made for bladder or bowel infection, constipation, impacted faeces, bowel fissures, abnormally wide bladder neck or defective sphincters, kidney dysfunction, prolapse of the bowel or bladder, neurological dysfunction in the pathways to the bowel or bladder, and whether there are any other diseases which may interfere with bowel or bladder control.

*Intervention design:* If we concentrate on bladder training, there are a number of procedures which can be used alone, or in combination, in addition to the successful operant procedures reported in the literature. Pants alarms, which emit a tone when urination begins, are often effective in training perception of bladder tension (Azrin et al., 1971; Dixon & Smith, 1976; Fried, 1974; Glen & Rowan, 1974; Herreshoff, 1973; Kashinsky, 1974; Litrownik. 1974; Passman, 1975; Watson, 1968; Yonovitz, 1976; Zimmer-Hart, 1977). They provide additional

discriminative stimuli at the point of bladder fullness which triggers reflex voiding. In addition, when the trainer shouts "No!" or "Stop!" on hearing the pants alarm there is frequently enough startle effect to stop urination (Mahoney et al., 1971; Van Wagenen et al., 1969a, 1969b). It seems likely that this directly teaches the subject how to tense the perineal muscles and thus effectively increases the ability to voluntarily "hold" urine. However, some of our subjects had trouble acquiring this skill, even when these procedures were used.

There is evidence that non-disabled people can bring physiological functions, including rectosphincteric responses and bladder capacity, under voluntary control with the help of training directly aimed at these functions (Ashkenazi, 1975; Engel et al., 1974; Jones, 1956; Kimmel & Kimmel, 1970; Kohlenberg, 1973; Muellner, 1960a, 1960b; Young, 1973).

A number of investigators, interested in nocturnal enuresis, have successfully increased bladder capacity and "holding" ability in non-disabled subjects by increasing fluid intake and giving verbal instructions to hold the urine as long as possible whenever the urge to urinate is felt (Doleys, 1977; Jones, 1956; Mahoney, 1973; Kimmel & Kimmel, 1970; Muellner, 1960a, 1960b). However, many people with intellectual disabilities cannot understand language. Vincent (1959, 1960, 1964, 1966) has reported good results from the use of a perineal pressure appliance which artificially raises the perineum. It takes the form of a belt moulded round the subject's hips and shaped so that there is no pressure on the abdomen. From this belt a saddle is slung under the perineum, containing an inflatable rubber balloon, attached by a tube to a bulb and manometer. The balloon can be inflated, and the pressure measured. His subjects were not intellectally disabled, but suffered from a number of conditions, including prolapsed bladder, neurological dysfunction and small bladder capacity. Many were able to take over voluntary control of the perineal muscles and increase their bladder capacity after this apparatus, faradism and perineal exercises were used. The attraction of Vincent's apparatus is that it could be used to prompt subjects to raise the perineum and to provide them with sensation cues which result from this. A suggested procedure would be a combination of Vincent's apparatus, a pant alarm, reward for holding urine and increased fluid intake. The trainer would artificially raise the perineum when the pants alarm sounded, and over a series of trials, gradually fade out the pressure in the balloon, rewarding the subject for continuing to hold urine for increasing periods as the balloon pressure is decreased.

Toilet alarms appear to help many subjects to voluntarily start the urinary stream, especially when combined with reward for toilet use (Azrin et al., 1971; Foxx & Azrin, 1973). They probably provide extra discriminative cues attached to the sensations involved in starting the stream. However, some of our subjects did not acquire this skill, even though they were clearly trying to force urine out in order to hear the buzzer. Some children contracted their abdomen, looked down into the toilet bowl, and even picked up the alarm box and looked at it or shook it. Clearly they could not find the right muscular actions. There are no techniques reported in the literature to elicit these actions. Many people report that sneezing can cause a urinary leakage or spurt when the bladder is full. This reflex action forces the diaphragm down, tenses the abdominal muscles, and lowers the perineum. A procedure involving the pants alarm and startle reaction, designed by Van Wagenen, to ensure a full bladder when the subject is toileted, with induced sneezing for several trials on the toilet, and reward for toilet use, may be enough of a prompt to elicit voluntary urination.

Methods for teaching the people with intellectual ddisabilties how to find the toilet and deal with clothing have been provided in Foxx and Azrin's program (1973).Their prompting, fading and graduated guidance procedures have been very successful with our subjects, as long as bladder control was achieved. These procedures have not proved as successful in teaching subjects to pull their pants up and down. Our training units have developed more complex chaining and shaping procedures which have been successful in teaching these skills to a number of children with profound and severe intellectual disabilities. Skills have been

maintained by these subjects for at least 12 months after training.

Many children with intellectual disabilities appear to develop bladder control in the usual sequence, but take longer than non-disabled children. Consequently, it may be developmentally inappropriate to train an 8 year old child, whose bladder functions are still like those of a 2 year old, to start the stream at any time, whether the bladder is full or not. It may be more effective to train the child to perceive bladder tension and signal to the parent that he needs to go to the toilet (Brown & Brown, 1974). Similarly a complex program directed at the whole chain of toileting behaviours is probably inappropriate for a subject who has all the skills but still has accidents. A simpler program which merely rearranges the natural contingencies for toilet use and accidents is probably all that is required.

Many of the ideas raised in this paper are speculative and require experimental testing. However, the main aim of applied research is to develop procedures which will work. It is important to remember that training programs are for people who are having difficulty learning skills which are usually learned in the normal course of child-rearing and development. Although children may go through similar sequences of development, there are individual differences and problems which training programs should encompass.

## References


Ashkenazi, Z. The treatment of encopresis using a discriminative stimulus and positive reinforcement. *Journal of Behavior Therapy and Experimental Psychiatry***,** 1975, 6, 155-157.

Azrin. N. H., Bugle, C., & O'Brien, F. Behavioral engineering: Two apparatuses for toilet training retarded children. *Journal of Applied Behavior Analysis*, 1971, 4, 249-253.

Azrin, N. H., & Foxx. R. M. A rapid method of toilet training the institutionalised retarded. *Journal of Applied Behavior Analysis*, 1971, 4, 89-99.

Azrin, N. H. Toilet training the profoundly and severely retarded. *Journal of Research and Training*, 1973, 1, 9-13.

Basmajian, J. V. *Musdes alive***.** Baltimore: Wilkins, 1962.

Baumeister, A., & Klosowski. R. An attempt to group toilet train severely retarded patients. *Mental Retardation***,** 1965, 3, 24-26.

Bettison, S., Davison, D., Taylor, P., & Fox, B. The long-term effects of a toilet training program for the retarded: A pilot study. *Australian Journal of Mental Retardation*, 1976, 4, 28-35.

Blackwood, R. O. *Operant conditioning as a method of training the mentally retarded*. Unpublished doctoral dissertation, Ohio State University, 1962.

Brown. R. M., & Brown, N. L. The increase and control of verbal signals In the bladder training of a 17 month old child: A case study. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, 1974, 15, 105-109.

Caldwell, K. P. S. (Ed.). *Urinary Incontinence***,** London: Secter Publishing Ltd., 1975.

Chopra. H. D. Treatment of encopresis in a mongol with operant conditioning. *Indian Journal of Mental Retardation***,** 1973, 6, 43-46.

Colwell C. N. Amazing changes in profoundly retarded. *Rehabilitation Record*, 1969, 10, 10-12.

Cunningham, C. C. & Jeffree. D. *Working with parents: Developing a workshop course for parents of young mentally handicapped children.* National Society for Menially Handicapped Children (NW Region), Hester Adrian Research Centre,Manchester. 1971.

Dayan. M. Toilet training retarded children in a state residential institution. *Mental Retardation*, 1964 2, 116-117.

Dixon. J. & Smith. P. S. The use of a pants alarm in daytime toilet training. *British Journal of Mental Subnormality,* 1976, 22, 20-25.

Doleys. D. M. Behavioral treatments for nocturnal enuresis in children: A review of the recent literature. *Psychological Bulletin*, 1977, 84, 30-54.

Ellis, N. R. Toilet training the severely defective patient: an S-R reinforcement analysis. *American Journal of Mental Deficiency*, 1963 68, 98-103.

Engel. B. T., Nikoomanesh. P., & Schuster M. M. Operant conditioning of rectosphinceteric responses in the treatment of fecal incontinence. *New England Journal of Medicine*, 1974, 290, 646-649.

Foxx, R. M. & Azrin. N. H. *Toilet training the retarded. A rapid program for day and night-time independent loileting*. Champaign. Illinois Research Press, 1973.

Fried, R. A device for enuresis control. *Behavior Therapy*, 1974, 5, 682-684.

Gershenfeld. L. *Urine and urinanalysis*. Philadelphia, Lea & Febiger, 1943.

Giles. D. K., & Wolf. M. M. Toilet training in institutionalised, severe retardates. An application of operant behavior modification techniques. *American Journal of Mental Deficiency,* 1966, 70, 766-780.

Glen, E. S., & Rowan, D. Enuresis alarm trainer for night and day. *The Lancet*, 1974, October 26, 987-988.

Herreshoff, J. K. Two electronic devices for toilet training. *Mental Retardation*, 1973, 11, 54-55.

Hundziak. M., Maurer. R. A., & Watson. L. S. Operant conditioning in toilet training of severely retarded boys. In A. M. Graziano (Ed ). *Behavior Therapy with Children.* Chicago: Aldine. 1971.

Jones, H. G. The application of conditioning and learning techniques to the treatment of a psychiatric patient. *Journal of Abnormal and Social Psychology*, 1956, 52, 414-420.

Kashinsky, W. Two low cost micturition alarms. *Behavior Therapy*,1974, 5, 698-700.

Kimbrell, D. L., Luckey, R. E., Barbuto, P. F. P., & Love. J. G. Operation dry pants: An intensive habit training program for severely and profoundly retarded. *Mental Retardation,* 1967, 5, 32-36.

Kimmel, H. D. & Kimmel, E. An instrumental conditioning method for the treatment of

enuresis. *Journal of Behavior Therapy and Experimental Psychiatry*, 1970,1, 121-123.

King, L. W. & Turner, R. 0. Teaching a profoundly retarded adult at home by non-professionals. *Journal of Behavior Therapy and Experimental Psychiatry*, 1975, 6, 117-121.

Kohlenberg, R.J. Operant conditioning of human anal sphincter pressure. *Journal of Applied Behavior Analysis*, 1973, 6, 201-208.

Levine, M. N., & Elliott. C. B. Toilet training for profoundly retarded with a limited staff. *Mental Retardation,* 1970, 8, 48-50.

Litrownik, A. J. A method for home training an incontinent child. *Journal of Behavior Therapy and Ex. perimental Psychiatry*, 1974, 5, 77-80.

Lovibond, S. H. *Conditioning and enuresis*. London, Pergamon Press, 1964.

Lovibond, S. H., & Coote, M. H. Enuresis in C G Costello (Ed.). *Symptoms of Psychopathology*. New York, Wiley, 1970.

Mahoney, K. Frequency and quantity of nocturnal urinary emissions after diurnal toilet training and after training to restrain reflex voiding in children. (Doctoral dissertation, Arizona State University. 1973). *Dissertation Abstracts International*, 1973. 34, 1705A.

Mahoney. K., Van Wagenen, R. K., & Meyerson, L. Toilet training of normal and retarded children. *Journal of Applied Behavior Analysis*, 1971, 4, 173-181.

Marshall, G. R. Toilet training of an autistic eight-year old through conditioning therapy: A case report. *Behavior Research and Therapy*, 1966, 4, 242-245.

McGraw, M. B. Neural maturation as exemplified in achievement of bladder control. *Journal of Pediatrics*, 1940, 16, 580-590.

Muellner, S. R. The voluntary control of micturition in man. *Journal of Urology*, 1958, 80, 473-478.

Muellner, S. R. Development of urinary control in children: A new concept in cause, prevention and treatment of primary enuresis. *Journal of Urology*, 1960, 144, 714-716 (a).

Muellner, S R. Development of urinary control in children. *Journal of the American Medical Association,* 1960, 172, 1256-1261(b).

Mussen, P. H., Conger, J. J., & Kagan, J. *Childhood development and personality* (4th ed.). New York, Harper & Row, 1974.

Osarchuk, M. Operant methods of toilet-behavior training of the severely and profoundly retarded: A review. *Journal of Special Education*, 1973, 7, 423-437.

Passman, R. H. An automatic device for toilet training. *Behavior Research and Therapy,* 1975, 13, 215-220.

Rentfrow, R. F., & Rentfrow, D. K. Studies related to toilet training of the mentally retarded. *American Journal of Occupational Therapy*, 1969, 23, 425-430.

Shearer, M. S., & Shearer, D. E. The Portage Project: A model for early childhood education. *Exceptional Children,* 1972, 39, 210-217.

Smith, P. S., Britton, P. G., Johnson. M. & Thomas, D. A. Problems involved in toilet-training profoundly mentally handicapped adults. *Behavior Research and Therapy*, 1975, 13, 301-307.

Spencer, R. L., Temerlin, M. K., & Trousdale, W. W. Some correlates of bowel control in the profoundly retarded. *American Journal of Mental Deficiency*, 1968, 72, 879-862.

Thompson, T., & Grabowski, J. (Eds.). *Behavior modification of the mentally retarded*. New York, Oxford University Press. 1972.

Tierney, A. J. Toilet training. *Nursing Times*, 1973, 27, 1740-1745.

Van Wagenen, R. K., Meyerson, L., Kerr, N. J., & Mahoney, K. Field trials of a new procedure for toilet training. *Journal of Experimental Child Psychology*, 1969, 8, 147-159(a).

Van Wagenen, R. K., Meyerson, L.., Kerr, N. J., & Mahoney, K. Rapid toilet training: Learning principles and prosthesis. *Proceedings of the 77th Annual Convention of the American Psychological Association,* 1969, 4, 781-782(b).

Vincent, S. A. The mechanics of bladder control. *Ulster Medical Journal*, 1959, 38, 176-187.

Vincent, S. A. Mechanical control of urinary incontinence. *The Lancet*, 1960, August 6, 292-294.

Vincent, S. A. Treatment of enuresis with a perineal pressure apparatus: The irritable bladder syndrome. *Developmental Medicine and Child Neurology*, 1964, 6, 23-31.

Vincent, S. A. Some aspects of bladder mechanics. *Biomedical Engineering*. 1956, 1, 436-445.

Watson, L. S. Application of behaviour shaping devices to training severely and profoundly mentally retarded children in an institutional setting. *Mental Retardation*, 1968, 6, 21-23.

Waye, M. F. & Melnyr, W. T. Toilet training of a blind retarded boy by operant conditioning. *Journal of Behavior Therapy and Experimental Psychology*, 1973, 4, 267-266.

Wiesen, A. E., & Watson, E. Elimination of attention seeking behavior in a retarded child. olof *American Journal of Mental Defiiency,*136, 72, 50-52.

Wright, J. *Comparison of toilet training techniques with Institutionalised retarded children.* Unpublished masters dissertation University of Queensland, 1975.

Yates, A. J. *Behaviour therapy*. New York, Wiley, 1970.

Yoder, J. W. Toilet training the profoundly defective patient at Greene Valley Hospital and School using a S-R reinforcement analysis. *Mind Over Matter*, 1966, 11, 28-34.

Yonovitz, A. An electronic toilet-training device. *Journal of Applied Behavior Analysis*, 1976, 9, 140.

Young, G. C. The treatment of childhood encopresis by conditioned gastroileal reflex

training. *Behavior Research and Therapy*, 1973, 11, 499-503.

## Reference note

Zimmer-Hart, C. L. *An inexpensive, ultra-low current urine alarm*. Unpublished manuscript, 1957. (Available from School of Social Sciences, Flinders University. Bedford Park. S.A.. Australia.)

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