



Persons with multiple disabilities increase adaptive responding and control inadequate posture or behavior through programs based on microswitch-cluster technology

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ABSTRACT

Study I used typical microswitch-cluster programs to promote adaptive responding (i.e., object manipulation) and reduce inappropriate head or head–trunk forward leaning with a boy and a woman with multiple disabilities. Optic, tilt, and vibration microswitches were used to record their adaptive responses while optic and tilt microswitches monitored their posture. The study included an ABB¹AB¹ sequence, in which A represented baseline phases, B represented an intervention phase in which adaptive responses were always followed by preferred stimulation, and B¹ represented intervention phases in which the adaptive responses led to preferred stimulation only if the inappropriate posture was absent. Study II assessed a non-typical, new microswitch-cluster program to promote two adaptive responses (i.e., mouth cleaning to reduce drooling effects and object assembling) with a man with multiple disabilities. Initially, the man received preferred stimulation for each cleaning response. Then, he received stimulation only if mouth cleaning was preceded by object assembling. The results of Study I showed that both participants had large increases in adaptive responding and a drastic reduction in inappropriate posture during the B¹ phases and a 2-week post-intervention check. The results of Study II showed that the man learned to control drooling effects through mouth cleaning and used object assembling to extend constructive engagement and interspace cleaning responses functionally. The practical implications of the findings are discussed.

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1. Introduction

Persons with severe to profound intellectual and multiple disabilities may frequently display inappropriate postures, such as head forward or sideward leaning, and forms of problem behavior, such as hand mouthing or drooling (Kurtz, Boelter, Jarmolowicz, Chin, & Hagopian, 2011; Lancioni, Singh, O'Reilly, & Sigafoos, 2005; LeBlanc, Patel, & Carr, 2000; Matson,

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Minshawi, Gonzalez, & Mayville, 2006; May & Kennedy, 2010; Vrijmoeth, Monbaliu, Lagast, & Prinzie, 2012). The presence of inappropriate postures or problem behaviors in the persons' repertoire may seriously complicate their situation and interfere with their already limited adaptive responding, cause health concerns and injuries, and hamper their social image and their overall acceptance by others (Cooper, 2012; Horowitz, Matson, Hattier, Tureck, & Bamburg, 2013; Lancioni, Singh, O'Reilly, Sigafoos, Oliva, Pidala, et al., 2007; Matson & LoVullo, 2008).

Given the aforementioned complications, the general recommendation for professionals in the education/rehabilitation areas is to apply intervention strategies to curb inappropriate postures and problem behaviors (Ball & Fazil, 2013; Hagopian, Paclawskyj, & Kuhn, 2005; LaVigna & Willis, 2012; Moore, Fisher, & Pennington, 2004; Richman, 2008; Smith & Matson, 2010). The intervention strategies available include, among others, noncontingent stimulation (environmental enrichment) with or without prompting, contingent reinforcement events (e.g., differential reinforcement of other behavior or of alternative behavior), response cost, and programs based on microswitch clusters (Carroll, Rapp, Rieck, & Siewert, 2011; Chowdhury & Benson, 2011; Lancioni et al., 2013; Lindberg, Iwata, Roscoe, Worsdell, & Hanley, 2003; Matson & LoVullo, 2008; Petscher, Rey, & Bailey, 2009; Vogl & Rapp, 2011).

The use of microswitch clusters is based on the recognition that educational/rehabilitation intervention with persons with profound and multiple disabilities needs to encompass the dual goal of reducing negative aspects (i.e., inadequate postures or behaviors) and promoting constructive responding in order to have a positive clinical impact (Lancioni et al., 2006; Lancioni, Singh, O'Reilly, Sigafoos, Didden, Oliva, et al., 2008). Typical programs based on microswitch clusters allow one to (a) monitor concurrently negative aspects and constructive responding, and (b) deliver preferred stimuli automatically on constructive responding occurring in the absence of the negative aspects (Lancioni et al., 2006). For example, a program for a person with hand mouthing or head leaning and inactivity would be set up to monitor both constructive responding (e.g., object manipulation) and hand mouthing or head leaning. Efforts would initially be directed at delivering preferred stimulation for each constructive response, irrespective of whether this occurs in the presence of hand mouthing or head leaning. When the constructive response has consolidated, the program can introduce two variations, that is, (a) constructive responses emitted in the presence of hand mouthing or head leaning would not be followed by preferred stimulation, and (b) the stimulation presented for a constructive response would be interrupted prematurely if hand mouthing or head leaning appears (Lancioni, O'Reilly, et al., 2011; Lancioni, Singh, O'Reilly, Sigafoos, Oliva, Severini, et al., 2007).

A number of studies have been carried out using typical microswitch-cluster programs such as those mentioned above to promote constructive responding and deal with inappropriate postures, such as head leaning or dystonic back arching, and problem behaviors such as hand mouthing and eye poking (Lancioni, Singh, O'Reilly, Sigafoos, Didden, et al., 2009). The results have been generally positive and indicated relevant improvement in the level of constructive responding as well as in the control of the inappropriate posture or problem behavior (Lancioni, Singh, O'Reilly, Sigafoos, Didden, Smaldone, et al., 2008; Lancioni, Singh, O'Reilly, Sigafoos, Oliva, et al., 2008; Lancioni, Smaldone, et al., 2007).

The present two studies were to extend the assessment of microswitch-cluster programs. Study I used typical microswitch-cluster programs to promote constructive responding and reduce inappropriate head or head-trunk forward leaning with a boy with congenital multiple disabilities and a woman with post-coma multiple disabilities including dementia, respectively. Study II assessed a non-typical, new microswitch-cluster program to promote two forms of constructive activity with a man with multiple disabilities. One form consisted of a mouth-cleaning response that was instrumental to reduce the impact of his problem behavior (i.e., drooling). The second form was an object-assembling response, which served to (a) extend the constructive engagement of the participant and (b) allow a largely programmable and functional interval between cleaning responses (i.e., an interval that could ensure successful control of drooling effects and avoid risks of skin irritation and/or inadequate social image; see Lancioni, Singh, et al., 2011). Initially, the participant received stimulation for each cleaning response. When this response was consolidated, the participant received stimulation for the cleaning response only if this was preceded by an object-assembling response.

2. Study I

2.1. Method

2.1.1. Participants

The participants (Kenny and Celine) were 10 and 64 years old, respectively. Kenny was born prematurely and had a diagnosis of congenital encephalopathy with spastic tetraparesis, severe visual impairment due to optic atrophy, epilepsy partially controlled through medication, lack of speech or any other form of communication, lack of interaction with objects, and absence of fecal and urinary control. He was considered to function within the profound intellectual disability range, although no IQ scores were available and no formal testing was possible. He was generally passive and withdrawn, and sat with his head leaning forward. He attended a daily school program in which he was provided with physiotherapy and general stimulation (e.g., music and massage). The main goals for parents and staff were to (a) promote constructive response engagement and thus enhance his level of activity and self-determination, and (b) strengthen his motor condition and help him control his head position. They were highly favorable to the use of the microswitch-cluster program proposed in this study and thought that it could be a helpful component of Kenny's general education package.

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