Enhancing activity engagement in persons with multiple disabilities by adding prompts to contingent stimulation: two single-case studies

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Abstract

The present two single-case studies assessed the use of automatic prompting/encouragement with two adults with extensive multiple disabilities. In both studies, the prompt/encouragement events consisted of one- or two-word statements that followed the stimulation occurring contingent on the activity responses during the intervention phases of the study. Stimulation and prompt/encouragement events were regulated through a technology-aided program. Study I involved an ABCACABC sequence, in which A represented baseline phases, B intervention phases with stimulation contingent on activity responses, and C intervention phases with stimulation and prompt/encouragement statements. Study II involved a CBC sequence. The results of both studies showed improvements in the participants’ performance during the C phases (i.e., the length of the sessions decreased and virtually no guidance from the research assistants was required). Implications of the findings were discussed.

Keywords: Technology-aided programs, Activity engagement, Automatic prompts, Multiple disabilities

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1. Introduction

Persons with severe to profound multiple disabilities are often characterized by limited activity skills and minimal or discontinuous activity engagement with possible behavioral stereotypies (Duker & Schaapeveld, 1996; Lancioni, Campodonico, & Mantini, 1998; Lancioni, O’Reilly, Campodonico, & Mantini, 2001; Lancioni, Singh, O’Reilly, Sigafoos, Oliva, Campodonico et al., 2008). Such a situation is considered largely unsatisfactory for any occupation/rehabilitation center, and efforts have been reported to correct it (Baker, Fox, & Albin, 1995; Lancioni, O’Reilly, Campodonico, & Serenelli, 2000; Davies, Stock, & Wehmeier, 2002; Lancioni, O’Reilly, Singh, Sigafoos, Oliva, Campodonico et al., 2006; Falcomata, Ringdahl, Christensen, & Boelter, 2010). The first essential component of those efforts has been the use of fairly straightforward activities. In general, the activities that the participants were to carry out required simple responses, such as putting away and/or assembling objects (Duker & Schaapeveld, 1996; Lancioni et al., 1998, Lancioni, O’Reilly, & Campodonico, 2002; Wilson, Reid, & Green, 2006; Lancioni et al., 2008). A second basic component of those efforts consisted of the use of preferred stimulation events (e.g., music and songs) contingent on the participants’ performance of those activities (Lancioni et al., 2001; Post & Storey, 2002; Falcomata et al., 2010).

Another variable, which has been frequently included in those efforts, concerned forms of prompting/encouragement (Götestam & Melin, 1990; Lancioni, Dijkstra, O’Reilly, Groeneweg, & Van den Hof, 2000; Lancioni, O’Reilly, Brower-Visser, Groeneweg, Bikker, Flameling et al., 2001; Lancioni et al., 2008; Lancioni, Singh, O’Reilly, Sigafoos, Didden, & Pichierrri, 2010; Sigafoos, Didden, Schlosser, Green, O’Reilly, & Lancioni, 2008; Chang, Wang, & Chen, 2011). This variable has been considered relevant, or even critical, to enhance the participant’s level of attention and improve his or her engagement and continuity of responding (Anson, Todd, & Cassaretto, 2008; Lancioni et al., 2008). For some participants, the use of prompts/encouragements may be a temporary requirement that the motivational power of the contingent stimulation helps to make gradually more redundant and eventually unnecessary (Post & Storey, 2002; Falcomata et al., 2010). For some others, the use of prompts/encouragements may continue to remain a relatively important variable (Shabani, Katz, Wilder, Beauchamp, Taylor, & Fischer, 2002; Gena, 2006). In the latter case, the practical question emerges of how this variable can be accommodated inside a program without being particularly costly for staff while remaining effective for the participants. Over the years, this question has been dealt with through the use of technology-aided programs that could present prompts/encouragements...
in an automatic manner (Lancioni et al., 2008, Lancioni et al., 2010). While the results have been fairly encouraging, new evidence would seem essential to determine the dependability of such an approach (Kazdin, 2001; Kennedy, 2005).

The present two single-case studies represent new efforts to assess the use of automatic prompting/encouragement with two adults with extensive multiple disabilities. In both studies, the prompt/encouragement events were regulated through a technology-aided program that also controlled the occurrence of preferred stimulation contingent on the participant’s responding. The activities available consisted of putting away objects from a sitting and a standing position (Study I) and disassembling and putting away objects from a sitting position (Study II).

2. Study I

2.1 Method

Participant

The participant (Ryan) was 20 years old. He had congenital encephalopathy with total blindness and lack of speech and orientation skills. He was capable of understanding brief praise sentences as well as verbal prompt/encouragement statements, and both of them were used during daily situations. No formal psychological evaluation or IQ scores were available for him, but his functioning had been rated in the severe/profound range of intellectual disability. He attended a center for persons with profound and multiple disabilities and was involved in daily activities dealing with the simple handling of objects (e.g., putting objects into containers). He was reported to have problems of performance discontinuity with breaks in his engagement and stereotypies (e.g., finger playing), but responded to verbal prompts with resumption of his activity. The possibility of helping him acquire a more satisfactory activity engagement was considered important for extending his daily program and improving his social status. His legal representative had provided informed consent for this study, which was approved by a scientific and ethics committee.

Activity, Technology, Stimuli, and Prompts/Encouragements

The activity selected for Ryan consisted of taking familiar objects (e.g., bottles) out of a large container and putting them into two smaller ones. Ryan performed the activity in a sitting position as well as in a standing position. The technology used for the study consisted of optic sensors/microswitches located in the small containers and connected to a computer system. Placing objects into the small containers triggered the sensors/microswitches microswitches and these
in turn activated the computer system. Computer activation led to an 8-s pre-
sentation of preferred stimuli or to the presentation of such stimuli plus a brief
prompt/encouragement statement during the intervention phases of the study
(see below). The stimuli were music and songs. They had been recommended
by Ryan’s staff and selected for the study after a brief stimulus preference
screening procedure. This procedure required that one or two 10-s samples of
each song and music item recommended by staff were presented 15-25 non-
consecutive times. A stimulus was selected if two research assistants who were
working together agreed that the participant alerted, oriented or smiled during
more than half of the presentations. The prompt/encouragement statements con-
sisted of one or two words, which varied within and across sessions, and occurred
immediately after the end of the 8-s stimulation that followed the activity re-
 sponses during the intervention phases of the study. The statement could include
the participant’s name alone or together with an encouragement word or a com-
bination of two encouragement words. Those statements were adopted based on
observations of regular staff’s prompting strategies and their positive effects (i.e.,
participant’s performance resumption) in regular daily situations.

Experimental Conditions

The study was carried out according to an ABCACABC sequence. The A
represented baseline phases, the B intervention phases with stimulation contin-
gent on activity responses, and the C intervention phases with stimulation conti-
tent on activity responses and prompt/encouragement statements attached to
(following) the stimulation events (Barlow, Nock, & Hersen, 2009). Sessions
involved the presence of 20 objects until the second C phase and 24 objects from
there onwards. All objects were to be placed into the small containers available.
Recording concerned (a) the length of the sessions and (b) the number of guidance
instances provided by the research assistants. Response guidance from a research
assistant was available when periods of non-responding of about 40 s occurred.
Interrater reliability was checked in about 15% of the sessions. Single sessions
were rated as agreements if the raters reported (a) duration times differing of 20
s or less (first measure) or (b) the same number of guidance instances (second
measure). The percentage of interrater agreement (computed by dividing the ses-
 sions rated as agreements by the sessions rated as agreements plus those rated as
disagreements and multiplying by 100) exceeded 95 on each of the two measures.

Baseline (A) phases. During these phases, the participant was provided with
the objects and the small containers with the microswitches. Responding was re-
corded, but no stimulation or stimulation plus prompt/encouragement statements
were available during the sessions. The research assistant intervened with guidance
after periods of non-responding as described above (see Experimental Conditions).
**Intervention (B) phases.** Conditions were as in Baseline except that stimulation occurred contingent on the responses, as described above. Each stimulation event lasted 8 s.

**Intervention (C) phases.** Conditions differed from those available during the B phases only with regard to the presence of a brief prompt/encouragement statement at the end of each stimulation event (see above).

### 2.2 Results

Figure 1 summarizes the data for Ryan. The bars represent mean session duration (in minutes) over blocks of sessions throughout the different phases of the study. The number of sessions included in each block/bar is indicated by the numeral above it. The black circles represent mean frequencies of guidance events applied by the research assistants per session, over the aforementioned blocks of sessions. During the first baseline (including 16 sessions), the mean length of the sessions was about 11 min and the mean frequency of guidance events per session was about six. No automatic prompts/encouragements occurred. During the first B phase (40 sessions), the mean length of the sessions approximated 10 min and the mean frequency of guidance events per session was about three. During the first C phase (40 sessions), the mean length of the sessions was below 6 min. The mean frequency of guidance events per session was near zero. The subsequent baseline phase (12 sessions) showed increase in the mean length of the sessions and in the frequency of guidance events. The second C phase (197 sessions) showed data in line with those of the first C phase. The increase in the mean length of the sessions from the second block of the phase was due to the increase in the overall number of objects available in the sessions (i.e., from 20 to 24). The data of the final three phases (i.e., baseline, B phase, and C phase) mirrored the data of the previous corresponding phases.

### 3. Study II

#### 3.1 Method

**Participant**

The participant (Larry) was 36 years old, had congenital encephalopathy with total blindness, lack of orientation skills, and epilepsy, which was partially controlled through medication. He seemed to enjoy a number of environmental stimuli (e.g., music) and praise sentences and also responded to verbal prompt/encouragement statements (see Study I). Psychological reports described him as functioning in the severe/profound range of intellectual disability,
but no IQ scores were available for him. He attended a center for persons with profound and multiple disabilities and was involved in simple daily activities such as assembling or disassembling and putting away objects. He was reported to have problems of performance discontinuity with slowdowns or breaks particularly after the responses, even when preferred stimulation was used contingent on those responses. As in the case of Ryan, staff valued the possibility of helping Larry improve his activity engagement and his social image. They thought that adding prompt/encouragement statements to contingent stimulation events would be an effective strategy for him, given that he was known to respond to such statements. His legal representative had provided informed consent for this study, which was approved by a scientific and ethics committee.

Activity, Technology, Stimuli, and Prompts/Encouragements

The activity selected for Larry consisted of disassembling objects and placing them into two different containers. For example, he was to separate the top from the bottom section of coffee machines and place them in a container to his right and take off the caps from plastic bottles and put them in a container to his left. Larry performed the activity while in a sitting position. The technology used for
detecting the responses and providing the stimuli with or without final prompt/encouragement statements matched that used for Ryan (Study I). The stimuli were music and songs. They had been recommended by Larry’s staff and selected for the study after a brief stimulus preference screening procedure (see Study I). The prompt/encouragement statements were similar to those described for Ryan, and were selected and occurred in the same way as in Study I.

**Experimental Conditions**

The study was carried out according to a CBC sequence, in which the C represented intervention phases with stimulation contingent on activity responses and prompt/encouragement statements attached to the stimulation events, and the B represented intervention with only stimulation contingent on activity responses (Barlow *et al.*, 2009). Sessions involved the presence of 14 objects. All of them were to be disassembled and placed into the containers available. Like in Study I, recording concerned (a) the length of the sessions and (b) the number of guidance instances provided by the research assistants. Response guidance from a research assistant was available during the sessions if periods of non-responding exceeding 1 min occurred. Assessment of and data on interrater reliability matched those of Study I.

**Intervention (C) phases.** During these phases, Larry was provided with the objects and the containers with microswitches. Placing a disassembled object in a container led him to receive a 10-s stimulation period followed by a prompt/encouragement statement (see above). The research assistant intervened with guidance after periods of non-responding as described in the Experimental Conditions.

**Intervention (B) phase.** Conditions differed from those available during the C phases in that prompt/encouragement statements were not available.

### 3.2 Results

Figure 2 summarizes the data for Larry. The bars represent mean session duration (in minutes) over blocks of sessions throughout the phases of the study. The number of sessions included in each block/bar is indicated by the numeral above it. The black circles represent mean frequencies of guidance events applied by the research assistants per session over the aforementioned blocks of sessions. During the C phases (including 56 and 98 sessions), the mean length of the sessions was slightly above 7 min and virtually no guidance events occurred. During the B phase (including 19 sessions), the mean length of the sessions was above 12 min and the mean frequency of guidance events per session was about three.
4. Conclusions

The results of the two studies indicate that adding a brief prompt/encouragement statement to the contingent stimulation was highly beneficial to improve the participants’ activity engagement. These data (a) represent a positive supplement to previous findings in this area and (b) indicate that the prompt/encouragement statement can be accommodated in a socially discrete and respectful way (minimizing the level of negative attention that it could bring into the participant’s engagement context). In light of the results obtained and the design of the two studies, several considerations may be forwarded.

First, the design of Study I was sufficiently articulate to provide convincingly strong evidence as to the impact of the prompt/encouragement variable for promoting activity engagement. The design of Study II was much weaker than the previous one, and the data collected within it could not constitute a definite proof of the fundamental importance or need of the prompt/encouragement variable on its own. Yet, if taken together with the data of Study I, the results of Study II could be considered an important addition in support of the positive role of prompt/encouragement. With regard to this point, one might also argue that the results of Study II were in line with the hypothesis (previous observations) of Larry’s staff who suggested that the use of prompt/encouragement statements could largely solve Larry’s problems of performance discontinuity and breaks (Lancioni et al., 2006; Wilson et al., 2006; Anson et al., 2008; Chang et al., 2011; Faul, Stepensky, & Simonsen, 2012).

Figure 2 - Larry's data plotted as in Figure 1.
Second, the studies did not assess whether the prompt/encouragement statements would be sufficient to enhance the participants’ engagement on their own (i.e., even without the use of positive stimulation contingent on responding). Indeed, the question was not addressed because of two reasons. One reason was that an intervention program with positive stimulation was considered much more desirable than a program without such stimulation. A second reason was that the use of an attractive (motivating) stimulation was thought to be critical to ensure the participants’ responding to a minimal level of prompting. In fact, a simple prompt/encouragement was thought to be effective in readdressing the participant to the activity (from a condition of passivity or stereotypy) also or mainly because activity responding was followed by positive stimulation (Kazdin, 2001; Lancioni et al., 2008, Lancioni et al., 2010; Faul et al., 2012).

Third, the systematic use of prompt/encouragement followed by activity responses and stimulation might strengthen the connection between the first two components of the sequence and thus the critical role of the prompt/encouragement component (Kazdin, 2001). Although this aspect (i.e., this form of prompt/encouragement dependence) could be considered with some concern, one might also argue that the availability of the prompt/encouragement can be easily ensured (i.e., without staff costs) within computer-aided programs (Lancioni et al., 2008; Chantry & Dunford, 2010; Reichle, 2011; Ripat & Woodgate, 2011). Moreover, the prompt/encouragement can be presented within such programs in a fairly inconspicuous, socially respectful manner (i.e., as it was done in the two studies reported).

Fourth, the availability of computer-aided programs becomes an increasingly more important resource for promoting successful occupation with persons like the participants of the present studies. Indeed, these persons could hardly be expected (a) to achieve independent (totally self-determined) engagement and (b) to obtain high levels of staff supervision over long periods of the day. Computer-aided programs can ensure that they receive the necessary support to (a) perform activities that allow them to be constructively busy with material appropriate for their age, (b) increase their sensory input and enjoy such input with possible benefits for their general mood, and (c) improve their overall appearance (social status) (Friedman, Wamsley, Liebel, Saad, & Eggert, 2009; Helm, 2000; Brown, Schalock, & Brown, 2009; Jumisko, Lexell, & Söderberg, 2009; Sunderland, Catalano, & Kendall, 2009; Scherer, Craddock, & Mackeough, 2011). The programs available in the present studies were particularly simple and inexpensive. In fact, they only included basic optic microswitches for monitoring the activity responses and a computer system to regulate auditory stimulation events and prompt/encouragement statements. More complex
programs may need to be available when response monitoring is more difficult and when the stimulation or prompt/encouragement events are not simply auditory/verbal and need to be emitted by sources other than the computer system (Baker & Moon, 2008; Lancioni et al., 2008; Borg, Larson, & Östegren, 2011; Chantry & Dunford, 2010; Shih & Shih, 2010; Reichle, 2011; Shih, 2011).

Fifth, new research in this area could focus on (a) replication studies with new patients to determine the generality of the present findings, (b) identification and development of additional computer-aided programs (i.e., technology solutions to monitor responding, provide stimulation, and regulate prompt/encouragement events), and (c) implementation of social validation assessments, in which care and rehabilitation personnel could be asked to rate the participants’ performance with computer-aided programs, their performance with staff supervision, and their time without programmed activities (Kennedy, 2005; Callahan, Henson, & Cowan, 2008; Barlow et al., 2009; Lancioni, Sigafoos, O’Reilly, & Singh, 2012).

References


