Life Span and Disability XVI, 1 (2013), 7-20

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

Giulio E. Lancioni[1], *Nirbhay N. Singh*[2], *Mark F. O'Reilly*[3], *Jeff Sigafoos*[4], *Gloria Alberti*[5], *Doretta Oliva*[6], *Adele Boccasini*[7], *Maria L. La Martire*[8], *Serafino Buono*[9] & *Grazia Trubia*[10]

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

Received: March 01, 2013, *Accepted:* May 15, 2013.

[1] University of Bari, Italy. E-mail: g.lancioni@psico.uniba.it
[2] American Health and Wellness Institute, Raleigh, NC, USA. E-mail: nirbsingh52@aol.com
[3] Meadows Center for Preventing Educational Risk, University of Texas at Austin, TX, USA. E-mail: markoreilly@mail.utexas.edu
[4] Wellington Victoria University, New Zealand. E-mail: jeff.sigafoos@vuw.ac.nz
[5] Lega F. D'Oro Research Center, Osimo, Italy. E-mail: glorya84@hotmail.com
[6] Lega F. D'Oro Research Center, Osimo, Italy. E-mail: oliva.d@legadelfilodoro.it
[7] Lega F. D'Oro Research Center, Osimo, Italy. E-mail: adele.boccasini@alice.it
[8] Lega F. D'Oro Research Center, Osimo, Italy. E-mail: marialuisa.lamartire@virgilio.it
[9] Unit of Psychology, IRCCS Oasi Maria SS. Troina, Italy. E-mail: fbuono@oasi.en.it
[10] Unit of Psychology, IRCCS Oasi Maria SS. Troina, Italy. E-mail: gtrubia@oasi.en.it

Correspondence to: G. E. Lancioni, Department of Neuroscience and Sense Organs, University of Bari, Via Quintino Sella 268, 70100 Bari, Italy.

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, & Wehmeyer, 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, & Pichierri, 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 presentation 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 consisted 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 responses during the intervention phases of the study. The statement could include the participant's name alone or together with an encouragement word or a combination 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 contingent on activity responses, and the C intervention phases with stimulation contingent 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 sessions 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 recorded, 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.

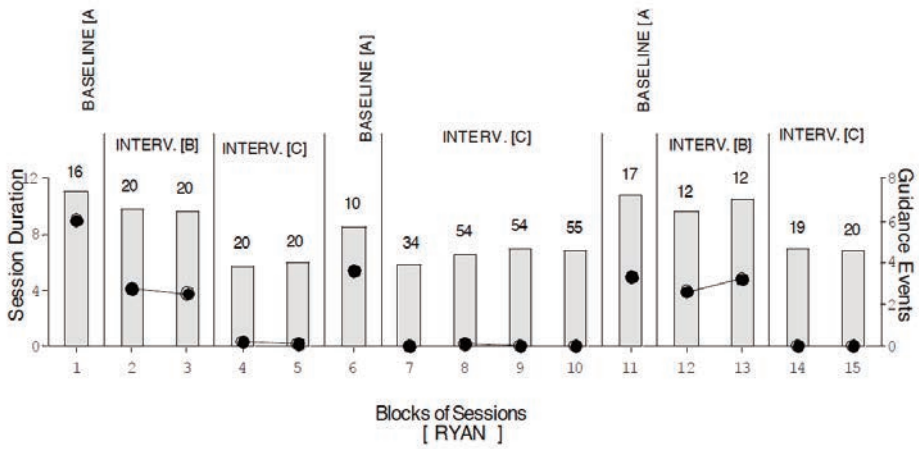
3. Study II

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,

Figure 1- *Ryan data. 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.*



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.

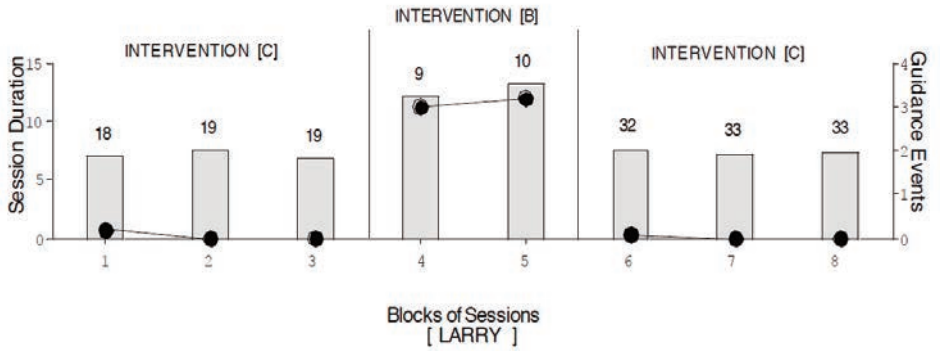
Intervention (C) phases. During these phases, Larry was provided with the objects and the containers with microswitches. Placing a disassembled object in a container led him to receive a 10-s stimulation period followed by a prompt/encouragement statement (see above). The research assistant intervened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

Figure 2 - *Larry's data plotted as in Figure 1.*



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).

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, & Mackeogh, 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

Anson, H. M., Todd, J. T., & Cassaretto, K. J. (2008). Replacing overt verbal and gestural prompts with unobtrusive covert tactile prompting for students with autism. *Behavior Research Methods, 40,* 1106-1110.

Baker, P. M., & Moon, N. W. (2008). Wireless technologies and accessibility for people with disabilities: Findings from a policy research instrument. *Assistive Technology, 20,* 149-156.

Baker, D. J., Fox, J., & Albin, R. W. (1995). Staff support strategies to increase the involvement of individuals with disabilities in mean preparation. *Behavioral Interventions, 10,* 197-210.

Barlow, D. H., Nock, M., & Hersen, M. (2009). *Single-case experimental designs: Strategies for studying behavior change* (3rd ed.). New York: Allyn & Bacon.

Borg, J., Larson, S., & Östegren, P. O. (2011). The right to assistive technology: For whom, for what, and by whom? *Disability and Society, 26,* 151-167.

Brown, R. I., Schalock, R. L., & Brown, I. (2009). Quality of life: Its application to persons with intellectual disabilities and their families – introduction

and overview. *Journal of Policy and Practice in Intellectual Disabilities, 6,* 2-6.

Callahan, K., Henson, R., & Cowan, A. K. (2008). Social validation of evidence-based practices in autism by parents, teachers, and administrators. *Journal of Autism and Developmental Disorders, 38,* 678-692.

Chang, Y. J., Wang, T. Y., & Chen, Y. R. (2011). A location-based prompting system to transition autonomously through vocational tasks for individuals with cognitive impairments. *Research in Developmental Disabilities, 32,* 2669-2673.

Chantry, J., & Dunford, C. (2010). How do computer assistive technologies enhance participation in childhood occupations for children with multiple and complex disabilities? A review of the current literature. *The British Journal of Occupational Therapy, 73,* 351-365.

Davies, D. K., Stock, S. E., & Wehmeyer, M. L. (2002). Enhancing independent time-management skills in individuals with mental retardation using a palmtop personal computer. *Mental Retardation, 40,* 358-365.

Duker, P. C., & Schaapeveld, M. (1996). Increasing on-task behavior through interruption-prompting. *Journal of Intellectual Disability Research, 40,* 291-297.

Falcomata, T. S., Ringdahl, J. E., Christensen, T. J., & Boelter, E. W. (2010). An evaluation of prompt schedules and mand preference during functional communication training. *The Behavior Analyst Today, 11,* 77-84.

Faul, A., Stepensky, K., & Simonsen, B. (2012). The effects of prompting appropriate behavior on the off-task behavior of two middle school students. *Journal of Positive Behavior Interventions, 14,* 47-55.

Friedman, B., Wamsley, B. R., Liebel, D. V., Saad, Z. B., & Eggert, G. M. (2009). Patient satisfaction, empowerment, and health and disability status effects of a disease management-health promotion nurse intervention among Medicare beneficiaries with disabilities. *The Gerontologist, 49,* 778-792.

Gena, A. (2006). The effects of prompting and social reinforcement on establishing social interactions with peers during the inclusion of four children with autism in preschool. *International Journal of Psychology, 41,* 541-554.

Götestam, K. G., & Melin, L. (1990). The effect of prompting and reinforcement of activity in elderly demented inpatients. *Scandinavian Journal of Psychology, 31,* 2-8.

Helm, D. T. (2000). The measurement of happiness. *American Journal on Mental Retardation, 105,* 326-335.

Jumisko, E., Lexell, J., & Söderberg, S. (2009). The meaning of feeling well in people with moderate or severe traumatic brain injury. *Journal of Clinical Nursing, 18,* 2273-2281.

Kazdin, A. E. (2001). *Behavior modification in applied settings* (6th ed.). New York: Wadsworth.

Kennedy, C. (2005). *Single case designs for educational research*. New York: Allyn & Bacon.

Lancioni, G. E., Campodonico, F., & Mantini, M. (1998). An automatic prompting system for improving the performance of a woman with multiple disabilities. *Scandinavian Journal of Behaviour Therapy, 27,* 145-148.

Lancioni, G. E., Dijkstra, A. W., O'Reilly, M. F., Groeneweg, J., & Van den Hof, E. (2000). Frequent versus nonfrequent verbal prompts delivered unobtrusively: Their impact on the task performance of adults with intellectual disability. *Education and Training in Mental Retardation and Developmental Disabilities, 35,* 428-433.

Lancioni, G. E., O'Reilly, M. F., Brower-Visser, G., Groeneweg, J., Bikker, B., Flameling, T., & Van den Hof, E. (2001). Frequent versus nonfrequent prompts and task performance in persons with severe intellectual disability. *Scandinavian Journal of Behaviour Therapy, 30,* 134-139.

Lancioni, G. E., O'Reilly, M. F., & Campodonico, F. (2002). Promoting fluency of performance of self-help tasks with a person with multiple disabilities. *Behavioral Interventions, 17,* 15-20.

Lancioni, G. E., O'Reilly, M. F., Campodonico, F., & Mantini, M. (2001). Promoting performance fluency in a person with profound intellectual disability and blindness. *Behavioural and Cognitive Psychotherapy, 29,* 373-377.

Lancioni, G. E., O'Reilly, M. F., Campodonico, F., & Serenelli, S. (2000). Use of anticipatory cues to reduce dependence on physical prompts by an adolescent with multiple disabilities. *Scandinavian Journal of Behaviour Therapy, 29,* 43-47.

Lancioni, G. E., O'Reilly, M. F., Singh, N. N., Sigafoos, J., Oliva, D., Campodonico, F., & Piazzolla, G. (2006). Promoting fluency of performance during morning dressing by two persons with multiple disabilities. *Perceptual and Motor Skills, 103,* 771-777.

Lancioni, G. E., Sigafoos, J., O'Reilly, M. F., & Singh, N. N. (2012). *Assistive technology: Interventions for individuals with severe/profound and multiple disabilities*. New York: Springer.

Lancioni, G. E., Singh, N. N., O'Reilly, M. F., Sigafoos, J., Didden, R., & Pichierri, S. (2010). Automatic prompting and positive attention to reduce tongue protrusion and head tilting by two adults with severe to profound intellectual disabilities. *Behavior Modification, 34,* 299-309.

Lancioni, G. E., Singh, N. N., O'Reilly, M. F., Sigafoos, J., Oliva, D., Campodonico, F., & Groeneweg, J. (2008). Assisting persons with multiple disabilities to move through simple occupational activities with automatic prompting. *Research in Developmental Disabilities, 29,* 439-446.

Post, M., & Storey, K. (2002). Review of using auditory prompting systems with persons who have moderate to severe disabilities. *Education and Training in Mental Retardation and Developmental Disabilities, 37,* 317-327.

Reichle, J. (2011). Evaluating assistive technology in the education of persons with severe disabilities. *Journal of Behavioral Education, 20,* 77-85.

Ripat, J., & Woodgate, R. (2011). The intersection of culture, disability and assistive technology. *Disability and Rehabilitation: Assistive Technology, 6,* 87-96.

Scherer, M. J., Craddock, G., & Mackeogh, T. (2011). The relationship of personal factors and subjective well-being to the use of assistive technology devices. *Disability and Rehabilitation, 33,* 811-817.

Shabani, D. B., Katz, R. C., Wilder, D. A., Beauchamp, K., Taylor, C. R., & Fischer, K. J. (2002). Increasing social initiations in children with autism: Effects

of a tactile prompt. *Journal of Applied Behavior Analysis, 35,* 79-83.

Shih, C. H. (2011). Assisting people with developmental disabilities to improve computer pointing efficiency through multiple mice and automatic pointing assistive programs. *Research in Developmental Disabilities, 32,* 1736-1744.

Shih, C. H., & Shih, C. T. (2010). Development of an integrated pointing device driver for the disabled. *Disability and Rehabilitation: Assistive Technology, 5,* 351-358.

Sigafoos, J., Didden, R., Schlosser, R., Green, V. A., O'Reilly, M. F., & Lancioni, G. E. (2008). A review of intervention studies on teaching AAC to individuals who are deaf and blind. *Journal of Developmental and Physical Disabilities, 20,* 71-99.

Sunderland, N., Catalano, T., & Kendall, E. (2009). Missing discourses: Concepts of joy and happiness in disability. *Disability and Society, 24,* 703-714.

Wilson, P. G., Reid, D. H., & Green, C. W. (2006). Evaluating and increasing in-home leisure activity among adults with severe disabilities in supported independent living. *Research in Developmental Disabilities, 27,* 93-107.