High-probability instructional sequence and building compliance with instructions of a child with autism

Abstract

Compliance with instructions is commonly described as one of the key pre-requisites for social, and academic skills acquisition and social inclusion. This text critically examines different approaches to building compliance with focus on instructional control. The high-probability instructional sequence was evaluated in relation to its effectiveness in building and maintaining compliance with low-probability instructions in a child with autism. Fictitious evaluation of the use of high-probability instructional sequence is presented including a suggested graphical representation of results. Results showed that compliance with low-p requests was higher if a low-p request was preceded by a sequence of three high-p requests. Ethical considerations of the use of the reversal design are discussed.

Compliance and instructional control

Compliance with instructions, as noted by Borgen et al. (2017) is an essential skill for children with ASD to be able to meaningfully engage in learning, social activities and maintain safety. At the same time, problem behaviour resulting from non-compliance hinders learning not only in intensive teaching sessions but also in the child's natural environment and may also put the children in greater risk of more restrictive placements and long-term dependence on others in general (Esch & Fryling, 2013). Borgen et al. (2017) define compliance as an example of stimulus control in which stimulus (instruction) "*acquires the capacity to reliably occasion* *response specified in the instruction*" (p. 831). And non-compliance has been described by Stephenson and Hanley (2010) as a situation in which a child does not complete instructions.

According to Skinner (1969 in Falcolmata et al., 2008), there are two ways to acquire certain (desirable) behaviour, either through direct contact with environmental contingencies, i.e. contingency-shaped behaviour or through verbal descriptions of environmental contingencies, i.e. rule-governed behaviour or instructional control. In the following text, we will focus on building and maintaining instructional control.

With instructional control the behaviour is under the control of verbal stimuli (instructions). The ability to follow instruction is a key skill predicting not only readiness for school but also the ability to initiate and follow educational and social activities (Borgen et al., 2017; Stephenson & Hanley, 2010). Therefore, it is a vital skill for both learning and social inclusion. Furthermore, this skill is socially desirable and contacts naturally occurring consequences, i.e. social praise or access to reinforcers based on compliance with instructions (Cooper, Heron & Heward, 2014).

Instructional control over behaviour has its strengths as well as weaknesses as noted by Falcomata et al. (2008). One of the outcomes that is perceived as both, disadvantage - when compared to contingency-shaped behaviour - and advantage - in situations when "*natural consequences are weak or when consequences are likely to produce undesirable behaviour*" – is insensitivity to changes in contingencies (Joyce & Chase, 1990). In this respect, instructional control appears to be an effective way to acquire and maintain appropriate behaviour (Falcomata et al., 2008), i.e. to establish so called behavioural momentum Nevin (1996).

In literature we can find a solid body of research proving the efficacy of different approaches to establishing and maintaining compliance with instructions: positive reinforcement, timeout, escape extinction, social punishment, time-out, guided or errorless compliance and the use of high-probability instructional sequence (Doleys et al., 1976; Borgen et al., 2017; Rortvedt & Miltenberger, 1994). As noted by Borgen et al. (2017), while being efficient, some of the procedures bear practical and ethical considerations as well, such as being time-consuming or impractical or employing aversive procedures causing either emotional distress or even pain. To this point, Vargas (2013) adds that punishment never builds behaviour, therefore, we shall always prefer positive practice.

From the above listed approaches, we decided to employ the use of high-probability instructional sequence to increase compliance with instructions in both intensive teaching and natural environment teaching sessions. This approach is one form of antecedent modifications involving "*issuing a sequence of high-probability (high-p) requests immediately prior to a low-probability (low-p) requests*" (Rortvedt & Miltenberger, 1994: 327). The use of high-p requests establishes behavioural momentum that persists when low-p requests are presented (Mace, 1988). Some researchers perceive the high-p sequence functioning as an abolishing operation decreasing the reinforcing value of non-compliance (Esch & Fryling, 2013).

A number of researches focused on comparison of the use of high-p requests with other approaches to building compliance and experimentally verified its efficiency. Mace et al. (1988) successfully used this procedure to increase compliance with low-p requests such as "take shower" for adults with intellectual disabilities. These low-p requests were preceded by a sequence of high-p requests such as "give me five". This finding is supported by later research by Borgen et al. (2017) using high-probability sequences after the therapist had been paired with reinforcement. The compliance with low-p requests increased from 9% to 58%. The research of Esch and Fryling (2013) further enriches the understanding of the effectiveness of the procedure. They state that the compliance with low-p tasks is higher in leisure high-p conditions (e.g. increase of compliance from 13% to 73% on "Put all your trucks into basket" request). The researchers further stipulate that the higher rate of compliance might be due to topographical similarity between high-p and low-p requests.

Despite sound research evidence, however, the effectiveness of the high-probability instructional sequence is not universal. Rortvedt and Miltenberger (1994) evaluated the use of this sequence for typically developing children and concluded that it was effective in 50% of the cases (N=2). And Zarcone et al. (1994), to build instructional control with children engaging in self-injurious behaviour, had to couple the procedure with extinction of SIB.

Method

Subject and setting

The subject of the evaluation is an 8-year old boy who had been diagnosed with autism and had a history of low compliance and non-compliance with instruction issued by parents or therapists in both home and school setting. We have a sound evidence based on behavioural interview and observations that the function of the behaviour is escape from demand.

The implementation and evaluation of the intervention will place at the subject's home where his therapy sessions usually take place.

Target behaviour and intervention

The target behaviour is compliance with high-probability and low-probability instructions. The **dependent variable** is compliance with instructions defined as initiation of the requested activity within 5 seconds from the request being posed and completion of the task within 15 s of initiation.

The **independent variable** (intervention), based on research evidence analysed above, is the use of high-probability instructional sequence.

Experimental Design

We will use a A-B-A-B reversal within-subject design (A = baseline, B = high-p sequence) which Cooper, Heron and Heward (2015) consider to be *"the most straightforward and generally most powerful within-subject design for demonstrating functional relation between environmental manipulation and behaviour"* (p. 197). We will extend the A-B-A design with repeated reversal (i.e. the intervention is withdrawn and reintroduced again) to gather more convincing demonstration of the functional relation. The design has the following phases: (A) an initial baseline in which the independent variable is not present; (B) treatment phase during which independent variable (intervention) is present; (A) return to the baseline condition, withdrawal of the intervention; (B) reintroduction of the independent variable. The design combines "*intra-subject experimental elements of prediction, verification and replication*" (Cooper, Heron & Heward, 2015: 199), which enables us to provide a clear proof of the existence (or absence) of functional relation between intervention (independent variable) and behaviour (dependent variable). Furthermore, the A-B-A-B design is not susceptible to confounding by sequence effect, which is a great threat with multiple treatment reversal design.

Procedure

Prior to baseline, a list of 12 high-p and 12 low-p instructions will be prepared in cooperation with caregivers and based on behavioural interview and observations. In accordance with Rortvedt and Miltenberger (1994), high-p instructions are simple, one-step requests with which the child immediately complies. Low-p requests are tasks which the child can complete within 30s, but the caregivers report that the s/he frequently refuses to comply.

Baseline. During baseline the caregiver or therapist will establish eye contact with the child and then deliver 5 low-p requests (put the car to the box, put the jacket on, etc.) from the list. Each low-p task will be requested only once, compliance (i.e. compliance initiated within

5 s and task finished to completion) will be followed by non-specific verbal praise (Good work!"). Non-compliance (i.e. compliance not initiated within 5 s or task not finished to completion) will be ignored. The time delay between requests will be 30 s to 2 min, depending on the length of the task.

High-p instructional sequence. In each trial, the caregiver or therapist will issue 3 high-p requests, each 5 s apart. If the child complies with 3 consecutive high-p requests, one low-p request is presented. Compliance with both high-p and low-p requests is followed by non-specific verbal praise ("Good work", "Well done."). Non-compliance is ignored. If the child fails to comply to the third high-p request, another high-p request is issued, until the child complies to it. Consequently, low-p request is issued.

Data collection

Independent observer will record the child's behaviour following the request for 60 s or until the task is completed by the child. If compliance with request is initiated within 5 s and task finished to completion, the observer records "+" to the data sheet. Non-compliance, i.e. behaviour not initiated within 5 s or task not finished to completion, is recorded as "-" in the data sheet. The compliance is calculated as percentage compliance for each phase (baseline and treatment). The percentage is calculated as follows: no. of trials with compliance / total no. of trials x 100.

Data display

Precise graphical representation of data is crucial for determination of cause-effect significance of the intervention, overlap and consistency of data (Bailey and Burch, 2018). For the graphical display of our data, a simple line graph will be used. The dependent variable will be displayed on the vertical axis. The dimension of the dependent variable displayed on the vertical axis will be the calculated percentage compliance per session during baseline and high-p instructional sequence. The horizontal axis will represent the passage of time.

Furthermore, the graph will contain condition change lines along the horizontal axis. These lines indicate points in time when changes in independent variable occurred. Data points (quantifiable measures of the target behaviour) will be connected to form a data path which indicates the level and trend of the behaviour. This is the primary source of data for interpretation and analysis of the data (Cooper, Heron & Heward, 2014).

Example of graphical display of data

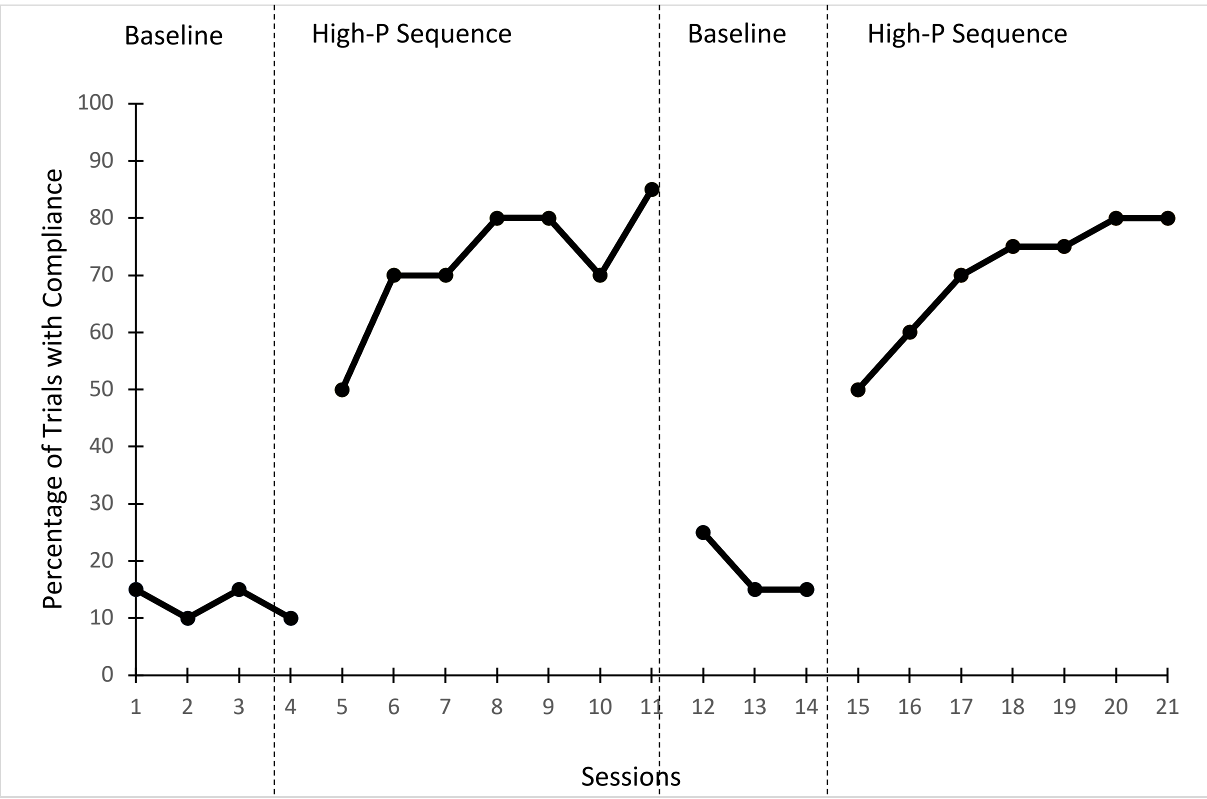

Figure 1. Percentage of compliance with low-p requests during baseline and high-p instructional sequence followed by low-p requests during treatment session.

Ethical consideration

Reversal design allows the therapist to evaluate the effectiveness of the treatment and base any decision-making on reliable data, which is an ethical responsibility of a behaviour analyst (Bailey & Burch, 2005). The greatest ethical concern when using reversal design is related to withdrawing of an effective intervention. Within this design, independent variable, which may be an effective intervention, is withdrawn and the improved behaviour deteriorates to the baseline levels and only after that the intervention is reintroduced (Cooper, Heron & Heward, 2014). Therefore, the reversal design is a serious ethical consideration for evaluation of interventions aiming at severe problem behaviour, such as dangerous or self-injurious behaviour. Alternating treatment design not requiring withdrawal of the intervention, despite the threat of the sequencing effect, might be more appropriate in such cases.

Furthermore, from educational perspective, reversal design is considered by some researchers as causing substantial instructional time loss. To this point, Cooper, Heron and Heward (2014) recommend to keep the reversal conditions brief to minimize the time loss.

To conclude this ethical section, Cooper, Heron and Heward (2014) also voice the concern that the behavioural improvement may not be achieved again after the reintroduction of the intervention. However, there is no strong research evidence for this concern, as the authors themselves noted.

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