

An ABA-based Intervention Package for Treating the Inappropriate Use of a Communication Device Within Autistic Populations

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abstract

The principles of applied behaviour analysis (ABA) are widely used with autistic populations in managing challenging behaviour. The following paper will review supporting literature for creating a treatment package for targeting the misuse of a communication device in brief detail by using key elements in ABA. It will examine various types of attention (or response) that may reinforce the problem behaviour, as well as intervention methods, such as functional communication training and noncontingent reinforcement. In addition, the necessity of extinction for effective intervention will be considered. A review of the literature may help inform the development of a successful treatment package that could be implemented within applied settings. Additional desirable outcomes include: reduction in aberrant behaviour, accessing attention appropriately, establishing the correct use of the communication device and increase in manding levels.

Keywords: functional communication training, noncontingent reinforcement, establishing operations, mand selection

Children with autism display substantial social, communicative and behavioural problems (Volkmar, Lord, Bailey, Schultz & Klin, 2004). Augmentative and alternative communication (AAC) devices are frequently used by autistic populations, as recent estimates suggest that between 25 and 61 per cent of individuals with Autism Spectrum Disorders are functionally non-verbal (Went, 2006). These AAC systems, if used properly, allow

individuals with autism to express themselves so that they can be understood by others, and, as such, can enhance the quality of their lives. Unfortunately, misuse of AAC devices is common, and problematic behaviour can arise when autistic individuals attempt to access attention from others through frequent inappropriate use of such devices (Hodge, 2007). Consequently, the main focus of this review is to provide evidence from various methods of applied behavioural analysis that could enhance communication strategies, and improve the use of AAC devices among autistic populations.

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Applied behaviour analysis (ABA) is the science derived from the principles of behaviourism that provides a framework for improving socially significant behaviours, such as social skills, independent living skills, communication and decreasing challenging behaviours (Cooper, Heron, & Heward, 2007). ABA focuses on events that are observable and testable (Johnston & Pennypacker, 1993; McReynolds & Kearn, 1983) and relies on data that are objective, reliable, and quantifiable (Poling, Methot, & LeSage, 1995) to draw conclusions about relationships between those events. It is important to note, that ABA should not be equated with a specific type of programme delivery but viewed as a foundation for the practice of a science from which teaching methods and educational programmes are constructed (Psychological Society of Ireland, 2010). Various ABA principles include (among others): positive and negative reinforcement, time out, extinction, and functional communication training. Currently, ABA-based interventions are viewed as the most efficacious psychosocial treatment for autism (Lilienfeld, 2005; Sturmey, 2000).

As an illustrative case, this review will explore ABA methods that could be adapted for use with a non-verbal 10-year-old boy with a diagnosis of autism. This individual (a case study) engages in attention-maintained aberrant behaviour by not using the ACC device "Go Talk 20+" functionally, but instead in a toy like manner, as icons are being pressed randomly and excessively. At present, he has no fluently established communication method. According to the Verbal Behaviour Milestones Assessment and Placement Program (Sundberg, 2008), his manding abilities are at level 1 (0-18 months). Manding refers to asking or requesting desired items (Skinner, 1957).

Being able to use an ACC device appropriately, such as "Go Talk 20+", would allow this individual to produce over 100 messages through voice output by pressing icons, which include requesting desired items, answering questions, learning concepts (e.g. colours, shapes) and many more. Full comprehension of the communication device can expand independence and help interaction with

others, by giving more suitable ways for gaining access to attention from others or request removal from aversive situations and stimuli (Hodge, 2007). An AAC device is also a good method for pairing images with sounds, which strengthens perceptual learning (Shams & Seitz, 2008).

Topographies of Attention

Firstly, it is important to look at various topographies of attention that could maintain the undesirable behaviour. Gaining attention from others is one of the possible functions of the behaviour and is categorised as a social positive reinforcement. Challenging behaviour often receives immediate reaction (i.e. inappropriate attention) from others in a form of reprimands, statements related to behaviour, laughing, head turns etc. Problematic behaviour can occur when the individual has not learnt to access attention in a more desirable way, when the attention is infrequent, when others in the environment are occupied, or because it is better to obtain attention through reprimands or punishment, than receive no attention at all (Cooper et al., 2007). Therefore, aberrant behavior may be functioning as a method of communication for the individual.

Kodak, Northup, and Kelley (2007) evaluated the influence of six forms of attention: verbal reprimands, physical touch (e.g. tickles hugs, etc.), praise, eye contact, facial expressions, and unrelated comments in two children exhibiting aberrant behaviour. Results indicated that problem behaviour occurred at the highest rates in the vocal attention conditions involving reprimands and unrelated comments. The lowest percentage of problem behaviour was observed in the physical attention and the eye contact sessions.

Based on this research, it is crucial to identify the most reinforcing form(s) of attention as various types of attention have different effects on aberrant behaviour. Providing access to the most preferred type of attention contingent on desired behaviour would benefit any treatment package by increasing the value of the reinforcement (Kodak et al., 2007).

Functional Communication Training

Functional communication training (FCT) focuses on replacing the problem behaviour with a more appropriate alternative response (i.e. mand) that would lead to reinforcement and access to a desired item. FCT is a widely used intervention method and numerous studies have demonstrated its effectiveness in reducing problem behaviour maintained by social reinforcement (Tiger, Hanley, & Bruzek, 2008) and in improving communication skills (Carr & Durand, 1985).

Schieltz et al. (2011) investigated additional possible indirect benefits of FCT as applied to the use of AAC devices. The study successfully demonstrated positive changes in non-targeted disruptive behaviours by applying FCT only to destructive behaviours. The results illustrated improved effectiveness of AAC devices, while employing FCT, in reducing the levels of non-targeted behaviours to a similar level with the behaviours directly targeted during FCT treatment.

Furthermore, numerous studies have confirmed that individuals with autism, across the range of ability, can learn to use AAC for functional communication (Mirenda, 2003). Research has demonstrated success in teaching individuals with autism to make a generalized "want" request (Sigafoos & Drasgow, 2001), requests for desired items such as drink (Dyches, 1998) or preferred activities (Brady, 2000), and respond to questions and make social comments (Schepis, Reid, Behrmann, & Sutton, 1998). Research from FCT also demonstrates that children may engage in manding as it requires less effort than exhibiting challenging behaviours (Richman, Wacker & Winborn, 2001).

Establishing Operations

Establishing Operations (EO) are factors that can increase the value of the reinforcement and can be compared to motivation or desirability (Skinner, 1957). Brown et al. (2000) evaluated the effects of FCT in the presence and absence of EO. Four children with developmental disabilities participated in the study. The

investigation began with identifying the function of the problem behaviour, followed by FCT using an alternating treatments design, i.e. that rapidly alternates between distinct treatments. It consisted of three settings: EO-present, EO-absent, and a control condition involving free-play where no intervention was implemented. Two different mands across two different settings were used in the treatment conditions. The first condition involved mands that were functionally matched to the problem behaviour and the presence of EO whereas the second condition comprised of irrelevant mands and the absence of EO. All selected mands were already in the child's repertoire. The appropriated mand led to reinforcement in the form of attention, tangibles (e.g., edibles, toys, activities, etc.) or a break, whereas problem behaviour resulted in extinction or brief time-out in both conditions. Results clearly indicated that the presence of the EO during FCT leads to a decrease in the aberrant behaviour and increases appropriate manding.

Therefore, EO should be taken into consideration when introducing AAC to clients due to an increase in appropriate manding. For a successful acquisition, it is vital to begin the teaching with requesting for concrete, highly desirable items that can be provided immediately (Frost & Bondy, 2002).

Brown et al. (2000) highlighted the importance of EO, but because FCT was combined with punishment, the authors could not determine whether the presence of EO alone would have led to improvements, nor if functional equivalence was responsible for successful treatment. In addition, the authors suggested that some mands may not be acquired simply through skills training, as there was a prolonged prior pairing history with reinforcement and the response cost². Therefore, the type of mands that are most suitable for an effective FCT treatment package remains unclear.

Mand Selection

² Response cost or negative punishment is another way to make behaviour less frequent. It occurs when a stimulus is taken away as a consequence of behaviour and the effect is to reduce the frequency of the behaviour.

Winbom, Wacker, Riehman, Asmus, and Geier (2002) focused specifically on mand selection using FCT. They compared the effectiveness of using already existing mands, such as saying “no”, “all done,” or shaking his head from side to side, with novel ones like pressing a micro-switch with the message, “Break, please” or handing the therapist a communication card with the word “break”, which could be used to replace the problem behaviour. There were two participants with developmental disabilities, both between two and three years of age. The experiment consisted of three phases: functional analysis (FA); training the existing and novel mands using differential reinforcement of alternate behaviour (DRA - where desirable substitute to problem behaviour is reinforced); and choice analysis. In addition, the problem behaviour was placed under extinction by discontinuing the previous reinforcement of the behaviour. Substantial increases in independent manding were observed after the initial mand training. Overall, results revealed that both mands were effective in suppressing the aberrant behaviour and were exhibited independently after the training sessions (where DRA was implemented alongside extinction). Nevertheless, when both existing and novel mands were presented concurrently in the choice analysis, the preference towards existing mands was more frequent than for novel ones.

However, it is important to note that the preference for existing mands was associated with lower levels of manding and higher percentages of aberrant behaviour, which was possibly related to prior reinforcement history. Furthermore, reduced response cost may have affected mand preference as well. Thus, the long-term maintenance of treatment effects may be compromised if former relations between existing mands and problem behaviour are not taken into consideration (Winbom et al. 2002). In contrast, other research indicates that novel mands may be equally effective, and may also reduce the incidence of problem behaviour (Winborn-Kemmerer, Ringdhal, Wacker, & Kitsukawa, 2009) making it applicable to AAC. Moreover, manding via AAC devices can be considered as an introduction of novel mands that possibly lead to an

increase in requesting skills and suppress challenging behaviours.

Other research has attempted to clarify optimal mand selection through using the reinforcement of multiple manding topographies simultaneously during FCT (Winborn-Kemmerer, Wacker, Harding, Boelter, Berg & Lee, 2010). The mands selected were either novel or existing ones. The effects were examined in two preschool-age children with developmental disabilities. Attention was the reinforcer for problem behaviour for one of the participants. A concurrent schedules design was implemented for the FCT. The mands were then assessed comprising of two different stimulus conditions using a reversal ABAB design, i.e. entailing an initial baseline phase (A), intervention phase (B), reversal by removing the intervention (second A) and re-introducing the intervention to replicate treatment effects (second B). Stimulus conditions involved either the presence or absence of a novel manding tool such as a communication card. Results showed that during FCT, aberrant behaviour was suppressed and participants used the novel mand more frequently. In addition, problem behaviour remained low across both stimulus conditions, as children used other means for appropriate communication when the card was not present.

The findings from this study (Winborn-Kemmerer et al., 2010) differ from those reported in Winbom et al. (2002) as a clear preference towards novel mands was indicated and, furthermore, there was no correlation between existing mands and higher levels of aberrant behaviour. This research is also consistent with findings by Winborn-Kemmerer et al. (2009) which confirmed the effectiveness of using novel mands. It is possible that the training of novel mands strengthened overall manding as well. Training individuals to use multiple mands may reduce the likelihood of the occurrence of aberrant behaviour when one of the mands is not available. This aspect can be related to AAC as it may not always be possible to communicate with the device during some activities, for example when using the trampoline or while performing personal hygiene tasks. It is important to note that these studies were conducted with preschool children

and thus it is unknown whether the results would generalize to older children with autism.

Noncontingent Reinforcement

Another method for reducing problem behaviour involves the implementation of non-contingent reinforcement (NCR) by delivering stimuli with known reinforcing properties on a fixed-time or variable-time schedule independent of the occurrence of the behaviour. A study by Doughty and Anderson (2006) investigated the effectiveness of NCR with an alternative preferred stimulus and FCT without the extinction³ for suppressing aberrant behaviour. The participants were two children with developmental delays who used signs for communication and exhibited problem behaviour, which was maintained by access to attention. The study consisted of functional analysis, preference assessment and an intervention including examination of the arbitrary stimulus and FCT involving a communication card. The chosen alternative stimuli were cola and oatmeal. The comparison between the effectiveness of NCR with arbitrary stimuli and the reinforcers maintaining the aberrant behaviour was conducted by using an alternating-treatments design. For both participants, results revealed that the combination of these two methods increased manding and was effective in suppressing problem behaviour. Interestingly, problem behaviour decreased slightly more in the alternative stimuli condition than in the FCT condition without the extinction phase. In addition, manding also occurred at a higher rate.

However, the greater reduction in using alternative stimuli (Doughty & Anderson, 2006) may have occurred due to time spent on consumption, the type of attention used for reinforcement not being functionally equivalent to the attention maintaining the problem behaviour, or because of an accidental reinforcement due to an initially dense schedule. It was also highlighted that extinction

may be a necessary component to this treatment package when thinning the NCR reinforcement schedule. Regardless of these limitations, the authors emphasised the practical implications for using arbitrary preferred stimuli for intervention as it may not always be possible to address specific behavioural functions due to limited resources or when dealing with several clients simultaneously in a school setting.

Hagopian, Contrucci Kuhn, Long, and Rush (2005) acknowledged the issue of schedule thinning, since reinforcement for appropriate communication cannot always be immediate or even possible in some circumstances. The participants were three children with severe behavioural problems maintained by social reinforcement. It was hypothesised that using competing stimuli during FCT would lead to more rapid schedule thinning without the increase in problem behaviour. The competing stimulus assessment was conducted to identify possible compatible reinforcers. The items detected were different for each participant and involved toys, games and books. FCT and FCT with additional access to competing stimuli were then conducted by using multi-element and reversal designs. FCT involved introducing responses such as "I need your attention" and handing over the picture card. Both treatment conditions contained extinction and were identical except that, in the competing stimulus condition, the alternative reinforcer was available non-contingently and continuously. The results supported the initial hypothesis that employing FCT with competing stimuli would lead to a more stable reduction in aberrant behaviour.

It is vital to take into account the practical implications as this method ultimately leads to quicker achievement of treatment objectives. Hagopian et al. (2005) also highlighted that using stimuli associated with low levels of problem behaviour during competing stimulus assessment may weaken the EO for problem behaviour during schedule thinning and decrease the likelihood of its reoccurrence.

Based on the research examining NCR effectiveness, it can be concluded that in a situation where an AAC device is used inappropriately, the availability of alternative

³ When operant behavior that has been previously reinforced no longer produces reinforcing consequences, the behaviour gradually stops occurring

reinforcers (Hagopian et al., 2005) and attention by applying NCR is likely to reduce the problem behaviour (Doughty et al., 2006).

The Use of Extinction

An additional issue within applied settings concerns the use of extinction, as research indicates that it is not favoured within schools and other facilities (Hagopian, Fisher, Sullivan, Acquisto, & LeBlanc, 1998). Athens and Vollmer (2010) investigated DRA without extinction among seven participants with developmental disorders exhibiting challenging behaviour. The study involved manipulating several dimensions of reinforcement such as duration, quality, delay and a combination of all these factors. The target behaviours involved aggression, disruption and inappropriate sexual behaviour. The appropriate replacement behaviour for each participant was based on the function of problem behaviour. For example, if an individual engaged in problem behaviour to gain attention, an appropriate mand was selected instead. These response forms were already in the participants' repertoires but occurred at low rates. Results demonstrated the effectiveness of DRA without extinction which was especially prevalent when all dimensions of reinforcement were manipulated simultaneously. Therefore, DRA can be implemented effectively without the extinction component.

Conclusion

The evidence from this review indicates that ABA techniques reduce problematic behaviour and improve communication strategies among autistic populations, and as such, these approaches could potentially be applied to improving the utilization of AAC devices, such as the 'Go Talk 20+' device. This review highlights that an effective treatment package must identify the most reinforcing form of attention, and use multiple mands in FCT to achieve optimal outcomes in the presence of the relevant EO

(Brown et al., 2000; Kodak et al., 2007; Winborn-Kemmerer et al., 2010). Other potentially efficacious components in enhancing the use of communication devices among autistic populations might include NCR of alternative preferred stimulus, in order to increase manding (Doughty & Anderson, 2006) and, possibly, competing stimuli during FCT to aid schedule thinning (Hagopian et al., 2005). In addition, although extinction may appear to be a necessary component for a successful intervention, other research demonstrated the effectiveness of an intervention which did not involve extinction (Athens & Vollmer, 2010). It is important to note that a successful intervention package may contain all, or some of the aforementioned components to improve the utilisation of communication devices in autistic populations. The decision about the exact combination would be made by a staff team and might vary according to the particular setting and available resources. It is hoped that this review will inform the implementation of evidence-based interventions for improving communication strategies among autistic populations (and clients with other related disorders) exhibiting problem behaviours within 'real world' service settings.

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