University of Southampton

Doctoral Programme in Educational Psychology

Title: Applied Behavioural Analysis interventions

for children with autism spectrum disorder

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Introduction

Autism spectrum disorder (ASD) is understood to be a pervasive neurodevelopmental disorder, in which the core features are impaired social communication and interaction, and stereotyped, restricted and repetitive patterns of behaviour and interests (Cadogan & McCrimmon, 2015; Eikeseth, 2009; Lord & Jones, 2013). A steady increase in the prevalence of ASD in recent years has been widely documented in European and US studies (e.g. Chamak, 2008; Gerhardt & Lainer, 2011; Parsons et al., 2011; Vismara & Rogers, 2010). While the reasons underlying this trend are debated, there is general agreement that this translates to an increasing demand for appropriate interventions and services to support children and young people with ASD (Gerhardt & Lainer, 2013).

Behavioural teaching interventions which are derived from principles of Applied Behavioural Analysis (ABA) are widely cited as the most prolifically used and empirically validated treatment approaches for children with ASD (e.g. Kasari & Lawton, 2010; Lord & Jones, 2013; Vismara & Rogers, 2010). This paper commences by addressing persisting misinterpretations of ABA within the literature and the public domain, as a single intervention, rather than a body of principles which underpin a range of interventions. It is then proposed that current approaches to enhancing communication in children with ASD may be usefully conceptualised as falling along a continuum ranging from traditional behavioural to social-pragmatic developmental approaches which draw on ABA principles in different ways and to varying degrees. The misinterpretations of ABA which pervade the literature, coupled with reports of increasingly integrated, eclectic approaches are discussed in terms of the challenges they pose to the present critique. These issues notwithstanding, the evidence base for 'traditional' early intensive behavioural interventions (EIBI) is critically evaluated. Finally, the implications for Educational Psychology practice are considered in the

context of wider ethical concerns and tensions surrounding ABA as an appropriate 'treatment' for children with ASD.

Prevailing misinterpretations of ABA

A lack of clarity regarding what defines and constitutes ABA is a major challenge to the present critique, as a clear understanding of what exactly is under consideration is the first step to meaningful evaluation. Baer, Wolf and Risely (1968) were among the earliest commentators to define Applied Behavioural Analysis. Baer et al. (1968) endeavoured to clearly distinguish the scientific analysis of individual behaviour (Skinner, 1953), from its application to the improvement of problem behaviours in society. Behavioural analytic application was thus originally conceptualised as "a self-examining, self-evaluating, discovery orientated" process which exclusively concerned itself with the improvement of socially significant behaviours (Baer et al., 1968, p. 91).

Applied behaviour analysis in the field of autism has been likened to Pavlovian dog training from its beginnings (e.g. Bettleheim, 1967) and continues to be sometimes construed this way in the present day media, (e.g. Lambert, 2013). However the theoretical underpinnings of ABA are located in theories of learning which relate to the voluntary responses involved in operant conditioning (e.g. Howlin, Magiati, & Charman, 2009; Ringdahl, Koelman, & Falcomata, 2009), rather than the involuntary reactions engineered through classical conditioning. In rudimentary terms, operant conditioning places an individual's behaviour temporally between what occurs before it (i.e. antecedents) and what occurs after it (consequences). The behaviour may be altered by changing what happens either side of it, though consequences are deemed to make the greatest impact (Woolfolk, Hughes, & Walkup, 2013). The distinction between operant and classical conditioning in the theoretical underpinnings of ABA is perhaps worth underlining, though it may well have

become blurred by the infamous use of physical aversives in the earlier practices of ABA revisited by Bowman and Baker (2014).

A more fundamental misinterpretation of ABA highlighted by Keenan & Dillenburger (2011) is that it represents one of many specific therapies for autism rather than a scientific knowledge base which underpins a range of interventions (e.g. Picture Exchange Communication System, Precision Teaching, Discrete Trial Training, Pivotal Response Training), and specific techniques (e.g. prompting, shaping, chaining, differential reinforcement). Keenan & Dillenburger (2011) assert that this serious 'category error' permeates political, professional and academic discourse surrounding ABA, despite repeated attempts to reinstate accurate definitions of ABA in the literature. Other commentators have underlined more specifically that ABA has become almost synonymous with Discrete Trial Training (Gerhardt & Lainer, 2013; Schreibman et al., 2015). DTT is composed of brief teaching units, initially delivered via massed trials; each trial commences with the teacher's instruction, to which the child responds, and receives a consequence accordingly; a short interval is then held prior to presentation of the teacher's next instruction (Prizant & Wetherby, 1998). DTT is a prominent feature of traditional highly structured ABA approaches popularised by the pioneering work of Dr Ivor Lovaas and his colleagues in this area (Lovaas, 1981; Lovaas, 1987; McEachin, Smith, & Lovaas, 1993). Interestingly, despite Lovaas' (1981) stipulation that DTT should be a short-term practice to be reserved for use at the beginning of a child's programme, it nonetheless gained status among proponents as "the predominant strategy for teaching children with autism" (Prizant & Wetherby, 1998, p. 335). This may arguably account for persisting observations that DTT is used almost interchangeably with ABA.

In reality, a critique which accurately acknowledges how ABA originated, and the breadth of its application as a science which underpins numerous interventions and

techniques for children with autism, would appear to be a highly problematic if achievable at all. In keeping with the 'category error' of ABA described by Keenan and Dillenburger (2011) above, it may correspondingly be argued that the present critique has fundamentally erred by selecting in ABA, an excessively broad unit of analysis for evaluation. An overarching strength of ABA which resonates from this point is that the interventions and techniques derived from ABA, in the field of autism and indeed beyond, are "as diverse as the challenges they are intended to address" (Gerhardt & Lainer, 2011, p. 39).

Critique of ABA as an empirically validated approach for children with autism

Mayton, Wheeler, Menendez, & Zhang (2010) argue that the importance of using evidence-based practice to support children with ASD cannot be overstated. As discussed above, a conceptually accurate evaluation of the empirical evidence base pertaining to ABA for children with autism is precluded by the sheer scope of interventions which fall under its umbrella. A further complicating factor for the discrete evaluation of behavioural analytic interventions for autism per se, is an increasing tendency towards eclectic approaches which integrate the behavioural principles of ABA with developmental theories related to communication, language and social interactions (Prizant & Wetherby, 1998; Prizant, Wetherby, Rubin, Amy, & Laurent, 2003; Rogers & Vismara, 2008; Schreibman et al., 2015).

Consistent with this notion of integrated approaches, Prizant & Wetherby (1998) proposed that current language and communication enhancement approaches to autism could be usefully conceptualised as falling somewhere along a continuum with 'traditional behavioural' approaches which are highly prescriptive, typically intensive, and essentially adult-led at one end, and 'social-pragmatic developmental' approaches which adopt flexible structures, use naturalistic contexts, and are essentially child-led, at the other. 'Contemporary behavioural' approaches are deemed to occupy the 'middle ground' in various forms, between

traditional behavioural and social-pragmatic developmental approaches (Prizant & Wetherby, 1998).

While it would appear that some interventions remain polarised in terms of being exclusively behavioural or developmental in their approach (Prizant & Wetherby, 1998), it is worth reiterating that emerging interventions seem to be mutually informed by both behaviourist and developmental principles (Screibman et al., 2015). This variation has for example been observed in early intensive behavioural interventions (EIBIs). These are comprehensive programmes implemented on a one-to-one basis at home and/or school, which focus on imitation, language, social interaction, pre-academic and self-help skills (Peters-Scheffer, Didden, Korzilius, & Sturmey, 2011). EIBIs are typically located towards the traditional behavioural end of the continuum described in the present paper (Prizant & Wetherby, 1998), as they are generally characterised by highly structured and highly analytic procedures including but not limited to DTT, reinforcement, backward chaining, prompting and shaping (Peters-Scheffer et al., 2011). In a recent overview of five meta analyses into EIBI for children with autism, Reichow (2012) noted that while all programmes were conceptually grounded in ABA, specific programme characteristics varied significantly, as some meta analyses deployed more restrictive inclusion criteria than others with respect to the continuum of approaches described above. Indeed some programmes differed to the extent of not according with established conceptualisations of EIBI (Reichow, 2012). On a slightly different note, given that traditional behavioural approaches (including EIBI) would seem to advocate a gradual reduction in adult control over time (Lovaas, 1981), the extent to which these approaches naturally begin to resemble contemporary behavioural approaches, and even begins to borrow significant features from social-pragmatic developmental approaches, seems unclear. To complicate the picture further, Prizant and Wetherby (1998) contend that the theoretical position with which programme facilitators are affiliated, may

have a greater bearing on how interventions are labelled, than what is actually experienced by the children in practice.

Overall, the apparent trend towards more eclectic approaches, along with the potential and perhaps likely progression towards an eclectic approach from a polarised beginning, appear to obscure the unique contributions of behavioural analytic approaches to positive outcomes for children with autism. In addition to the lack of treatment fidelity reported in a number of review papers (e.g. Cadogan & McCrimmon, 2015; Howlin et al., 2009; Mayton et al., 2010; Reichow, 2012) and the inadvertent possibility that facilitators do not 'practice what they preach', it is difficult to isolate the key change elements within specific interventions.

Notwithstanding the terminological and methodological challenges discussed thus far, ABA research in the field of autism has proliferated, particularly into EIBIs, following the landmark studies of Lovaas (1987) and McEachin, Smith, & Lovaas (1993). These studies were the first to provide empirical evidence of the impact of EIBI on young children with autism. The studies became eminent for reportedly 'recovering' 9 out of 19 children (<4 years old) with autism to "normal intellectual and educational functioning" following at least 2 years of one-to-one EIBI therapy for 40 hours or more per week (Lovaas, 1987, p.3). These children achieved IQ scores within average range, were successfully integrated into mainstream school and described by school staff as "indistinguishable from their normal friends" (Lovaas, 1987, p.8). These gains were sustained into early adolescence (McEachin et al., 1993). Together the arguably ground-breaking findings of these studies renewed interest in traditional behavioural approaches and the power of DTT in particular (Prizant & Wetherby, 1998). Ultimately however, the studies were heavily criticised on a number of design issues and methodological limitations. These pertained to non-random assignment to treatment and control groups, small sample size, lack of specificity of training, treatment fidelity and child and family characteristics, and judgements made about normal functioning

based on limited assessments (Howlin et al., 2009; Prizant & Wetherby, 1998). The same commentators have also noted a distinct underplaying of the poor outcomes of the majority, for whom over seven years of EIBI did not translate to good progress. Conceptually, the studies may also be criticised for appearing to prioritise and celebrate "recovery" from autism, as reflected by its 'headline' findings of increased IQ and behavioural normalisation, rather than a primary and more discerning focus on improvements to social communication and interaction skills as the core features of ASD.

Replications of these initial studies have reported gains in the original outcome measures, but not of the same magnitude (Howlin et al, 2009). In recent years, systematic and narrative reviews and meta-analyses of EIBI studies have abounded the ABA-autism literature. Due to limitations of scope, the present critique considers the findings of a recent paper by Reichow (2012) which reviewed five meta-analyses of EIBI published in 2009 and 2010 (Eldevik, Hastings, Hughes, Jahr, & Eikeseth, 2009; Makrygianni & Reed, 2010; Reichow & Wolery, 2009; Spreckley & Boyd, 2009; Virues-Ortega, 2010). The participants across the analyses were aged up to 7 years old and totalled 1041 participants in the treatment groups and 491 in the control groups. The number of studies included in each meta-analysis ranged from 4 to 22, dating from 1987 to 2008. EIBI treatment groups across the meta-analyses received between 12.5 and 45 hours per week - a notably high degree of treatment intensity variability. All but one meta-analysis (Spreckley & Boyd, 2009) concluded that EIBIs are effective for a number of children with ASD (Reichow, 2012). A number of narrative reviews have also reached this conclusion (e.g. Eikeseth, 2009; Rogers & Vismara, 2008). The weighted mean effect sizes for these four meta-analyses ranged from g=.57-1.19 and g=.42-1.09 for IQ and adaptive behaviour respectively, indicating greater gains in IQ. It should be noted that the exception (Spreckley & Boyd, 2009) misinterpreted a parent-direct EIBI group, impacting significantly on the results of this meta-analysis (Reichow, 2012).

For each meta-analysis inclusion was restricted to studies which had adopted a group research design, but was not restricted to randomised control trials (RCTs) as per the usual recommendation for meta-analysis (Reeve, Deeks, Higgins, & Wells, 2008). On this point, while the evidence base for behavioural interventions as a whole is frequently criticised for a paucity of RCT studies (e.g. Rogers & Vismara, 2008; Spreckley & Boyd, 2009), it may be more constructive to actively question the appropriateness of RCTs for research which involves the evaluation of inductive treatment programmes which vary in line with individual needs and responses, as opposed to treatments which will not differ between participants (Keenan & Dillenburger, 2011). In other words, RCTs may lack the sensitivity to evaluate behavioural analytic approaches effectively (Keenan & Dillenburger, 2011). Additionally, RCTs in this research area may be ethically challenged at this stage, given the debatable lack of genuine uncertainty about the treatment of choice (Morris, 2009).

Arguably less defendable methodological shortcomings, (in addition to the high variation between EIBI programmes discussed above) were that for each meta-analysis, all of the included studies were subject to one or more of the following issues: small sample sizes, lack of participant specificity and treatment fidelity data, narrow outcome measures and a lack of standardised treatment conditions for the control/comparison groups (Reichow, 2012). Parsons et al. (2011) argue for consideration of outcome measures which move beyond indicators of academic attainment (including IQ) to measures such as communicative competence and emotional wellbeing, which capture children's progress more holistically and meaningfully in relation to the core features of ASD. To this end, Reichow (2012) proposes the need to develop a better understanding of how EIBI impacts language ability.

While the limitations of EIBI studies would suggest that results should be interpreted with caution, the weight of evidence in support of EIBI, gleaned from a review of five recent meta-analyses which incorporated group research designs, seems rather compelling and

difficult to set aside. Undoubtedly, research practices require refinement, however it would appear reasonable based on the evidence reviewed, to assert that EIBI is an empirically validated approach to support gains in IQ and adaptive functioning in young children with autism.

Conclusion and Implications for Educational Psychology Practice

Prevailing misinterpretations of ABA in professional, academic and political arenas, as a specific treatment for autism, rather than a scientific body of principles which underpin numerous interventions within and beyond the field of autism, substantially obscure the utility of ABA as a tool for change. Given the breadth of application which ABA demonstrates, it resists review within a critique of this scope. Moreover, critical evaluation of behavioural analytic interventions per se is complicated by the emerging movement towards eclectic approaches which integrate behavioural and developmental principles to varying degrees and in different ways, across interventions which share the same label. Affiliations with particular theoretical positions may not be reflected in the practices of programme facilitators, and this highlights the need for better reporting of treatment fidelity in ASD research. Early intensive behavioural interventions (EIBIs) appear to have a substantial and compelling evidence base, which may not be reasonably dismissed, notwithstanding acknowledgement of various methodological shortcomings within EIBI studies. In terms of contributing to research activities, Educational Psychologists have a role to play in challenging colleagues and other professionals regarding the degree to which RCTs should be deemed the 'gold standard' for research in this area, given the heterogeneity of children with ASD (Warren et al., 2011) and the inductive nature of individualised treatment programmes.

In order to support children and families living with ASD, EPs need to be aware of the bewildering array of interventions available to them, and the associated anxieties that families may experience when trying to make sense of intervention options. There is strong empirical

evidence that EIBIs benefit many children with autism, however EPs need to be mindful in their conversations with families to present a balanced account of this evidence, which does not guarantee gains for all children. With respect to any intervention under consideration, it is essential that children, families and schools are able to embrace both its methods, and its intended outcomes, and that open lines of communication are maintained across home and school contexts. EPs have particular skills to offer in terms of facilitating these discussions. In the context of ABA based interventions for autism, EPs need to be aware of the wider political tensions which relate to social constructions of autism. Children and families may vary in the extent to which they perceive ASD as a neurological 'disorder' which requires treatment or a neurological 'difference' which is inseparable from the child's identity (Chamak, 2008; Kapp, Gillespie-Lynch, Sherman, & Hutman, 2013). These constructions will bear on the desired outcomes of ABA based interventions in terms of the extent to which families are seeking 'normalisation' for their child, or improved skills and confidence to navigate their social worlds. By drawing on high quality consultation skills, EPs may support children and families to the greatest extent by demonstrating interest, understanding and attunement with their unique goals.

References

Baer, D. M., Wolf, M. M., & Risley, T. R. (1968). Some Current Dimensions Of Applied Behavior Analysis. *Journal of Applied Behavior Analysis, 1*, 91-97.

Bettlelheim, B. *The Empty Fortress: Infantile Autism and the Birth of the Self.* New York, NY: Free Press.

Bowman, R. A., & Baker, J. P. (2014). Screams, Slaps, and Love: The Strange Birth of Applied Behavior Analysis. *Pediatrics, 133*, 364-366.

Cadogan, S., & McCrimmon, A. W. (2015). Pivotal response treatment for children with autism spectrum disorder: A systematic review of research quality. *Developmental Neurorehabilitation, 18*(2), 137-144.

Chamak, B. (2008). Autism and social movements: French parents' associations and international autistic individuals' organisations. *Sociology of Health & Illness, 30*(1), 76-96.

Eikeseth, S. (2009). Outcome of comprehensive psycho-educational interventions for young children with autism. *Research in Developmental Disabilities, 30*, 158-178.

Eldevik, S., Hastings, R. P., Hughes, C., Jahr, E., Eikeseth, S., & Cross, S. (2009). Meta-analysis of early intensive behavioral intervention for children with autism. *Journal of Clinical Child and Adolescent Psychology, 38*, 439-450.

Gerhardt, P. F., & Lainer, I. (2011). Addressing the Needs of Adolescents and Adults with Autism: A Crisis on the Horizon. *Journal of Contemporary Psychotherapy, 41*, 37-45.

Goldstein, H. (2002). Communication Intervention for Children with Autism: A Review of Treatment Efficacy. *Journal of Autism and Developmental Disorders, 32*(5), 373-396.

Howlin, P., Magiati, I., & Charman, T. (2009). Systematic Review of Early Intensive Behavioral Interventions for Children with Autism. *American Journal on Intellectual and Developmental Disabilities, 114*(1), 24-41.

Kapp, S. K., Gillespie-Lynch, K., Sherman, L. E., & Hutman, T. (2013). Deficit, Difference, or Both? Autism and Neurodiversity. *Developmental Psychology, 49*(1), 59-71.

Kasari, C., & Lawton, K. (2010). New directions in behavioral treatment of autism spectrum disorders. *Current Opinion in Neurology, 23*, 137-143.

Keenan, M., & Dillenburger, K. (2011). When all you have is a hammer....: RCTs and hegemony in science. *Research in Autism Spectrum Disorders, 5*, 1-13.

Lambert, C. (2013). Is it right to try to 'normalise' autism?. The Guardian. Retrieved from http://www.theguardian.com/education/2013/oct/29/specialeducationneeds.autism.

Lord, C., & Jones, R. M. (2013). New strategies and findings for behavioral interventions in autism spectrum disorders. *Annals Of The New York Academy Of Sciences, 1304*, 70-76.

Lovaas, O. I. (1981). *Teaching developmentally disabled children. The "me" book.* Baltimore, MD: University Park Press.

Lovaas, O. I. (1987). Behavioural Treatment and Normal Educational and Intellectual Functioning in Young Autistic Children. *Journal of Consulting and Clinical Psychology, 55*(1), 3-9.

Makrygianni, M. K., & Reed, P. (2010). A meta-analytic review of the effectiveness of behavioral early intervention programs for children with autism spectrum disorders. *Research in Autism Spectrum Disorders, 4*, 577-593.

Mayton, M. R., Wheeler, J. J., Menendez, A. L., & Zhang, J. (2010). An Analysis of Evidence-Based Practices in the Education and Treatment of Learners with Autism Spectrum Disorders. *Education and Training in Autism and Developmental Disabilities, 45*(4), 539-551.

McEachin, J. J., Smith, T., & Lovaas, I. (1993). Long-Term Outcome for Children With Autism Who Received Early Intensive Behavioral Treatment. *American Journal on Mental Retardation, 97*(4), 359-372.

Morris, E. K. (2009). A case study in the misrepresentation of applied behavior analysis in autism: The Gernsbacher lectures. *The Behavior Analyst, 32*, 205-240.

Parsons, S., Guldberg, K., MacLeod, A., Jones, G., Prunty, A., & Balfe, T. (2011). International review of the evidence on best practice in educational provision for children on the autism spectrum. *European Journal of Special Needs Education, 26*(1), 47-63.

Peters-Scheffer, N., Didden, R., Korzilius, H., & Sturmey, P. (2011). A meta-analytic study on the effectiveness of comprehensive ABA-based early intervention programs for children with Autism Spectrum Disorders. *Research in Autism Disorders, 5*, 60-69.

Prizant, B. M., & Wetherby, A. M. (1998). Understanding the Continuum of Discrete-Trial Traditional Behavioral to Social-Pragmatic Developmental Approaches in Communication Enhancement for Young Children with Autism/PDD. *Seminars in Speech and Language, 19*(4), 329-352.

Prizant, B. M., Wetherby, A. M., Rubin, E., & Laurent, A. C. (2003). The SCERTS Model A Transactional, Family-Centered Approach to Enhancing Communication and Socioemotional Abilities of Children with Autism Spectrum Disorder. *Infants and Young Children, 16*(4), 296-316.

Reeves, B. C., Deeks, J. J., Higgins, J. P. T., & Wells, G. A. (2008). Including non-randomized studies. In J. P. T. Higgins & S. Green (Eds.), *Cochrane handbook for systematic reviews of intervetions* (pp. 391-432). West Sussex, UK: Wiley-Blackwell.

Reichow, B. (2012). Overview of Meta-Analyses on Early Intensive Behavioral Intervention for Young Children with Autism Spectrum Disorders. *Journal of Autism and Developmental Disorders, 42,* 512-520.

Reichow, B., & Wolery, M. (2009). Comprehensive synthesis of early intensive behavioral interventions for young children with autism based on the UCLA Young Autism Project model. *Journal of Autism and Developmental Disorders, 39,* 23-41.

Ringdahl, J. E., Kopelman, T., & Falcomata, T. S. (2009). Applied Behavior Analysis and Its Application to Autism and Autism Related Disorders. In J. L. Matson (Ed.), *Applied Behavior Analysis for Children with Autism Spectrum Disorders* (pp. 15-32). New York: Springer.

Rogers, S. J., & Vismara, L. A. (2008). Evidence-Based Comprehensive Treatments for Early Autism. *Journal of Clinical Child & Adolescent Psychology, 37*(1), 8-38.

Schreibman, L, Dawson, G., Stahmer, A. C., Landa, R., Rogers, S. J., McGee, G. G., ...& Halladay, A. (2015). Naturalistic Developmental Behavioral Interventions: Empirically Validated Treatments for Autism Spectrum Disorder. *Journal of Autism and Developmental Disorders*. doi 10.1007/s10803-015-2407-8

Skinner, B. F. (1953). *Science and human behavior.* New York: Macmillan.

Spreckley, M., & Boyd, R. (2009). Efficacy of applied behavioural intervention in preschool children with autism for improving cognitive, language, and adaptive behavior: A systematic review and meta-analysis. *The Journal of Pediatrics, 154,* 338-344.

Virués-Ortega, J. (2010). Applied behavior analytic intervention for autism in early childhood: Meta-analysis, meta-regression and dose-response meta-analysis of multiple outcomes. *Clinical Psychology Review, 30,* 387-399.

Vismara, L. A., & Rogers, S. J. (2010). Behavioral Treatments in Autism Spectrum Disorder: What Do We Know? *Annual Review of Clinical Psychology, 6,* 447-68.

Warren, Z., McPheeters, M. L., Sathe, N., Foss-Feig, J, H., Glasser, A., & Veenstra-VanderWeele, J. (2011). A Systematic Review of Early Intensive Intervention for Autism Spectrum Disorders. *Pediatrics, 127*(5), e1303-e1311.

Woolfolk, A., Hughes, M., & Walkup, V. *Psychology in Education,* 2nd edition. London: Pearson.