Instruction and Practice

– are these enough for effective teaching?

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Abstract

Children with developmental disabilities, including autism, frequently require bespoke supports to learn new behaviours or develop important skills. A precise task analysis (i.e., a precise list of requisite behaviours for a targeted skill) is beneficial and in many cases necessary to guide supportive evidence-based procedures. The involvement of parents in these interventions is essential. We examined whether, after a brief training session, parents (n=7) were able to construct effective task-analyses. Videos were used to practice constructing a task-analysis for 16 specific skills. At baseline, parents used vague summary labels to describe the skills in the videos. After training, all participants were able to identify approbate numbers of steps for each of the skill in the videos. Participants, who had some previous experience with behaviour analysis (n=4) were able to identify more steps than participants with no prior such experience (n=3). Findings suggest that a brief (one-day) group training event can be useful for teaching task analysis, albeit the effectiveness was limited.

Keywords: Task Analysis, Chaining, Autism, Parent Training, Education, Applied Behaviour Analysis (ABA)

Instruction and Practice – are these enough for effective teaching?

1.Introduction

Parents of children with developmental disabilities, such as Autism Spectrum Disorder (ASD) face levels of stress that are well above that expected by other parents. Consequently, many of these families experience lower quality of life, poorer mental health, increased divorce rates, higher unemployment levels, and financial hardships (Keenan, Dillenburger, Doherty, Byrne, & Gallagher, 2010, Baker-Ericzen, Brookman-Frazee, & Stahmer, 2005). Applied Behaviour Analysis (ABA) interventions for children with autism focus on improving socially relevant behaviours, such as language, imitation, self-help, independence, academic, and social skills and therefore are linked to alleviating stress for these children and their families (Boyd, McDonough, & Bodfish, 2012, Palmer et al., 2020). One of the key components of ABA interventions is the construction of detailed task analyses in which the targeted skills are described in terms of their discrete behavioural components and subsequently each component is taught using methodologies such as discrete trial teaching, shaping, reinforcement, chaining (backwards or forward), prompting and prompt fading (Peters-Scheffer et al., 2011).

Training parents/carers of children diagnosed with autism how to use behaviour analysis is beneficial for a number of reasons. First and foremost, it allows parents to gain skills that can help their child and thus improve the overall quality of life of the child and their families (Ingersoll & Caquias, 2020). Furthermore, the inclusion of parents as skilled collaborators in their child's intervention programmes is critical to the generalization and maintenance of any new skills the child has learnt at school or in the clinic (Nikopolous & Keenan, 2004). Parent involvement in therapy can also minimise the effects of delays in

getting access to behaviour analytic services as parents can implement programmes while their children are on waitlists for professional services (Keenan et al. 2010). Involving the parents in interventions to support their own children with autism also can produce the so-called “spread of effect” (Symon, 2005, p.159), when these parents are able to train other parents in implementing procedures derived from behaviour analysis. Prata, Lawson, and Coelho (2018) summed this up by saying that “parent training is now considered an important component of successful intervention programs” (p. 2).

Of course, one of the key elements of parent training is parental empowerment. Empowered parents engage both assertively and successfully in their child’s programme (Ravn Anderson, Bøttcher, & Dammeyer, 2017; Brookman-Frazee, 2004) and are able to advocate for better services for their own and other families’ child/ren (Boettcher-Minjarez et al., 2013). They proactively achieve better health and competency for their own and other families (Boettcher-Minjarez et al., 2013), including better parental mental health (Weiss et al., 2012).

More specifically, training parents as ‘tutors’ fulfils the recommendation by the National Research Council (NRC, 2001) that parent training should be an ‘essential component of early intervention’ (p.35) because of the central role parents play in their children’s development and in overall family functioning (Briggs- Gowan et al., 2016). This means that parent training should be a high priority for services providers. Without it, parents are faced with increased stress (Calero et al., 2017), disruptions and restrictions in daily activities, and long-term caring responsibilities (Hoefman et al., 2014).

Task Analysis

Many new skills and behaviours such as employment preparation, literacy skills, and behaviours for school inclusion (Bross, Zane & Kellems, 2019; Baker et al., 2019; Reeves et al., 2013) have been taught successfully using task analyses as part of a comprehensive teaching programme (Cooper et al., 2020). Task analysis has also been extensively used for teaching new skills in populations without an autism diagnosis or intellectual learning disability such as closing-task completion for staff in a restaurant (Austin, Weatherly, & Gravina, 2005) and staff training effectiveness (Reid, Parsons, & Jenson, 2015). In a task analysis the targeted skill is broken down into its component parts and all necessary steps/behaviours for successful completion are taught, thus ensuring that the acquisition of the target skill is completed successfully. While this work often is carried out by well-trained staff (cf. BACB, 2019) in clinics or centres, there is increasing awareness of the importance of training parents to use behavioural procedures with their children in their own home, thus ensuring consistency of intervention and generalisation of outcomes (Heitzman-Powell et al, 2014). Training parents to implement behavioural interventions has become more relevant following the worldwide Covid19 pandemic in 2020 and the subsequent restrictions of movement for people within countries across the globe. Providers of behavioural interventions have embraced technology and continued direct service provision and training events via telehealth whilst maintaining service integrity (Ferguson, Craig, & Dounavi, 2019; Rodriguez, 2020).

Most socially significant skills or tasks involve learning a series of sequenced responses, also called a task analysis. Task analysis involves breaking a complex skill into smaller, teachable units (Cooper, Heron, & Heward, 2020) using systematic instructional

procedures (Parker & Kamps, 2011). Through modelling, graduated guidance and various prompting strategies, individual steps of the task are taught to a fluent level, including complex chains of behaviour, such as self-care skills (Stokes, Cameron, Dorsey, & Fleming, 2004), and internet usage (Jerome, Frantino & Sturmey, 2013). Task analysis has been called a 'fundamental tool for teaching life skills' (About Education, 2016), such as feminine hygiene (Veazey et. al., 2016) and self-monitoring skills (Parker & Kamps, 2010). Skill deficits in areas such as self-help skills (Drysdale et. al., 2014), household skills (Shipley-Benamou et. al., 2002), hygiene skills (Byra et. al., 2018) and social skills (Kourassanis, Jones, & Fienup, 2015) have also be taught using a task analysis procedure. Task analysis has been successful in helping teach basic to complex skills across a variety of populations as referenced above but, as with any teaching tool, there can be problems that present.

A task analysis is developed using one of four methods (Cooper et. al., 2020). The first method is that a competent individual in the skill is observed and the steps completed are recorded. A second method is to consult with experts in the area and get validation of the identified steps whereas the third method involves the teacher to perform the task and document the steps. The final method is that of trial and error whereupon the task analysis is generated and subsequently refined through testing. While there is no superior method identified for construction of the task analysis the steps outlined are very subjective and thus may not necessarily be the correct steps required for individuals. Therefore, it is vital that the skills and abilities of the learner are at the forefront when any task analysis is being constructed.

Breaking skills into smaller, teachable steps meets the learning needs of most children (Alberto & Troutman, 2003) and impacts positively on their long-term

independence (Kraijer, 2000). Failing to teach these skills can result in learned helplessness, poor self-esteem, and overall low quality of life (Domire & Wolfe, 2014). For some individuals on the autism spectrum even simple everyday tasks can present complex challenges. By utilising a carefully constructed task analysis it can go some way to alleviating these challenges by teaching smaller steps sequentially and can identify difficulties that may occur within specific steps – new steps are only introduced when the learner demonstrates fluency of a previous step.

Clearly then, training parents to conduct and implement task analyses, including operationally defining, teaching, reinforcing, and measuring changes in behaviours and skills is an important and cost-effective model for ABA-based home programmes that has the potential to lead to skill acquisition for the child and empowerment of the parents (Symon, 2001).

While there has been some research on the general principles of parent training, little is known about the best way to teach parents to conduct a task analysis. Therefore, this study examined the effects teaching the construction of a task analysis to a group of parents whose children had a diagnosis of autism. Parents were exposed to brief a lecture-based training event that focussed on teaching the construction of a task analysis and then testing the parents' ability to identify teaching steps. Sixteen pre-recorded videos were used to illustrate everyday basic skills (Video 1 was shown only during the baseline condition, the other 15 videos were used for training). The question addressed here was whether this brief training event (4 hours) would be effective at increasing participants' ability to carry out a task analysis and independently identify the necessary teaching steps for a set of target skills. An increase in understanding the construction and teaching strategy for implementing

a task analysis in their own setting could potentially result in skill acquisition and independence across many domains for their child with an autism (or suspected autism) diagnosis. This would be assessed by comparing participant knowledge and understanding of the task analysis pre-and-post training, measured by the number of identified steps in pre-recorded videos of various everyday life skills.

2. Method

2.1 Participants

Participants were recruited using convenience sampling. To identify participants, an email request was sent to an autism charity membership database as well as the wider autism community within Northern Ireland; criteria for inclusion were being a parent/carer of a child/young person with a confirmed or suspected diagnosis of autism, waiting to avail of behaviour analytical support or have had minimal support for less than 12 months, had minimal or no understanding of behaviour principles and technologies such as task analysis, had identified a socially significant skill for teaching their child and were available for attending the training session.

Seven parents (6 mothers and one father) of 6 children with a diagnosis of autism consented to take part in the study (NB; for one of the children, both mother and father attended). All participants had a basic understanding of behaviour principles and strategies such as reinforcement, discrete trial teaching, and prompting strategies. Four of the participants (Parents 1, 2, 3 and 4) had received ABA-based supports prior to the study via consultations with a Board-Certified Behaviour Analyst (BCBA), whereby they had had gained some basic understanding of Task Analysis.

The mean age of the children was 11.3 years old (range 3-17 years of age).

Table 1 shows the pre-intervention characteristics of the participants. Note that Participants 2 and 3 were the parents of the same 3-year-old boy.

Table 1: Participant demographics and pre-intervention characteristics

Participant	Number of BCBA consultations	Prior knowledge of Task Analysis	Parent Characteristics	Child Characteristics	Rural/Urban
1	1 consultation	Yes.	Divorced Mother, 37, Part-time employment	Male, 9	Urban.
2	3 consultations	Yes	Mother, 28, Unemployed	Male, 3	Urban.
3	3 consultations	Yes.	Father, 32, Unemployed	Male, 3	Urban.
4	6 consultations	Yes.	Divorced Mother, 35, Student.	Male, 12.	Urban.
5	No.	No.	Single Mother, 30, Unemployed	Male, 11.	Rural.
6	No.	No.	Divorced Mother, 49, Business owner.	Male, 16.	Rural.
7	No.	No.	Married Mother, 53, unemployed	Male, 17.	Rural.

2.2 Ethical Consideration

Ethical approval was provided by the ethics committee of Ulster University as well as written consent from the participants. There were minimal ethical implications identified that could impact on the child following the training. Teaching using a task analysis uses

reinforcement-based strategies and skill acquisition only occurs when pre-identified key steps have been met with these being guided by the behaviour of the learner.

2.3 Setting

The setting was a general classroom in a local University, with the appropriate Audio Visual (AV) equipment to present a PowerPoint presentation and video files with audio. Participants sat facing the screen while the training took place. The total duration of the training was four hours, excluding a lunch break and comfort breaks.

2.4 Research instrument

Videos

Sixteen skills were role-played by student volunteers and video-recorded in a behavioural observation laboratory at Ulster University, Northern Ireland. These skills were simple, everyday tasks that were identified as common life-skills deficits for individuals on the autism spectrum (WHO, 1997). The skills that were presented in the videos are shown in Table 2 with the figures identifying the numbers following each skill such as brushing hair (17 steps), sitting appropriate on a chair (6 steps) and setting a table (11 steps).

Table 2: Life-skills presented on videos

1: Making coffee (34*)	9: Ending a play activity (15)
2: Putting on shoes and tying laces (30)	10: Putting on trousers (trousers on a chair) (12)
3: Play activity (catch) (12)	11: Sitting appropriately on a chair at a table (6)
4: Sitting appropriately on a chair (6)	12: Putting on a coat with buttons (14)
5: Putting on a coat with a zip (12)	13: Putting on trousers (trousers on floor) (14)
6: Setting a table (11)	14: Getting backpack ready for school (19)
7: Putting on socks (12)	15: Unzipping a coat and taking coat off (12)
8: Brushing hair (17)	16: Conversation during a play activity (8)

* Number of identified steps in brackets

Videos were of 30-60 seconds duration depending on the skill. Each of the skills consisted of a series of discrete steps/behaviours that were carried out in consecutive order, thus being suitable for a task analysis. The dependent variable in the study was the number of steps reported by parents for each of the videos.

2.5 Recording booklet/sheets

To construct a 'recording booklet' for the task analyses, 16 blank sheets of A4 paper were stapled together on the left-hand top corner. Each paper was headed with one of the life-skill shown in the videos. Fourteen of these booklets were constructed (two booklets for each of the parents) for recording responses during the baseline condition and post-training condition.

2.6 PowerPoint presentation

A bespoke PowerPoint (PPT) presentation was developed by the researcher based on her practical experiences of teaching task analyses to parents in their home setting as part of their home-based behaviour intervention service. The general structure of the PowerPoint presentation described the rationale behind task analyses, how to construct a task analysis, and how to teach new skills following the task analysis. Examples that were presented during the teaching phase did not include any of the skills shown in Videos 1-16.

The first section (Slides 1-4) introduced participants to the concept of task analysis, what it was and how it could be successfully used for teaching new skills. The second section (Slides 5-12) showed how a task analysis could be constructed i.e., observing and documenting and individual perform the task, consulting with experts in the behaviour to be taught, and performing the skill oneself and recording the steps. Researcher constructed written task

analyses were shown to participants during this section of the training. The third section (Slides 13-24) showed participants what was required in order to construct a task analysis and how to collect baseline data on pre-requisite occurrences of behaviour. The concepts of both forward and backward chaining and total task presentation were also taught as well as the importance of continued data collection throughout the teaching process.

2.7 Standardisation and Inter-observer agreement

Although the number of steps identified for task analyses generally depends on the needs of each learner and therefore there is no definitive number of steps for each life-skill, for standardization purposes in the present study, the number of steps was set for each target skill. Once the videos were recorded, standardization by 2 coders (both BCBAs with many years of experience working with autistic individuals) identified independently, the number of steps they considered necessary for each skill to be considered completed successfully. This was done by both coders watching the videos and identifying the specific action labels required as well as the exact number of steps required to ensure that a task or skill could be considered as complete. These were then compared and delineated a target number of steps for each video, the total number of steps for each task identified by each coder were added and divided by two. This resulted in an agreed number of steps for each video that allowed for consistency in measurement. Interobserver agreement (IOA) was above 82% for all videos.

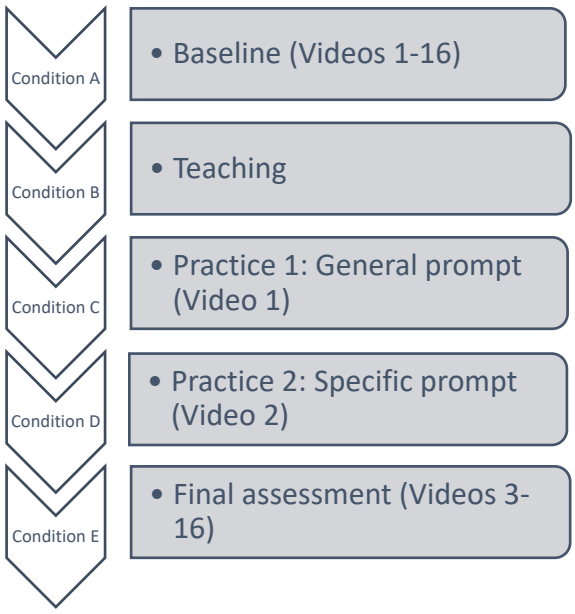
3. Research procedure

On the teaching day parents were seated in the room. The trainer welcomed the parents and introduced herself. As a brief 'ice-breaker' exercise to encourage active participation,

the parents were asked the following question: “If you wanted your child to put on a jumper, how would you make it happen?”. Verbal responses from participants were discussed within the group for about 10 minutes.

Figure 1 shows the sequence of the study.

Figure 1: The sequence of the study



Condition A: Baseline (Videos 1-16)

Participants were given one of the two recording booklets for this phase of the study. Videos 1-16 were shown one at a time with enough time (i.e., all parents indicated that they had completed the task) between them to allow parents to write down on the relevant recording sheet, first a definition of the skill shown, e.g., “girl putting on a coat” and then the steps needed to complete that life-skill. After the 16 videos had been viewed and recorded, the response booklets were removed from participants. The Baseline condition lasted a total of 22 minutes and provided data on current participant understanding of the topic before the teaching condition began in order to allow for measurement of learning pre and post training.

Condition B: Teaching

The PowerPoint presentation was delivered by the researcher speaking freely to each slide. The text on the PowerPoint was discussed in detail with the researcher providing additional, practical examples, to increase the chance of all participants understanding both the theoretical and practical applications of the concepts. During the presentation participants were encouraged to ask questions regarding the topics covered. The teaching condition lasted approximately two hours.

Condition C: Practice 1: General verbal prompt (Video 1)

After the teaching condition, each participant was given the second response booklet. Video 1 (making a cup of coffee) was presented with the following general verbal prompt, "What you would tell an animator if he was asked to recreate this scene that he has not seen". Participants were encouraged to apply the learning from the teaching session to help with their answers. Participants individually wrote down in the response booklet, the steps they identified as necessary to complete the task shown in Video 1.

Condition D: Practice 2: Specific verbal prompt (Video 2)

Video 2 (putting on shoes and tying laces) was used for Practice 2. A specific prompt was given by informing participants that there were 30 researcher-identified steps within this task analysis. As in Condition C, participants were required to record in the recording booklet and label the number of steps they could identify in the video.

Condition D was followed by a 15-minute comfort break.

Condition E: Final assessment (Videos 3-16)

Participants returned to the classroom and were informed that they now would be shown the remaining 14 videos that they had seen during the early part of the training event. They were not prompted generally or specifically, i.e., they were not told how many researcher-identified steps there were for each of the remaining videos. This was to ensure that they would not be influenced by aiming to identify a particular number of targets but instead would use the learning from Condition B to identify specific component skills. As before, they recorded in their response booklets the steps involved within the particular skill shown in each video. Each video was shown as many times as requested (range 1-7 times), giving time to identify and write down steps before moving onto the next video. The objective was not to increase the speed in which participants were able to identify the steps but to enhance the accuracy of the task analysis. The duration of this condition was approximately 60 minutes. At the end of Condition E, the response booklets were collected from the parents, the researcher thanked the parents for their participation, and finished the session.

Follow-up session

Approximately one month after the training event a follow-up email was sent to participants to determine if they had used task analyses at home as part of their child's interventions. Participants were asked to send any task analyses they had constructed since the training event. Three participants responded to the follow-up email (43% response rate).

4. Results

In Condition A (Baseline), 6 participants used a range of basic descriptions for the skills observed in each video (Participant 5 was not in attendance for this condition) without

reference to steps necessary to complete each task. For example, Participant 1 described Video 4 as 'someone waiting at a desk'; Participant 7 described Video 8 as 'a lady brushing her own hair with a brush'; and Participant 4 labelled Video 12 as 'putting on coat, doing up buttons'. None of the participants used a comprehensive task analysis to identify the number of steps identified by the researcher that were necessary to engage in the skills shown in the videos. The number of steps for each video can be seen in Table 2 above in the numerical figures following the skill label.

Table 3: Results of Baseline Condition for Participant 2

Participant	**Written response on each video**
Participant 2	1. A person making a cup of coffee 2. A lady putting on her trainers 3. Lady and boy playing catch then another joins in 4. Lady moving chair and sitting at a table 5. Lady putting on her coat and doing the zip on it 6. Lady at a table putting a table mat down 7. Lady putting on her socks, one foot at a time 8. A lady brushing her own hair with a hairbrush 9. Three people playing catch and then one deciding not to play anymore 10. Lady putting on a pair of jeans 11. Lady moving chair and repositioning herself at the table 12. Lady putting on a lab coat and then doing up the buttons 13. Lady sitting down then putting on her jeans 14. Lady puts bag on table then gets her things out of it and then gets ready for work 15. Lady doing her zip up with her coat then unzips it and takes it off 16. Boy and girl are talking while throwing a teddy to each other

Table 3 shows the written response by Participant 2 for Video 1 for Condition C, when a general verbal prompt was provided. When compared to the response this participant gave in Condition A (Baseline) for this video, there is a noticeable difference. Previously, the response is one of a basic description 'A person making a cup of coffee' whereas Table 3 shows that 14 steps have been identified for this particular video. This change in responding

i.e., starting to identify more specific steps between Condition A and Condition C for Participant 2 was representative of results for all participants.

The interobserver agreement (using the same coders as before) for Condition C, with respect to the number of steps identified by parents for each video clip was 100%. The coders analysed the written responses from all participants across all videos and identified these steps as having occurred within the videos.

Figure 2: Number of steps identified in Condition D (with prompt) for all participants

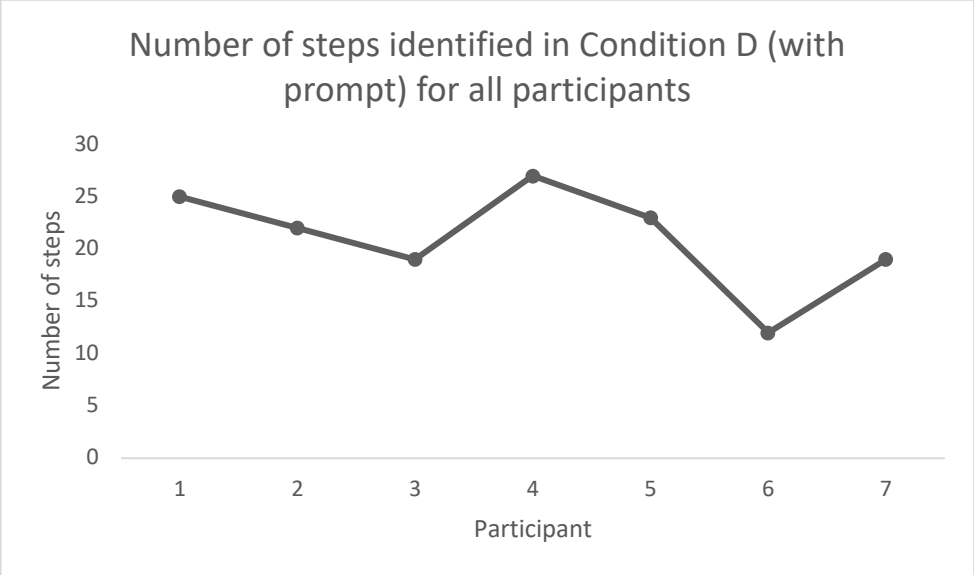
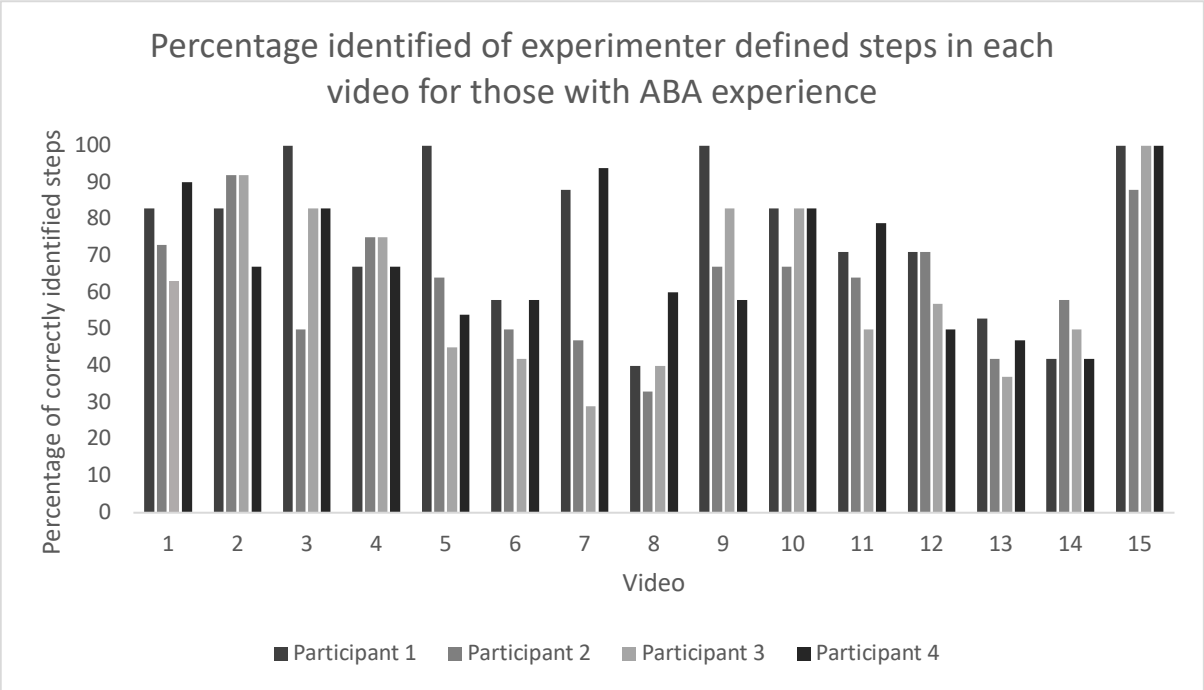
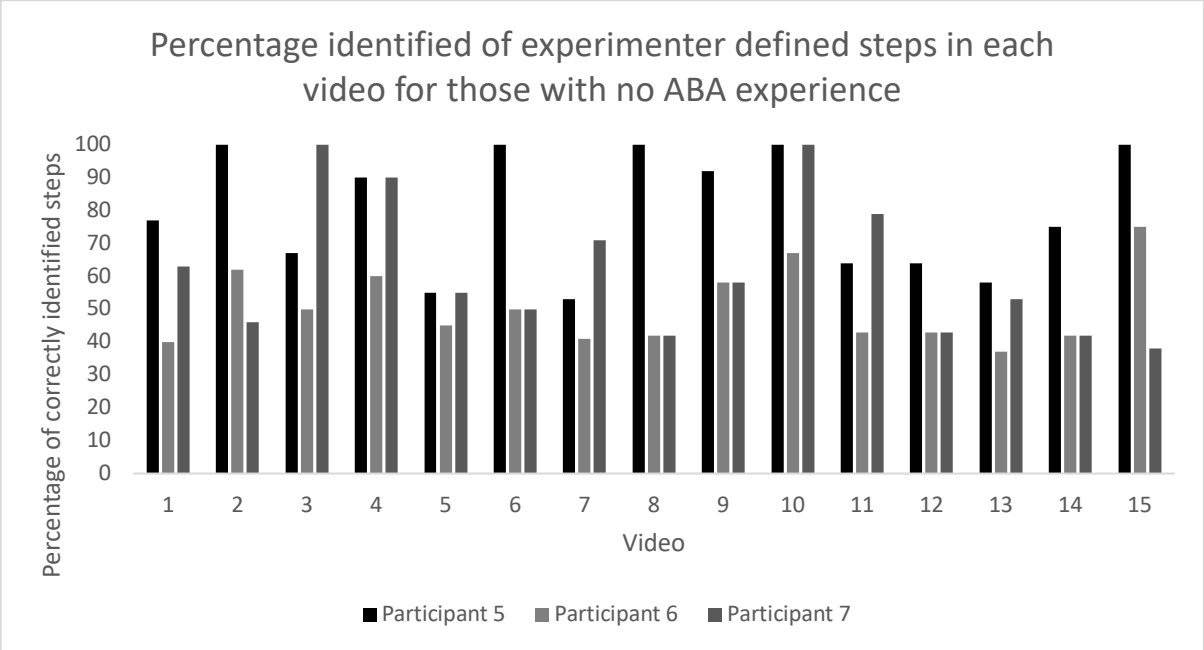


Figure 2 shows the number of steps identified by all 7 participants in Condition D with a prompt provided by the researcher indicating that there were potentially 30 steps identified within the video clip (Video 2) that they could identify. No participant identified all of the 30 observable steps, but Participant 4 correctly identified 27. Participants 1, 2, and 5, identified 25, 22, and 23 steps respectively. Two participants, 3 and 7, both identified 19 steps while Participant 6 only identified 12 steps from the potential 30.

Figures 3 and 4 show the percentage identified of experimenter defined steps in each video for those with ABA experience and those without ABA experience





Figures 3 and 4 show the percentage of steps identified by each participant for each video compared to the percentages produced by the researcher in Conditions D and E. All participants successfully identified numerous individual steps within the videos. However,

there was a distinct difference between participants who were in receipt of some ABA-based provision (Participants 1, 2, 3, and 4 – Figure 3) and participants who had not received behaviour analytic support (Participants 5, 6, and 7 – Figure 4).

Condition D, when the prompt was provided for Video 2 (tying shoe laces) that 30 steps had been identified by the researcher as target for the task analysis, none of the participants identified all of the 30 steps. Participant 4 came closest by correctly identifying 27 steps (90%). Three participants (Participants 1, 2, and 5) identified in excess of 20 steps (25 [83%], 22 [73%], and 23 [77%] respectively) and two participants, Participants 3 and 6 identified fewer than 20 steps with 12 (40%) and 19 [63] respectively.

Participant 3, whilst in receipt of ABA support with his wife (Participant 2), was rarely in attendance during home appointments. For Participants, 1, 2, and 4 (who had received ABA consultations prior to the study) the percentage of steps that they identified paralleled those identified by the researcher more closely than did the steps identified by the other participants. Participant 1 in particular identified the same percentage of steps as the researcher in 4 different videos (Videos 3, 5, 9, and 10). For Participants 3, 5, 6, and 7 there was much more inconsistency in percentage of steps identified, with Participant 5 the only one within this group, on two occasions, to correctly identify 100% of steps as those identified by the researcher (Videos 3 and 10). The results of Participant 3 should be noted as there is little variability in the number of steps identified by him, regardless of the complexity or ease of the skill/video being demonstrated. Percentage correct was more consistent with this participant when the overall skill/behaviour shown in the video was not complicated, e.g., Video 10 (Sitting appropriately on a chair at a table) that included 6 potential steps, Participant 6 identified 67% of the steps. However, in Condition D (Video 1,

putting on shoes and tying laces), he only identified 12 steps (40%), despite the explicit prompt that 30 steps were to be identified.

One month after the training session, participants were asked for copies of any task analyses they had constructed to teach new skills to their own children at home in the meantime. While all 7 participants were asked, only 3 of them responded (Participants 3, 4, and 6). Table 6 shows the skill for which participants had designed task analysis as well as how many steps they identified for teaching the skill to their child.

Table 6: Task analyses completed by participants independently during follow-up

Participant	Skill to be taught	Number of steps in task analysis
3	Independent tooth-brushing	15
4	Making a bed	13
6	Independent shaving	17

These task analyses are unique to their own circumstances and the number of steps identified, 15, 13, and 17 are those they have considered necessary for the skill to be taught. These were constructed within a six-month period following the training.

5. Discussion

The extent to which parents of children on the autism spectrum can learn to carry out a task analysis was examined. A one-day training event was delivered to 7 parents and generalisation probes were taken at one-month follow-up. Results show that the brief training event was effective, especially for parents who had some prior knowledge of behaviour analysis. However, the effects were limited for those with no prior knowledge of

ABA. Simple repetition of viewing the videos did not produce skilled performance. Generalisation of skills did occur for participants who took part in a one-month follow-up.

During baseline condition (Condition A), participants used basic one-sentence descriptors of the task they observed on the video without reference to the component skills necessary to complete the task. The risk of using basic description summary labels (e.g., terms such as 'want', 'wait', 'decide') is that they can fall prey to mentalism (Cooper et al., 2020). Mentalism involves both describing and explaining behaviour with reference to a non-physical mental domain and can prevent potential influences on behaviour being identified and thus prevent effective strategies to be developed. If used correctly, summary labels are simple short descriptors of a behaviour. However, if misused summary labels can be perceived as explanatory fiction (Moore, 2009). In other words, a summary label is reified so that it appears as if an explanation has been found. When a person is said to 'want', 'wait', or 'decide', it appears that there is no need to seek further explanation and while these are acceptable constructs, if they prevent access to activities, social events etc. it would be prudent to understand why these occur under specific situations to enable alternatives to be identified. Clearly, in order to explain a behaviour a contingency analysis, which includes a description of the behaviour and the events that precede and follow the behaviour is necessary enabling an understanding of the contingencies that may be functionally related to the behaviour. Thus, the use of summary labels during the baseline phase is fraught with potential problems.

The results reported here show that participants can be taught how to conduct an adequate task analysis, thus avoiding the use of summary labels or mentalistic pseudo-explanations. The results of their self-reported task analyses following the training event

demonstrated that this learning had transferred outside of the training setting and also generalised to the formation of task analyses for skills not specifically taught during the session, thus supporting the argument of Nikopolous and Keenan (2004) that parent training is crucial to skill generalisation. This understanding could help increase parental empowerment and reduce perceived stress levels as parents will be able to teach a skill to mastery level thereby increasing parental adherence to other behavioural programmes and additionally an increase in intrinsic reinforcement (Ravn Anderson, Bøttcher, & Dammeyer, 2017; Brookman-Frazee, 2004; Weiss et al., 2012). This training event was unique in that it added to the literature on teaching task analysis to parents, an area of minimal focus, but of importance. The results suggest that training can be effective even if it only entails a short, one-day group training event.

In view of increasing demand for behaviour analytic services, community-based training that focuses on parent-mediated interventions are underutilized, with less than 25% of parents having access to such interventions (Pickard et. al., 2016). The findings reported here add to evidence that group training can be used as a cost-effective parent training tool, especially where funds are limited, and individualised tuition may not be feasible. When considering the evidence on the importance of parent training leading to parental empowerment, a training event, albeit with a small number of participants, can produce valuable findings and guidance for what can be offered. While a short course, such as that used in the present research, is useful, it has become evident that a once off event may not suffice for some parents and follow-up bespoke trainings may be necessary to achieve adequate skill levels in the construction of task analyses.

An important consideration for the interpretation of results reported here also is that task analysis generally does not have standardised or specified number of component skills. The number of steps identified for a task analysis generally is individually tailored to the pre-existing skills of the learner and designed using one of the four procedures referenced previously. For research purposes, the numbers of component steps for tasks shown in the videos were defined by researchers. It is not entirely surprising, then, that parents did not identify all the component steps. For example, in Condition D (Video 2), despite the fact that participants were explicitly prompted that there were 30 'researcher identified' steps, none of the participants identify all steps. Therefore, by presenting the videos to the participants a number of times during the training session it represented an artificial replication of how they would devise a task analysis in their own setting.

5.1. Limitations and recommendations

Findings showed a difference between participants with some prior experience with behaviour analysis (1-6 consultations across less than 12 months) and others. The former was more competent in identifying the appropriate numbers of steps necessary for the task analyses, than the latter. Evidently, the teacher has to take account of the learner's skills levels prior to arranging a new learning experience. Since some of the participants already had basic experience with behaviour analytic principles and technologies, the training built on their knowledge. For participants without such prior experience, further training would be necessary before they can achieve appropriate performance. In any case, it is important not to 'blame' the learner for not learning. It is the teacher's responsibility to arrange contingencies to ensure learning it taking place. As evidenced by this study the correct contingencies were not in effect during this session – no feedback was provided following

each showing of the video thus it could be hypothesised that results for all participants may have been more uniform had individual feedback been given. Simply, teaching and repetition, in the absence of feedback could be considered as an ineffective method for teaching. This would be considered a major limitation of this study and future research should ensure that corrective and informative feedback is a crucial part of any training session, regardless of the ability of the learner.

It is entirely possible that parents considered the skills levels of their own children when constructing the task analyses in this study. However, given that skills levels of the children were not assessed, it is impossible to be confident about this possibility. Future studies should identify the skills levels for the child for which a task analysis is to be constructed. For example, the researcher could provide a pen picture or video vignette of the target child. This would ensure that all participants aim for the same level of detail when constructing the task analysis.

The present study focused on the actual number of steps included in a task analysis rather than the specific characteristics of the steps. Previous studies included so-called 'safety steps', in other words, steps that could not be skipped because they were necessary for the safety of a child. For example, when working with vulnerable parents of very young babies, McDaniel and Dillenburger (2014) describe 'checking water temperature' as a necessary safety step in the task analysis for 'bathing a baby'. Future studies may differentiate between steps that are absolutely necessary for a task analysis (for safety or other reasons) and other steps that depend on the skill level of the child. For example, for the task of 'making coffee', a necessary step would be to fill the kettle with water, but it may not be necessary to teach a child to turn on the water tap, if this component skill

already is in the child's behavioural repertoire. The measurement for completed task analyses may, in future studies, focus on these steps rather than merely a total count of steps.

Perhaps the inclusion of a large variety of videos (n=16) in the present study was overwhelming for the participants. It is possible that training on fewer exemplars could have been even more effective. Future studies could focus on fluency, retention, endurance and application (Kubina & Wolfe, 2005) to establish a more consistent responding pattern from all participants with a greater emphasis on providing specific feedback which was not provided to participants in order to reduce the likelihood of responder bias. The success of feedback in training is well established (Dillenburger, 2016), for example, LeBlanc et al. (2005) successfully taught paraprofessionals how to implement discrete trial teaching procedures using performance feedback. Superior gains may have been observed if specific, individual feedback had been provided but the results did suggest that basic knowledge and understanding can result in changes in participant behaviour.

In conclusion, the results reported here suggest that a one-day group training session can be effective to a certain extent in that the training resulted in a change in participant understanding of the task analysis but that such brief practice opportunity alone does not result in skill mastery. Findings support previous research on parental training, parents can be successfully taught how to execute behaviour analytic interventions in the absence of a professional (Fisher et al., 2020; Gerow et al., 2021; Boutain et al., 2020). However, there has been minimal interest in teaching foundation skills, such as the task analysis to parents that could be considered a building block in a behavioural repertoire for understanding and implementing advanced interventions. This study shows that

understanding the basics is as crucial as understanding harder concepts. Future studies should build upon the procedures developed here to achieve fluency and true mastery (Binder, 2003). The old adage that 'practice makes perfect' has been used to support claims in education that repetition, and practice are the key to successful learning and skill retention. However, findings reported here show that educators cannot simply rely on repetition to achieve skilled performance. Meaningful learning requires exposure to effective training methods.

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