Early social responding and verbal behaviour: an analysis of current applications

Francesca degli Espinosa, National Autism Conference at Penn State, August 2018

Our objective today

* How can behaviour analysis guide our teaching choices in establishing early social responding in young children with autism undergoing EIBI?

* Why is it important?

* How do we define early social behaviour?

* What strategies can we derive from current functional analyses?

* Can we derive a conceptually systematic procedure from non explicitly behavioural approaches?

Topics

* Social learning deficits in autism

* Current behaviour analytic accounts of early social behaviour

* Applied intervention models

Autism
A disorder of social interaction

- General consensus: lack of social initiation and reciprocity as defining features

- Sharing of interests, emotions or affect (people as Sds, MOs and Srs)

- Poorly integrated verbal and non verbal communication, poorly modulated eye contact and body language, use and understanding of gestures and facial expressions (behaviour)

- Difficulties in developing, maintaining and understanding relationships: adjusting to social contexts, pretend play and making friends (outcomes)

Assessment: ADOS-2

* Semistructured play based interactive assessment: 4 modules to be chosen depending on child's verbal ability

* **Toddler module:** 12 to 30 months

* **Communication:** frequency of spontaneous vocalisations, pointing and gestures

* **Reciprocal social interaction:** Unusual eye contact, facial expressions directed towards other, integration of gaze and other behaviours during observation, shared enjoyment in interaction, responding to name, responding to being ignored, requesting, showing, spontaneous initiation of joint attention, responding to joint attention, quality of social overtures Amount of social overtures toward caregivers, overall quality of rapport

Social Motivation

* "At the proximal level: a set of psychological dispositions and biological mechanisms biasing the individual to preferentially orient to the social world (social orienting), to seek and take pleasure in social interactions (social reward), and to work to foster and maintain social bonds (social maintaining)" (Chevallier et al., 2012 p.2)

* "At the ultimate level, social motivation constitutes an evolutionary adaptation geared to enhance the individual's fitness in collaborative environments" (Chevallier et al., 2012 p.2)

A disorder of social motivation

✤ "Early-onset impairments in social attention set in motion developmental processes that ultimately deprive the child of adequate social learning experiences and that the resulting imbalance in attending to social and non-social stimuli further disrupts social skill and social cognition development [46–48]. As discussed in detail below, recent evidence demonstrates that social orienting, social seeking and liking, and social maintaining are all disrupted in ASD" (Chevallier, 2012, p.4).

A primary deficit

* Unusual language development as a consequence

* Deficits in the acquisition of verbal behaviour may, in fact, not result primarily from considerations relating to verbal behaviour itself, but from the paucity of opportunities for learning such behaviour that result from core deficits in interpersonal interaction and other repertoires of social behaviour (e.g., Mundy, Sigman, & Kasari, 1990).

Developmental evidence

✤ **Compared to typically developing children reliably demonstrate deficits in:**

✤ Early onset difficulties with monitoring gaze, difficulty using the face to regulate and derive meaning in social interaction, and lack of eye contact (Chawarska et al., 2014a; Chawarska, Macari, Volkmar, Kim, and Shic, 2014b).

✤ Eye-tracking technology showing children with autism look at the eyes less than typical children (Chawarska, Macari, & Shic, 2013) .

✤ Joint attention (Mundy, Sigman, Ungerer, &Sherman, 1986)

✤ Social referencing (Sigman et al. 1992; Warreyn et al. 2005).

Supporting neurological evidence
(Supekar et al., , 2018)

- **Animal studies: the mesolimbic reward pathway in driving and reinforcing social behaviour**

- 2 independent and controlled cohorts (24 children ASD - 24 TDC children aged 7-13), replication cohort (17 children ASD - 17 TDC children) matched age, gender, IQ

- **Disruption in neurobiological mechanisms underlies reduced social interest in humans.**

- Investigation through imaging and fMRI showed that structural aberrations were accompanied by aberrant functional interactions between nucleus accumbens and ventral tegmental area (VTA) during a task of responding to social, non-social and neutral stimuli

- Structural and functional integrity of the mesolimbic reward pathway is aberrant in children with ASD, and these aberrancies contribute to the social interaction impairments.

- **Both these structural and functional circuit aberrations in the mesolimbic reward pathway were related to parent-report measures of social interaction impairments in affected children (social subscale of ADI-R).**

A disorder of social reinforcement

✣ "It follows that the child who **has failed to acquire such reinforcers,** should demonstrate **a deficiency** in the behaviors which would have been reinforced. In the extreme case of complete failure to acquire secondary reinforcers, the child should evidence little, if any, **social behaviors**. That is, the child should fail to attend to people, fail to smile, fail to seek company, to talk, etc., because his environment has not provided him with the rewarding consequences for such behaviour to increase or because he is unable to appreciate that consequences are rewarding. It is apparent that such failure in the acquisition of secondary reinforcers need not be complete, but may be partial". (Lovaas et al., 1966, p. 118-119)

A critical intervention objective

* Research linking specific neurobiological abnormalities to deficits in social behavior typical of ASD is promising, but still in its infancy.

* **Consensus:** early social deficits reduce participation in social learning experiences, and should therefore represent a primary target for intervention

Social interaction

* Interaction in typical humans appears to be inherently reinforcing

* Primary or conditioned reinforcer?

* Is it an important distinction?

* Regardless, social stimuli have reinforcing properties for most humans and guide the typical child's intellectual, verbal and social development

Engaging adult participation

- "Indeed, the most common function of the reinforcers appears to be **face-to face interactions** with an adult (Pelaez-Nogueras, Field, Hossain, & Pickens, 1996). Put simply, reinforcers are initially produced by the activity related to the stimulus in question (for example, playing with a toy) and then increased by adult-generalized social reinforcers such as vocalizations and smiling, gestures of approval, or demonstrations of affection while engaged. **In other words, it is often more reinforcing for a child to play with a toy or look at a book when the caregiver participates in the event than it is when the caregiver is absent"** (Pelaez, 2009, p.70)

Social stimuli

* "…Social stimuli do not differ from other stimuli in their dimensions. Rather, the difference is one of origin. They arise from other organisms, their behavior, or the products of their behavior. Moreover, social stimuli do not differ in their function from those of inanimate origin…**Social life arises because social stimuli come to exercise these functions**." (Keller & Schoenfeld, 1950 p. 352-353)

Joint attention

✤ The capacity to use eye contact and cues to coordinate attention with another person in the sharing of an experience (such as an interesting object or event) (Mundy, Sigman, & Kasari, 1994).

✤ It involves shared awareness of a stimulus.

✤ 9-12 months of age: gaze shifts between a target object and a familiar person (Bakeman & Adamson, 1984)

Joint attention: A triade

Not just pointing

Not just looking where another is looking

"Responsive and initiating behaviors as well as the checking of another person's face that occurs while the infant **is playing** with something, when the infant has **accomplished** some task, after the infant has pointed to something, or in an **ambiguous situation**" (Sigman and Kasari, 1995, p. 189).

Social referencing

✤ A novel object or (ambiguous) situation in the environment (e.g., a stranger) encountered by the child who then looks at the parent or caregiver for information (e.g., smiles, nodding, gestures, facial expressions, vocal responses) about how to respond (Walden 1991). **Consequently, the child responds by either approaching the object or situation or avoiding the object or situation.**

✤ "Although numerous authors integrate the concepts of joint attention and social referencing, the current chapter argues that they are distinct and that **joint attention essentially precedes social referencing**. Specifically, what social referencing adds to joint attention is that it also involves the learner reacting to the novel stimulus in a manner that is in accordance with the other's expression" (Pelaez-Nogueras & Gewirtz, 1997).

Attending to (social) stimuli

"As organisms living in a complex environment, we are affected by multiple stimuli from moment to moment. As a result (of our evolutionary history), we have developed a singularly efficient method of selecting and **attending to stimuli** so that we can affect some kind of control over the environment in which we live" (Keohane, Luke, & Greer, 2008, p. 23).
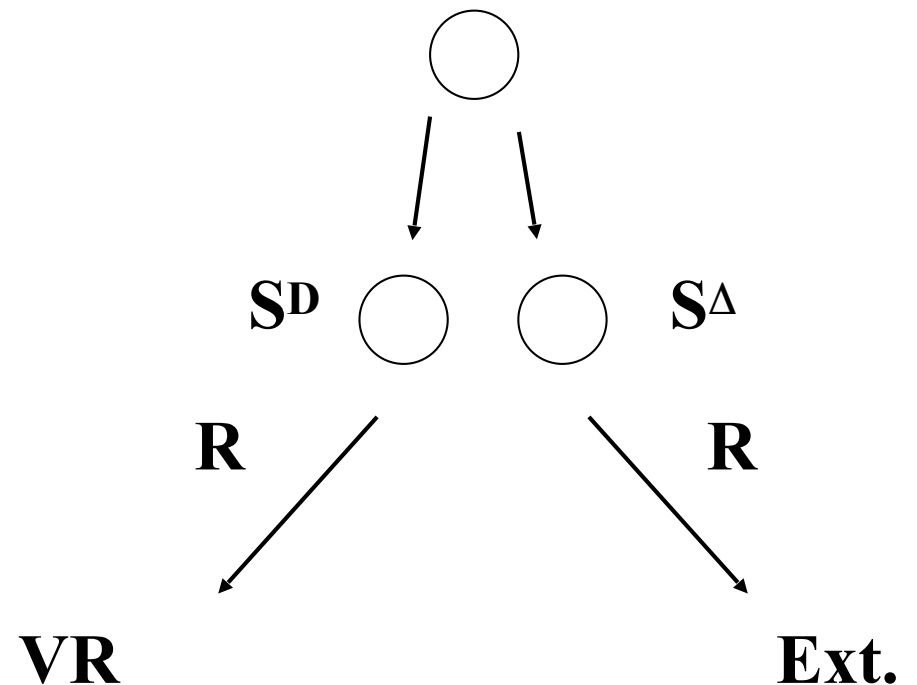
Attention as an Sd and a reinforcer

* How does the child "know" if an opportunity for honouring his mand exists?

* What are the signals that the child must learn to discriminate?

* What is "attention"? What are the behaviours that we commonly tact as "attention"?

* Looking - how does the child know if the adult is attending/looking?

Observing responses

Responses that create contact with the antecedent stimulus. The antecedent stimulus that evokes subsequent behaviour or reinforcement is a reinforcer that maintains the observing behaviour (Dinsmoor, 1983)

Looking as the earliest operant response to contact social stimuli

S^D $\qquad$ S^Δ

R $\qquad$ **R**

VR $\qquad$ **Ext.**

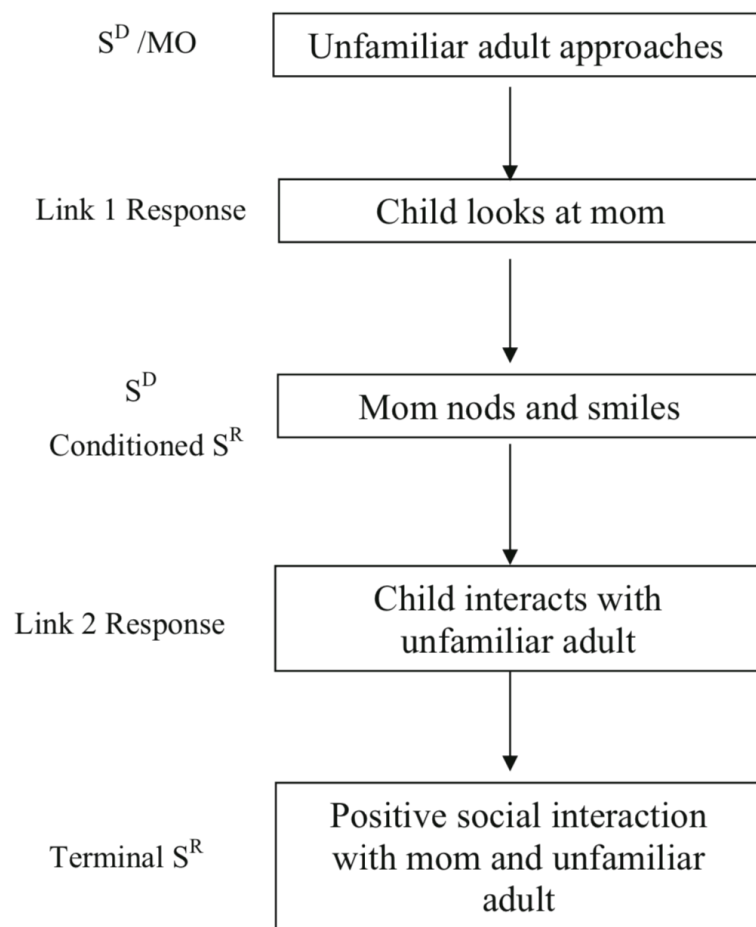Per Holth 2009

A behavioural chain

Fig. 1 Diagram of the social referencing behavior chain in which the observing response produces affective stimuli that evoke an approach response with social interaction as the terminal reinforcer

Social Referencing and Children with Autism

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Abstract During social referencing, infants as young as 6 months of age look to others when confronted with unfamiliar or unexpected events in the environment and then respond to these events based on affective cues of the parent or caregiver (e.g., smiling and frowning). Social referencing is important for early communication and language development. Unfortunately, social referencing repertoires are limited or completely lacking in children with autism. Despite these documented social deficits, little research has focused on ameliorating social referencing deficits. The purpose of this paper is to present a behavior-analytic conceptualization of social referencing and the implications for ameliorating social referencing deficits of children with autism.

Keywords Social referencing · Autism · Operant analysis

A social chain

* The **change** in the environment functions as a **motivating operation**

* **Observing response** (Catania, 2013) **Looking** at the mother produces an Sd (her expression or action).

* Two functions in the chain: a **conditioned reinforcer** that maintains the observing response and **a discriminative stimulus** for subsequent approach or avoidance behaviour

* "The affective stimuli become discriminative for approach or avoidance responding because they are correlated with reinforcement (e.g., social interaction with mother and adult, access to some novel event, stranger or aversive event avoided), extinction (e.g., no social interaction with mother, no access to novel event), or even punishment (e.g., exposure to stranger, aversive event, scolding from mother)" (DeQuinzio et al., 2015, pg.)

Functional analyses

* Eye-contact as operant social behaviour reinforced by contacting attending by adult, looking as part of a behavioural social chain:

* Dube et al., 2004 (share interest)

* Carbone et al., 2013 (honour mand)

* Isaksen & Holth., 2009 (signal access)

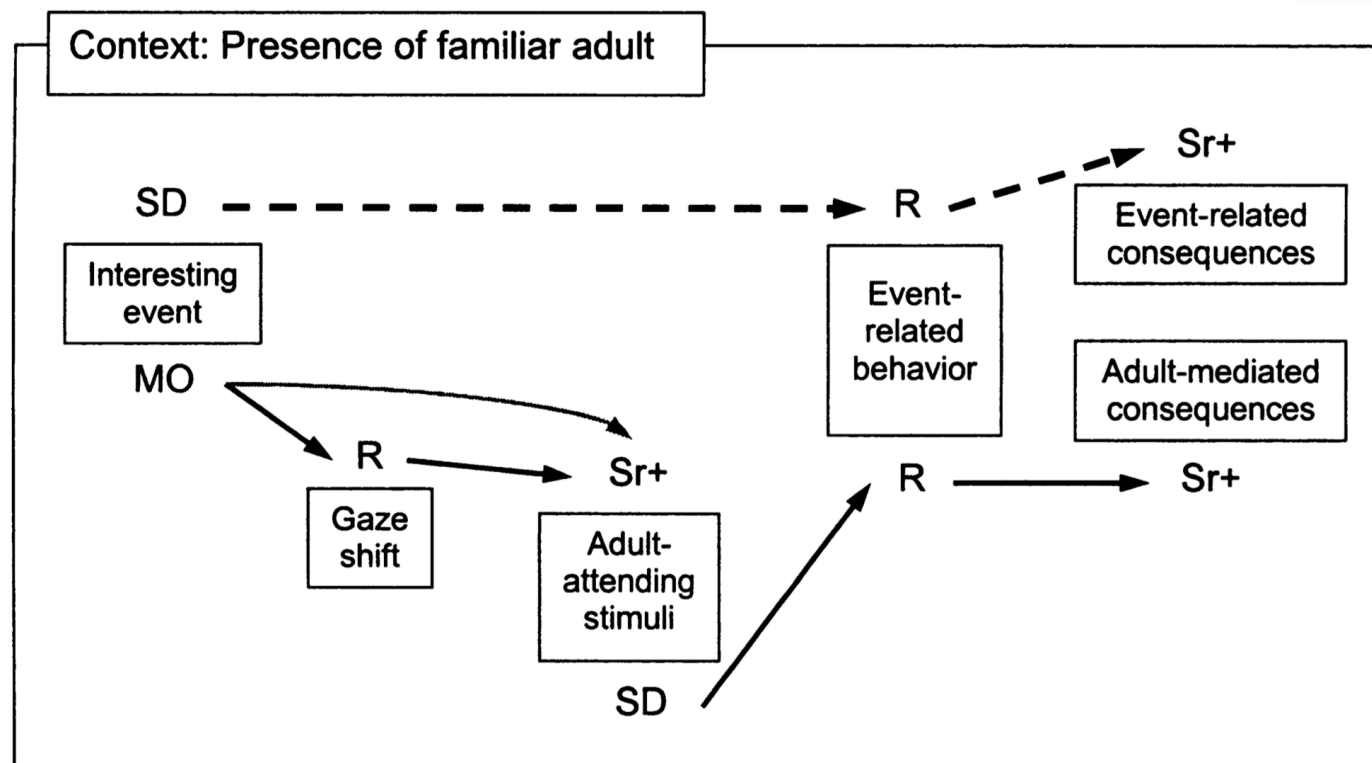# Dube et al., 2004: "Toward a Behavioral Analysis of Joint Attention"

Figure 1. Contingency diagram. Large box indicates a context that includes a familiar adult. Smaller boxes show stimuli and responses. Abbreviations for contingency terms appear above or below boxes: SD = discriminative stimulus; R = response; Sr+ = conditioned reinforcer; MO = motivating operation. Dashed arrows show a three-term contingency that is independent of adult-mediated consequences. Solid arrows show contingencies that may support joint attention initiation. The curved gray arrow from MO to Sr+ represents the reinforcer-establishing effect of the interesting event; the arrow from MO to R represents the evocative effect of the interesting event.

Carbone et al., 2013: "Teaching Eye Contact to Children with Autism: A Conceptual Analysis and Single Case Study"

Following frequent exposure to the variables that control the mand response, a behavioral chain occurs:

Child wants something & needs Listener's action to receive it -- but Listener is not looking
Conditioned Transitive Motivating Operation

↓

Conditions the sight of Listener's face and eyes as a Reinforcer
& evokes looking for face and eyes of Listener

↓

Sight of Listener's face and eyes (acts as a)
Reinforcer for the Looking Response & S^D for the Mand

↓

Mand Response is evoked

↓

Child Mands
Delivery of the item acts as Reinforcer for Mand

Italicized Words = Stimuli | **Bold Words =** **Behavioral Variables** | Standard Print Words = Effects of Behavioral Variables
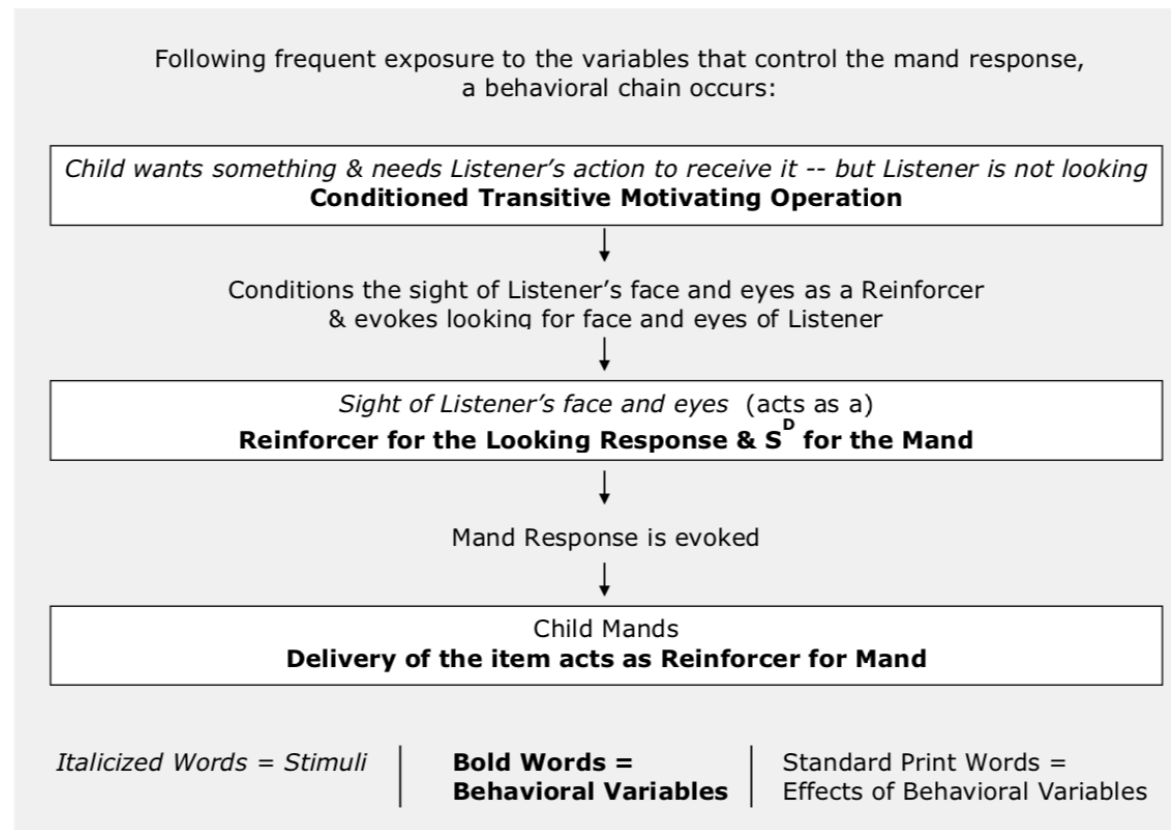
Figure 2. Description of the behavioral variables that evoke the eye contact response and select and maintain it by reinforcement in the form of social attention of a communication partner.

Isaksen & Holth, 2009 "An operant approach to teaching joint attention skills to children with autism"

- Gaze following

- Monitoring

- Social referencing

- Protoimperative

- Protodeclarative

Emerging applied literature

- "Social behavior may be described as behavior for which the **reinforcing or discriminative stimuli** are, or have been, mediated by the behavior of another organism." Keller & Schoenfeld, 1950, pp. 257-258.

- Stimulus - stimulus pairing: Dozier (2012) - inconsistent results

- Response contingent pairing: Dozier (2012), Axe & Laprime (2017)

- Discrimination training: Isaksen and Holth (2009), Carbone et al., (2013)

- Observational Learning: Leaf et al (2012, 2016)

- **Please see Judah Axe (Penn State, 2014) and Einar Ingvarsson presentation (https://autism.outreach.psu.edu/sites/default/files/75-Presentation_0.pdf) for two excellent reviews and specific references on this topic**

However

* Applied research has focused mainly on the organisation of discrete contingencies, distinct events to establish specific topographies (e.g. eye-contact) in response to specific social stimuli (e.g. smiles, nods), either as conditioned reinforcers or discriminative stimuli.

* Molecular analyses and derived applications help in identifying the underlying processes and potential sources of stimulus control, but at the clinical level they may lead us to procedures that reduce a complex response class (social behaviour) into instances of single topographies

Reconciling research with clinical needs

✤ Social behaviour includes a multitude of topographies and it is fluid, dynamic, involving **constant adaptations to changes in the social arena**. It typically involves **integrated** responses that are intertwined: showing **while** smiling **while** shifting gaze from person to item and back **while** vocalising. This is different from a chain of responses: showing, **then** looking, **then** vocalising.

✤ Social responses often occur **bundled** together, not **chained** after one another

✤ How can we incorporate the current molecular analyses and treatment models into a naturalistic intervention framework that is conceptually systematic and firmly based on a Skinnerian analysis of social and verbal behaviour?

Gold standard for autism treatment

- Early Intensive Behavioural Intervention:

  - Comprehensive curriculum

  - Evidence-based

  - Family involvement

  - Lead by expert individuals

  - Intensive

  - Early

  - Applied Behaviour Analysis

ABSTRACT

In a previous study, we compared the effects of just over one year of intensive behavior analytic intervention (IBT) provided to 29 young children diagnosed with autism with two eclectic (i.e., mixed-method) interventions (Howard, Sparkman, Cohen, Green, & Stanislaw, 2005). One eclectic intervention (autism programming; AP) was designed specifically for children with autism and was intensive in that it was delivered for an average of 25–30 h per week (n = 16). The other eclectic intervention (generic programming; GP) was delivered to 16 children with a variety of diagnoses and needs for an average of 15–17 h per week. This paper reports outcomes for children in all three groups after two additional years of intervention. With few exceptions, the benefits of IBT documented in our first study were sustained throughout Years 2 and 3. At their final assessment, children who received IBT were more than twice as likely to score in the normal range on measures of cognitive, language, and adaptive functioning than were children who received either form of eclectic intervention. Significantly more children in the IBT group than in the other two groups had IQ, language, and adaptive behavior test scores that increased by at least one standard deviation from intake to final assessment. Although the largest improvements for children in the IBT group generally occurred during Year 1, many children in that group whose scores were below the normal range after the first year of intervention attained scores in the normal range of functioning with one or two years of additional intervention. In contrast, children in the two eclectic treatment groups were unlikely to attain scores in the normal range after the first year of intervention, and many of those who had scores in the normal range in the first year fell out of the normal range in subsequent years. There were no consistent differences in outcomes at Years 2 and 3 between the two groups who received eclectic interventions. These results provide further evidence that intensive behavior analytic intervention delivered at an early age is more likely to produce substantial improvements in young children with autism than common eclectic interventions, even when the latter are intensive.

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Meta-Analysis of Early Intensive Behavioral Intervention for Children With Autism

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A systematic literature search for studies reporting effects of Early Intensive Behavioral Intervention identified 34 studies, 9 of which were controlled designs having either a comparison or a control group. We completed a meta-analysis yielding a standardized mean difference effect size for two available outcome measures: change in full-scale intelligence and/or adaptive behavior composite. Effect sizes were computed using Hedges's g. The average effect size was 1.10 for change in full-scale intelligence (95% confidence interval = .87, 1.34) and .66 (95% confidence interval = .41, .90) for change in adaptive behavior composite. These effect sizes are generally considered to be large and moderate, respectively. Our results support the clinical implication that at present, and in the absence of other interventions with established efficacy, Early Intensive Behavioral Intervention should be an intervention of choice for children with autism.

Consistent results

✤ Outcome group studies: ranging from poor to moderate methodological quality according to several systematic reviews

✤ Significant gains in formally assessed IQ and language, compared to control TAU groups

✤ **But significant changes in diagnostic classification (social responding) either not measured or weak**

Both approaches

Naturalistic

Planned situations in which the adult manipulates the child's motivation for a particular activity or item and creates opportunities to teach language (speaker and listener) in the context of play and day to day activities.

Structured

Planned situation in which the adult presents a series of formal teaching trials in which the response is unrelated to the reinforcer

Incidental teaching refers to the interaction between an adult and a single child, which arises naturally in an unstructured situation such as free play and which is used by the adult to transmitting formation or give the child practice in developing a skill. An incidental teaching situation is child-selected; that is, the child initiates interaction by requesting assistance from the adult.

Hart and Risley (1975, p.411)

An example: cars (sr) and imitation (skill)

* Materials: cars, tracks and slide

* Child imitates adult pushing cars on the tracks, inside the tunnel, down the slide, going off road. May also copy noises (brum, up, down)

* Materials: cars, tracks and slide

* Adult says do this and claps hands. Child claps hands - adult provides cars as the reinforcer

Basic procedure

✣ Adult makes moment to moment decisions to:

✣ Select and implement relevant language objective (focus typically on requesting/manding) based on activity

✣ Which signal to use (expectant look or/and verbal instruction)

✣ Which prompt hierarchy to use (full, partial, minimal)

Table 6.1
Examples of Incidental Teaching

Using Phonemes

Target response	Requesting preferred materials or activities with an initial sound or syllable.
Prerequisite skills	Initiates for objects or activities by reaching or pointing; imitates some sounds.
Environmental design	Make a list of the sounds the child imitates; then display favorite foods and activities that begin with those sounds (e.g., /m/ for milk, macaroni, movie, music).
Child's initiation	Reaches for, points or gestures to, or pulls an adult toward materials or activities.
Request for elaboration	Respond to his initiation with the question "What do you want?" If he does not respond or responds incorrectly, model the correct sound (e.g., "Say, '/m/.' ").
Provide the object for which the child initiated	When he responds with the correct sound, confirm that he is correct by stating the object label with emphasis on the target sound (e.g., "*m*ilk"), and give him the requested item.

Using Prepositions

Target response	Using one of the following prepositions or prepositional phrases: *in, on, under, next to, behind,* or *in front of.* (*Note:* You may want to begin with only two prepositions.)
Prerequisite skills	Uses sentences to request objects, imitates verbal models of 8 to 10 words.
Environmental design	Put high-interest toys or snacks in, on, under, or beside containers, and put containers on countertops, shelves, or tables in the kitchen, family room, or playroom. Use a variety of containers (e.g., shoeboxes, plastic food containers, food storage bags) to promote generalization. For example, put the child's favorite videotape in a bag, and put her stuffed bear behind a shoebox.
Child's initiation	The child requests food or play materials with a word, phrase, or sentence (e.g., "I want a cookie").
Request for elaboration	Respond to the child's initiation with a question that requires her to identify the location of the object in relation to a container, using a target preposition or prepositional phrase. For example, ask "Where is the videotape?" If the child makes an incorrect response or does not respond, provide a verbal model (e.g., "Say, 'I want the video that's *in* the bag' ").
Provide the object for which the child initiated	When the child uses a correct preposition or prepositional phrase in a sentence, confirm that her response is correct and immediately provide access to that item (e.g., "Oh, you want the videotape that is *in* the bag. Here it is").

Fenske, Krantz & McClannahan
(1996)

Naturalistic comprehensive intervention models (multiple objectives)

✣ Natural Environment Teaching (VB)

✣ Pivotal Response Training

✣ Natural Language Paradigm

✣ Joint Activity Routines (ESDM)

Both natural and structured

- Most current comprehensive intervention models incorporate structured teaching and naturalistic instruction, implemented during play and day to day activities to promote speaker and listener behaviour.

- "Such unstructured, child-initiated, "naturalistic" techniques have been an essential part of ABA from its very beginning. Contrary to some assertions (e.g., Koegel, Koegel, & Carter, 1999; Prizant & Wetherby, 1998; Rogers & Dawson, 2010; Schreibman et al., 2015), they were not just discovered recently or developed to make up for the alleged shortcomings of more structured, adult-directed techniques"(APBA, 2017, p.13).

Can EIBI impact on the core deficits of autism?

Randomized, Controlled Trial of an Intervention for Toddlers With Autism: The Early Start Denver Model

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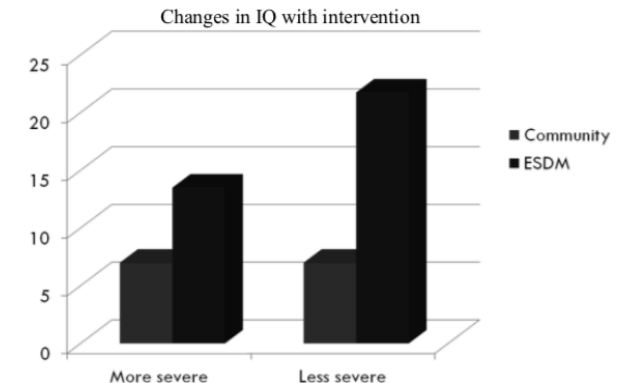
KEY WORDS
autism, behavioral intervention, cognitive function, developmental outcomes, early intervention

WHAT'S KNOWN ON THIS SUBJECT: Previous studies on the efficacy of early behavioral intervention for improving outcomes for preschool-aged children with autism have yielded promising results. However, no randomized clinical trials of early developmental behavioral intervention designed for toddlers with autism have been conducted to date.

WHAT THIS STUDY ADDS: This study assessed the efficacy of the Early Start Denver Model, a comprehensive developmental behavioral intervention, for improving outcomes of toddlers with ASD. The intervention, which was initiated when children were less than 2½ years, resulted in significant improvements in IQ, language, adaptive behavior, and autism diagnosis.

Severity of ASD moderates outcomes, but those with more severe ASD improve in ESDM

Dawson, et al., Pediatrics, 2010

Changes in IQ with intervention

Long-Term Outcomes of Early Intervention in 6-Year-Old Children With Autism Spectrum Disorder

Annette Estes, PhD, Jeffrey Munson, PhD, Sally J. Rogers, PhD, Jessica Greenson, PhD, Jamie Winter, PhD, Geraldine Dawson, PhD

- Follow-up of the same children, two years after

Mean IQ over time / Mean ADOS severity score over time

Characteristics

✣ Comprehensive manualised early intervention: 12-48 months

✣ Based on a naturalistic developmental model incorporating some aspects and techniques of ABA, **but not its theoretical underpinnings.**

✣ Aims to alter developmental trajectories and decrease core autism symptoms

Recommended, not experimental

* "Based on our review of 12 studies, reported in 15 separate articles, the ESDM appears to be a promising treatment for young children with, or at risk for, an ASD diagnosis. However, there are methodological limitations that reduce the certainty of evidence for eight of the 12 studies. Given the generally promising results, the ESDM can be recommended as a practical approach to delivering a sensible early intervention program to children with, or at risk for, an ASD diagnosis. Still, more research is needed on all aspects of this model, particularly independent replications of the findings" (Waddington, van der Meer, Sigafoos, 2016)

But…

* "Nor can interventions that may incorporate some ABA procedures along with some non-behavior analytic procedures (e.g., Prizant, Wetherby, Rubin, & Laurent, 2003; Rogers & Dawson, 2010; also see Smith & Iadarola, 2015), because such interventions do not meet the criterion of being conceptually systematic, that is, thoroughly grounded in the concepts and principles of behavior analysis"

* **However, any intervention that specifically aims to increase early social responding as the overarching goal and provides a systematic procedural method of potentially achieving such an objective, merits, at least, our attention and study, as a scientific community geared toward the remediation of autism deficits**

"behavior reinforced through the mediation of other persons [who] must be responding in ways which have been conditioned *precisely in order to reinforce the behavior of the speaker*"

Skinner, 1957, p.225

"Social reinforcement is usually a matter of personal mediation...verbal behavior always involves social reinforcement and derives its characteristic properties from this fact."

Skinner, 1953, p. 299.

Language is social in nature: it is acquired through and maintained largely by social interaction

Where do we start?

* "Follow and manipulate his motivation", "capture interest", "follow the child's lead"

* These are not operational terms...

* Motivating Operations: definition

Motivating Operations

An event or stimulus condition (an environmental change) that **alters** the current reinforcing effectiveness of some stimulus and the probability of behaviour that has previously contacted that stimulus.

In the presence of its discriminative stimuli

Conditioned - as a result of a learning history

Follow his motivation…

* Adapting one's behaviour based on fluctuations in the child's behaviour (interest) in order to maintain the child in contact with our actions and adult mediated activities.

* Creating opportunities: making changes to the physical or verbal environment to alter the value of certain stimuli (MO manipulation) and establish the adult and his or her cues (expression, eye-contact, gestures) as a discriminative stimulus for the delivery of the reinforcer. At the same time, we want to be part of that reinforcer, not just givers (vending machines).

Behaviours to produce interaction vs items

* Non-Specific, generalised mands for interaction (showing, giving, proto-declarative pointing, activity related gestures)

* Mand training: specific topographies to access items or actions. Attention must already be a conditioned reinforcer, the adult as an Sd (not vending machines)

An analysis of social behaviour

* CMO: an event

* SD: person (or toys **and person**)

* R: vocal or non vocal

* SR: vocal or non vocal action of the person

* Any response that is evoked by the presence or action (can be verbal or non verbal) of a person and maintained by continued contact with the person (interaction).In the case of "social play", the person increases the value of the objects and their use, or it is necessary for the reinforcing movement (sensory motor social routines).

What to reinforce?

* Natural contingencies of reinforcement

* **To evoke behaviours that naturally recruit social interaction through social interaction (all VB is social)**

* If we can achieve this early in intervention, we can then create opportunities to teach language in the context of natural activities, without relying on arbitrary non functional reinforcers

* **We want to establish actions of the adult as Sds and Srs:** through generating changes in a verbal antecedent or in the physical environment

Joint Activity Routines

* Early Start Denver Model (Rogers., 2010)

* Joint: source of reinforcement must come from the adult (together) - shared control

* Activity: it must make sense, have a theme, a purpose (functional play skills)

* Routine: **repetition is key. Building chains: Sds and Srs**

Structure

* Set up: start of the activity, approach

* Theme: elaboration

* Variation: changes

* Closing, transition: ending

* Interaction: listening, narration, imitation, assistance

Basic procedure

* Objectives across activities

* Natural antecedents (another behaviour, environmental changes, preceding behaviour)

* Intrinsically reinforcing activity - no extraneous reinforcer, at least initially (but may be required if no progress)

* Active listening (few demands) - monitoring fluctuations in child's behaviour

* Please see relevant literature for detailed procedural explanations

Differences and similarities

ESDM

❖ **Analysis**: Developmental but uses behavioural procedures

❖ **Structure:** ABC model

❖ **Classification of objectives:** psycholinguistic, developmental domains

❖ **Definition of spontaneity:** unprompted

❖ **Prompting hierarchy:** pausing, least to most (flexible)

❖ **Focus:** social engagement

❖ **Reinforcement**: shared engagement in activity

ABA based

❖ **Analysis**: Behavioural in both theory and practice: but social engagement not specifically defined

❖ **Structure:** ABC model, motivating operations

❖ **Classification of objectives:** Behavioural

❖ **Definition of spontaneity:** natural source of stimulus control

❖ **Prompting hierarchy:** most to least, least to most, time delay (flexible)

❖ **Focus:** Manding/requesting

❖ **Reinforcement**: engaging with the activity

Can we achieve a behavioural social intervention model both in theory and practice, but that is still developmentally sequenced?

A social chain

✤ Building chains in which the Sds and Srs are all mediated by the adult.

✤ Once the chain is built, look for choice points, the break point of the link in the chain, create a pause or a change to evoke a change in **social** behaviour (e.g., looking, reaching, seeking assistance, showing)

✤ Transitive motivating operations (CMO-T)

✤ Extinction induced variability

Get ball

Throws in basket

Ball held high

Reaches and looks

Two balls: points to choose one

Empty hand: adult points to where ball is, follows point to get ball

Turns to get ball from adult

Imitating different throws

Basket held high

Looking at adult in anticipation

Gesturing "down"

Giving basket to adult to tip

Basket tipped

Balls falling down

Variations, closing

Practical considerations

✤ **What do we play:** choice of activities, directing intrinsic reinforcement (self-stimulation) to social reinforcement

✤ **I listen and observe:** constantly monitoring signs of interest and changes in participation (affect, smiles, body posture, orienting, proximity, looking)

✤ **Stay with me:** maintaining engagement (keeping value of escape and automatic Sr low)

✤ **Do what you want, do what I tell you:** balancing our tendency to give instructions vs adult mediated transitive motivating operations. Time delay (waiting) vs prompting (assisting)

✤ **Let's do something else:** alternating activities, building different chains

✤ **How long do we play for:** duration of engagement and alternating physical with sit-down activities

✤ **Let's change way or game:** managing variations **within** and **across** activities (changes vs putting away)

✤ **What do I teach you:** focus on social objectives across activities

Our biggest obstacle

✤ Differentiating **between** social reinforcement in which the vocal or non vocal **action of the adult <u>is</u> the reinforcer -** and the delivery of a tangible reinforcer via the adult, in which **the item is the reinforcer** (and in the absence of the adult, the child would be able to access it or produce it)

Social interaction and social play

- CMO: an environmental change

- SD: person

- R: vocal or non vocal

- SR: vocal or non vocal action by the person

- Any response that is evoked by another person and is maintained by the ongoing interaction with another person, that conforms to the rules of the community

- CMO: an environmental change

- SD: person and toys

- R: verbal and motor

- SR: verbal and motor

- Both the activity and another person are reinforcers. The person increases the value of the activity.

Structural play activity analysis

* Sensory-social

* Sensory manipulation and cause and effect

* Functional close-ended activities

* Early board games

* Arts and crafts

* Symbolic and dramatic play (scenarios)

Sensory social

✤ Motor: adult generate reinforcement through his own movement (e.g., spinning, aeroplane, spaghetti arms, tickles, chase)

✤ Object: adult manipulates object (e.g., peek-a-boo with blanket, swinging with blanket, spinning with chair, up and down the tunnel)

✤ **The received movement is the reinforcer, but the child cannot generate it on his own**

Sensory manipulation

* Pouring water, flour rain with sieve, sand, finger paint, shaving foam, volcano

* Cause and effect toys: pressing, stacking and pushing down, filling and emptying

* **If automatic reinforcement: objective is on social behaviours to obtain it**

    * Turn taking: I do it, you do it (tolerance and release)

    * Delayed imitation: I do it, you copy - you do it, I copy, you watch me change action - you copy

    * Simultaneous imitation: looking, response to changes in actions

Functional close-ended

✤ Self-corrective materials: insert and jigsaw puzzles, stacking rings, shape sorters

✤ Completion is likely to be the reinforcer: natural chain, each subsequent piece signalling the reinforcer

✤ **Social responses in each link (following point to find piece, showing where it goes, shaking head when given wrong piece). The objective is not on teaching how to do the puzzle.**

Early board games

✤ Matching games: Lotto boards or repetitive action games

✤ These can also be used as functional close-ended games (same objectives)

Arts and crafts

* Colouring, drawing, cutting and pasting, play-dough,

* Different materials to build something together

* Co-operating toward a final shared outcome: coordinated cooperative chain in which the end of a person's action is the start of the other person

Symbolic and dramatic play

✤ Kitchen play, doll play, cars and trains, small doll furniture

✤ Language is necessary. Child and adult use shared materials to engage in meaningful actions (preparing a pretend meal) or use agents to develop a story. the adult action can be the initial input or a consequence to what the child does (chain): imitation, following instruction for a variation, coordinated social responses and language objectives

An example of social objectives

Social objectives	Activity	Activity	Activity
Turns towards social sounds (raspberries, whistles, laughter)			
Turns when called by name and looks expectantly			
Approaches adult when near favourite activity			
Responds to a social smile			
Participants in singing (gestures, smiles, anticipates)			
Looks at adult when s/he blocks access to activity (e.g. blocks in sorter)			
Looks and smile with anticipation during a sensory activity (peekaboo, spinning)			
Looks and smiles with anticipation during a play routine (birthday party)			
Gestures and looks to continue a social physical activity (e.g. gives arm for tickles, lifts t-shirt for			
Gives objects in hand to request for help or taps hand (e.g. can't open something or broken toy)			
Looks before asking for something			
Mands with eye contact			
Mands for attention using person's name (if person not looking)			
Points in choosing between similar manded items and checks back			
Follows another person's point to find an item and checks back with eye contact			

Social objectives	Activity	Activity	Activity
Shows interest (laughs, smiles looks) when adult does something funny or silly			
Shows object when asked "show me"			
When adult says "look" looks at object and says name and looks at adult			
When adult shows something comments (says name of item) and looks at adult			
When adult points at a distance and asks what something is, follows point and says name of item			
When asked where to put something, points to place and checks back with adult			
Shows item has been searching for after finding it			
Follows eye-gaze to find an object that is hidden			
Enganges in a turn taking verbal routine (e.g. counting in turns)			
Reciprocates comments			
Gives items with eye contact for adult approval			
When having to choose between multiple items points to one and checks back with adult			
Looks and Imitates play and changes in play			
Responds to declarative language (listener)			
Coordinates actions in symbolic play (tutn taking, i pour he drinks)			
Comments in response to ambiguous or unexpected events and checks back			
Draws attention to unexpected events (points and comments)			
When answering questions looks at adult for approval			
Completes short sentences in play activities			

Naturalistic interventions: early learner

Profile	Objective: establish others as Sds and Srs
Absent mands (grabs) or defective (moves adult hands) Limited social engagement, self-directed, sensory stimulation Limited or absent: listener skills, functional object use and play-skills, imitative skills. Defective NV conditional discrimination	Maintains proximity and accepts adult giving items Early social responses (eye contact based: anticipation, following a point, showing) Mand training: direct MO and transitive MO Gradual inclusion of activity based adult directed skills (listener, matching and imitation) Tacting **Teacher objective: To create tens of joint activity routines**

Example: throwing balls

	Examples	Social targets	VB: Mands, tacts, pure IV	NV: Receptive, Imitation, Matching
Opening	Setting up, gathering materials: balls, tunnel, basket	Looks at adult and points to activity. Follow adult pointing to get materials	Asks to be picked UP. Points to balls and mands "ball".	R: "get tunnel"
Theme	Throwing balls through the tunnel, picking them up from floor into the basket, throwing them again	Looks up in anticipation of next action. Following pointing to gather specific balls. Laughs at BIG ball not fitting Shakes head to sign NO. Shows after finding hidden ball	Mands: Ball, In, Down Mand: Throw Tact: counting balls IV: ready steady GO	Imitates throwing High, bouncing Matching: adult shows BIG ball, child finds another BIG ball. Shows blue ball, child finds blue ball
Variations	Balls back and forth through the tunnel. Putting them in basket and throwing them all at once onto the floor. Using basket as a target.			
Ending	Tidying up, balls back in the basket, folding tunnel and putting it in bag	Takes it in turns to throw balls back in the basket, puts lid back on and gives basket to put up.	Points to where it should go on the shelf	Matches coloured balls in belonging boxes (e.g. red with red)

Naturalistic interventions: Intermediate learner

Profile	Objective: Talking and being with people as the Sr
Combines words as mands Single and multi-step instructions Hundreds of tacts: including adjectives, propositions and actions Question discrimination (tact and intraverbal)	Symbolic play (younger children) Games and experiences (older children) Teaching and generalisation occurs in the context of joint activities All verbal operants (about activity) Monitoring eye-gaze and joint attention with commenting and reciprocation **Transfer objectives from structured teaching into naturalistic contexts**

Making foot prints with paint on long paper

ACTIVITY	Social and Mands	Tact and Intraverbal	Listener
Gathering the materials from various rooms of the house. Each has a long piece of paper. painting on feet and walking on paper. Funny walks. Washing feet. Getting dinosaurs and painting their paws and making them walk to leave foot prints. Painting a scene for the dinosaurs (mountain and lake) Adding glitter and hanging up paper on windows. Giving dinosaurs a bath. Putting every away in the various rooms.	Imitating strokes Showing own prints Following eye-gaze to get a specific coloured paint Asking "where is the X paint?" Asking for assistance for opening paint Reciprocating comments about actions Commenting on an ambiguous event (e.g., using juice instead of paint) Taking it in turns to paint	Discriminating questions about the ongoing activity: who, what, where, how. Functions: what do we paint with? What do we paint? What do we do with the paper? What is the towel for? What do we use for cleaning? Prepositions: where is the X? What is under the X	Following multiple step instructions Acting out a story about the dinosaurs going to the mountains

Naturalistic interventions: Advanced learner

Profile	Objective: Verbal interaction as the Sr
Mands for information Describes ongoing events Intraverbally controlled responding (problem solving and recalls past events)	Verbal interaction (conversation) within the context of activities and experiences. Conversation about the activity Activity is ongoing and conversation is about something else Cooperative play Emotions (private events) Others perspectives **Teacher objective: conversation social rules (posture, changing topic, monitoring listener) and structure (questions, answers, comments) Integrating all advanced objectives**

Not just making a cake…

ACTIVITY	Complex speaker and listener responding
The activity serves as the shared enjoyable event, as a springboard for a conversation	Do you know where mum keeps the chocolate? **No.** Can you ask her? **Mum, where is the chocolate?** What do you need it for? **We are making a cake for John's birthday!** It's in the top shelf of the cupboard above the dishwasher **Ok, thanks!** …. **She said it's in the top shelf od the cupboard above the dishwasher** Ok, let's get it. Do you think John is going to like it? **Yes, he likes chocolate.** Is he having a party? **Yes on Saturday, at Animal Kingdom** Mmmh sounds fun. I was there last week… **Why did you go?** Oh, I went for another one of my kids' birthday **Which one?** William's, there were some new animals **Which animals?** Some new baby monkeys. I love monkeys **I like the elephants, do you like elephants?** I do, very much, I once rode on an elephant. Have you ever been on on one? **No, where did you do that?** Remember last summer I went to India? They have elephants there and they let you ride on them…

Be humble and be bold

✤ Although we need not go outside our science to explain and potentially alter social responding in children with autism, addressing social behaviour in this population represents a significant challenge, both in analysis and practice.

✤ Be humble and respectful in recognising the achievements and scope of other approaches, and be bold in trusting what a conceptually systematic analysis of behaviour can do: changes in behaviour, including social behaviour, can be explained in terms of contingencies.

Thank you for your engagement!
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