TEACHING “LEARNING HOW TO LEARN”: A FUNCTIONAL ANALYSIS OF CURRICULUM PROGRAMMING FOR CHILDREN WITH AUTISM

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TOPICS

• Curriculum development: historical and theoretical underpinnings

• Curricula in behavioural intervention for children with autism: a structural analysis

• Curriculum development in behavioural intervention: a functional analysis

• Defining skills: generalised vs cumulative

• Discriminative learning: simple vs conditional in early learners

• The speaker as its own listener: naming
TO RUN

• From the Latin word for the “course of a race”, originally derived from “currere”, to run.

• “All the learning which is planned and guided by [a school, whether it is carried on in groups or individually, inside or outside the school” (Kelly, 1983, p. 10).

• ABA and autism: to accelerate learning and modify developmental trajectory
EVOLUTION OF CURRICULUM DEVELOPMENT THEORY

• Curriculum as transmission of knowledge and as a product: sequence of objectives, definition and measurement of attainment (Tyler, 1949)

• Curriculum as a process (Stonehouse, 1974): not a syllabus to be followed, but a proposal to be tested. Emphasis on empiricism: selecting content, developing teaching strategies, sequencing learning experiences, and assessing student strengths and weaknesses with an emphasis on empiricism.

• Curriculum as a praxis: a commitment to curriculum development and the context in which it is implemented. Emphasises curriculum as a social process marked by the interactions within the learning environment and the concept of “assisted performance” (Wildman, 2007) or Vygotskian scaffolding.
"We can offer a set of concepts and principles derived exclusively from experimental research; we can offer a methodology for applying these concepts and principles directly to teaching practices; we can offer a research design which deals with changes in the individual child (rather than inferring them from group averages); and we can offer a philosophy of science which insists on observable accounts of the relationships between individual behavior and its determining conditions.” (Bijou, 1970, p.66)
“Since the real purpose of education is not to have the instructor perform certain activities but to bring about significant changes in the students' pattern of behaviour, it becomes important to recognize that any statement of objectives [...] should be a statement of changes to take place in the students.”

Tyler (1949, p. 44)
CONSTRUCTING EDUCATION

1. What educational purposes should the school seek to attain?

2. What educational experiences can be provided that are likely to attain these purposes?

3. How can these educational experiences be effectively organised?

4. How can we determine whether these purposes are being attained?

1. Clear definition of learning objectives.

2. Descriptions of teaching procedures for acquisition and generalisation and teaching approach (e.g., DTT vs NET)

3. Sequential organisation of learning objectives within and across curricular domains.

4. Data-based evaluation of mastery and generalisation of learning outcomes.
HISTORY OF CURRICULA IN EIBI: 80S AND 90S
PAST 20 YEARS
“That is, the curriculum is not simply a set of plans to be implemented, but rather is constituted through an active process in which planning, acting and evaluating are all reciprocally related and integrated into the process.”

Grundy (1987, p.115)
“Learning should not only take us somewhere; it should allow us to go further more easily... The more fundamental the idea, the greater will be its breath of applicability to new problems.”

(Bruner, 1960, p.17-18)
Many of the subjects may be unrecognisable, however. It has often been remarked that an educated man has probably forgotten most of the facts he acquired in school and university. Education is what survives when what has been learned has been forgotten. We teach “subjects” partly because teachers are hired as subject-matter specialists and partly because competence in a given subject is convenient proof of successful teaching. But we may eventually learn how to teach the things which comprise the important marks of an education. The specific intellectual skills, abilities, attitudes, and tastes which are now taught mainly as by-products of content instruction may, if the experimental analysis of behaviour is fully exploited, occupy the focus of attention in 1984.

Skinner (1964, p.484)
A PARADIGM SHIFT IN CURRICULUM DESIGN

• Behavioural curricula have been almost exclusively concerned with the nature and structure of curriculum content in hierarchical cumulative fashion

• Transition to the design and arrangement of teaching procedures that will ensure the greatest gains in novel, untaught, skills from the minimum amount of direct teaching

• Learning how to learn: a common goal for all educators

• Acquiring skills through social interaction: a fundamental goal for all autism interventionists
BEHAVIOURAL DEFINITIONS

• Curriculum as a product: A series of verbal statements regarding the changes that the teacher will evoke in the student, sequenced in hierarchical fashion.

• Curriculum as a process: The identification of the controlling variables for any given skill, to be established through procedures derived from such an analysis in order to bring behaviour change under its natural sources of stimulus control, regardless of complexity or teaching context.
CHOICE OF OBJECTIVES: ASSESSMENT

• Standardised tests: Can an overall score on generic domains inform the choice of specific objectives?

• Curriculum derived assessments: relies on the curriculum being appropriately sequenced and the objectives reflecting the acquisition of socially significant skills

• Individualised to the child’s needs: without a framework, it relies on the clinician’s experience and interpretation of the child’s strengths and weaknesses and which skills will produce maximum quality of life in his current environment
A FUNCTIONAL ANALYSIS

- Understanding the type and function of the skill
- Understanding stimulus control for that skill
- A framework for understanding skills regardless of manual or theoretical orientation
INTERPRETIVE FRAMEWORK

- Curriculum as a syllabus vs curriculum as a process
- How vs what
A STRUCTURAL ANALYSIS: CURRICULUM COMPONENTS

• Curricular domains
• Programme or task
• Items or responses
• Mastery criteria
TASKS AND ITEMS

• A task, a programme, an activity: an arrangement of teaching contingencies to facilitate the development of a skill

• Item: the specific stimulus (e.g., visual or auditory) to which responding is established within that task
SKILLS AND RESPONSES

• Skill: a change in stimulus control of common multiple stimuli over a response class, the establishment of which is demonstrated by specific topographies.

• Skill: a class of responses with share stimulus control.

• Target response: a specific topography contingent on the presentation of specific stimuli, multiple responses demonstrate the establishment of the response class.
TWO MASTERY CRITERIA

When is a skill mastered?

• If accurate performance is displayed to all stimuli in the set?

• If performance occurs outside the teaching context?

• If the child demonstrates a response not previously taught?

• When the skill is generalised? How do we define generalisation of a skill?

When is a target topography or response mastered?

• When it is performed without prompts on a specific criterion (e.g., a probe trial over 3 consecutive days)?

• But what kind of a response is it? What kind of discrimination?
LANGUAGE IS GENERATIVE

• “However, despite diversity of theoretical orientation, most students of children's language agree that very early in the development of language, children appear to exhibit "generative" repertoires. That is, children emit language that has not appeared in their repertoires previously, and that apparently has been neither directly taught nor demonstrated to them by other speakers”
GENERATIVE LEARNING

- Recombinative generalization & matrix training
- Behavioural cusps
- Higher order operants or generalised operants
- Atomic repertoires
- Equivalence relations
- Derived relational responding
“Separate variables combine to extend their functional control, and new forms of behavior emerge from the recombination of old fragments. All of this has appropriate effects upon the listener, whose behavior then calls for analysis. Still another set of problems arises from the fact, often pointed out, that a speaker is normally also a listener. He reacts to his own behavior in several important ways. Part of what he says is under the control of other parts of his verbal behavior. We refer to this interaction when we say that the speaker qualifies, orders, or elaborates his behavior at the moment it is produced”

Skinner (1957, p. 10)
GENERALISED OPERANTS

• **Higher order operants**: defined in terms of the general relationship between antecedents and responses and not in terms of specific responses. Each instance of antecedent control is viewed as an example of a more general relation (e.g., motor imitation).

• **By atomic repertoire**: a set of fine-grained units of behavior, each under control of a distinctive stimulus, that can be evoked in any permutation by the arrangement of corresponding stimuli. Examples of atomic repertoires include rule-governed behavior, imitation, echoic behavior, textual behavior, transcription, and tacting, among others. The grain of such units depends on one's history of discrimination training and is therefore idiosyncratic. The important feature of atomic repertoires is that they permit the induction of a criterion variation in behavior in a single trial, or in a few.

• When atomic repertoires are evoked by permutations of controlling stimuli, we typically see the appearance of criterion responses on the very first trial of a novel task.
DEFINING SKILLS

**Generalised skills**

- More than one novel response (no direct teaching) can be established as a result of teaching individual responses within the same class.
- Example: motor imitation, visual-visual match to sample, naming, descriptions, recalling past events.

**Finite or cumulative skills**

- At least one teaching trial (one instance of reinforcement) is required to establish any novel response within that skill.
- Example: specific vocabulary acquisition (e.g., selection of common nouns).
CUMULATIVE SKILLS

Limited number of items

• A specific number of items.

• Example: prepositions, possessive pronouns

Unlimited number of items

• Speed of acquisition, the minimum number of trials to demonstrate errorless discriminative responding (i.e., three)

• Transfer across operants (e.g., listener to tact/naming, tact to intraverbal control)
SKILL ACQUISITION FRAMEWORK

Generalised
- Train ABC, test XYZ

Cumulative
- Unlimited number
- Minimum number of trials
- Limited number
- All items

Transfer across operants
GENERALISED OR CUMULATIVE?

• Tacting common items
• Discriminating questions on established tacts
• Oral motor imitation
• Play scenario imitation
• Prepositions (listener)
• Inferences
• Recalling past events
• Identical matching
• Puzzles

• Object imitation
• Listener instructions without objects
• Selecting common items (receptive labelling)
• Single word echoic
• Listing by category
• Sorting by category
• Sequencing
• Following two-step instructions
• Block building imitation
RESPONSE MASTERY CRITERION

• Accurate task performance on a single “item” or a emission of a single “response” does not reflect mastery or constitute a skill

• Within class discrimination comparisons: Sds and Sdeltas (targets and distracters) within the same response class - presentation of a new stimulus similar to the controlling one does not evoke the same response.
DISCRIMINATION

• Fundamental to demonstrate acquisition
• Stimulus control over certain topographies
• How antecedent stimuli become SDs
• Simple and conditional
SIMPLE

“Ball”

“Car”

“Shoe”
CONDITIONAL
The importance of multiple exemplar instruction in the establishment of novel verbal behavior

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According to traditional linguistic accounts language, and its generative nature, cannot be taught. From a behavior analytic perspective, language is like any other behavior; it is learned and amenable to change. Based upon Skinner’s radical behavioral analysis of verbal behavior, specific procedures have been designed to promote novel verbal relations. However, despite the strength and utility of this approach, using behavioral principles to understand the generativity of language has been challenging. Dependent upon the specific theory (e.g., stimulus equivalence, relational frame theory, bidirectional naming) within the radical behavioral orientation, researchers arrange unique procedures to evaluate the variables responsible for this phenomenon. This paper presents the commonalities and differences of two procedures (i.e., multiple exemplar training, multiple exemplar instruction) with examples of research highlighting the use of both in producing generativity. Further, it describes how multiple exemplar instruction is independent from other procedures leading to this outcome, and concludes by providing recommendations for both research and practice.

Key words: generativity, intervention, multiple exemplar instruction, multiple exemplar training, verbal behavior
GENERALIZATION VS OPERANT INTERDEPENDENCE

• MEI: “a special kind of task interspersal of various novel and acquired exemplars across verbal operant categories ... In this arrangement, the same target is taught simultaneously as two or more different verbal operants” (Sidener et al., 2010, p.15).

• MET may be more accurately described as a teaching procedure used to systematically program for generalization (stimulus or response) that exemplifies the concept of ‘training sufficient exemplars’ as discussed in Stokes and Baer’s (1977) seminal paper (p.4)

• The distinguishing feature of MEI in comparison to MET is that the function of responses across consecutive trials differs. MEI procedures consist of the rotation of different verbal operants with different functions (e.g., match, point to, tact, multiply controlled tact) across a series of consecutive trials (Greer, Stolfi, et al., 2005). Often, teaching continues across new sets of stimuli until probe data reveal that teaching only one operant produces untrained operants for that same response form (e.g., teaching a listener response, such as pointing, results in untrained speaker behavior, such as a tact) (p.4)

• “MEI only for procedures aimed at teaching functional interdependence by rotating between trials focusing on speaker behavior, listener behavior, or the emission of distinct verbal operants, while reserving the term MET only for procedures aimed at improving stimulus or response generalization through the systematic modification of stimuli or responses.” (p.11)
ABA BASED OBJECTIVES

- In what way our curricula, programmes and procedures meet the requirements that define our science?

- We know how to manipulate reinforcers to establish and increase the emission of responses, but reinforcement establishes stimulus control between certain antecedent variables and the related response.

- Prompting and differential refer to the process through which stimulus control changes to the natural stimulus.

- Have we become too technological?
PARADIGMS, PRINCIPLES, PROCESSES, PROCEDURES

• **A paradigm** is a summary term for a world view, a way of ordering and simplifying the world's complexity by making certain fundamental assumptions about the nature of the universe, the individual, and society.

• **Principles.** In the science of human behaviour they are defined as the laws of learning. Principles are true regardless of whether one can define them. They are not species specific.

• **Processes** is the word we use to describe how something happens based on a principle. Principles and processes are sometimes used interchangeably.

• **Procedures** are the specific actions or operations one engages in to evoke certain outcomes, based on processes and are typically derived from principles.
HAVE WE BECOME TOO TECHNOLOGICAL?

• “We are becoming less concerned with basic principles of behavior and more concerned with techniques per se” (Hayes, Rincover, & Solnick, 1980, p. 283),

• A rise of research that “demonstrates the effects of behavioral interventions at the expense of discovering... actual controlling relationships” (Morris, 1991, p. 413).
AND NOT VERY CONCEPTUALLY SYSTEMATIC?

Prior to BWR’s publication, members of the social-validity camp had been impatient with conceptually and methodologically cautious research-to-practice translation. Following an additional decade or so of field successes, it was perhaps logical for the same individuals to exhibit less and less interest in conceptual questions (Hayes et al., 1980, p. 289)—or, stated more positively, to conclude that the technology of dissemination was sufficiently advanced that field practitioners had little need to understand the underlying theoretical principles (e.g., see Baer, 1981; Wolf, 2001).

To be clear, Baer et al. did not advance this view explicitly and even acknowledged that the field of applied behavior analysis will probably advance best if published descriptions of its procedures... strive for relevance to principle... This can have the effect of making a body of technology into a discipline rather than a collection of tricks. (p. 96)
AN OBJECTIVE IN 7 DIMENSIONS

- **Applied**: how immediately relevant is this skill for this child in his current social context, now. Is it a prerequisite skill?

- **Behavioural**: operational definitions and quantification. Assessment, data collection system and mastery criteria.

- **Analytic**: Analysis of the controlling variables first, then a demonstration of a functional relation between the intervention and its outcome.

- **Technological**: a clear description of the procedures, prompting, fading, maintenance and generalisation. Treatment integrity, procedural fidelity, performance monitoring systems and staff training.
ANALYTIC + TECHNOLOGICAL =

Conceptually Systematic

- Procedures derived from an analysis of the controlling variables of the operant class to be established.

- Thus, these three complex are inextricably linked.

- Understanding the difference between a principle, a process, and a procedure.

- Can we define the controlling variables for the responses we are teaching? Defining the antecedent stimuli and responses is a description, not an analysis
GENERALISED LEARNING

• Effective: how will this skill produce subsequent gains, facilitate further learning or changes of high social value.

• General: the extent to which this skill can be utilised and effectively maintained by the child’s natural context
Early Intensive Behavioral Intervention: Outcomes for Children With Autism and Their Parents After Two Years

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Abstract
An intervention group ($n = 23$) of preschool children with autism was identified on the basis of parent preference for early intensive behavioral intervention and a comparison group ($n = 21$) identified as receiving treatment as usual. Prospective assessment was undertaken before treatment, after 1 year of treatment, and again after 2 years. Groups did not differ on assessments at baseline but after 2 years, robust differences favoring intensive behavioral intervention were observed on measures of intelligence, language, daily living skills, positive social behavior, and a statistical measure of best outcome for individual children. Measures of parental well-being, obtained at the same three time points, produced no evidence that behavioral intervention created increased problems for either mothers or fathers of children receiving it.
OUTCOME PROCESS

• To enable full understanding of the functional components of intervention, and to enable replication of findings reported, any research reporting outcomes of EIBI should provide process data regarding intervention targets, number of items achieved within each major curricular skill, teaching techniques employed, hours of intervention, and levels of tutor training (Lechago and Carr, 2008).
EARLY BEHAVIOURAL INTERVENTION CURRICULUM

• Each skill was classified as being generalised or cumulative. A single skill could have had multiple programmes or procedures

• A value of 0 = no response topographies

• A value of 1 = emergent or present (5 discriminated topographies: cf. Weiss & Delmolino, 1999)

• A value of 2 = mastered to the specified skill criterion (cumulative vs generalised)
CORRELATION DOES NOT IMPLY CAUSATION

• Correlation between EBIC and IQ at 24 months $r = .969$

• Stepwise regression controlling for pre-intervention IQ: $r = .951$
WHAT DID WE FIND?

• Significant correlation between post-intervention IQ and EBIC scores even after pre-intervention IQ had been controlled for, suggesting that pre-intervention IQ alone had not accounted for skills gains observed.
WHICH ITEMS WERE CORRELATED WITH GREATER CHANGES?


- Partial correlations were carried out to investigate which aspects of intervention were correlated with post-intervention IQ and EBIC score, after controlling for pre-intervention IQ. Regarding IQ scores, results indicated that time taken to master the first five items of echoing sounds \((r = -.65, p < .05)\), echoing words \((r = -.76, p < .01)\), tact \((r = -.62, p < .05)\), and mand \((r = -.61, p < .05)\), were all significantly correlated with post-intervention IQ, but not with the time taken to master the first five items of imitation, visual, and listener skills. Regarding EBIC scores, results indicated that the time taken to master the first five items of echoing sounds \((r = -.68, p < .05)\), echoing words \((r = -.76, p < .01)\), tact \((r = -.71, p < .05)\), and mand \((r = -.71, p < .05)\), were all significantly correlated with post-intervention EBIC score,
Although pre- and post-intervention IQ scores were found to be significantly correlated, the extent to which IQ and EBIC scores changed during intervention also could not be accounted for by pre-intervention IQ scores, indicating that factors other than pre-intervention IQ had been associated with changes in intellectual functioning and skills levels. The strong negative correlation observed between time required to demonstrate presence of echoing sounds and words, tacts, and mands, and gains in intellectual functioning and skills further supported this conclusion, and also indicated that development of vocal verbal behaviour had provided a necessary precondition for gains in intellectual functioning and skills attainment observed. Four children progressed sufficiently to learn advanced level skills within the EBIC. These children were the only ones to achieve intellectual functioning within the normal or superior range. Each of these children had mastered vocal verbal behaviour within the first three months of intervention.
### CURRICULUM STRUCTURE, CONTENT, & OVERALL OBJECTIVES

<table>
<thead>
<tr>
<th>Social</th>
<th>Beginner</th>
<th>Intermediate</th>
<th>Advanced</th>
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<tbody>
<tr>
<td>People need to become SD for delivery of SR: Eye-contact as CMO-T and joint attention</td>
<td>Attention and shared activities as the SR: reciprocal commenting and comment extensions</td>
<td>Verbal interaction as the SR: conversation</td>
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<tr>
<td><strong>Verbal: Function and structure</strong></td>
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<td>Conditional discriminations: visual and unmediated selection (receptive)</td>
<td>Tact and intraverbal conditional discriminations: objects and ongoing events</td>
<td>Tact and intraverbal conditional discriminations: general topics and past events</td>
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<tr>
<td>Communication: Mands</td>
<td>Listener (mediated selection, jointly controlled responding)</td>
<td>Descriptions of past events (remembering)</td>
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<tr>
<td>Establishing basic noun and action vocabulary: tacts and receptive</td>
<td>Relations between nouns and classes (categories), nouns and actions (functions)</td>
<td>Abstract reasoning: predictions, inferences, temporal relations/sequences</td>
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<tr>
<td>Generalised imitation Naming</td>
<td>Descriptions (tacts of compound stimuli): events and objects</td>
<td>Problem solving and tacting private events of others (Theory of Mind)</td>
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<tr>
<td>Structure: single words</td>
<td>Structure: basic utterance (SVO + articles and agreements)</td>
<td>Structure: Multi-clause, connected sentences (discourse)</td>
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<tr>
<td><strong>Academic</strong></td>
<td>Drawing imitation and colouring</td>
<td>Textual (decoding) e taking dictation, number/quantity relations</td>
<td>Story comprehension and story writing, maths-word problems, sums</td>
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<tr>
<td>SKILL</td>
<td>DESCRIPTION</td>
<td>COMMENTS</td>
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<tr>
<td>Tact to mand transfer</td>
<td>Uses words learned as mands in a tact context, without requiring specific transfer procedures</td>
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<td>Tact to intraverbal transfer</td>
<td>Transfers responses learned in the presence of visual stimuli, to an intraverbal relation without specific training. For example: E.g.: answers yellow when asked &quot;What colour?&quot; in the presence of a banana. When asked the intraverbal question &quot;What colour is the banana?&quot; the s/he answers &quot;yellow&quot; without having received specific training for that response or a transfer procedure.</td>
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<td>3-word echoic adult form</td>
<td>Repeats two to three word (or more) sentences being sensitive to changes in the suffixes (mum washes, I eat a carrot)</td>
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<td>Selects/Performs on self-echoic</td>
<td>In cases where there are changes in environmental complexity (extended visual field or distance) that increase the latency between the initial instruction and the opportunity for selection, the s/he repeats the instruction to maintain the discriminative control and selects/Performs with the aid of the self-echoic</td>
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<td>Multiple generalised discrimination 2+ elements</td>
<td>Selects stimuli composed of elements that include the whole acquired vocabulary without needing formal teaching of each combination. (e.g.: colour/noun, adverb/noun, agent/action, shape/colour, adjective/noun). The ability to discriminate grows proportionally to the echoic capacity and description/tact of compound stimuli.</td>
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<td>Performs the actions of a story narrated to her/him</td>
<td>Acts out a narrated story, complexity of the story matches verbal vocabulary (e.g. direct instructions vs more articulated descriptions - the boy went to bed vs the boy was feeling tired, he found something to lie down on)</td>
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<tr>
<td>2 Answers with extended sentences</td>
<td>Response structure is extended and matches the structure of the question and grammar is correct. E.g.: &quot;What do you see?&quot; &quot;I see the cat&quot;</td>
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<td>Discrimination of basic questions</td>
<td>Classification based on common nouns (categorisation)</td>
<td>Uses new concepts in descriptions</td>
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<td>2</td>
<td>Once a new concept is learned s/he is able to answer the corresponding question when in discrimination with other questions, without the needing specific training for the tact conditional discrimination. For instance: having learned classification (categorisation) and the answering of classification questions (What is a dog?), can immediately answer that question when shown a picture of a dog and asked a series of dog-related questions: with What is it?/What does it say?/What does it have? and What is a dog?</td>
<td>Categorises stimuli not categorised before, without specific training, but tact (name of item) must be known.</td>
<td>Having learned new tacts or information related to a stimulus, includes that information in the description of the item, without formal teaching. For example: s/he has learned that a bicycle has a saddle, wheels, and a handle bar as parts of a whole, having acquired the frame &quot;It has x, y, z&quot;, can now include a statement about the parts of a bicycle when asked for a description of the bycicle (without prior reinforcement for that description)</td>
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LANGUAGE INSTRUCTION IN EIBI

• Teaching programmes for language deficits remediation in autism: a focus of EIBI

• Acquisition of language skills during first few months of intervention correlated with better outcomes (Lovaas, 1993; Sallows and Graupner, 2006)
INITIAL EIBI OBJECTIVES

• The initial aim of many EIBI programmes is to establish a basic single-word repertoire in the primary operants and listener discriminations

• Tacting: Saying the names of things visually presented under non-verbal stimulus control (i.e., the item)

• Content: common objects, animals, names of familiar people, rooms of the house, locations, actions, colours

• Debate about the sequence of acquisition of tacts and receptive discrimination (Lovaas, 1993; Sundberg & Partington, 1998; Petursdottir & Carr, 2011)
THE INTERDEPENDENCE OF OPERANTS IN TYPICAL DEVELOPMENT

• The issue of constructing sequences of objectives on the assumption that operants are independent of one another and separately acquired.

• This assumption may lead to curricular sequences in which each response requires specific teaching in each primary operant.

• What is the developmental and behavioural account for the emergence of verbal behaviour? How can we use such an account to sequence our teaching to establish verbal behaviour under the environmentally valid sources of control?
EARLY LANGUAGE ACQUISITION: NAMING

• Horne and Lowe (1996, 1997) in extending Skinner’s (1957) analysis of verbal behaviour offer a detailed investigation of the interactions between speaker and listener behaviour within their “conceptualisation of the individual as a speaker-listener within the same skin” (Horne & Lowe, 1996, p. 189).

• Informed by several accounts and research on early language development, but firmly based on a Skinnerian analysis of verbal behaviour.
NAMING

• Used generically to mean “saying the names of” or “labelling” however,

• It is used to describe, by Horne and Lowe (1996):
  • How tacting is acquired in typical development
  • The process through which the child begins to be a listener of his own speaking
  • Categorisation
CHALLENGE TO EQUIVALENCE AS A BASIC PROCESS

- **Naming** (Horne and Lowe, 1996) e RFT (Hayes et al., 2001)

- For both accounts, deriving responses is learned behaviour, and not a direct outcome of the reinforcement contingency (Sidman). A reinforcement history is required to give rise to emergent (novel) responses. The two theories differ in terms of the teaching history, both emphasise the development of a reinforcement history that produces not specific responses, but a generalised operant class or a higher order operant.

- Higher order operant

- Also see Palmer on atomic repertoires (2012)
• A circular relation that includes seeing an object, saying the name of the item, hearing oneself saying the name, reorienting toward the item.

• Combines listener, echoic and tactual in a relation that enables the child, as a listener, to respond to his own behaviour as a speaker (Horne & Lowe, 1996).
CHARACTERISTICS OF NAMING

• “Higher order bidirectional relation” that combines conventional speaker and listener behaviour within the individual.

• Once present, it does not require reinforcement of both speaker and listener behaviour to establish a new topography.

• Refers to a class of items and events.
Common and Intraverbal Bidirectional Naming

Caio F. Miguel

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Abstract  Naming has been defined as a generalized operant that combines speaker and listener behaviors within the individual. The purpose of this paper is to reintroduce the concept of naming and its subtypes, common and intraverbal, distinguish it from other terms such as the tact relation, and discuss the role of naming in the development of verbal behavior. Moreover, a taxonomical change is proposed. The addition of the qualifier bidirectional would serve to emphasize the speaker-listener bidirectional relation and serve to distinguish the technical term from its commonsense use. It is hoped that this paper will inspire future basic and applied research on an important extension of Skinner’s analysis of verbal behavior.

Keywords  Development · Intraverbal · Naming · Tact · Verbal behavior
PREREQUISITES

• Parents model **conventional behaviour towards objects** (e.g., generalised imitation). They differentially reinforce conventional actions toward objects, the child moves from placing objects in his mouth to object specific motor behaviours (e.g., sitting on a chair, drinking from a cup).

• **Orienting towards people’s voices** – correlated with several forms of reinforcement. Voices acquire both discriminative and reinforcing functions.

• **Parents tact items in the relevant context.** At time they say the name of things the child is looking at or pointing to, in other interactions parents show the child items (listener behaviour).

• **Joint attention:** crucial aspect in the development of naming.
Echoic and early intraverbal behaviour

Social stimuli as Sd and Sr

Conventional object related motor behaviour

Generic mands (holding hand up, pointing, nodding, shaking head)

Orienting to social stimuli

Imitation and Listener responding

Echoic and early intraverbal behaviour

Pure and multiply controlled mands and tacts (language-specific vocal topographies)

Social referencing

Joint attention

Naming
DEVELOPMENT OF NAMING

• Many interactions of this type give rise both to conventional motor behaviour towards specific objects and classes, and listener behaviour.

• Contact with the same and other examples establish both visualisation (I hear doll, I see doll) and the autoclitic frame “where is X?” as discriminative for looking around to search for the item specified in the parent mand.

• The emergence of echoic. The child begins to be able to echo what he hears. The auditory stimulus produced by the child can then evoke listener behaviour toward the relevant item and similar ones. We say the child begins to listen with comprehension when he begins to respond coherently to what he himself says. Responding as a listener to his own verbal behaviour sets the ideal conditions for the development of tacting.
DIFFERENCES BETWEEN TACTING AND NAMING

• Transfer of stimulus control from listener and echoic to speaker within the same interaction. Subsequently, contact with the same item or similar items exerts discriminative nonverbal control on the specific vocal topography, previously reinforced. At this point we say the child has acquired the name of the item.

• The tact, as a primary relation or elementary operant, describes a unidirectional relation between a nonverbal stimulus and the verbal response. A name represents a bidirectional relation between speaker and listener behaviour. We can teach a child through echoic prompting to tact, but the child may not necessarily be able to respond to his own vocal production with comprehension, until this repertoire is established.

• **A name is more than a tact, a name is a tact with understanding.**
THE DIFFERENCE BETWEEN VERBAL AND NONVERBAL

• Naming occurs when both speaker and listener responses are established after only one of those two has been directly reinforced.

• Important for the development of intraverbal behaviour, manding, categorization, rule-governed behaviour, reading comprehension.

• When reading, the child is not only required to engage in textual responding, but to react to what he reads. When the child reads “sea”, the product of his response exerts discriminative control for additional listener behaviour (imagining the sea or looking for the sea).

• The mere vocal emission without understanding (speaker and listener within the same skin) renders the response nonverbal (Barnes-Holmes, Barnes-Holmes, & Cullinan, 2000).

• Naming as the developmental milestone, or demarcation line between being nonverbal and verbal.
<table>
<thead>
<tr>
<th>Term and acronym</th>
<th>Brief definition</th>
<th>Example</th>
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</thead>
<tbody>
<tr>
<td>Bidirectional naming (BiN)</td>
<td>Higher-order operant involving a bidirectional relation between speaker and listener behaviors. The teaching of one of these components suffices to establish both.</td>
<td>Learning to say, “cow” in the presence of its picture (tact) establishes the selection of the picture when hearing the word “cow” (listener) with no direct training (or vice-versa).</td>
</tr>
<tr>
<td>Common bidirectional naming (C-BiN)</td>
<td>Common tactics and listener behaviors may establish stimuli as related or equivalent (having the same meaning).</td>
<td>Learning to say, “cow” in the presence of an actual cow and its picture. Also learning to look at the cow and select its picture when hearing “cow.” Seeing an actual cow would evoke saying, “cow” (tact), whose response product (the sound “cow”) serves as an $S^g$ for selecting the picture of a cow, imagining a cow, etc. (listener).</td>
</tr>
<tr>
<td>Intraverbal bidirectional naming (I-BiN)</td>
<td>Intraverbal relations may establish stimuli as related or equivalent.</td>
<td>Learning to say, “milk comes from the cow” may establish the stimuli “milk” and “cow” as intraverbally related. Seeing an actual cow may evoke saying, “cow” (tact) whose response product (the sound “cow”) serves as an $S^g$ for the response “milk,” whose product serves as an $S^o$ for looking for milk, covertly tasting milk, selecting a picture of a milk bottle, etc. (listener).</td>
</tr>
<tr>
<td>Joint control (JC)</td>
<td>The simultaneous presentation of two stimuli that control responses of the same topography. The onset of joint control is a discriminable event that may evoke subsequent behavior.</td>
<td>Learning to say, “cow” in the presence of a cow and its picture (tact). Seeing an actual cow may evoke saying, “cow” (tact) whose response product serves as an $S^o$ for repeating the word “cow” (echoic). Seeing another cow or any other stimulus that evokes saying, “cow” (tact) would lead to the emission of the topography “cow” under joint stimulus control (echoic + tact) which would in turn evoke looking for or selecting the picture of the cow (autoelic).</td>
</tr>
</tbody>
</table>
RESEARCH SO FAR

• Several studies have focused on naming as the vehicle for emergent intraverbal categorization (see Miguel, 2016)

• A few studies have investigated procedures to establish earlier naming skills via Multiple Exemplar Instruction (for reviews: Longano & Greer, 2010; LaFrance & Miguel, 2014; LaFrance & Tarbox, 2019)

• Inconsistency in the terminology: why Naming is more than listener-tact transfer (Hawkins, et al., 2018).

• **Naming: the whole is greater than the sum of its parts.**
Deconstructing Common Bidirectional Naming: A Proposed Classification Framework

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Abstract
Conceptually, the use of the technical term naming appears to be a broad term that describes several subtypes of emergent verbal behavior. Miguel (The Analysis of Verbal Behavior, 32, 125–138, Miguel, 2016) introduces the concept of subtypes of naming, specifically common bidirectional naming and intraverbal bidirectional naming. He defines common bidirectional naming as “the process of different stimuli evoking the same speaker and listener behaviour and becoming members of the same class” (p. 130). A review of the literature on common bidirectional naming yielded some ambiguities related to differences in how researchers in the field defined naming. This article suggests that common bidirectional naming may be further dissected to yield six subtypes of naming. We aligned previous research on emergent verbal behavior with a unified taxonomy as part of a larger proposed classification framework on naming. The impact of identifying the subtypes of common bidirectional naming on skill acquisition and curriculum design is discussed. Finally, recommendations are made for future research based on this framework.

Keywords Naming • Common bidirectional naming • Emergent verbal behavior • Incidental learning
IMPLICATIONS AND APPLICATIONS

• Naming relates to the interdependence of operants, a concept typically not considered in EIBI

• What are the advantages of establishing naming?

• Does it alter how we go about teaching early speaker behaviour?
SPEAKER AND LISTENER

• Naming as the first verbal generalised skill in early learners

• Learning new speaker behaviour through listening to oneself

• Listener and speaker within the same skin: being able to speak the name of stimuli presented under one source of stimulus control (i.e., tacting) as a result of hearing themselves say the name of stimuli presented under another source of stimulus control (i.e., selection) within the same skin (Horne & Lowe, 1996; Skinner, 1957),

• Naming unlikely to emerge without specific intervention in autism.
LEARNING HOW TO LEARN

• “If generalization is considered as a response itself, then a reinforcement contingency may be placed on it, the same with any other operant. Informally, teachers often do this when the urge a student who has been taught one example of a general principle to “see” another example as “the same thing”. (Stokes and Baer, 1977, p. 362)
ANALYSIS AND SCOPE
THANK YOU!

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