Teaching “learning how to learn”: a functional analysis of curriculum programming for children with autism

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National Autism Conference
Penn State, 2017
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
What is education?

Many of the subjects may be unrecognisable, however. It has often been remarked than 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)
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.
History of curricula in EIBI
Since then...
‘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)
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?
A structural analysis

1. Clear definition of learning objectives.

2. Descriptions of teaching procedures for acquisition and generalisation.

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

4. Data-based evaluation of mastery and generalisation of learning outcomes.
General organisation of all curricula

- Curricular domains
- Programme or task
- Items or responses
- Mastery criteria
“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).
A shift in stimulus control for curriculum design

- Behavioural curricula have been almost exclusively concerned with the nature and structure of curriculum content

- Need for 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
“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”

(Brunner, 1960, p.17-18)
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
Interpretative framework

- Curriculum as a syllabus vs curriculum as a process
- How vs what
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 selected stimuli over a response class, the establishment of which is demonstrated by specific topographies.

- Skill: a class of responses.

- Target response: a specific topography contingent on the presentation of specific stimuli.
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?
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: receptive labelling.
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)
Early Intensive Behavioral Intervention: Outcomes for Children With Autism and Their Parents After Two Years

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Richard P. Hastings  
University of Wales, Bangor, UK

Hanna Kovshoff and Francesca degli Espinosa  
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University of Southampton, UK

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.
Example of score sheet

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Skill acquisition criteria

Generalised

- Train ABC,
- test XYZ

Cumulative

- Infinite number
- Limited number
- Minimum number of trials
- All items
Generalised or cumulative?

- Tacting common items
- Discriminating what colour/what is it questions
- Oral motor imitation
- Play scenario imitation
- Receptive prepositions
- Inferences
- Recalling past events
- Identical matching
- Puzzles

- Object imitation
- Receptive 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 the emission of a single “response” does not constitute a skill

- Within same class discrimination: sample and comparisons within the same response class
Discrimination

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

- Motor imitation
- Receptive instructions without objects
- Tacting common items
- Echoic
- Rote intraverbal responses
- Visual visual match to sample
- Auditory visual match to sample (receptive)
- Receptive instructions with objects
<table>
<thead>
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<th>Overall objectives</th>
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<tr>
<td><strong>Beginner</strong></td>
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<td><strong>Social</strong></td>
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<td><strong>Verbal: function &amp; structure</strong></td>
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<td>Communication: mands</td>
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<td>Establishing basic noun and action vocabulary: tacts and receptive</td>
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<td>Generalised imitation</td>
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<td>Naming</td>
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<tr>
<td>Structure: single words</td>
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<td><strong>Academic</strong></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)
Transfer across operants

- Debate about the sequence of acquisition of tacts and receptive discrimination (Lovaas, 1993; Sundberg & Partington, 1998; Petursdottir & Carr, 2011)

- The issue of constructing sequences of objectives on the assumption that operants are separate

- Regardless of theoretical orientation
Verbal Behaviour

- The initial aim of many EIBI programmes is to establish a basic single-word repertoire in the primary operants and receptive 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)
What is “Naming”?

- Horne and Lowe (1996) describe the critical steps in early language acquisition through which children acquire listener and speaker responding.

- Three repertoires are acquired between the ages of 9 months and 2 years:

  - Selection (e.g., pointing to or giving items)
  - Echoing (i.e., vocally repeating spoken words)
  - Tacting (i.e., vocally labelling items)
Development of Naming

- Children learn to select items in response to spoken words as a result of a history of differential reinforcement for such responding.

  e.g., “cup” points to cup “good girl!”

- During such child-carer interactions, closer echoic approximations are also differentially reinforced.
- Children thus become able to speak the names of items that they encounter in their environment.
Definition of Naming

• When a tacting repertoire has been established, children become able to demonstrate novel responses acquired as listeners to the speaker repertoire and vice versa, in the absence of specific reinforcement.
• Naming is thus established as a “higher order bidirectional relation” (Horne & Lowe, 1996).
Relationship between listener and speaker in EIBI

- Early applications (video)

- Few studies have focused on “cross-modal generalisation” (transfer across operants)

- Limited investigations specifically adopting Naming account as the theoretical framework from which to derive interventions

- Important to consider in language curriculum planning
Teaching naming

• The current research sought to provide controlled investigation of a verbal transfer procedure to evoke naming as a generalised skill in children with autism.

• Eight children with autism (age 6 to 9 years), each able to echo single words, point to common items, and tact 50 to 100 items.

• 2 parts of the study:
  - Assessment of naming in potential participants
  - Teaching of verbal transfer procedure
Assessment Procedure

• Phase 1:
  • Establish selection of three items
  • Establish tacting of three other items.

• Phase 2:
  • Test tacting of the three items to which selection had been previously established
  • Test selection of the three items to which tacting had previously been established.
Assessment of naming

![Bar chart showing the assessment of naming for different participants. The chart includes bars for Tact, Selection, and Echoic responses. The x-axis represents participants named as Charlie, Sarah, Yuri, Oscar, Tommy, John, Dan, and Chad. The y-axis represents the number of trials, ranging from 0 to 650.](image)
Results

- Although participants showed transfer to selection responding, to be able to suggest that Naming occurred, participants needed to demonstrate transfer from listener to speaker.

- An analysis of errors showed that echoic responding did not occur for all participants during the teaching of selection responding and that in those who did, it was never emitted simultaneously with the selection response, but only immediately after the experimenter’s instruction. This suggests participants possibly engaged in echolalia rather than echoic verbal behaviour.
Verbal Transfer Procedure

- All participants were taught to echo and select the requested item simultaneously
- Only simultaneous selection and echoic responding was reinforced
- Immediately after correct independent selection, participants were asked to tact the same item
- An increasing number of distracter trials were delivered in between target tacts
- Multiple probe baseline across participants
1. Teach all participants three selection responses

2. Test all participants for tact transfer

3. Teach transfer strategy to participants S and Y

4. Teach all participants three selection responses

5. Test all participants for tact transfer and S and Y for tact responses on previously learned set of items

6. Teach transfer strategy to participants C and O

7. Teach all participants three selection responses

8. Test all participants for tact transfer and C and O for tact responses on previously learned set of items

9. Teach transfer strategy to participants T and J

9. Teach all participants three selection responses

10. Test all participants for tact transfer and T and J for tact responses on previously learned set of items

11. Teach transfer strategy to participants D and C2

12. Teach all participants three selection responses

13. Test all participants for tact transfer and D and C2 for tact responses on previously learned set of items
Number of correct transfer responses

Probe sessions

Sarah

Yuri

Charlie

Oscar

Tommy

John

Dan

Corey
Trials to criterion

- Echoic-tact
- Selection-echoic to tact

Participants:
- Sarah
- Yuri
- Dan
- John
- Charlie
- Tommy
- Chad
- Oscar

Trials vs. Participants chart.
Naming as generalised skill

- 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 oneself say the name of stimuli presented under another source of stimulus control (i.e., selection) (Horne & Lowe, 1996; Skinner, 1957),
- Naming unlikely to emerge without specific intervention.
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)
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Thank you!