Developing behavioral fluency with movement cycles using SAFMEDS

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Introduction

- The principal character trait setting behavior analysis apart from all other subdisciplines of psychology rests on the conceptualization of behavior
- "Behavior is what an organism is doing; or more accurately what it is observed by another organism to be doing" (Skinner, 1938, p. 69)
- Ogden Lindsley, the founder of Precision Teaching and one of B. F. Skinner’s graduate students, understood the critical need to properly label or “pinpoint” authentic behavior for improvement projects
- Precision Teaching suggests pinpointing by using simple present tense requiring the addition of an “s” to the action verb, adding an object of the movement to form a Movement Cycle
- Four steps are used to create a Movement Cycle: (1) select an observable action verb, (2) choose an object (noun) that ends the cycle of movement, (3) add an “s” to the action verb, and (4) check the Movement Cycle for observability and repeatability
- A Precision Teaching intervention called SAFMEDS was employed
- SAFMEDS stands for “Say All Fast Once Every Day Shuffled” (Graf & Auman, 2005)

The specific experimental questions asked, (1) “could SAFMEDS lead to fluency for identifying Movement Cycles among practicing behavior analysts and special education teachers?” and (2) “if effective, would the SAFMEDS fluency intervention foster positive outcomes with maintenance after the intervention ended?”

Figure 1. SAFMEDS card (front)

Participants Table 1. Participant characteristics

<table>
<thead>
<tr>
<th>Participants</th>
<th>Age</th>
<th>Area of MA</th>
<th>Degree</th>
<th>Years with BCBA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hanna</td>
<td>32</td>
<td>Education</td>
<td>Yes</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Penny</td>
<td>32</td>
<td>Education</td>
<td>No</td>
<td>N/A</td>
</tr>
<tr>
<td>Mack</td>
<td>26</td>
<td>ABA</td>
<td>Yes</td>
<td>3</td>
</tr>
<tr>
<td>Darla</td>
<td>30</td>
<td>Education</td>
<td>No</td>
<td>N/A</td>
</tr>
<tr>
<td>Rachel</td>
<td>34</td>
<td>ABA</td>
<td>Yes</td>
<td>3</td>
</tr>
<tr>
<td>George</td>
<td>26</td>
<td>Psychology</td>
<td>Yes</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Thomas</td>
<td>33</td>
<td>Psychology</td>
<td>Yes</td>
<td>5</td>
</tr>
<tr>
<td>Natalie</td>
<td>29</td>
<td>Edu/psychology</td>
<td>No</td>
<td>N/A</td>
</tr>
</tbody>
</table>

*The authors wish to thank G. David Smith, Alicia Burger, and Emily Strausbaugh for serving on the expert panel.

Methods

Setting
- Private school that serves children between the ages of three and 21 with a primary diagnosis of autism
- Intervention took place in general office locations and occurred at various times during the course of participants’ normal weekday

Materials
- Two counterbalanced decks of SAFMEDS cards (deck A and B, 100 cards total)
- Decks matched for type of action - daily care routines (e.g., brushes teeth), academic behaviors (e.g., touches instructional material, colors on paper), leisure activities (e.g., catches ball, places puzzle piece), and functional routines (e.g., washes dish, empties trashcan)
- The SAFMEDS card (Figure 1) depicts a photograph of an individual performing an everyday action in both the school and home environments and the Movement Cycle label on the back of the card
- Models included adults or children performing actions in home or school environments
- Cards were printed on 3 ½ x 5 inch cardstock paper
- Photos included arrows and circles superimposed to highlight the action and object
- Expert panel determined the correct Movement Cycle label achieving 100% agreement on the label for inclusion*

Dependent Variable
- Saying out loud the associated SAFMEDS cards using the correct Movement Cycle
- Correct responses when participants said the specific Movement Cycle assigned to the card (e.g., a unique combination of action verb and object)
- If Figure 1 depicts the Movement Cycle “brushes hair,” any stated response other than “brushes hair” resulted in an incorrect score (‘skips’ allowed)

Independent Variable
- Frequency building to a performance criterion (FBPC) and entails daily, timed skill practice with performance feedback (Graf & Lindsley, 2002)
- Frequency building to a performance criterion, a more precise and technical term than mere practice, results in systematically increasing the frequency and accuracy of the target skill
- The performance criterion was set at seventeen correct responses in twenty seconds

Experimential Design
- A multiprobe multiple baseline across participants design (two groups of four participants each) was used to investigate the independent variable

Procedures

Table 2. Intervention procedures for frequency building

<table>
<thead>
<tr>
<th>Trials per session</th>
<th>Practical Timing Check Responses? Videotaped</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Functional</td>
</tr>
<tr>
<td>1</td>
<td>Entire deck</td>
</tr>
<tr>
<td>2</td>
<td>Incremental 1</td>
</tr>
<tr>
<td>3</td>
<td>Entire deck</td>
</tr>
<tr>
<td>4</td>
<td>Incremental 1</td>
</tr>
</tbody>
</table>

Results

- Table 3 describes the change measures used to analyze experimental results
- Figures 2 and 3 display all the baseline, intervention, and maintenance data for participants in group one and group two on Standard Celeration
- Participant celerations for correct responses ranged from x1 (i.e., flat, no change in the frequency of responding across baseline) to a deceleration of <3.7 [15 days] (a significant decrease in frequency across baseline)
- Intervention saw correct responses accelerate sharply for all participants and incorrects decelerate significantly as compared to baseline
- Accuracy during baseline ranged from x1.2 [15 days] to +5.3 [15 days] and showed significant improvement during intervention ranging from x1.7 [38 days] to x27.25 [7 days]
- The immediate impact of intervention is illustrated by frequency multipliers, which jumped up from between +1.1 to +25.35 for correct responses and jumped down for incorrect responses ranging from +1.15 to +47 across both groups
- The trend change (change in celeration) across baseline to intervention showed significant learning with celeration multipliers ranging from x1.2 to x5.2 for correct responses and +1.6 to +9.5 for incorrect responses

Table 3. Change measures and definitions

<table>
<thead>
<tr>
<th>Change measure</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Celeration</td>
<td>Speed of learning, directly shows growth or decay of multiple frequencies across time; illustrates the magnitude to behavior change</td>
</tr>
<tr>
<td>Frequency multiplier</td>
<td>Shows how sharply the data point changed as a result of the new intervention measures immediacy of change looks at change in frequency between two charted performances (last point of baseline to first point in phase 1)</td>
</tr>
<tr>
<td>Celeration multiplier</td>
<td>Indicates if the behavior (learning) sped up or slowed down when compared to the previous phases across two phases</td>
</tr>
<tr>
<td>AIM</td>
<td>Accuracy of overall performance (correct and incorrect responding show improving and worsening outcomes)</td>
</tr>
</tbody>
</table>

Discussion

- The multiple baseline design for Group 1 (Deck A) had 3 replications of the experimental effect. Group 2 (Deck B) also had three replications of the SAFMEDS intervention.
- With both groups having all participants demonstrate a strong response to the intervention, a functional relation was demonstrated and replicated.
- With behavior analysts and special education teachers being so busy, the efficient learning demonstrated by the SAFMEDS intervention is significant for delivering important instructional content.
- By reaching the performance standard for Movement Cycles, the participants became fluent with labeling behaviors with an observable action verb and an object. The Movement Cycle is a direct extension of what Skinner identified as behavior.
- Four out of eight participants showed strong maintenance after the intervention ended. The other four participants had maintenance that demonstrated improvements compared to their baseline.
- This study demonstrated fluency can be achieved with an important skill, identifying Movement Cycles, efficiently with the SAFMEDS intervention.

Figure 2: Participant Data Group 1

Figure 3: Participant Data Group 2