

Use of a Computer Program to Teach Number Recognition

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We examined the use of a computer program designed to teach developmentally delayed participants number recognition. The computer program focused on numbers 1 - 10. Numbers were introduced one at a time, with increasing distractors. Various learning channels were utilized, to include hear number, touch number and see number, and select group of objects. We looked at generalization to real groups of objects and hand held flashcards. Data will be presented on standard celeration charts.

Method

Participants and Setting

There were a total of four participants in this study. All were male, and ages ranged from 14.11 to 18.2. Diagnoses included autism, MR, and ADHD.

Three participants attended school at the Judge Rotenberg Center and lived in one of JRC's group homes, while one participant attended school at the Judge Rotenberg Center and lived at home.

Participants worked on the computer program in their classrooms with their teacher or teacher's assistants guiding them while independently completing the timings. The computer program was set up as touch screens, meaning the participant was able to touch the correct answer using their fingers on the computer screen. All of these participants had this ability.

Measures and Instruction

The proprietary computer program Numbers was used in this study. This program was developed to teach the relationship between groups of objects and the numbers one to ten. This was accomplished through programmed instruction, using images of groups of objects, audio files of numbers and images of digits.

The program was comprised of thirteen units, each of which was broken down into nine chapters. Each unit focused on a specific learning channel. For this study, we examined the first three units.

Unit	Learning Channel
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1	Hear Number/Touch Picture
2	See Digit/Touch Picture (with Audio Prompt)
3	See Digit/Touch Picture

Each chapter taught a specific number. Within each chapter, there were further sub-chapters where a pre-set number of distracters was used. As the user achieved mastery on a sub-chapter, a new distracter was introduced, until the user was able to select the correct answer at a pre-set rate, with five distracters.

To check for generalization in Unit 1, the participant was shown flashcards with groups of objects and verbally asked to select a specific number of objects. He was also shown an array of groups of objects (blocks of different colors) and was verbally asked to select a specific number of objects.

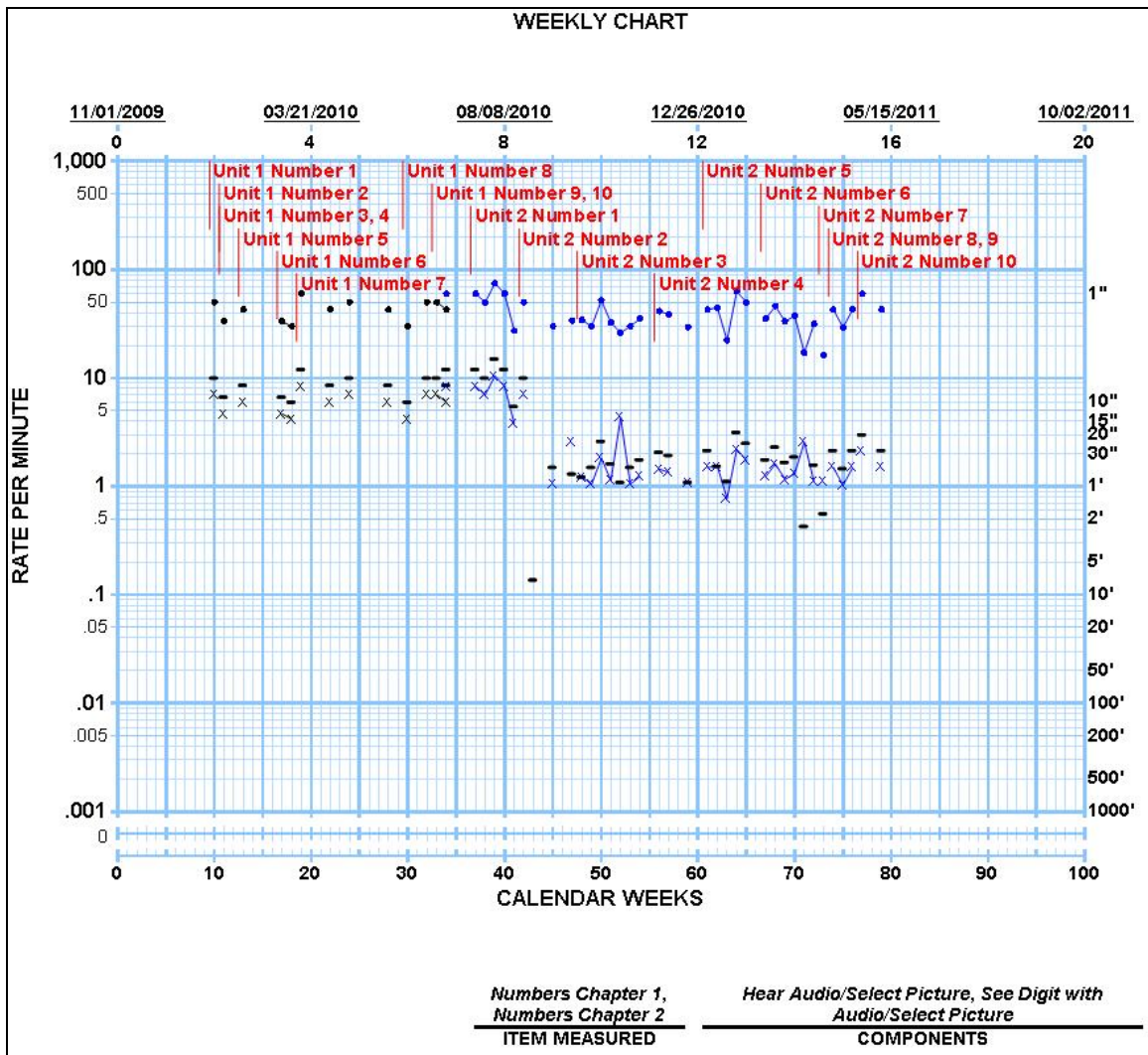
For a generalization check for Unit 2, the participant was shown a flashcard with a digit on it and flashcards with groups of objects and was verbally asked to select the corresponding group of objects. He was also shown a flashcard with a digit on it and an array of groups of objects (blocks of different colors) and asked to select the corresponding group of objects.

For a generalization check for Unit 3, the participant was shown a flashcard with a digit on it and flashcards with groups of objects and was not given any audio prompts, with the exception of a prompt to match. He was also shown a flashcard with a digit on it and an array of groups of objects (blocks of different colors) and was not given any verbal prompts with the exception of a prompt to match.

Results

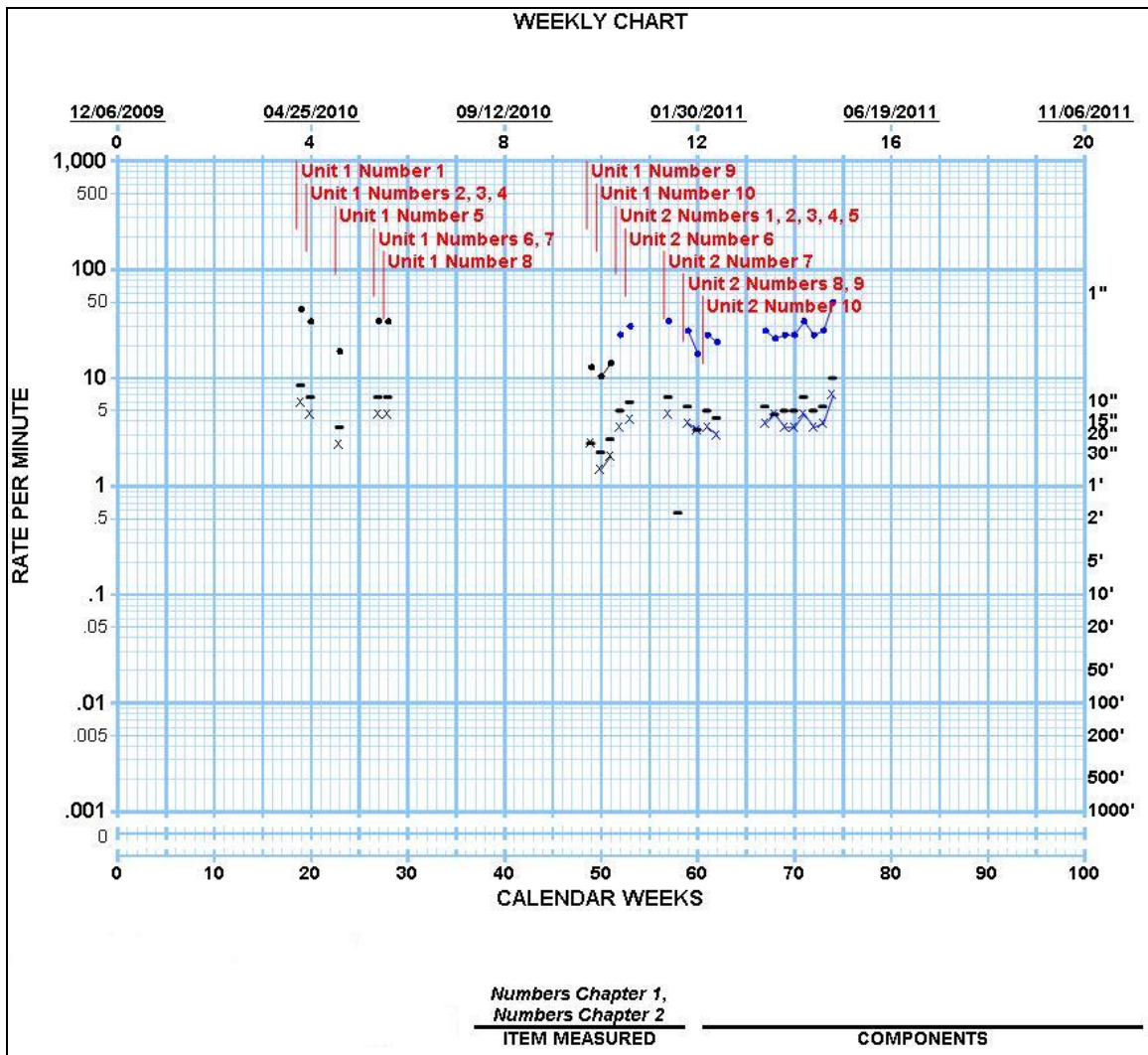
Participant 1 worked on Unit 1 and 2 in the Numbers program, learning numbers 1-10 (Figure 1). When tested for generalization in Unit 1, through flashcards, he got 54 out of 100 cards correct. When tested for generalization in Unit 1, through groups of objects, he got 70 trials correct, out of 100. When tested for generalization in Unit 2, through flashcards, he got 49 out of 100 cards correct. When tested for generalization in Unit 2, through groups of objects, he got 47 out of 100 trials correct.

Figure 1



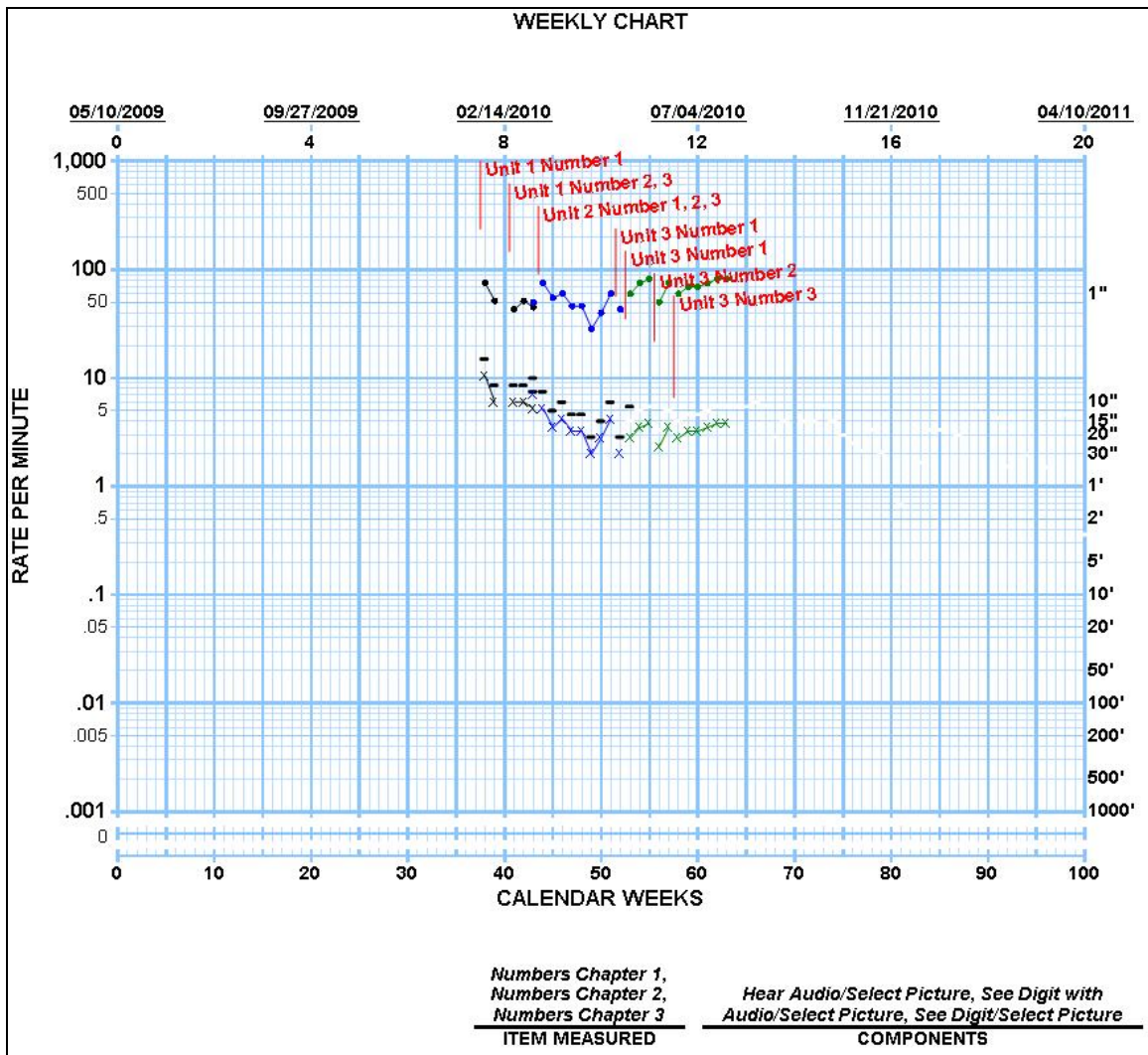
Participant 2 worked on Unit 1 and 2 in the Numbers program, learning numbers 1-10 (Figure 2). When tested for generalization in Unit 1, through flashcards, he got 75 out of 100 cards correct. When tested for generalization in Unit 1, through groups of objects, he got 56 trials correct, out of 100. When tested for generalization in Unit 2, through flashcards, he got 79 out of 100 cards correct. When tested for generalization in Unit 2, through groups of objects, he got 31 out of 50 trials correct.

Figure 2



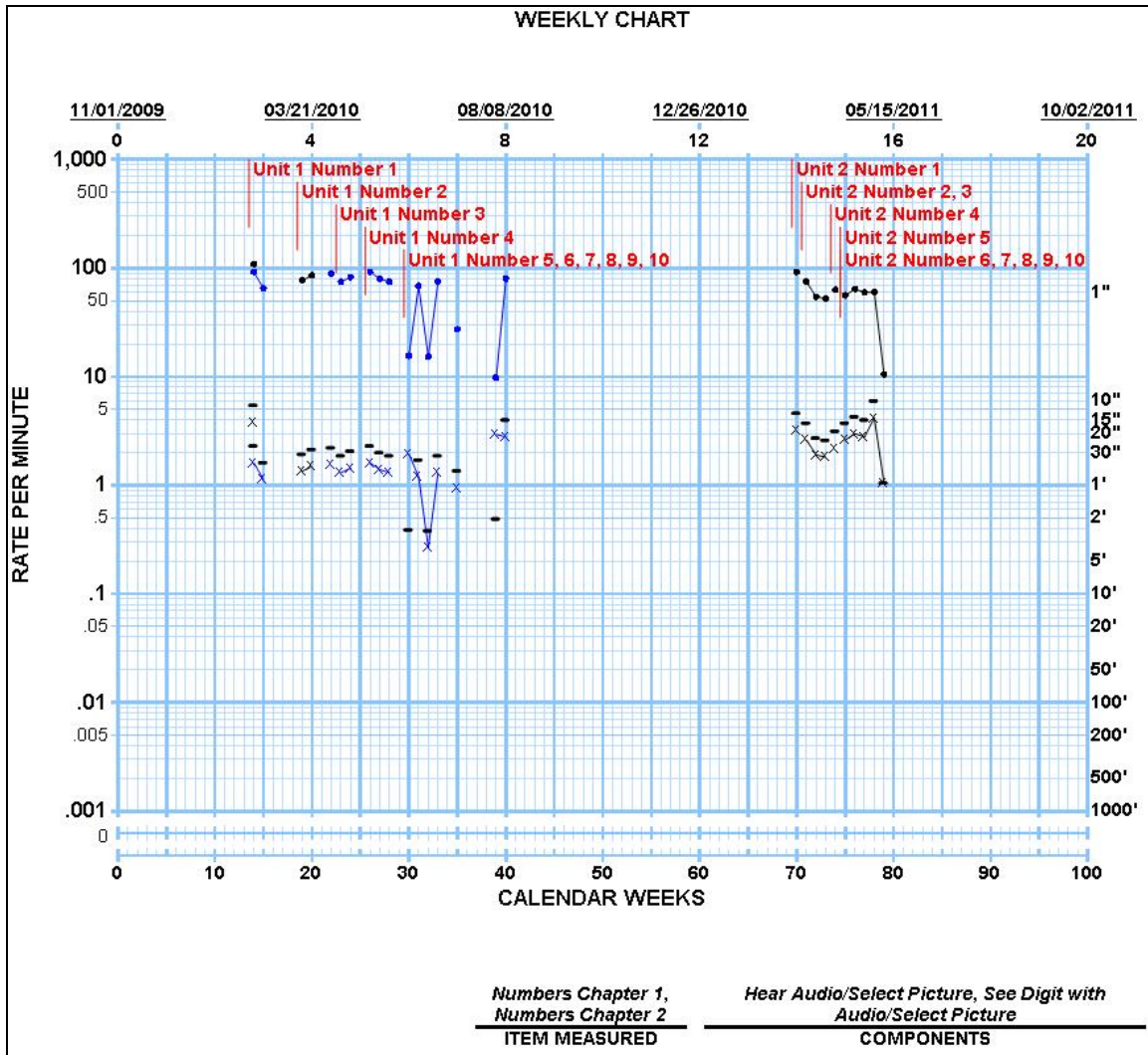
Participant 3 worked on Unit 1, 2 and 3 in the Numbers program, learning numbers 1-3 (Figure 3). When tested for generalization in Unit 1, through flashcards, he got 15 out of 30 cards correct. When tested for generalization in Unit 1, through groups of objects, he got 12 trials correct, out of 100. When tested for generalization in Unit 2, through flashcards, he got 13 out of 30 cards correct. When tested for generalization in Unit 2, through groups of objects, he got 19 out of 30 trials correct. When tested for generalization in Unit 3, through flashcards, he got 12 out of 30 cards correct. When tested for generalization in Unit 3, through groups of objects, he got 12 out of 30 trials correct.

Figure 3



Participant 4 worked on Unit 1 and 2 in the Numbers program, learning numbers 1-10 (Figure 4). When tested for generalization in Unit 1, through flashcards, he got 46 out of 100 cards correct. When tested for generalization in Unit 1, through groups of objects, he got 37 trials correct, out of 100. When tested for generalization in Unit 2, through flashcards, he got 58 out of 100 cards correct. When tested for generalization in Unit 2, through groups of objects, he got 36 out of 50 trials correct.

Figure 4



Discussion

Our results show that the information learned in the Numbers computer program, did not generalize to flashcards or real life objects, in a way that showed mastery of the concept of number recognition. Learning did take place, but with a basic concept like numbers, total mastery is important.

Further work will be done to the Numbers computer program. We plan to try at least two different additions to the program. The first will be to add an introductory unit, which uses visual prompts to show the relationship between a digit and a group of objects. The visual prompt will be faded out, as the user gains fluency. The second will be to add an instructional unit, which shows a group of objects, verbally counts the objects, highlights each object as it counts, and shows the digit while counting. We hope that these changes will help the content from the Numbers program transfer to real life application.

