Analog Analysis of Two Variables Related to the Joint Attention of a Toddler with Autism

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Joint attention-the ability to alternate attention between people and objects (Adamson & MacArthur, 1995)-is important to both language and social development and children with autism often show deficits in joint attending skills (Charman, T., Swettenham, J., Baron-Cohen, Cox, A., Baird, G., & Drew, A., 1997; Mundy, 1995; Dawson, Meltzoff, Osterling, Rinaldi, & Brown, 1998); as an example, children with autism may have difficulty shifting their gaze between a person and a toy with which they are playing. This chart shows the results of our analysis of the gaze shifting performance of a toddler with autism under analog conditions designed to test the affects of two variables on the child's joint attention: toy manipulation demands and the child's preference for the toy. We present this chart to document how precision teachers might display data collected during analog analyses on the Standard Celeration Chart and to describe clinical procedures for evaluating the effects of two variables on learner performance.

Diagnosed with Autism, Amir was 2-years and 9-months old when this chart began and had been receiving four hours per day of intensive in-home intervention services for one month. His in-home intervention team consisted of the authors listed above. During a language evaluation, Amir's Speech Language Pathologist noticed he seemed to have difficulty shifting his attention (i.e., moving his head and eyes) from toys he played with to people in his immediate environment. Amir's Speech Language Pathologist suspected that Amir experienced this difficulty shifting attention because of the manipulation demands the toys presented. She hypothesized that he was unable to "break" his attention from toys to attend to adults around him when the toys required a great amount of manipulation. She suggested Amir receive daily formal intervention in shifting attention as part of his in-home intervention program because of his apparent difficulty with shifting attention and its developmental importance.

Rather than beginning intervention right away, however, we chose to examine more closely and systematically whether the amount of manipulation a toy required affected Amir's attention shifting. Because we suspected Amir's preference for various toys might also influence how frequently he shifted his eye gaze away from them, we also analyzed how his preference for a toy affected his attention shifting at the same time that we evaluated the effects of toy manipulation.

We began by generating a list of toys for which Amir showed a high preference and a list of toys for which he showed little or no preference by considering how frequently he chose to play with a given toy and how long he interacted with it. If he interacted with a toy for long periods and consistently chose to play with it, we classified the toy as Highly Preferred. If he did not play with the toy for long periods or rarely chose to play with it, we classified the toy as Less Preferred. We then classified each of the same toys according to the degree of manipulation they required by considering several factors: the number of moving parts on each toy, the number of ways he could move the parts, and the size of the toy's parts. For example, because picture books consist of a few, large parts (pages) that Amir could only turn, we classified books as requiring a low level of manipulation. A Busy Beads toy, by contrast, consists of many small moving parts that Amir could move in a variety of ways; therefore, we classified Amir's Busy Beads toy as requiring a high level of manipulation. Once we classified each toy according to manipulation requirements and perceived preference, we subdivided the toys into four categories: (1) Highly Manipulative and Highly Preferred toys, (2) Less Manipulative and Highly Preferred toys, (3) Highly Manipulative and Less Preferred toys, and (4) Less Manipulative and Less Preferred toys. We used these categories as the four experimental conditions for the project.

After we generated our toy lists, we evenly distributed four sessions, each 2.5-minutes long, throughout Amir's daily intervention schedule. During each of these 2.5-minute long sessions, we conducted the analysis. Each day, we gave Amir a toy from each list for 2.5 minutes. During those 2.5 minutes, a member of Amir's intervention team (usually the third or fourth author) said Amir's name aloud every 60 seconds. The staff member counted one attention shift if Amir looked up from the toy he was playing with within two seconds after hearing his name. If he did not look towards

the staff member within two seconds, no attention shift was counted. The order in which the toys were given to Amir varied randomly each day to control for sequence effects. Amir received between 9 and 11 sessions overall within each condition.

Figure one below shows Amir's rate of shifting attention plotted as cumulative frequencies by condition. Because staff members only requested that Amir look once per minute, and each session lasted only 2.5 minutes, the maximum counted shifts in attention he could emit was two. Because detecting differences between such low rates of behavior would be very difficult if plotted as per minute frequencies each day, we plotted the data cumulatively.

We employed the Quarter-Intersect procedure (Koenig, 1972 as cited in White & Haring, 1980) to calculate celeration values for each of the four experimental conditions. Amir's attention shifting accelerated at a rate of X1.9 per week during the Highly Manipulative and Highly Preferred condition. During the Less Manipulative and Highly Preferred condition, Amir's attention shifting changed at a rate of X1.8 per week. In the Highly Manipulative and Less Preferred condition, his attention shifting accelerated at a rate of X2.0 per week, and during the Less Manipulative and Less Preferred condition, it accelerated at a rate of X1.6 per week.

His attention shifting performance changed faster within both conditions where he played with highly manipulative toys (X1.9 and X2.0) than in either condition using less manipulative toys (X1.8 and X1.6). When the manipulation demands of the toy were kept constant and low (that is, during both the Less Manipulative and Highly preferred and the Less Manipulative and Less Preferred conditions), his attention shifting performance was better with highly preferred toys (X1.75) than with less preferred toys (X1.55).

Based on these differences, we concluded that the level of manipulation demand presented by a toy most influenced Amir's attention shifting-the more manipulative the toy, the better his attention shifting performance. This conclusion refuted the hypothesis his Speech Language Pathologist originally developed during her clinical examination. We also learned that toy preference affected Amir's attention shifting, but to a lesser degree than toy manipulation. When toys required less manipulation, toy preference did affect his performance-Amir shifted his attention more frequently with highly preferred toys than less preferred toys when the toys themselves presented lower manipulation demands.

Systematically analyzing how toy preference and toy manipulation affected Amir's ability to shift his attention presented several advantages over immediately beginning formal intervention to change his performance. First, evaluating the variables' effects gave us important information about how frequently Amir was actually shifting his attention without intervention. Once counted and charted, his intervention team (including his Speech Language Pathologist) agreed that his rate of attention shifting was adequate and did not warrant intervention. Having baseline data that indicated no intervention was needed saved us time, saved Amir's family money, and most importantly, saved Amir time. Clinicians often develop impressions during informal assessment, but too often they rush to begin intervention when such may be unnecessary.

Beyond helping us decide not to intervene with Amir's attention shifting, had we instead found that his performance did warrant intervention, having evaluated the variables' effects on his performance would have provided another benefit: the data would have allowed us to evaluate clearly the effects of any intervention we developed.

Further, the baseline data we gathered when we evaluated the two variables separately also gave us a good deal of information about which variable exerted functional control over Amir's attention shifting as well as interactions that existed between the two variables. We learned that the manipulation opportunities toys offered were more important than Amir's preference for the toys in controlling his attention shifting. We also learned that this control appeared to work in an opposite way from what we originally hypothesized.

We hope clinicians working with children with autism will invest the time needed to collect baseline and functional assessment data prior to designing and implementing an intervention. Collecting the data for this project took a total of 100 minutes (40 sessions at 2.5 minutes per session). The analysis took very little time, was easy to do, and produced quite a bit of information that helped us make better decisions on Amir's behalf.

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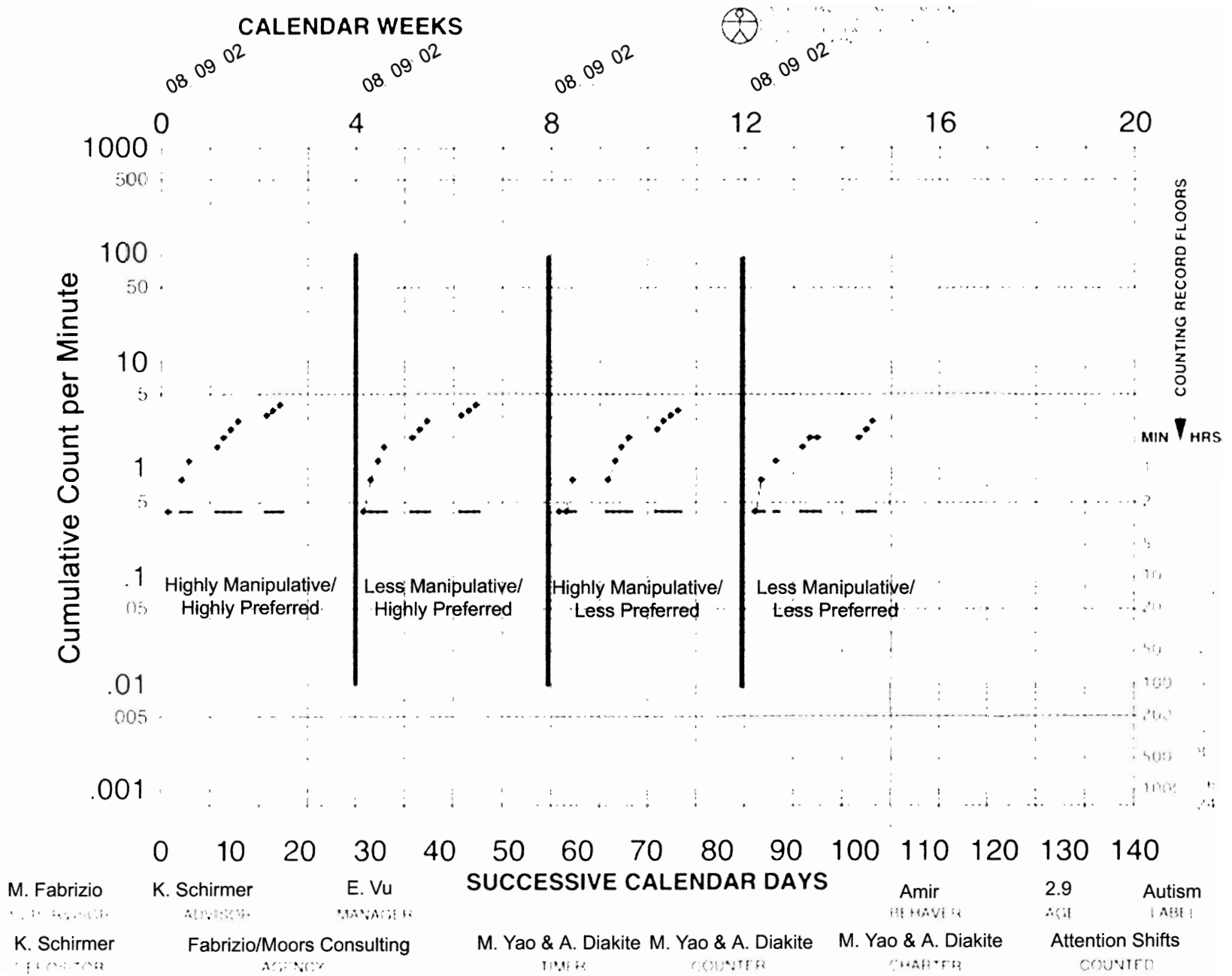
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