

The Write Way Forward: A Transformative Journey from Illegible to Flawless Handwriting in Asperger's Syndrome: A Case Report

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ABSTRACT

Background:

Asperger's Syndrome, characterized by social and communication difficulties, often coexists with unique challenges such as handwriting issues. This study focuses on a 14-year-old boy with Asperger's Syndrome, highlighting the impact of handwriting difficulties on academic performance as board exams loom.

Objectives:

1. Assess the specific handwriting challenges faced by the boy.
2. Implement targeted interventions to improve handwriting skills.
3. Evaluate the impact of interventions on academic performance.
4. Provide insights into the broader implications of handwriting challenges in individuals with Asperger's Syndrome.

Methods:

The study employs a case study design, utilizing qualitative and quantitative handwriting assessments, academic performance tracking, and implemented interventions tailored to the individual's needs for the duration of 6 months. The study involves collaboration with school teachers and patient's family and school teachers to create a comprehensive intervention plan.

Patient:

The focus is on a 14-year-old boy diagnosed with Asperger's Syndrome, showcasing his intellectual abilities and the specific challenges posed by poor handwriting. The patient's mother expresses concern about his academic performance as board exams approach.

Results:

The interventions implemented, including targeted handwriting exercises, collaborative support, are tracked and evaluated. The study records improvements in handwriting legibility, speed, and overall academic performance, providing valuable insights into effective strategies for individuals with Asperger's Syndrome.

Conclusion:

This study underscores the significance of recognizing and addressing handwriting challenges in individuals with Asperger's Syndrome. The tailored interventions presented demonstrate the potential for significant improvements in both handwriting skills and academic performance, offering hope and guidance for families, educators, and practitioners working with individuals facing similar challenges.

Keywords: Handwriting issues, Asperger's Syndrome, Occupational Therapy

Background: DSM IV

Asperger's Syndrome, a neurodevelopmental disorder is categorized under Autism Spectrum Disorder (ASD). As defined by the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV), the key criteria for Asperger's include persistent challenges in social interactions, nonverbal communication difficulties, and restricted, repetitive patterns of behavior.¹ Asperger's Syndrome manifests a distinctive interplay between cognitive strengths and social challenges, with individuals often exhibiting intense "special interests," showcasing diverse cognitive profiles (Happé & Ronald, 2008). Special interests become sources of expertise and accomplishment, underscoring the richness of cognitive experiences in individuals with Asperger's Syndrome (Klin & Volkmar, 2003). While they typically have average to above-average intelligence, they may struggle with understanding social cues, in forming and maintaining social relationships, understanding the nuances of nonverbal communication², interpreting facial expressions and body language, sarcasm, humour and empathy, and adapting to changes in routines, contributing to social awkwardness and potential misinterpretations (Attwood, 2006).

Moreover, individuals with Asperger's may experience sensory sensitivities, leading to heightened responses to environmental stimuli, influencing daily activities including participation in educational settings (Ben-Sasson et al., 2009). In academic settings, these challenges can manifest in various ways, including difficulties in organization, time management, and, notably, handwriting. Handwriting issues in Asperger's Syndrome can be influenced by fine motor difficulties, motor coordination challenges, sensory sensitivities and challenges in executive functioning, particularly in planning and organization (Kenworthy et al., 2008), impacting academic performance including tasks requiring written expression, note-taking, and exam completion⁴, and overall well-being.

The "fractionable autism triad" concept, encompassing behavioural, genetic, cognitive, and neural aspects, provides a nuanced understanding of Asperger's Syndrome (Happé & Ronald, 2008). The unique cognitive strengths and challenges within Asperger's Syndrome necessitate a comprehensive understanding for tailored interventions in educational and social contexts (Happé & Ronald, 2008). Ultimately, addressing all the diverse challenges associated with Asperger's Syndrome becomes crucial to fostering success and ensuring a positive educational experience for these individuals.

Case Report

“Every stroke of practice paints the canvas of improvement, turning dedication into a masterpiece of skill.”

On the bright morning of April 22, 2023, I was bursting with anticipation as an appointment for a home consultation scheduled with a Medical Officer from AFMC was looming. However, that anticipation was tinged with an undertone of concern, as the primary focus of this visit was the handwriting challenges faced by the eldest son of the household.

As the clock struck closer to the designated time, I arrived hoping that I exuded professionalism and empathy. I sensed an air of restlessness in the mother, who was visibly concerned about her son's well-being. The mother, who appeared to be carrying the weight of her son's challenges, welcomed me into her home with a mixture of hope and trepidation.

The assessment began, and the mother shared her observations, "He's very shy, making it difficult for him to engage with new people. He avoids eye contact". When I entered, the young boy was seated in the drawing room. He seemed both curious and reserved and began giving his introduction almost mechanically, as if he had rehearsed it. His hesitancy to make eye contact and the rehearsed introduction painted a vivid picture of the social challenges he faced, which aligned with characteristics commonly associated with Asperger's Syndrome. Despite these challenges, there was keen intelligence in the way he expressed himself.

The mother, with a sense of dedication, provided a detailed history of her son's journey – from the initial diagnosis of Asperger's Syndrome to the on-going therapies. She highlighted the progress achieved, acknowledging that her son had evolved into an intelligent individual. However, the mother's concern was palpable as she articulated, "The only thing lacking here is his confidence, and it manifests prominently in his poor handwriting. I fear this could adversely affect his performance in the upcoming board exams."

This heartfelt concern pointed to the broader impact that handwriting challenges can have on academic achievement and, more importantly, on the individual's confidence and self-esteem. I noted the intricate details of the mother's narrative, empathetically engaged in the discussion, recognizing the need for a comprehensive approach that considered both the social and academic dimensions of the young boy's life.

Assessment:

Legibility: Poor

Observation: The writing is often illegible, with inconsistent letter formation and spacing.

Possible Causes: Poor control, uneven pressure, and inconsistent grip contribute to difficulties in maintaining legible writing.

Consistency: Poor

Observation: The size and shape of letters vary throughout the writing sample.

Possible Causes: Lack of consistent hand-eye coordination and motor control, leading to variability in letter formation.

Letter Formation: Poor

Observation: Letters are frequently formed inaccurately, and starting points vary.

Possible Causes: Challenges in fine motor skills may impact the ability to form letters consistently and accurately.

Spacing: Poor

Observation: Inconsistent spacing between words and letters.

Possible Causes: Difficulty judging and maintaining appropriate distances between letters and words.

Line Alignment: Poor

Observation: The writing does not consistently follow the baseline, with occasional drifting.

Possible Causes: Poor spatial awareness and difficulty maintaining a straight line while writing.

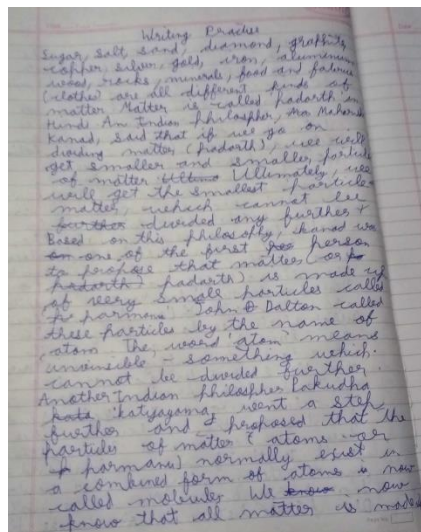


Fig. 1 Pre-intervention Handwriting

Pressure Control: Poor

Observation: Excessive pressure is applied, resulting in ink smudges and uneven lines.

Possible Causes: Difficulty modulating pressure during writing, leading to an impact on overall legibility.

Speed and Fluency: Poor

Observation: Writing is slow and hesitant, lacking overall fluency.

Possible Causes: Challenges in motor planning and execution contribute to a lack of writing speed and fluidity.

Posture and Grip: Poor

Observation: The posture is poor, with a tendency to stoop while writing. Grip is tight and rigid.

Possible Causes: Suboptimal posture and grip may be a likely result of the intense concentration he devotes to produce legible handwriting.

Ergonomics: Poor Posture

Observation: The writing environment lacks ergonomic features, potentially contributing to discomfort and impacting overall control.

Possible Causes: Inadequate seating arrangements or writing tools may affect the overall writing experience.

Adaptability: Poor

Observation: The individual struggles to adapt handwriting to different tasks or writing surfaces.

Possible Causes: Difficulty in adjusting writing style based on task requirements or environmental changes.

Self-Perception: Poor

Observation: The individual expressed frustration and dissatisfaction with his handwriting.

Possible Causes: Poor self-perception may be a consequence of the unsuccessful results achieved in spite of the immense effort put into the task, judgement received from teachers and peers incognizant of his difficulty; thereby impacting motivation and confidence in improving handwriting.

Difficulties with letter formation, spacing, size, slant, and/or alignment: Present Comparison to Developmental Norms: Poor

Observation: Writing skills appear below the expected level for the individual's age.

Possible Causes: Developmental delays or challenges in fine motor skills may contribute to writing difficulties.

Management:**1. Postural Control:****a. Ideal Seating Position:**

- Ensure feet are flat on the floor, hips and lower back supported against the back of the chair.
- Maintain approximately 90° of knee flexion with elbows slightly flexed and forearms resting on the desk surface.
- Address issues related to desk or chair height to prevent slouching or unsupported feet.

b. Activities for Postural Control:

- Wall press-ups or chair push-ups.
- Encourage leaning on arms and putting weight through shoulders during activities like puzzles in side sitting.
- Reaching activities while sitting erect on a therapy ball.

2. Setting up Good Working Positions in the Classroom:

- Ensure that the desk and chair are the right size.
- Feet should be fully supported on the floor or footrest.
- Hips and knees should be bent to 90°.
- Desk height should align with elbows; with forearms being straight and parallel to the thighs and floor.
- Consider slope-boards or sloping desks if the child tends to lean over their work.

3. Fluency and Speed:

- Use big arm movements for drawing patterns on upright surfaces.
- Encourage activities on whiteboards, blackboards, or wall-attached paper.
- Make letter patterns by joining alphabets, e.g. a row of joined up a's

4. Improving Legibility:

- Write on the line using paper with raised lines.
- Practice leaving spaces between words using stickers or ink stamps.
- Emphasize correct height for ascending and descending letters.

5. Pressure & Hand Fatigue:

- Take short breaks between writing periods.
- Incorporate limb pressure exercises like crawling games and wheelbarrows into the daily schedule.
- Use a mouse mat underneath paper to control excessive pressure.
- Larger barreled pencils will reduce strain on finger joints.
- Engage in games like "MI5" which includes providing a pad created by placing a layer of paper alternately with carbon paper. Ask the child to write a secret message so that only one agent can read it. Initially the pressure may make the child write so that the message can be seen on 3 or 4 copies, but by encouraging the child to self-monitor, pressure will reduce.

6. Making Continuous Improvement:

- Emphasize the importance of continuous practice for visible improvement.
- Consider creating a structured practice routine for daily implementation.

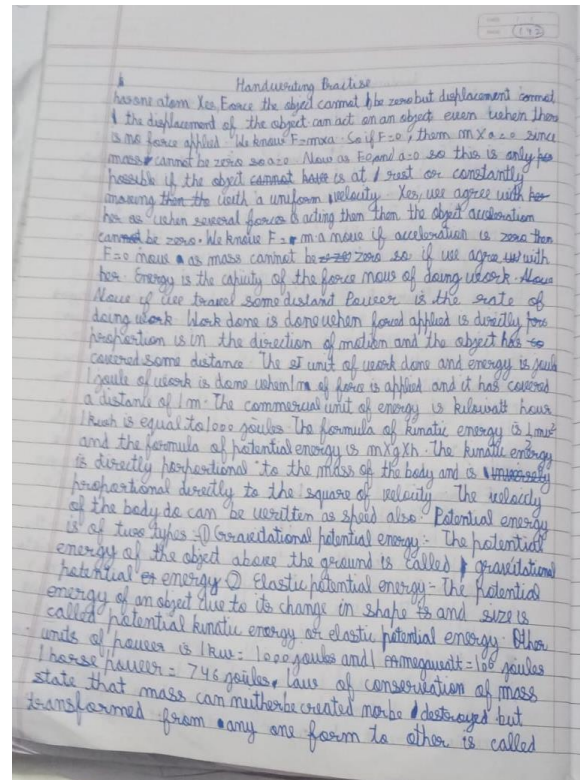
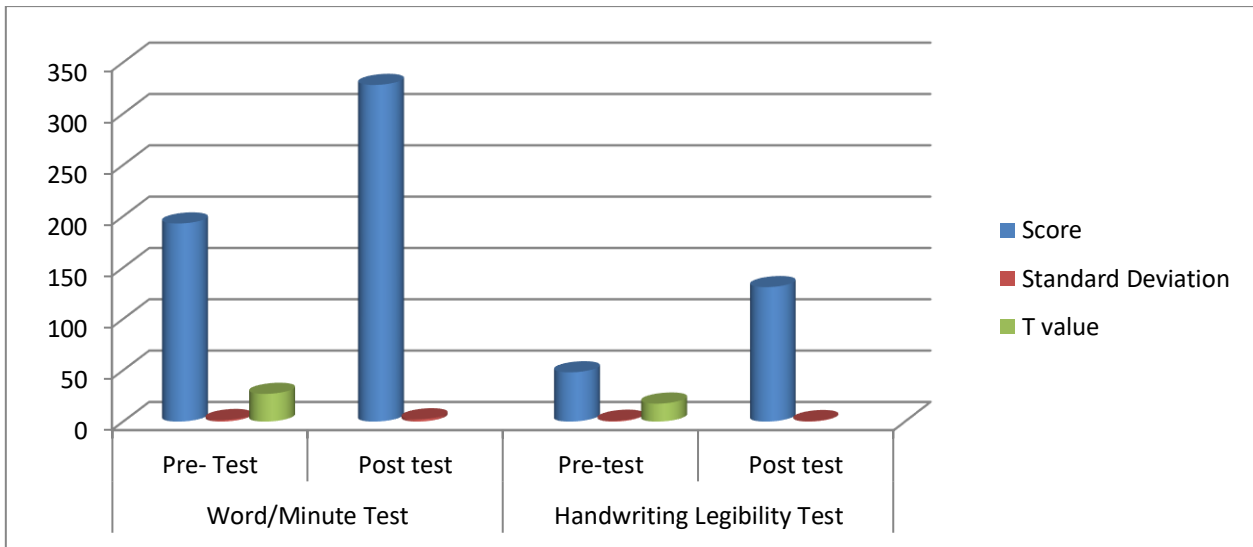


Fig. 2 Post-intervention Handwriting

“Success in handwriting, like any skill, is born from the marriage of dedication and regular practice. The ink of improvement flows through the pen of persistent effort, creating a masterpiece of legibility and confidence.”

Result:

Result				
N Number	Word/Minute Test		Handwriting Legibility Test	
	Pre- Test	Post test	Pre-test	Post test
1	193	328	48	131
Score	1.49	2.2	0.79	0.46
Standard Deviation	27		17.5	
T value				



Word/Minute Test:

Pre-Test Score: 193 | Post-Test Score: 328

The pre-test score of 193 words per minute indicates the initial speed at which the child could write words before the handwriting intervention. This baseline measurement reflects the child's initial writing speed, which may have been affected by challenges in motor coordination, letter formation, or other factors associated with their handwriting difficulties.

The post-test score of 328 words per minute reflects the child's writing speed after the intervention. The significant increase of 135 words per minute suggests a positive impact on the child's ability to write words quickly.

The substantial improvement in writing speed indicates that the intervention strategies implemented were effective in addressing the specific challenges that were impacting the child's writing speed.

Significant Improvement:

A T value of 27 is notably high, indicating that the observed increase in writing speed from the pre-test to the post-test is highly unlikely to occur by chance alone. This suggests a significant and meaningful improvement in the child's ability to write words quickly after the intervention.

Effectiveness of the Intervention:

The elevated T value implies that the changes observed in the child's writing speed are not random fluctuations but are likely a result of the specific interventions implemented. The strategies employed in the intervention have demonstrated a considerable impact on the child's writing performance.

Handwriting Legibility Test

Pre-Test Score: 48 | Post-Test Score: 131

The pre-test score of 48 indicates the initial level of legibility on the Handwriting Legibility Test, while the post-test score of 131 reflects the improved legibility after the intervention.

The notable increase (83 points) suggests a positive impact on the individual's ability to produce more legible handwriting.

T Value: 17.5

The T value of 17.5, similar to the Word/Minute Test, suggests a significant difference between the pre-test and post-test scores in the Handwriting Legibility Test.

Overall Interpretation:

The substantial increases in both Word/Minute Test and Handwriting Legibility Test scores, along with the high T values, suggest that the handwriting intervention had a statistically significant and positive impact on both writing speed and legibility.

In summary, the results indicate a successful handwriting intervention, resulting in significant improvements in both writing speed and legibility in the participant.

Conclusion:

The findings of this study strongly support the effectiveness of the handwriting intervention implemented. The significant improvements in both writing speed, as demonstrated by the Word/Minute Test, and handwriting legibility, as evidenced by the Handwriting Legibility Test, suggest that the intervention strategies were successful in addressing the specific challenges faced by the participant. The substantial increases in scores and high T values further indicate that these improvements are unlikely to be due to random chance.

The results not only highlight the success of the intervention in enhancing the participants' ability to write words quickly and legibly but also underscore the importance of targeted interventions in addressing handwriting difficulties. The findings contribute to the growing body of evidence supporting the efficacy of interventions aimed at improving both speed and legibility in individuals facing handwriting challenges.

Limitations:

Generalizability: The study's generalizability may be limited by the specific characteristics of the participants involved. It is crucial to recognize that individual differences and diverse populations might respond differently to the intervention. Future research should aim to include a more diverse and representative sample to enhance the external validity of the findings.

Control Group: The absence of a control group makes it challenging to attribute the observed improvements solely to the intervention. A randomized controlled trial with a control group receiving no intervention or an alternative intervention would strengthen the study's ability to establish a causal relationship between the intervention and the observed outcomes.

Outcome Measures: While the study focused on writing speed and legibility, it did not explore potential impacts on other relevant aspects of handwriting, such as spatial organization or ergonomic factors. A more comprehensive assessment of various dimensions of handwriting could provide a more nuanced understanding of the intervention's effects.

Potential Bias: The study may be vulnerable to biases, such as selection bias or participant expectancy effects. Ensuring a blinded assessment or employing objective measures could mitigate potential biases in future studies.

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