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Observational Analysis of the Contents of Drawings by Children with High-Functioning Autism: A Case Series

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ABSTRACT

Background and Objective: One of the core diagnostic criteria for autism is restricted and repetitive patterns of interests or behaviors. Content analysis of these limited obsessional interests suggests they are mostly focused on physical systems. Children with autism express their obsessional interests in different ways. One of them being through their drawings. However, a content analysis of such drawings has not been performed to date. The aim of this case series was to perform an observational content analysis of the drawings of children with high-functioning autism.

Case series: Six children with high-functioning autism who reportedly exhibited intense obsessional interests were selected for the study. Drawings produced by these children both at home and in therapeutic settings were collected. The authors analyzed the contents in these drawings. The contents of the drawings produced by all cases were related to physical systems and mechanical or electrical object categories with details regarding their components, types, brands, attributes, dynamics, and functions.

Conclusion: These results show that the contents of the drawings of children with high-functioning autism are affected by their obsessional interests. The specific details of these drawings exemplify their fascination with physical systems and are consistent with the hypersystemizing theory of autism.

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Introduction

Autism Spectrum Disorder (ASD) is a neurodevelopmental condition characterized by difficulties in social interaction and communication, alongside restricted and repetitive patterns of behavior, interests, or activities [1]. The intense restricted interests, and in some cases special abilities, observed in autism have intrigued researchers for decades. Studies suggest that these limited interests in children with ASD are not random.

A content analysis of these "obsessional interests" in individuals with ASD indicates that they are mainly focused on mechanical or physical systems [2]. Such studies as well as experimental research on children with ASD, indicate intact or superior *intuitive physics*, or *folk physics*, in these individuals [2, 3]. *Folk physics* refers to perceptions related to physical causality and expectations regarding the attributes of physical objects, motion, and mechanics [3]. Further studies on the cognitive phenotype of autism propose that individuals with ASD are hypersystemizers, that is, they show a notably strong drive to systemize and score higher both on performance tests of systemizing and on the Systemizing Quotient (SQ), a self-report questionnaire that measures the Systemizing Mechanism (SM) [4, 5]. The SM is the ability of the human mind to analyze, construct or constitute systems, allowing one to predict and control the behavior of a system [4, 5].

Different types of systems have been proposed such as: *technical* (e.g., mechanical or electrical tools and machines); *natural* (e.g., biological, geographical, meteorological, and astronomical); *abstract* (e.g., mathematics, computer software, calendars); *social* (e.g., sports league tables, business values, constituency boundaries); *organizable* (e.g., organizing archives or shelves), and *motoric* (e.g., sports strokes) [2, 4, 6, 7]. We interpret these systems in terms of basic rules and regularities.

Children with autism show their restricted and obsessional interests in various ways, such as constant daily preoccupation with the object of interest, discussing it and its functions in great detail, and learning its taxonomy. Clinical observations suggest that some children with ASD also produce drawings of their obsessional interests.

To our knowledge, the contents of these drawings have not yet been analyzed or investigated in terms of details and characteristics. In this observational study, we analyzed the contents of drawings of non-savant children with high-functioning ASD who have obsessional interests in mechanical, electrical and physical systems to further investigate the effect of their fascination with physical systems on the content of their drawings.

Case Series

Six Iranian children with high-functioning ASD, referred to a private pediatric occupational therapy (OT) center in Tehran who according to parents' reports produced repetitive drawings of their obsessional interests, were selected for this study. The diagnoses and referrals were made by their child and adolescent psychiatrists.

All children enrolled in this study were male and in their preschool years (4 to 6 years old). Parental consent was obtained for all cases for their child's participation in the present study. Parents were asked to collect the drawings created at home by the children and bring them to the researchers. Drawings created during the OT sessions were also collected for the study. These repetitive drawings were not requested by an adult and were produced by the children voluntarily as expressions of their obsessional interests and preoccupations, whether at home or during the OT sessions.

The authors, both pediatric occupational therapists, analyzed the contents of the drawings.

The obsessional interests of the cases were reflected in their drawings. *Table 1* presents the cases' obsessional interests and their ages at the time of collecting data. Their obsessional interests included trains, cars, buses, trucks, fans, tires, entry phones, and roads.

The following are the details of the object categories observed in the cases' drawings:

Case 1: drawings included various types of roads such as highways, streets, dirt roads, and boulevards. He also drew generic trains, high-speed trains, and cargo trains.

Case 2: drawings depicted both stationary and rotating tires, as well as regular and flat tires.

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Case 3: drawings featured city buses, electric buses, and minibuses.

Case 4: drawings showed entry phones with or without video displays, different button layouts, and different brands (Fig. 1).

Case 5: drawings included not only generic trucks but also tractor units, semi-trailer trucks, tank trucks, and box trucks (Fig. 2).

Case 6: drawings depicted various types of fans such as bathroom fans and pedestal fans, with stationary blades (off) and spinning blades (on).

The analysis showed that the *obsessional interests* of children with ASD were evident in their drawings. As noted above, the drawings in our study contained different models, types, and brands; physical components, attributes, and features; as well as the dynamics and functional aspects of the object categories related to their obsessional interests.

Table 1: Age and obsessional interests of cases

Case	Age(years)	Contents of drawings
1	6	Trains; Roads
2	4	Cars; Tires
3	5	Buses
4	4	Entry phones
5	4	Trucks
6	6	Fans

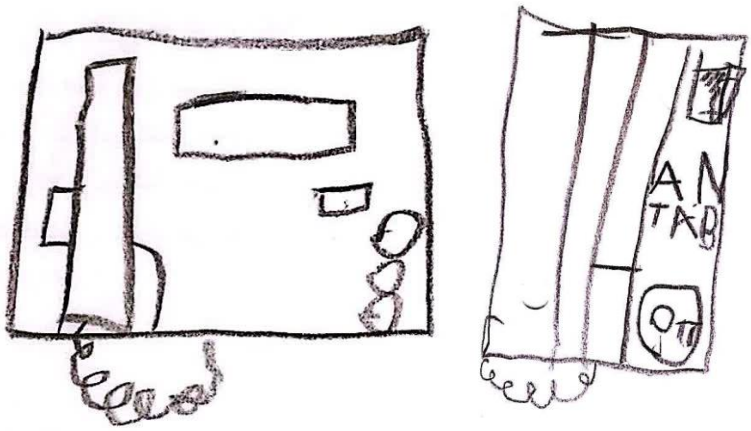

Fig 1. Two entry phones, drawings by case 4

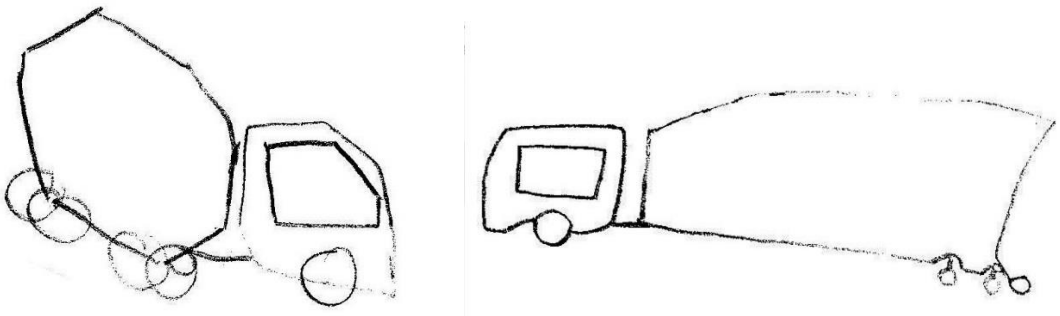

Fig 2. A tank truck and a box truck, drawings by case 5

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Discussion

The obsessional interests of all of our cases were reflected in their repetitive drawings, and in all cases, these interests were related to physical systems, and mechanical or electrical machines. This aligns with the theory of folk physics superiority in autism [2, 3]. Furthermore the children depicted functional aspects of their obsessional interests, as well as the dynamics, features, physical attributes, and different types and models, in great detail. This significant amount of detail supports the hypersystemizing theory of autism [4, 5, 6]. It also aligns with Scott and Baron-Cohen that suggest children with ASD are quite capable of drawing empirical objects [8]. As reported by Baron-Cohen and Wheelwright, a case was introduced by Bettelheim in 1968 as a boy who had a fascination for machines and was obsessed with drawing real and fictitious machines [2]. Although to our knowledge there is not much detailed information available to us today about the specifics of the contents of his drawings, this case report seems very similar to current study with one important difference being that our cases only produced drawings of real objects not fictitious ones.

A limitation of our case series is that the sample population was restricted to male children. This outcome was incidental, reflecting the pattern of referrals during the study period, and was not part of the initial selection criteria.

We suggest further investigation and analysis of the contents of drawings produced by non-savant children with ASD, with a larger sample size and a wider age range.

Conclusions

The results of this observational content analysis show that the obsessional interests of children with autism can have an effect on the contents, characteristics, and details of their drawings. Such findings can provide invaluable information about the cognitive phenotype of autism.

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Ethical Considerations

Parental consent was obtained for all cases for their child's participation in the present study.

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Conflict of interest

The authors declare no conflict of interest.

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