

DISTURBANCES OF CENTRAL COHERENCE: A CASE STUDY

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SUMMARY

This paper presents the case of an autistic boy, who displayed serious deficiencies in the ability to integrate pieces of information into a coherent whole, which would support the Weak Central Coherence (WCC) theory of autism. During the course of therapy the boy acquired some skills needed to integrate details, but he still began his drawings with one of the peripheral elements rather than a central shape. The paper is illustrated with the boy's drawings. A significant improvement in his performance on the Bender-Koppitz and ROCF tests was also noted. Moreover, the boy acquired the ability create cartoons on a specific topic. He was not able, however, to reconstruct the sequence of events in a story read to him, despite the fact that he proved to be capable of relating individual events after being asked about them.

INTRODUCTION

Autism remains an enigma, despite the constantly growing number of scientific publications, since most authors concentrate on the symptomatology, and not on the pathogenesis. Recently three rival theories have been offered to explain the essence of autism:

- The autistic patient lacks a "theory of mind," i.e. the awareness that other persons have cognitions and emotions (this theory will be referred to hereinafter as TOM);
- Autism results from disturbances of executive functions, i.e. the patient presumably has relatively normal cognition and relatively normal praxis, but is unable to coordinate them in disciplined behavior (this theory will be called EF);
- In the Weak Central Coherence (WCC) theory, autism is thought to result from the patient's inability to subordinate smaller units of either experience

or behavior to an overall conception or intention.

Unlike publications based on TOM and EF, studies derived from WCC are still relatively few. This may be due to the methodological and technical difficulties in organizing such experiments, since currently fashionable approaches to cognition and behavior tend to move in the direction of analysis (breaking phenomena down into ever smaller and simpler units) rather than synthesis (integrating discrete phenomena into a coherent whole). At the same time, however, many authors have long been of the opinion that deficits in the cognitive integration of pieces of information are a typical feature of autism (e.g. Frith, Snowling, 1983; Tager-Flusberg, 1991; Jolliffe, Baron-Cohen, 1999). It is assumed that central coherence is concerned with integrating sources of information and processing diverse kinds of information in the brain. Martin and McDonald (2003) point to the fact that autistic children attend to details rather than global and coherent wholes. The inability to synthesize is also reflected in their linguistic competence: autistic children tend to concentrate on the meaning of individual words and phrases and not whole utterances (Frith, 1989).

Puttting (1982) notes that the main feature of language use is an ability to formulate utterances in relation to context. We do not pay attention to individual words, but rather take into account the whole meaning of a given utterance. As a rule most utterances include some irregularities, and they are often not complete, but we are able to understand them thanks to the situational context. It is a familiar phenomenon that two people who have known each other very well for some time can speak in half-sentences, even monosyllables, and be perfectly understood to one another, while someone from outside their relation will be perfectly baffled by their conversation, which appears to be devoid of content. The difference between this situation and the formal conversation of complete strangers is one of degree, and not kind: we almost never say everything that could be said in a given situation, because we know that some things will be taken for granted by the other party. If a man is selling ice cream on the beach, we could say, "I would like to purchase two small servings of vanilla-flavored ice cream and one large serving of chocolate-flavored ice cream, if you please," but most of us will say, "Two small vanillas and one large chocolate, please." The context fills in the unstated information automatically and mostly subconsciously, so the transaction is completed despite the amount of information left unstated.

Autistic children are able to acquire some linguistic skills, such as reproducing individual sentences, but exhibit difficulties with understanding ambiguous sentences, metaphors, and homonyms (Tager-Flusberg, 1991). They are, therefore, unable to use context to access the deeper meaning of an utterance. The authors point to the fact that a tendency to concentrate on particular elements and to miss the meaning of the whole figure can also be observed in other domains. Hence the inability to integrate individual components into a meaningful whole is also observed in visual, auditory, and sen-

sory perception.

METHODS

The description of the present case is derived from longitudinal studies of autistic children aimed at evaluating changes in cognitive functions interpreted in terms of WCC. Since these children exhibit deficits in verbal communication, two common tests that do not require language skills – Bender-Koppitz and the Rey-Osterrieth Complex Figure (ROCF) – were administered. In the first test figures of various degree of complexity are copied from the presented design, while in the second one complex figure is to be drawn, also from memory. A significant correlation between cognitive performance and central coherence in this case has been elsewhere described (Markiewicz, 2007); the present study will also include the analysis of pictures drawn by the patient.

CASE HISTORY

Peter (born in 1995) came under the care of the Special Clinics for Early Diagnosis and Rehabilitation in Lublin at the age of four. He was one of the few patients who began to communicate verbally, but he used mainly echolalic utterances that were gradually replaced by one word utterances, which at the age of six developed into single sentences. At the age of seven he included also compound sentences into his drawings, which were meant to explain the situations presented. However, they were mostly echolalic in character.

The problems reported by Peter's parents at the beginning of therapy were as follows:

- reluctance to establish contacts with others;
- difficulties in communication;
- strange interests.

The final diagnosis of autism was reached after consultations with a neurologist, a psychiatrist, and a special educator, and it was further verified in the course of therapy. The following disturbances were noted:

1. Disorders of social interactions:

- Difficulties with accepting new situations;
- Reluctance to accept any changes;
- Limited social activity (despite lack of initiation of social contacts he performed tasks placed in front of him);
- Lack of social contacts, with preserved awareness of the presence of others (e.g. he did not display contact with his mother, but "froze" when she left the room and did not perform any further actions);
- Lack of spontaneous expression of emotions.

2. Disorders of communication

- Basic verbal skills but weak expressive language;
- Lack of ability to use language in social situations;
- No emotional reaction to verbal and nonverbal stimuli from others;

- No modulation of utterances or accompanying gestures;

3. Disorders of behavior

- Stereotyped patterns of behavior (e.g. concentration on dates and bus timetable);
- Strong tendency to stiff rituals (e.g. all family members had to sit in the same chairs at every meal).

Drawing abilities

An analysis of Bender-Koppitz drawings reflected progressive changes. On his first drawings (when he was 4 years old) it was almost impossible to identify particular figures or their components (Fig. 1). At a later stage (at the age of 5 years and 6 months) some figures were still difficult to identify (see Fig. 2), while others were similar to the patterns despite considerable distortions. At the

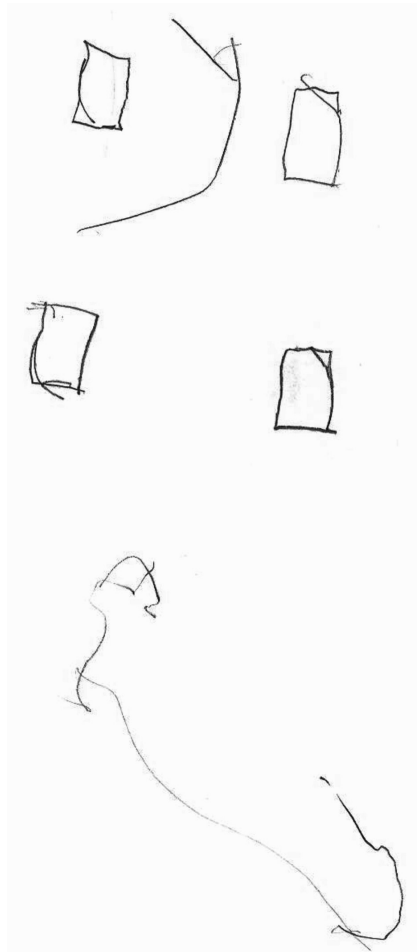


Fig. 1. Performance of Peter on the Bender-Koppitz Test at the age of 4;1

age of 7;8 Peter drew figures that were legible and precise (Fig. 3).

Similar improvement was observed on the Rey-Osterrieth test. The first drawings were considerably distorted and impossible to identify. Considerable progress occurred, however, from one examination to the next, and his final accomplishment was a fine and precise drawing, as can be seen in Fig. 4. He refused, however, to draw the figure from memory, which may be due to communication problems: he did not understand the instruction given to him.

Drawing was among Peter's favorite occupations. He drew at a high speed, and a characteristic feature of his works was the large number of details. As a rule his drawings were in one color, and he used a ballpoint to draw. He pressed the ballpoint very hard, leaving traces on the card. From time to time he filled in some fragments of his pictures with colors (see Fig. 5; light gray shading represents red and yellow coloring on the original).

Another hobby was drawing maps and cartoons. He began by copying maps, which he did with great precision, preserving the scale. It was charac-

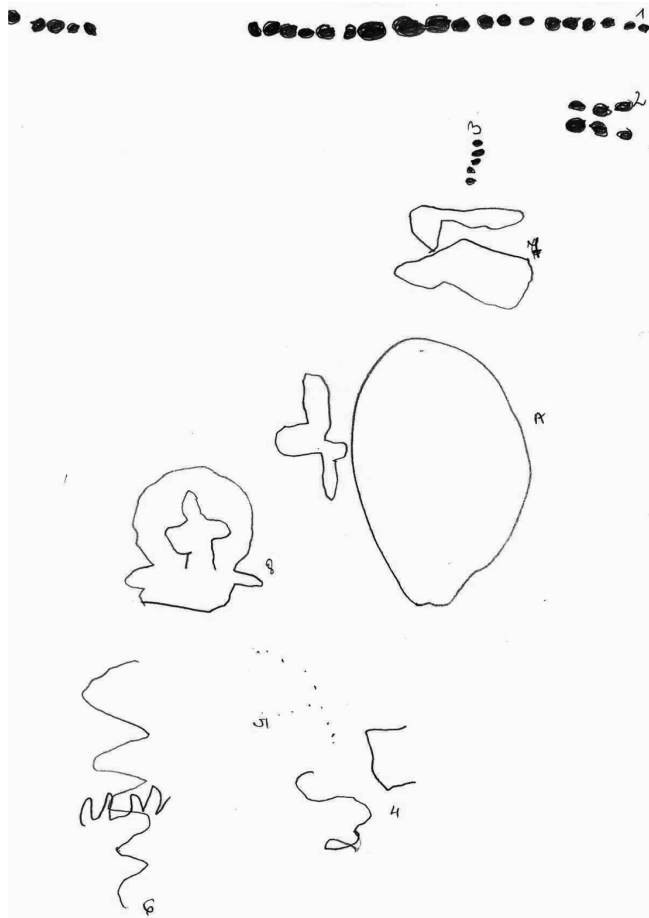


Fig. 2. Performance of Peter on the Bender-Koppitz Test at the age of 5;6

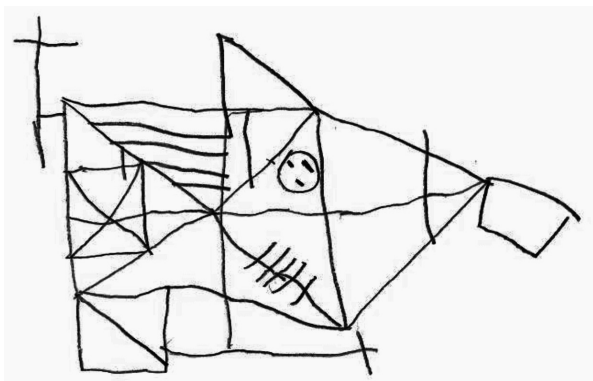


Fig. 3. Performance of Peter on the Bender-Koppitz Test at the age of 7;8

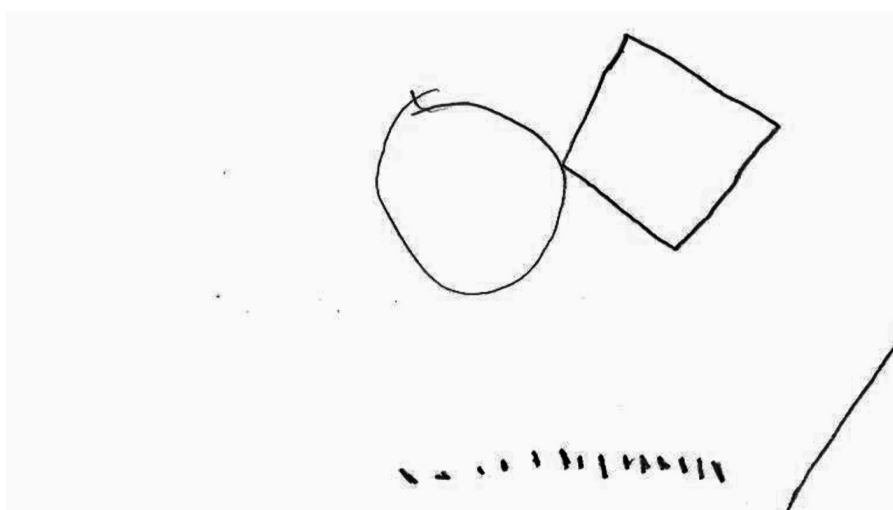


Fig. 4. Copying by Peter of the Rey-Osterrieth complex figure at the age of 7;8

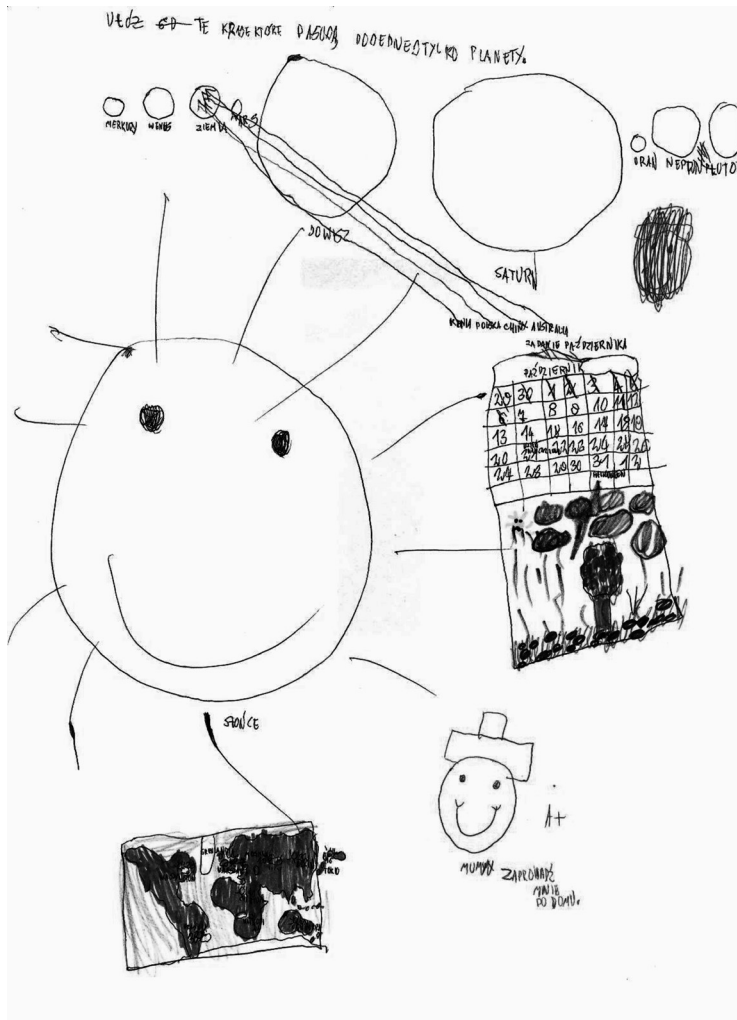


Fig. 5. A map of the universe drawn at the age of 7;8

teristic that Peter always began with a particular detail, around which he added other details. With time he began to create his own maps, yet he always worked in the same way, beginning with individual parts that he later combined into a meaningful whole. He also commented on his drawing, naming individual elements. Thus, when asked about his drawings, he labeled the earth, Mars, Africa, days of the week, etc. (see Fig. 5), but he did not give a name to the whole picture.

His cartoons were on a given topic, such as operating a computer or redecoration of his home, and again he always began with details, out of which he created the whole picture. As can be observed in figures 6 and 7, the details were put on particular sides of the paper and integrated into a whole. The great number of details is very characteristic of Peter's drawings.



Fig. 6. A picture of a "flat" with a number of details loosely connected with the main topic. Inclusion of labels and text is characteristic. The text is incoherent

Outcome

A close and careful observation of the patient engaged in various activities revealed a gradual development of coherence. Peter gradually became able to combine particular elements of his actions into a coherent whole. As mentioned above, as a rule he began with details and then created the whole, and this pattern could be observed in all forms of activity. Both his parents took an active part in therapeutic sessions with their son. They were instructed to explain drawings to their son from the perspective of the whole figure; this made it possible to create coherent wholes from isolated fragments. Peter was also encouraged to explain the theme of his drawings before creating them; accordingly, he was asked what a cartoon would be about before he began drawing it.

Another task that contributed to the patient's considerable progress in cog-

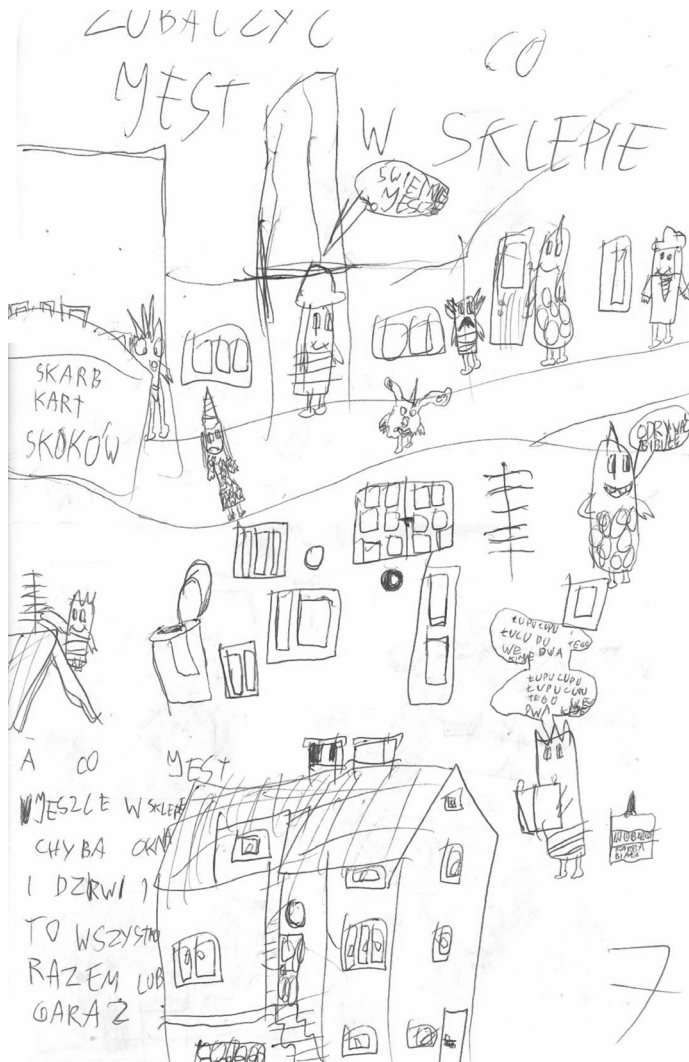


Fig. 7. A complex picture drawn by Peter with a characteristic number of details. Inclusion of labels and text is characteristic. The text is incoherent

nitive functioning was requiring him to summarize stories which had previously been read to him by his parents. It is characteristic that Peter was able to relate individual events from these stories, but reconstructing the sequence was still too difficult for him. He managed, however, to reproduce the content of the story if he was given a series of questions relating to particular events. It was beyond his capacity to tell what the story was about, which means that he was not able to grasp its meaning or draw any conclusions.

DISCUSSION

According to Frith (1989), most autistic symptoms are due to a disorder of

the central system that makes it possible to integrate individual sensations into meaningful patterns of information. Hence autistic persons experience difficulties in comprehending contextual relations and in organizing patterns into coherent wholes. They tend to attend to details, and are not able to use context to derive meaning (see Bogdashina, 2003; Martin & McDonald, 2003).

These difficulties were observed in the patient described here, but the matter appears to be much more complex. It is quite possible that the difficulties in communicating with others may be due to weak central coherence, which makes autistic persons concentrate on individual pieces of information, individual words, and not the sense of a whole utterance. We experience such difficulties when reading complex instructions, or when reading text in a language that we have not mastered to a sufficient degree. Central coherence deficits do not provide an explanation for such difficulties of autistic persons as sensory disorders, or the strong attachment to certain objects, places, and tastes. Moreover, they do not explain the source of the auto-aggressive behaviors frequently observed in autistic individuals.

CONCLUSION

The case described here demonstrates that progress in autism is possible with persistent therapy over the long term. The use of drawings, which began as a diagnostic exercise and continued as a major part of therapy, reveals both how the disorder works and what can be done to improve the symptoms. It seems clear the patient's particular way of making drawings, i.e. beginning with peripheral elements and elaborating a kind of whole by combining these elements, is an indication of the way his mind works generally, and explains many other behaviors. All this is consistent with the Weak Central Coherence theory. Nevertheless, in its present form WCC is not able to provide a global explanation of autism. More needs to be known about the central brain mechanisms that integrate bits of experience into meaningful experiences. Thus more research is clearly needed, both for the needs of autistic patients, and for a better understanding of how the human brain/mind actually works.

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