Research in Autism Spectrum Disorders 2 (2008) 739–752

Contents lists available at ScienceDirect

Research in Autism Spectrum Disorders

Journal homepage: http://ees.elsevier.com/RASD/default.asp

Non-superior disembedding performance in children with high-functioning autism and its cognitive style account

Fei Chen [a,*], Eric Lemonnier [a], Alain Lazartigues [a], Pascale Planche [b]

[a] Service de Pédopsychiatrie, CHU de Brest, Hôpital de Bohars, BP17, 29820 Bohars, France
[b] Département de Psychologie, Faculté des Lettres et Sciences Sociales, Université de Bretagne Occidentale, 29200 Brest, France

ARTICLE INFO

Article history:
Received 29 February 2008
Accepted 4 March 2008

Keywords:
High-functioning autism
Disembedding performance
CEFT
Kohs' Cube Test
Cognitive style

ABSTRACT

Some early studies showed a superior disembedding performance in autistic people while other studies found no difference between autistic and controls. The present study aimed to assess such disembedding ability in 14 boys with high-functioning autism (HFA) and 14 chronological age and non-verbal IQ matched typically developed boys using an Informatized Kohs' Cube Test ("Samuel") and a modified Children's embedded figures test (CEFT). No statistically significant group difference was found between paired subjects (although more control subjects succeeded in the Samuel Test) and the HFA subjects showed in the Samuel Test as much "flexibility" in strategy adoption as the control subjects, which is not in accordance with some early reports of superior visuo-spatial performance nor with the classical weak coherence theory. Results in the present study, the discrepancies in early findings as well as the symptomatic and cognitive heterogeneity of autism are discussed in the light of cognitive style account.

1. Introduction

Autistic people are "well known" to have some preserved skills such as the superior performance in the embedded figures test (EFT; Witkin, Oltman, Raskin, & Karp, 1971) and the block design subtest (BDT). They have been found to be either faster or more accurate in these tests than mental age

* Corresponding author. Present address: Laboratory of Prof. Hadjikhani, EPFL, SV-BMI-GRHAD AAB 023, Station 15, CH-1015 Lausanne, Switzerland. Tel.: +41 216931806.
E-mail address: pierre.fei.chen@gmail.com (F. Chen).

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doi:10.1016/j.rasd.2008.03.003

matched or/and chronological age matched non-autistic people do (De Jonge, Kemner, & Van Engeland, 2006; Jolliffe & Baron-Cohen, 1997; Ropar & Mitchell, 2001; Shah & Frith, 1983) while some other studies found no group difference (Brian & Bryson, 1996; Kaland, Mortensen, & Smith, 2007). How to explain such a wide behavioral variation in autistic people? The autistic "cognitive style" account (Happe, 1999) seems to be a very interesting and illuminating approach.

Cognitive style, "can be defined broadly as a preferred approach to problem solving that characterizes an individual's behavior across a variety of situations and content domains" (Waber, 1989). Happé, who has initially proposed the autistic "cognitive style" hypothesis, suggested that the "weak central coherence theory" (Frith, 1989), one of the main accounts for autism, which could "*explain patterns of excellent and poor performance with one cognitive postulate*", seems to reveal rather a "*cognitive style than a cognitive deficit*" (Happe, 1999). That is, the autistic superiority in local processing revealed in some studies "*may be a processing bias, rather than a deficit*" (Happe & Frith, 2006). The global processing that was originally suggested to be deficient by "weak central coherence theory" has been subsequently found to be intact in some autistic individuals by the Navon Hierarchical Figures task (Mottron, Burack, Iarocci, Belleville, & Enns, 2003). Another study (Rondan & Deruelle, 2007) suggested a configural than a global processing deficit for people with autism and Asperger's syndrome (AS). All these results demonstrated that the visuo-spatial processing and the perceptive organization might be fairly "contextualized" in people with autism. Thus, the cognitive style account seems to reveal how their visuo-spatial resources are organized for problem solving.

The question became could we define an autistic cognitive style? From the point of view of the differential psychology, this superior ability in EFT represents a tendency of Witkin's "field independent (FI)" cognitive style (Witkin et al., 1954). Based on Werner's organismic theory of development, the field-dependence–independence is one of the "*most prominent and well-researched dimension of cognitive style*" (Waber, 1989). This theory has been used to reveal the individual difference on their perceptual organization in visual contexts with embedded targets (the EFT) and conflicting visual cues (the EFT, the Rod and Frame Test, etc.). Thus, two different styles have been defined: the field dependent style and the field independent style. Compared to field dependent participants, those defined as field independent were found to be more analytic in perceptive behavior, less distracted by the confusing content field and more competent in restructuring skills. However, it has been argued that it is not appropriate "*to equate FI with weak central coherence*" since "*FI people are conceptualized as succeeding on EFT because of their ability to see, but resist, the gestalt*", while "*people with weak coherence are postulated to be good at this test precisely because they do not spontaneously attend to the gestalt, instead seeing the figure first in terms of its parts*" (Happe & Frith, 2006). There is also evidence that some children with autism are capable of segmenting a complex image and restructuring conjoint elements by mobilizing some particular strategies (Planche, Lemonnier, Moalic, Labous, & Lazartigues, 2002). Hence, there seems to be some limitations in the application of field-dependence–independence theory for accounting the autistic perceptive behaviors. So, could there be any variant between the field independent and the field dependent cognitive styles? Pascual-Leone (1989) has proposed a variant that he called FM (for "Mobile FI") cognitive style containing a "rich perceptual learning" as well as "a strong executive control". This more flexible style seems to bridge the continuity between the two original "extreme" cognitive styles of Witkin's theory. It has been also under such consideration that three cognitive strategies (analytic, synthetic and global) have been proposed to differentiate individual performance and behavioral specificities in the Kohs' Cube Test (in which people with autism have also shown some preserved skills). The author suggested: people who adopt mostly an analytic strategy show a good segmentation and anticipation ability in completing this task, following a linear order; people adopt mostly a synthetic strategy will also show a good segmentation and anticipation ability while their completion of task will follow the gestalt order; people with a global strategy (not efficient in this task) show deficiency in segmentation and anticipation and their completion of task is often characterized by trials and errors following neither the linear order nor the gestalt order (Rozencwajg, Corroyer, & Altman, 2002). Could people with autism show one or more of these cognitive strategies?

The present study aimed to investigate the cognitive style account in HFA. Fourteen high-functioning autistic boys and 14 boys with typical development aged from 8 to 12 years were tested