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Relations between learning potential, cognitive and interpersonal skills in Asperger children☆

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ABSTRACT

Asperger Syndrome is a developmental disorder characterized by severe deficits in interpersonal skills. Different theories have tried to explain this disorder by taking into account general intelligence, information processing, executive functions, emotional intelligence, etc., but to date, none of these completely explains the cause of these deficits. The present study investigates the relations between interpersonal skill deficits and different cognitive skills. A total of 45 children with Asperger Syndrome, between the ages of 7 and 13, were assessed using tests of intelligence, executive function (using a dynamic assessment methodology) and social comprehension. The results show that Asperger Syndrome children profit from the brief training inserted into a dynamic assessment test. In addition, dynamic assessment reveals differences within the Asperger Syndrome group that go unnoticed in standard assessment, and shows how these differences are related to measures of social comprehension and to the intercorrelation between WISC sub-tests. In conclusion, use of dynamic assessment methodology may be useful for planning interventions.

1. Introduction

Asperger Syndrome (AS) is a developmental disorder found at the high functioning end of Autism Spectrum Disorders (ASD) (Cobb et al., 2002). Core symptoms of AS include altered social development, characterized by a severe deficit in reciprocal social skills or socialization. Although this condition is expressed differently in each child, certain broad areas are affected: social interaction, communication skills and stereotyped behavior patterns, restricted interests and/or rigid adhesion to routines, without cognitive or language retardation (APA, 2000; Carter, Davis, Klin, & Volkmar, 2005). Current epidemiological data show that ASDs are more common than was thought a few years ago. Specifically, there are between 6 and 8 cases per 1000 inhabitants (1%) and AS is 8–10 times more common in males (Duchan & Patel, 2012).

Several lines of theory have tried to explain this alteration in social interaction through different hypotheses.

Some studies analyze emotional intelligence (Montgomery, McCrimmon, Schwean, & Saklofske, 2010), concluding that AS subjects have the knowledge and cognition involved in emotional intelligence skills, but they are unable to put them into practice in real life.

One well-known theory makes the hypothesis of Weak Central Coherence (Frith, 1989). According to this hypothesis, ASD subjects show a bias in processing, leading them to focus on details of the information and overlook its global meaning (Aljunied & Frederickson, 2011; Happé & Booth, 2008; Happé & Frith, 2006; Schlooz & Hulstijn, 2014).

As such, Weak Central Coherence has been linked to the inability to process social information (Sourn-Bissaoui, Caillies, Gierski, & Motte, 2009) and the lack of pragmatic conversational skills presented by people with ASD (Noens & van Berckelaer-Onnes, 2004). Particularly affected are their understanding of jokes and figurative language (see Norbury, 2004), as well as their performance on different measures of reading comprehension (e.g., Frith & Snowling, 1983). In some authors' judgment, central coherence ability is necessary for processing social information, therefore its deficit could explain social difficulties (Sourn-Bissaoui et al., 2009).

To measure this construct, many authors have used the Group Embedded Figures Test (GEFT) by Witkin, Oltman, Raskin, and Karp (1987). However, studies that made use of this test have yielded contradictory results. According to White and Saldaña (2011), these results do not reflect the underlying central coherence ability of the individual, compelling us to seek greater methodological rigor in addressing this question. The notion of some form of integration deficit remains central to contemporary cognitive theories of autism, even though "integration" and "central coherence" remain elusive and ill-defined concepts, whose underlying cognitive mechanisms are still not properly understood (Brock, Norbury, Einav, & Nation, 2008).

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These "cognitive mechanisms" that underlie central coherence (Brock et al., 2008) may have to do with how the components of intelligence are organized. In 2008, Goldstein et al. performed a study to explore the factor structure of intelligence on the Wechsler scales in high functioning autism. They concluded that, while the factor structure is similar in persons with autism and in the general population, cognitive capacities are less strongly associated with each other, even in autistic individuals who have high intelligence. According to these authors:

> The implication of different loading patterns is that they reflect a different organization of cognitive abilities than that found in the general population. […] The most direct interpretation of these findings is that their intellectual function is characterized by a reduced relative to normal "g" factor or general intelligence and their intellectual function is more modular (Gardner, 1999). This organization may have neurobiological significance.
>
> [Goldstein et al. (2008 p. 320)]

Generalizing from this under-connectivity theory, correlations among the different intelligence sub-tests may be considered to reflect the underlying neurofunctional differences in autism, which could then be related to the concepts of Weak Central Coherence or weak integration, as described by Brock et al. (2008).

There are other theories that examine information processing in AS and perception and attention patterns, given that flexibility and planning seem to be clearly impaired in children with ASD. Thus, certain authors point to impaired executive functions as one of the possible causes (Kalbfleisch & Loughan, 2012; Semrud-Clikeman, Fine, & Bledsoe, 2014; Verté, Geurts, Roeyers, Oosterlaan, & Sergeant, 2006).

As early as 1990, Szatmari, Tuff, Finlayson, and Bartolucci (1990) applied a battery of tests to a sample of adolescents and adults with ASD, in order to analyze which cognitive measures were most appropriate for use in prognosis, and to study the role of the evolving symptomatology in a person's lifelong functional adaptation. To accomplish this, the researchers included the following measures: an intelligence test, a memory and auditory comprehension test, a verbal problem solving test, a facial recognition test, a test of visual–motor function, a manual speed test and the Wisconsin Card Sorting Test (WCST). The results demonstrated that the WCST was the only measure capable of predicting the later outcome of adults with ASD. Executive function is understood to involve skills like identifying appropriate objectives, generating action plans, and assessing the consequences of one's actions–skills that are needed for problem solving in everyday life.

A review by Ozonoff (1995) offers an exhaustive analysis of the reliability and validity of the WCST, and its suitability for application in autism. Their study confirms that people with autism show a higher number of perseverations in the WCST than do others with the same age and normal IQ (Ozonoff, 1995). These results lead Ozonoff to conclude that the WCST is highly reliable in the ASD population and in people with learning difficulties (to a greater extent than in the normal population, because of a possible ceiling effect). Similar conclusions are reached by Russo et al. (2007) in their study of executive function difficulties in individuals with autism.

South, Ozonoff, and McMahon (2007) analyzed the relation between repetitive behaviors and a standardized measure of flexibility based on WCST perseverations, finding significant correlations between performance on the WCST and scores obtained in repetitive behavior domains as measured by the Autism Diagnostic Interview-Revised (ADI-R) and the Autism Diagnostic Observation Schedule-Generic (ADOS-G). These studies suggest that cognitive flexibility is a core characteristic for assessing and intervening in ASD.

In their review, Montgomery, Stoesz, and McCrimmon (2012) find that for each of these theories, there are also contradictory research results; it seems that none of them individually can account for the social difficulties of AS. Consequently, they propose a combination of these theories in order to reach a full explanation for these social deficits.

It may be helpful to extend the scope of present-day AS research by introducing the dimension of individual variability through the use of a dynamic assessment approach. This approach takes into account the potential for learning new tasks and has already proven to be useful in the study of other severe mental disorders: 1) more efficient discrimination between different clinical groups (elderly people with and without dementia, schizophrenic patients, children with learning deficits or Down Syndrome) and/or groups of healthy subjects (Calero & Navarro, 2004; Peña, 2000; Robles & Calero, 2013; Watzke, Brieger, Kuss, Schöttke, & Wiedl, 2008; Wiedl, Schöttke, & Calero, 2001); 2) analysis of intra-individual variability in persons with one diagnostic category or between groups with different diagnoses (Lidz, 2003; Sergi, Kern, Mintz, & Green, 2005; Wiedl et al., 2001); and 3) classification of variables that mediate in changes in test performance and which may help improve the predictive validity of different types of intervention (Calero & Navarro, 2007; Donaldson & Olswang, 2007; Swanson & Howard, 2005; Tenhula, Strong Kinnaman, & Bellack, 2007).

This method seeks to activate skills in the subject and improve his or her performance, through a test–training–test paradigm, where the training phase involves feedback and progressive help on tasks similar to those in the test phase. An improved score on the posttest is assumed to reflect the subject's cognitive modifiability; this also serves for prediction purposes and differential diagnosis. Moreover, a gain score that assesses change of performance from pre- to posttest in a methodologically consistent way is considered to be more sensitive and to have greater practical use than scores obtained through classic standardized procedures (Calero, 2004).

In the specific area of ASD, there have been few studies in this line of research. An early study that applies this methodology in children with ASD was carried out by Donaldson and Olswang (2007), who investigated information requests, an ability that is considered to be fundamental to learning about one's environment and relating to others. These authors worked with 14 children with ASD and 12 children with normal development, between the ages of 5 and 7. A static assessment was applied to the participants, consisting of the observation of unaided performance during a play situation in the classroom. The dynamic assessment condition included three separate sessions in which certain aspects of the environment were systematically manipulated in order to trigger requests for information from the participants. The performance achieved during dynamic assessment sessions marked a clear distinction between two sub-groups of high scoring and low scoring ASD children, who clearly differed in their competence in making information requests, even though there were no differences in IQ level or symptoms. The ASD high score sub-group did not present deficits in producing information requests as compared with typical peers. The results of this study indicated that the teachers' informal appraisals were not completely accurate, in that not all ASD children demonstrated information request deficits once proper cues had been provided. In fact, the initial performance assessment on standardized measures of verbal and non-verbal performance revealed no significant differences between the high and low scorers, as were distinguished by dynamic assessment. Consequently, neither clinical impressions/observations nor results from standardized measures could enable the investigator to accurately predict participants' group membership. The authors emphasize the value of applying dynamic assessment to children with autism, and argue that the key to achieving good performance in this group of children is to control the context during the assessment process.

In Spain, Bonete, Vives, Fernández-Parra, Calero, and García-Martín (2010) used a dynamic assessment technique based on Raven's Progressive Matrices test with a group of 20 adolescents (10 with AS and 10 with normal development) in order to verify whether learning potential is related to interpersonal skills in children with AS. Their results showed that, on the dynamic assessment, the gain score of children with AS was similar to that of children with normal development, whereas inter-group differences were found in interpersonal skills. A