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Networks Way Between Autistic Spectrum Disorder and Schizophrenia

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Abstract

This study analyze the possible relationships of diagnostic clinic criteria between Autism Spectrum Disorder (ASD) and Schizophrenia (SCH) to conclude relation way regarding both diagnoses. A total of 5 participants have collaborated in this study analysis, of which 3 students own ASD diagnosis and 2 SCH diagnosis, 2 participants are 14 years old and 3 students are 15 years old, of which 3 are men and 2 women. The relationships analysis between ASD and SCH diagnostics criteria carried out throughout qualitative methodological structure of ATLAS.ti (v.9) statistical program. This methodology is motivated owing small number of participants selected and the strong power of this methodology to develop relationships and nodes information networks. Results show that all cases present common high criteria regarding the code-groups that set ASD and SCH diagnosis. Just, case 1 with SCH diagnosis, shows common similar coefficients in code-groups ASD and SCH (0.40), case 2 with ASD diagnosis, presents criteria specific at ASD (0.33) and SCH (0.33), case 3 with ASD diagnosis presents coefficients to ASD=0.63 and SCH=0.44, case 4 with SCH diagnosis, presents a coefficient of 0.38 in relation to ASD criteria and 0.57 in SCH and, at last, case 5, diagnosed with ASD, presents 0.44 in ASD and 0.30 in SCH.

Keywords: Autism Spectrum Disorder; Schizophrenia; Information Processing

Introduction

Autism spectrum disorder (ASD) and Schizoid Disorders or Schizophrenia (SCH) have a generalized impact on lives of people with those diagnosis, with highly similar prevalence indices over social level and, notwithstanding, the obvious differences, both disorders are classified independently and differentially, with clearly differentiated symptoms in the International Classification DSM-5 [(American Psychiatric Association (APA, 2013)], for ASD [(299.00 (F84.0)] and for SCH [(295.90 (F20.9)]; However, both disorders present similar aspects, regarding the diagnostic criteria and their base etiological. In relation to basic criteria, ASD and SCH are characterized by giving social deficits, with alterations in social skills and social communication. Communication is widely limited pragmatic way, with severely affected expressions of personal emotions and the presence of incoherent occasional language, focused on stimuli, analyzed from a particular or local perspective, centred on element details. From base etiological perspective, prevalent causal nuclear for disorders is fundamentally genetic, which could describe the relationships of highly comorbidity between ASD and SCH. Thus, from clinical perspective, these disorders, which keep specific needs related to affective- social development, mostly it been reported over clinical studies based on evident functional deficits along frontal lobe [1,2]. Structural level, these studies were complemented with tests showing high prevalence of reduction in volume of corpus callosum and, above all, researches indicates it´s outstanding the presence of a noteworthy increase over cerebellar white matter hyper-intensities [3]), as well as, the heavy enlargement at ventricular level [4]. The understanding of basal neurodevelopmental alterations is supported by genetic basis, caused by interstitial deletion of chromosome 22q11.2, deletion syndrome 22qDS, which´s commonly associated with cognitive deficits with a high risk of psycho-affective and relational disorders, since a specific behavioral phenotype is reported with difficulties related of social interactions development, idiosyncratic and individual behaviors and inhibition-disinhibition processes alterations and overt behavioral impulsivity. In synthesis, research implemented by (*Campbell et al., (2006)*), It´s concluded, just, the participants with 22qDS presence have highly differential specificities regarding normal-typical groups founded on alterations of gray and white matter volume, related to typical regression scores in people with ASD and SCH. According the neural networks theories, which inter-informative connectivity is widely researched, following the basic principles of information processing theory, it concludes the disturbances in processing connectivity happen in both disorders, which, in relation the specific networks theory of Mesulam (1998). Author found on its studies of emotions processing, the thought central mechanism has similar connotations, both SCH disorder, and people with ASD, differentially to normal-typical people group. These findings transfer studies to search deficits found over needs towards set informational nodes (relationships) along sequential processing of information, from basic conceptual unit to categorical and

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Page **1** of 6

inter-categorical coding, widely researched by topographic basic conceptual theory *[5-7,10, 22]).* Same specific criteria are also found in both disorders throughout studies performed by *[11],* throughout analysis of emotional expressions recognition (anger, fear, happiness and sadness) with and without cognitive interference between groups of participants with SCH and ASD *[12, 13])* get an association of autism characteristics with a reduction of white matter in region of upper right temporal cortex, which´s a specific region to favor the development of social processes, especially involved over prosody processing and the aspects psycholinguistics of language, as well as in cognitive-executive tasks of Theory of Mind, in relation to understanding the viewpoint of others. Likewise, this concurrence also happens into SCH traits, however, while in ASD, the metabolic functioning of glutamine is interrelated with high concentrations of glutamic acid and low levels of neurotransmitters (GABA), which are an indication of increase in inhibition- behavioral excitation process in SCH disorder, this metabolism process seems work contrary. Just, there´s greater specificity along inter- neural interconnection of information in people with ASD, which justify their greater difficulties in cognitive- executive activities of conceptual-categorical and inter-categorical coding, although, both disorders, metabolic alteration, although works inversely, it´s explicative nuclear element of social specific needs, as well as to prediction of symptomatic degrees of diagnosis.

In synthesis, the fundamental question is knowing if there´re common core elements that converge in both diagnosis way, or else, it´s a high incidence of comorbidity presents between both disorders, which are associated between ASD and SCH diagnostics.

Research Aims

From previous premise, this study sets following general aims: 1) analyze the relationships between ASD and SCH diagnostic clinic symptoms and, hence, 2) deduce interaction way regarding both diagnoses, and 3) propose the nuclear basic criteria of disorders differential diagnosis.

Method

Research design

The relationships analysis between ASD and SCH diagnostics criteria carried out throughout qualitative methodological structure of ATLAS.ti (v.9) statistical program. This methodology is motivated owing small number of participants selected (N=5) and the strong power of this methodology to develop relationships and nodes information networks.

Participants

A total of 5 participants have collaborated in this study analysis, of which 3 students own ASD diagnosis and 2 SCH, 2 participants are 14 years old and 3 students are 15 years old, of which 3 are men (M) and 2 women (W) (see Table 1).

Diagnosis	Sex		Age	
	M	W	14 years old	15 years old
ASD	2	1	1	2
SCH	2	0	1	1
Total	4	1	2	3

Table 1: Participants distribution

Analysis Codes

Study codes are taken of personal variables it corresponds to nucleus aspects of specific diagnosis: ASD and SCH, found into reports corresponding regarding 5 selected cases:

a. **Sex**: Man (M) and Woman (W).
b. **Age**: 14 and 15 years old.
c. **Diagnosis**: ASD and SCH.

Coding process has been raised throughout variables of diagnosis way: 1) ASD and 2) SCH, selected from center components indicated in their reports:

a. **Social** (social skills and social interaction in context).
b. **Emotional** (emotional expression, emotional response in social ambit).
c. **Communication** (verbal / non-verbal interaction communicative).
d. **Thought** (recurring ideas, limited or restrictive thought).
e. **Behavior** (behavior way in social context and reaction towards social stimuli).

Likewise, each cited code has been classified in codes-group, formed by specific contents of previous codes, assigned regarding diagnostic reports. Therefore, for Social code: code-group=Social Skill Deficits, to Emotional code: code-group=Emotional Distance, No Emotional Understanding; to Communication code: code-group=Normalized-Pragmatism, Pragmatic, for Thought code: code-group=Recurring Ideas, Restricted Ideas, to Perceptive-Cognitive code: code-group=Reality Distortion, Local Perception and for Behaviour code: code-group=Local Agressive Behavior, Anxious Behavior, Obsessive Behavior (see Table 2)

CODES						
ASD SCH	Social	Emotional	Communication	Thought	Perceptive-cognitive	Behavior
Code-Groups	Social Kills Deficits	Emotional Distance	Normalized-Pragmatism	Recurring Ideas	Reality Distortion	Local Aggressive Behavior
		No Emotional Understanding	Pragmatics	Restricted Ideas	Local Perception	Anxious Behavior
						Obsessive Behavior

Table 2: Codes and code-groups**.**

Procedure

The diagnostic cases selected (N=5), through individual clinical reports, basic codes and code-groups were codified in Atlas.ti. Then, consequent relational analysis of relational networks and nodes between codes was carried out, as well as the analysis of co-occurrences list and co- occurrences table. Finally, data was analyzed.

Ethical

All study ethical considerations regarding to approval and anonymity of selected cases have been exhaustively achieved.

Results

First, analysis of common co- occurrences list in relation the code groups of cases (N=5), as well as co-concurrences list for diagnosis way was carried out, throughout exploration of co-occurrences coincidences of Atlas.Ti program (see Table 3).

| CASES	DIAGNOSTIC WAY
CASE 1 (7-0)	ASD (7-0)
CASE 2 (5-0)	SCH (7-0)
CASE 3 (6-0)	
CASE 4 (4-0)	
CASE 5 (6-0)	

Table 3: Co-occurrences scanning

As can be seen, co-occurrences-coincidences scanning shows the presence of 7 common occurrences in case 1, 5 occurrences in case 2, 6 coincidences in case 3, 4 coincidences in case 4 and 6 occurrences in case 6. According ASD and SCH diagnostic, co-occurrences- coincidences show 7 common concurrent elements in code-groups to ASD (7) and SCH (7): Social Skills Deficits (1-71: 1-94), Normalized-Pragmatism (2-48: 2-69), Pragmatics (2-106: 2-116), Recurring Ideas (2-69: 2-85), Restricted Ideas (2-116: 2-133), Reality Distortion (2-85: 2-103) and Local Perception (2-133: 2-149). Indeed, Co-occurrences Table reflects the sum (Σ) and co-occurrences coefficient (coeff) found regarding relationship of diagnosis type: ASD and SCH in relation to study cases related (N=5) (see Table 4).

|	CASE 1 Gr=7 SCH		CASE 2 Gr=5 ASD		CASE 3 Gr=6 ASD		CASE 4 Gr=4 SCH		CASE 5 Gr=6 ASD	
	Σ	coeff	Σ	coeff	Σ	coeff	Σ	coeff	Σ	coeff
ASD Gr=7	4	0.40	3	0.33	5	0.63	5	0.38	4	0.44
SCH Gr=7	4	0.40	3	0.33	4	0.44	6	0.57	3	0.30

Table 4: Co-occurrences Table.

It´s observed, all cases present common high criteria regarding the code- groups that set ASD and SCH diagnosis. Just, case 1

with SCH diagnosis, shows common similar coefficients in code-groups ASD and SCH (0.40), case 2 with ASD diagnosis, presents criteria specific at ASD (0.33) and SCH (0.33), case 3 with ASD diagnosis presents coefficients to ASD=0.63 and SCH=0.44, case 4 with SCH diagnosis, presents a coefficient of 0.38 in relation to ASD criteria and 0.57 in SCH and, at last, case 5, diagnosed with ASD, presents .44 in ASD and 0.30 in SCH. For latest lightness, in Graph 1 data the co-occurrences Table found can be observed visually (blue colour corresponds to ASD co-occurrences and brown colour to SCH).
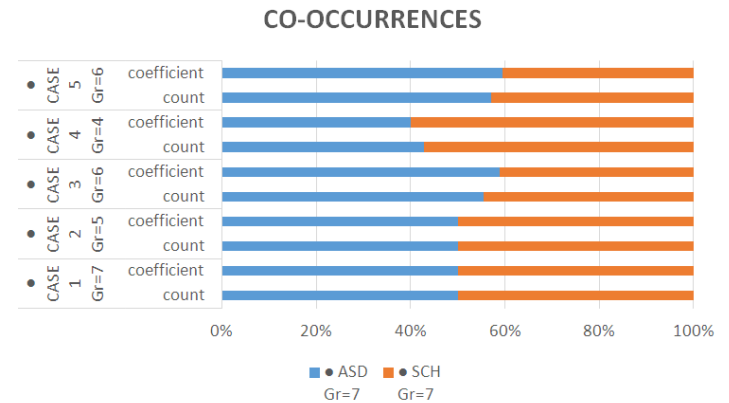
Graph 1: Co-occurrences Table.

The codes and code-groups relational networks found focused on ASD and SCH diagnosis in relation to study cases can be observed in the Graphic 2.
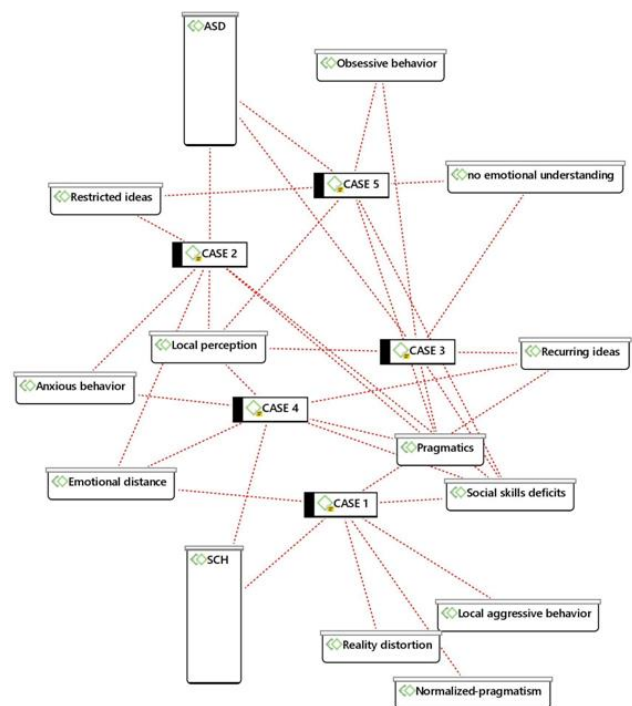
Graph 2: Codes and code-groups networks.

In synthesis, all cases analyzed present a greater or lesser overlap level in all codified variables regarding code-groups. Case 1 (SCH) shows relationships with deficits in social skills, emotional distance, normalized communication with inclination to pragmatism, recurring ideas (with partial delusions), distortion of reality and isolated local aggressive behaviors into social environment. Case 2 (ASD) concurs in social skills deficits and pragmatic connotations in communication, also presents emotional understanding needs, restricted ideas and anxiety behaviors and perception focused on local aspects. Case 3 (ASD) presents deficits in social skills, emotional understanding deficits, pragmatic communication, recurring ideas, perception focused on details, perceptive localism and obsessive behaviors. Case 4(SCH) presents deficits in social skills, emotional distance, pragmatic communication, recurring ideas, local perception and anxiety behaviors. Case 5 (ASD) show deficits in social skills, pragmatic communication, restricted ideas, local perception and obsessive behaviors. Hence, there are 3 commun code-groups with highest incidence, which forming a coincidences criteria core in relation both diagnosis (see Table 5)

1	Social skills deficits (n= 5)
2	Pragmatic communication (n= 5)
3	Local cognition- perception (n= 4)

Table 5: Commun code-groups.

	Reality Distortion	No Emotional Understanding	Emotional Distance	Recurring Ideas	Restrictive Ideas	Anxious Behavior	Obsessive Behavior	Local Aggressive Behavior
ASD		3		1	2	1	2	
SCH	1		2	2		1		1

Table 6: Differential code-groups-diagnostic way.

Therefore, code-groups formed by Reality Distortion (n=1) and Emotional Distance (n=2) shown highly specific to SCH diagnosis, while code-groups formed by emotional understanding deficits (n=3) and restrictive ideas (n=2) are characteristic of ASD diagnosis. Likewise, ASD diagnosis correlates with obsessive behaviors (n=2), while SCH way is higher incidence regarding specific aggressive behaviors, differentially to ASD type (n=1).

Conclusion

Within study limitations, owing small number of participants, the general aim has been set the relationships between codes and code-groups classified to observe the possible relationships between the ASD and SCH diagnoses criteria. As can be seen, ASD and SCH diagnosis present a clearly differential clinical frame, in relation the diagnosis specific criteria in each disorder. Thus, SCH diagnosis concurs with codes "distortion of reality", "emotional distance" and "behavior with of aggressive reaction on context", which are common symptoms of recurring ideas, based on the presence, frequency, duration,

location and intensity of intrinsic voices perceived, as well as the existence of own beliefs. Besides, aggressive reactive behavior along context presents specific characteristics before presence of deflected perceived internalized voices, which aren´t reflection of reality. ASD diagnosis also includes own aspects highly differential: "lack or deficits in emotional understanding", "presence of limited and restrictive ideas and stereotypical behaviors" and "anxiety or obsessive behaviors". In this sense, local perception is defined regarding analysis of stimuli carried out over relationships between new knowledge and previous knowledge. Precisely, along these relationships of information processing are found severe deficits to create relational nodes, it implies semantic understanding deficits, which isn´t found along cases with specific SCH diagnosis. However, there´re general basic criteria which are characteristic of differential diagnosis it converges, e.g., deficits in social skills or social communication, which´s highly specific dimension of ASD diagnosis, it also concurs with high incidence in SCH diagnosis. Similarly, highly structured and pragmatic communication, which´s typical of ASD diagnosis are coincident with SCH diagnosis. It also, local perception or perception focused on details, which´s typical of ASD diagnosis, it´s found SCH diagnosis. Likewise, specific criteria related the presence of recurrent ideas, which´s more specific criterion of SCH diagnosis, it´s also found in 1 ASD case. In synthesis, it´s concluded a high level of confluence between both diagnoses: ASD and SCH. Hence, it may co-exist similar symptomatic clinics. This particular setting could lead errors over initial diagnosis process. Therefore, it´s suitable use specific diagnostic tests and contrast the scores founds regarding highly weighted percentiles. Of course, it must be a diagnostic criterion according criterial basic of Disorder International Classification (APA, 2013), but, mainly, diagnosis must be into information processing way, in relation to nodes analysis, networks and relationships between new and previous knowledge and over retrieval information neural mechanisms from the permanent and semantic memory, since it´s where specific differences between ASD and SCH diagnoses are most differential.

Discussion

Indeed, ASD diagnosis is characterized by a particular specific processing with deficits in autonomous construction of information relational neural nodes, which give retrieving the previous learned information for context practical application. This deficit complicates the learning generalization posterior process, which generates needs along development socio-personal process. While characteristic basic to SCH diagnosis is a wrong categorical-conceptual analysis owing the reality perceptual distortion, but isn´t deficit regarding neural relational nodes construction of learning. However, if differences are not specific diagnosed, psycho-social intervention planned processes can´t be successful hoped. Indeed, ASD and SCH diagnoses present highly comorbidity itself, which get their differentiation hard. Several current studies [15,16] show that 70-75% of people diagnosed with ASD have at least one or more symptoms associated with the basic neuropsychiatric diagnosis, which condition the specific

diagnostic process and social- personal development evolution in relation to psychosocial and educational intervention programs. A synopsis of some most relevant associated neuropsychiatric disorders detected are following: 1) severe adaptive behavior needs (32%), 2) anxiety behaviors (16%), 3) attention deficit hyperactivity disorder (ADHD) (15%), 4) cognitive disability (11%), 5) depression (11%), epilepsy (5%), 6) sleep disorders (4.3%), 7) neurosensory and psychomotor disorders (2%), 8) schizophrenia and schizotypal behaviors (1%), 9) other disorders related to eating (2%). Other researches 9) growth this prevalence of ASD comorbidity to 90% and also include other associated disorders, eg: oppositional defiant disorder (58%) and within associated anxiety symptoms specify the presence of phobias (33%), social phobias (24%) and agoraphobias (10%), as well as the obsessive compulsive disorder (10%). Beside, this concurrent process doesn´t occurs isolation, but most people with ASD can present between 2 and 3 associated comorbidity conditions, which requires highly personalized planning adjusted to set of symptoms evaluated. Psychoeducational practice with people with ASD show these cross data are evident. Therefore, ASD diagnosis which is complex process, which requires the nuclear process assessment, as well as evaluation of neuropsychiatric comorbidity associated carried out. General aim is design psycho- educational specific programmatic intervention adapted to educational specific needs. Hence essential question is if these relationships be common elements of ASD and SCH diagnostic process, or it´s singular and differential nuclear diagnostic specific process with highly incidence of comorbidity related. In result, differential diagnostic process is exhaustive analysis developed throughout information processing specific regarding analysis of the perception, coding and information retrieval of permanent memory performed through, eg: Semantic Integration Evaluation Scale "SIS" *[17]*, Memory "MY" Tes *[18]*, Cognitive Assesment System Scale "DN-CAS" *[19]*, Wisconsin Card Sorting Test "WCST" *[14]*, *Hanoi Tower Test [22, 23]*.

Study Limitations

Study is limited by small number of selected participants. Hence qualitative methodology has been designed. This method has facilitated deepen into existing relational nodes networks regarding ASD and SCH diagnoses, which form this study aim.

Acknowledgment

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