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Journal of Psychological Research
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ARTICLE

The Analysis of Effects of Semantic Comprehension upon the Anxiety Indices in People with Autism Spectrum Disorder

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ARTICLE INFO

Article history
Received: 4 March 2019
Accepted: 16 April 2019
Published Online: 26 June 2019

Keywords:
Autism spectrum disorder
Anxiety
Naturalistic learning

ABSTRACT

Hypersensitivity to stimuli is one of main way of anxiety symptoms in people with Autism Spectrum Disorders (ASD) owing, within other factors, to deficit cognitive attribution performed on stimulating input. This research studies precisely the possible existence of relationships between the comprehensive elements of the information input and the anxiety increase in people with ASD.

A total of 30 students with ASD have participated in the study, aged between 6 and 14 age years, divided into two groups, an experimental group (EG) consisting of 20 students and a control group (CG) formed by 10 other students. Study aims are to study the relationships between perception and information understanding, as well the consequent anxiety reactions in people with ASD and, finally, analyze the improvement of these data from application of a naturalistic systemic program.

Results found along 3 successive measures along 12 months, performed throughout correlation analysis, *ANOVA W* test of 1-factor comparative measures and post- hoc analysis to age variable, allows to conclude the students who belong to EG significantly improved in aspects related to conceptual coding and in self-management of their own learning and, accordingly, they reduce anxiety level with regarding to their CG peers.

1. Introduction

Anxiety is considered as a very common symptom in children with Autism Spectrum Disorder (ASD). The description about the seeming of the anxiety processes, at present, are very varied and recurrent.

Hodgson, Freeston, Honey & Rodgers [12] show that intolerance to uncertainty and exhibition to unexpected stimuli can be one of most important causes of anxious processes for these people. However, this reaction to presence of the stimuli is due to cognitive interpretation these people make about this situations, as well as their anticipation levels. Cai, Richdale, Dissanayake & Uljarevic [5] also analyze this issue, and find related scores between emotional regulation, intolerance to uncertainty and the anxiety symptoms levels increase, concluding all key variables studied are associated among themselves in analysis of the anxiety decisive factors and depression in people with ASD.

Indeed, intolerance to uncertainty is indicated as a major element or indicator of the diagnostic process of anxiety disorders in children with ASD, which implies the trend to react negatively to unforeseen or uncertain events,

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DOI: https://doi.org/10.30564/jpr.v1i2.595

forming a transdiagnostic construct associated with a variety of anxiety disorders, including generalized anxiety disorder, social anxiety, panic and sensitivity to anxiety in general [15,27,30]. This aspect is being investigated by Neil, Olson & Pellicano [25], who report this construct is highly relevant to sensory sensitivities and anxiety in children with autism.

In this sense, Joyce, Honey, Leekam, Barret & Rodgers [14] and also Rodgers, Glod, Connolly & McConachie [29] precisely relate the anxious foci with the restricted and repetitive behaviors that constitute a specific diagnostic dimension[1], and find significant relationships between the anxiety increase and intolerance to uncertainty, caused, largely, through behavior inflexibility, concluding with a high correlation between both variables.

For this reason, the factor related to conceptual understanding of stimuli scopes an aspect of essential importance. Indeed, as they claim Black et al. [3], people with ASD, in general, have certain specific characteristics of hypersensitivity to stimuli, which is largely related to presence of anxiety factors. Hence, this stimulating hypersensitivity can cause people with ASD to perform a wrong cognitive centering process, which deform the meaning and understanding of main stimulus and, consequently, the anxiety is greatly increased, due lack of cognitively attributed comprehension.

Rodas, Eisenhower & Blacher [28] confirm, in effect, that risk of comorbidity to anxiety problems in people with ASD are due to association between semantic and pragmatic language and the externalization behavior itself. Therefore, pragmatic language was inversely related to anxiety levels and concurrent externalization behaviors. Indeed, deficits in pragmatic language are a common feature in people with this diagnosis type, which affects to reception, coding and the information recovery throughout its interaction with context, which creates difficulties for analyze the big number of ensue stimuli, especially, when they get more complex, producing, consequently, a considerable increase in anxiety in peoples with ASD.

Vella, Ring, Aitken, Watson, Presland & Clare [32] checked the participants with ASD were slower, more concrete and less flexible than their normal typical pairs in tasks of decision making. These tendencies to information processing, derived from deficits found in cognitive tasks of coding and interpretation of information, can contribute to difficulties in understanding some contexts, especially when these are less familiar, more complex and, specially, when it happens unexpectedly, which it´s ease a considerable increase of anxiety levels.

Although there´s little research on functional evaluation for anxiety treatment, Moskowitz et al. [24] assess the teaching strategies based on multiple methods to analize the anxiety degrees in children with ASD, as well as application of adjusted treatments to improve levels of anxiety and their associated behaviors, through a multicomponent intervention process of individualized strategies to support the positive behavior of traditional cognitive behavior therapies [7].

Also, improvement through natural treatments, that facilitate self-training and self-information, about contexts about information necessary for stimuli understanding can support reduction of anxiety levels in people with ASD. For which, we´ve to look for those methodologies that facilitate intervention focused in natural environment with the aim of facilitating information cognitive self-management. In this sense, Corbet, Blain, Ioannou & Balser [9] propose an intervention "mediated" through their peers based on use of theater in order to analyze the impact this intervention has on reducing anxiety levels and stress of people with ASD.

However, any intervention model must be supported on basis of systemic interaction in two ways: 1) the mutual impact of all basic psychological processes involved over the information processing shape, and 2) the interaction of all context elements related on growth of anxiety levels, hence intervention must focus on own environment conducive to understanding of events, personal autonomy and construction through naturalistic environment. According to these principles, integrated systemic programs based on natural context are adjusted, both these that relate the perceptive-cognitive areas and those with intervention context itself, characterized by interactivity of all the participants, namely, teachers, families, health services and peers, applied in a natural environment noted as Pivotal Response Treatment (PRT), it shapes a naturalistic developmental behavior intervention [23].

PRT program is based, above all, in specific interests of children themselves and their previous potential, in order to improve the development of communication, language, play and social relations, through a naturalistic learning-teaching, focused on the different perceptual-cognitive areas and family affection, with participation of all factors of natural change, through education, training and empowerment [16,18,19].

2. Research Aims

This study aims to analyze the effectiveness of perceptual-cognitive on conceptual understanding and its relationship with anxiety levels in people with ASD, based on following main hypothesis: perception and stimuli understanding are directly related to anxiety degrees in people

 DOI: https://doi.org/10.30564/jpr.v1i2.595

with ASD.

Within this general aim, research presents following specific aims:

(1) Analyze the relationship levels between perception and stimuli understanding in relation with anxiety levels increase of people with ASD.

(2) Study interactive effects between integrated perceptual-cognitive hypothesis, conceptual coding and its consequences in anxiety levels in this people.

(3) Perform a naturalistic systemic program to improve attention-perception and contextual comprehension rates, in order reduce anxiety levels in people with ASD.

(4) Observe the differences of the effects on experimental group regarding to control group.

(5) Analyze possible differences in relation to participants age interval.

3. Method

3.1 Design

Study design is an experimental investigation of two groups, an experimental group (EG) to which an integrated cognitive-perceptual-cognitive program and a control group (CG) was applied standard development. Evaluation was carried out during 12 months along 3 successive measures.

3.2 Participants

A total of 30 students with ASD, of age ranges between 6 and 14 years, distributed in both groups, have participated in this study. For the EG 20 students have been selected, of which, 7 students are between 6-8 years old, 6 between 9-11 years old and 7 between 12 and 14 years old; in the GC another 10 students have participated, of which 4 have between 6-8 years, 3 between 7-9 years and 3 between 12-14 years.

3.3 Variables

Analysis has been configured based on following variables:

(1)"Group": EG and CG.

(2) "Age": age ranges.

(3) "Sensory": cognitive-perceptual integration (3 measures).

(4) "Semantic": semantic-conceptual coding (3 measures).

(5) "Anxiety": anxiety level (3 measures).

3.4 Data Analysis

Correlation analysis between variables under the hypothesis of related interactions between stimuli understanding on context and anxiety reactions, through the Pearson correlation.

ANOVA test of a 1-factor repeated measures was carried out, "factor 1" being the arithmetic mean (μ) of data found in "sensory", "semantic" and "anxiety" variables to measure possible causal interaction between the "sensory", "semantic" and "anxiety" variables ("factor 1") in relation to "group" variable.

Finally, interaction analysis of "factor 1" in relation to "age" variable is found through the post- hoc test.

3.5 Instruments

Instruments used have been following: 1) reading analysis of a curricular text adapted to different competencies of students, 2) participant observation of natural and simulated situations, and 3) three scales of evaluation measures, make ad hoc, according to standardized criterion indices for "sensory" variable: 1) attention, and 2) perception; "semantic" variable: 1) semantic integration, and 2) categorial integration; and "anxiety" variable: 1) generalized anguish, and 2) fear reaction, indicated in tables 1 ("sensory"), 2 ("semantic") and 3 ("anxiety").

Table 1. Standardized criteria for "sensory" variable: cognitive-perceptual integration.

Attention	***Criteria***	***p***
	Very dispersed attention towards stimuli.	4
	Temporary attention is focused, with external help.	3
	Attention is made, but it´s induced.	2
	Intrinsic attention is often developed.	1
	No disorder.	0
Perception	***Criteria***	***p***
	Concretism stimulate.	4
	Concrete partial meanings are perceived.	3
	There's meanings´ perception, with help.	2
	Meanings are frequently integrated.	1
	Meanings are integrated.	0

Table 2. Standard criteria for variable "semantic": conceptual coding

Semantic integration	***Criteria***	***p***
	Concepts are not integrated.	4
	Very limited concepts are integrated, with help.	3
	Various concepts are integrated, with help.	2
	Integrations of several concepts are frequently carried out.	1
	New concepts are integrated with the information.	0

DOI: https://doi.org/10.30564/jpr.v1i2.595

Categorial integration	*Criteria*	*p*
	Conceptual categories are not formed.	4
	Some category is developed, with help.	3
	They develop categories that group different concepts, with external help.	2
	Categorial setting are frequently made.	1
	Categorial setting are developed.	0

Table 3. Anxiety measure

Generalized anguish	*Criteria*	*p*
	Anguish reactions cause very serious interference with behavior.	4
	Severe anguish reactions are observed.	3
	Anguish reactions are clearly manifest.	2
	There´re slight anguish reactions to the external demands.	1
	No disorder.	0

Fear reaction	*Criteria*	*p*
	Fear of situations causes very graves interference in behavior.	4
	Severe fearful reactions are observed.	3
	The fear reactions to situations are clearly manifest.	2
	There´re slight reactions of fear to situations.	1
	There´s no disorder.	0

3.6 Procedure

Standard scores formed throughout average found in each dimension (0: no disorder-4: severe deficit), assessed by Association's social education, psychology and psychiatry team. In the other centers, assessment has been completed by the educational centers professionals.

3.7 Program

Applied cognitive-perceptive integration program aims to set an integrated continuity of all lived situations, in order to generate the higher functionality and meaningfulness of learning, starting from the previously conceptual semantic units, through systematic and continuous evaluation of exchange of data in all intervention contexts.

Program consists of the following structure [26]:

3.7.1 Previous Analysis of the Initiated Behaviors: "Initiation":

(1) Situation analysis that give to increase in anxiety, through the Agenda.
(2) Situational analysis of context.
(3) Delimitation of the main elements.

3.7.2 The Situational Aspects´ Reconstruction:

(1) Situation Reproduction.
(2) Reconstruction with help of situation.
(3) Summary of reconstruction implemented.

3.7.3 Experiential Methodological Process Based in the Self-management with Help:

(1) Personal self-construction of the previous reproduced situation.
(2) Analysis of self- constructed situation.
(3) Experience of the personal reconstruction.

3.7.4 Analysis and Synthesis of Situation and its Reconstruction (Self-management):

(1) Analysis of self-constructed situation.
(2) Understanding of self-constructed situation.
(3) Synthesis of stimulus learned.

3.7.5 Exchange of Learned Roles:

(1) Learning by observation.
(2) Exchange of roles in learning process carried out.
(3) Personal assessment of role exchange.

3.7.6 Establishment of Empathy´ Situations in the Reconstructed Experiences:

(1) Analysis of reconstructed situation.
(2) Meanings´ attribution to reconstructed situation.
(3) Cognitive attribution.
(4) Emotional attribution.
(5) Personal assessment of situation.

3.7.7 The Behavior Expression:

(1) Expression of feelings elicited by cognitive-emotional situation.
(2) Analysis of behavioral expression.
(3) Analysis of situation consequences.

3.7.8 Cognitive Decoding of Situation as a Whole:

(1) The stimuli elements analysis.
(2) The context aspects analysis.
(3) The interactions analysis.

3.7.9 Situation Modification, through Creation of Alternative Contexts (Generalization):

(1) Behavior alternatives analysis to anxiety doing situation.
(2) New alternatives implementation.
(3) Understanding of situational concept.

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3.7.10 Cognitive Reconstruction Considering the Alternatives (Self-management):

(1) Self-management of the different alternatives.
(2) Self-management of new behavioral reactions.
(3) Analysis of the effects of new reactions.

3.7.11 Learning Assessment:

(1) Self-test of the lessons learned.
(2) Learning Relationships with other previous conducts.
(3) Verification - global evaluation.

3.7.12 Personal Agenda: "end":

(1) Specify the new strategies learned in the Personal Agenda.
(2) Setting new strategies into practice in other natural contexts.
(3) Shape new main learning strategies.

4. Results

Pearson's bivariate correlations analysis shows positive partial relationships between variables of the study: "sensory", "semantic" and "anxiety", which can be observed in Table 4, hence it can be assumed that, in general, changes found in any of variables, may involve changes in the other variables of this study.

Indeed, partial positive correlations are observed: “anxiety1” with “semantic1” (r = -.46, sig= .00); “anxiety 2” with “semantic1” (r= -.48, sig= .00) and “sensory2” (r = -.40, sig= .02); “anxiety3” with “sensory2” (r = -.50, “sensory3” (r = -.50, sig= 00) and “semantic1” (r = -.35, sig= .05), “semantic2” (Pearson= -.50, sig= .00) and “semantic3” r = -.55, sig= .00).

Likewise, there´re other meaningful relationships: “semantic1” with “sensory1 (r = .48, sig= .00) and “sensory2” (r = .46, sig= .00); “semantic2” with “sensory1” (r = .36, sig= .04), “sensory2” (r = .58, sig= .00) and “sensory3” (r = .65, sig= .00); “semantic3” with “sensory2” (r = .52, sig= .00) and “sensory3” (r = .75, sig= .00).

Although correlation analysis aren´t cause-effect, it´s corroborated that meaningful relationships are produced between variables analyzed, therefore any change in one score can affect the study data set as a whole.

Statistical mean of measured criteria referred for "sensory", "semantic" and “anxiety” variables, whose intersection constitute “factor1” of comparative analysis with the goal to analyze the set of variances and co- variances compared to "group" variable. This comparative analysis has been made-up with the ANOVA W test of Mauchly (see

Table 4. Pearson Correlation (n= 30).

		Senso-ry1	*Senso-ry2*	*Senso-ry3*	*semantic1*	*Seman-tic2*	*Seman-tic3*	*Anxie-ty1*	*Anxie-ty2*	*Anxie-ty3*
sensory1	Pearson Correlation	1								
	Sig. (2-tailed)									
sensory2	Pearson Correlation	.62(**)	1							
	Sig. (2-tailed)	.00								
sensory3	Pearson Correlation	.40(*)	.75(**)	1						
	Sig. (2-tailed)	.02	.00							
semantic1	Pearson Correlation	.48(**)	.46(**)	.15	1					
	Sig. (2-tailed)	.00	.00	.42						
semantic2	Pearson Correlation	.36(*)	.58(**)	.65(**)	.21	1				
	Sig. (2-tailed)	.04	.00	.00	.26					
semantic3	Pearson Correlation	.11	.52(**)	.75(**)	-.04	.64(**)	1			
	Sig. (2-tailed)	.53	.00	.00	.82	.00				
anxiety1	Pearson Correlation	-.22	-.24	-.10	-.46(*)	-.04	-.05	1		
	Sig. (2-tailed)	.24	.18	.58	.01	.80	.77			
anxiety2	Pearson Correlation	-.22	-.40(*)	-.27	-.48(**)	-.15	-.11	.64(**)	1	
	Sig. (2-tailed)	.23	.02	.13	.00	.40	.56	.00		
anxiety3	Pearson Correlation	-.25	-.50(**)	-.50(**)	-.35	-.50(**)	-.55(**)	.67(**)	.59(**)	1
	Sig. (2-tailed)	.17	.00	.00	.05	.00	.00	.00	.00	

Notes:

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

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Table 5).

As observed *W* statistical analysis rejects sphericity hypothesis= .01 (sig= .00), which let to reject the Sphericity Assumed, that´s say variances- covariances between study variables aren´t same, hence a univariate approximation is applied: Test of Within- Subjects Effects, which, also para small samples (N= 30) data related to the univariate ANOVA F constitutes an index correction more stable and powerful than multivariate statistics as it corrects multivariate contrasts values inter- subjects (see Table 6).

As can be seen, the meaningful critical level found indicates that there´s a mutual positive influence between both variables: "sensory", "semantic" and "anxiety" ("factor1"), whose most significant data are: Sphericity Assumed: sig= .00 and Greenhouse-Geisser: sig= .00, that is, there´s an influential interdependence between the study variables.

Comparative analysis of the "factor1" in relation to "group" variable, shows that there´re significant differences in variance- covariance perform by the "factor1" regarding to group type (factor1 * group), whose data are: Sphericity Assumed: sig= .00 and Greenhouse-Geisser: sig= .01, which let to conclude the program has found important differences between the EG and the GC, with significant improvements being observed upon the 3 successive measures in participants that make up EG, confirming the main hypothesis of this study.

Likewise, Mean Square Intercept is also highly significant, which explains the estimates of percentile of "factor1", formed by the intersection of the three measures

Table 5. Mauchly's Test of Sphericity(b).

Within Subjects Effect	*Mauchly's W*	*Approx. Chi-Square*	*df*	*Sig.*	*Epsilon(a)*		
	Greenhouse-Geisser	*Huynh-Feldt*	*Lower-bound*	*Green-house-Geisser*	*Huynh-Feldt*	*Lower-bound*	*Greenhouse-Geisser*
factor1 (sensory, semantic and anxiety variables)	.01	97.20	35	.00	.36	.50	.12

Note:

(a) May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects oteEffects table.

(b) Design: Intercept (factor1) + group+ age+ group * age.

Table 6. Tests of Within-Subjects Effects.

Source		*Type III Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*
factor1 (sensory, semantic and anxiety variables)	Sphericity Assumed	87.22	8	10.90	41.46	.00
	Greenhouse-Geisser	87.22	2.91	29.97	41.46	.00
	Huynh-Feldt	87.22	.04	21.56	41.46	.00
	Lower-bound	87.22	1.00	87.22	41.46	.00
factor1 * group	Sphericity Assumed	12.29	8	1.53	5.84	.00
	Greenhouse-Geisser	12.29	2.91	4.22	5.84	.00
	Huynh-Feldt	12.29	4.04	3.03	5.84	.00
	Lower-bound	12.29	1.00	12.29	5.84	.02
factor1 * age	Sphericity Assumed	21.80	16	1.36	5.18	.00
	Greenhouse-Geisser	21.80	5.82	3.74	5.18	.00
	Huynh-Feldt	21.80	8.08	2.69	5.18	.00
	Lower-bound	21.80	2.00	10.90	5.18	.01
factor1 * group * age	Sphericity Assumed	8.68	16	.54	2.06	.01
	Greenhouse-Geisser	8.68	5.82	1.49	2.06	.07
	Huynh-Feldt	8.68	8.08	1.07	2.06	.04
	Lower-bound	8.68	2.00	4.34	2.06	.14
Error(factor1)	Sphericity Assumed	50.48	19	.26		
	Greenhouse-Geisser	50.48	69.84	.72		
	Huynh-Feldt	50.48	97.07	.52		
	Lower-bound	50.48	24.00	2.10		

 DOI: https://doi.org/10.30564/jpr.v1i2.595

of three variables regarding to "group" type variable (see Table 7).

As it´s observed, data found: R^2= 728.98, *F*= 1589.92, sig= .00 shows that variables values studied are robustly related, which it can be concluded that anxiety variable depends strongly of improvement in "semantic" and "sensory" variables, since the effect of "factor1" is highly explanatory of changes found in relation to "group" variable.

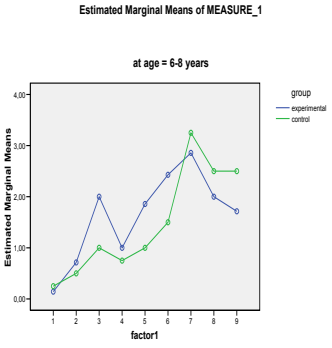
This consideration allows conclude the manifest "anxiety" variable can be related to the meaningful subject-matters of informative stimuli coming from context, since incomprehension produce an intolerant uncertainty in people with ASD, showing an anxious reaction consequent to this situation.

Finally, regarding to variances interaction between variables that make up "factor1" and "age" variable show significant partial differences between participants age ranges (see Table 8).

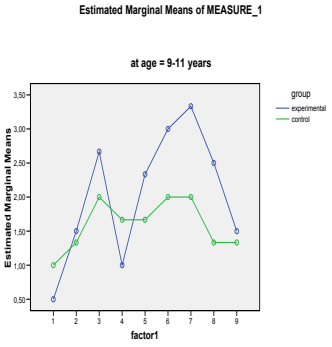
In this senses, *post-hoc* statistical test indicates that there´re differences between the 6-8 years´ age range with 9-11 years' age range (sig= .01) and with 12-14 years' interval (sig= .00), but there´re no differences between 9-11 years range and interval between 12 and 14 age years (sig= .99).

For graphical observation of this results, graphs corresponding to differences found between both groups can be observed, distributed according to age range (see Graphs 1, 2 and 3).

Graph 1-2-3. Baseline "factor1" evolution between the CG and CG by age intervals.



Graph 1



Graph 2

Table 7. F Tests of Between-Subjects Effects.
Transformed Variable: Average

Source	*Type III Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*	*Partial Eta Squared*	*Observed Power*
Intercept	728.98	1	728.81	1087.81	.00	.97	1.00
group	2.81	1	2.81	4.20	.05	.13	.50
Error	11.00	28	.66				

Table 8. Multiple Comparisons.
Tukey HSD

(I) age	*(J) age*	*Mean Difference (I-J)*	*Std. Error*	*Sig.*	*95% Confidence Interval*	
		Lower Bound	*Upper Bound*	*Lower Bound*	*Upper Bound*	*Lower Bound*
6-8 years	9-11 years	-.31(*)	.10	.01	-.56	-.05
	12-14 years	-.32(*)	.09	.00	-.57	-.07
9-11 years	6-8 years	.31(*)	.10	.01	.05	.56
	12-14 years	-.01	.10	.99	-.27	.24
12-14 years	6-8 years	.32(*)	.09	.00	.07	.57
	9-11 years	.01	.10	.99	-.24	.27

Note:

* The mean difference is significant at the ,05 level.

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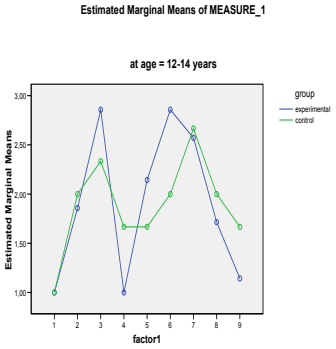

Graph 3

5. Discussion

In this study found a significant relationship between the variables that make up stimuli semantic understanding and anxiety levels in people with ASD, which allows conclude that as stimuli understanding and coding becomes more difficult, anxiety increases considerably and, also as it facilitates their understanding and coding, anxiety decreases.

For this reason, it´s necessary to provide specific programs that improve the environmental stimuli understanding, but, due to great stimuli diversity they can happen throughout daily events, the best programming option is promote programs that facilitate contexts understanding from autonomy and self-management in order to improve the interaction of people with ASD with different context, for which, PRT program can be an important reference.

In this sense, these data are corroborated with other research of interest.

Indeed, people with ASD don´t differ from their peers in narrative global aspects, such as length or identification of basic narrative characteristics like as the characters or settings [2,13,31], but they find significant difficulties in integrating elements of history into a coherent whole, partly, due to limited use of complex syntax, that results of temporality lack and information link [6]. Moreover they show a limited use of evaluation processes to bring and give the perspective of events with a wider meaning, and simply describe indices of behavioral emotions, as well as they often make inappropriate comments [8] and, consequently, anxiety associated with narrative formulation probably contributes, in addition, to limitations widely observed with the narrative experienced by individuals with ASD in social settings, being consistent with some previous research [20, 22].

For this reason, Lin & Koegel [21] and Koegel [17] include the self-control procedures of children during the whole interactive intervention, since these people require a higher level of staging to advantage overall process of semantic integration, but, undoubtedly, it restricts your ability to narrate in everyday interactions where such extensive support from an interlocutor is unlikely, therefore it´s pivotal to generate programs that increase autonomy of individuals with ASD during the learning process.

In this sense, programs based on naturalistic use methods, such as Pivotal Response Treatment (PRT) can be an important overtake in achievement of semantic comprehension improvement of events and, hence, to diminish anxiety levels associated.

Verschuur, Husbens, Verhoeven & Didden [34] analyze PRT program effectiveness and indicate the data showed significant increases in people with ASD both regarding opportunities created by professionals, as in questions initiated by own children, as well as significant improvements in generalization processes in relation to group situations and collateral changes in children's language, pragmatic and adaptive skills and adaptive behaviors.

Duifhuis, den Boer, Doornbos, Buitelaar, Oosterling & Klip [10] assert the group of children with ASD selected in the experimental condition of PRT program improved their own symptomatology of autism diagnosis, as well as the behavior adaptability and affirm that model can prevent that higher cognitive breach between the autistic development and normotypic development rise.

Bradshaw, Koegel, & Koegel [4] have focused their study on improving expressive communication. Results indicated that verbal communication improved as a consequence of this intervention, with concomitant improvements in areas not worked for all participants, as after the intervention, autism symptoms decreased and their parents reported they were satisfied with program implementation since observed the its child's achievements.

In conclusion, PRT intervention models have demonstrated their effectiveness in improving semantic language in young children with ASD [11,33], which benefits the stimuli understanding, their codification and storage in permanent memory, in order to have needed resources for their recovery and use along the presentation of new stimuli and, consequently, to reduce anxiety levels caused by uncertainty before perceived events.

STUDY LIMITATIONS

This study presents the limitations of research with groups of people with specific educational support needs, which are usually small groups.

ACKNOWLEDGMENT

Our acknowledgment to families, social, educational and psychiatric services of the Association of Families, Professionals and Researchers of People with ASD in

 DOI: https://doi.org/10.30564/jpr.v1i2.595

Ourense (Spain), as well as families and those educational centers participated in this study.

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