Is autism spectrum disorder (ASD) a mind-and-somatic state "neuro-managing" system malfunction? About some possible mechanisms of this kind of neurodevelopmental disorder

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Abstract.

Introduction: The problem of autism spectrum disorder (ASD) is becoming more acute in the world. Traditionally, ASD is seen as a violation of the neurodevelopmental disorder, characterized by disorders of social interaction, verbal and non-verbal communication, as well as limiting the manifestation and repetition of patterns of behavior. It is not just some local mental anomaly, but a multifunctional systemic disorder, based on problems of different origins: immunological, neurological, biochemical, social, cultural, etc. Usually, signs of autism manifest themselves in the first two years of a child's life and do not completely disappear in the adult age, even under the most favorable scenarios of therapy and social rehabilitation.

Purpose: The present paper is attempt to made an interpretation of some of the latest experimental data published by another research team working in Israel that studied the misunderstanding of emotional signals, based on laboratory studies of adult subjects (both autistics and neurologically typical) and a comparative analysis of their altered responses to social chemosignals.

Methodology/Approach: It has been suggested that autistic persons lack a mechanism of transferring the acquired "neuro-experience" that is "imprinted" into the neuro-network of the bearer of this neuro-experience, from one individual to another, that is not yet studied, and presumably present in neurotypical people, but suppressed (broken) in autistics. Is proposed a conceptual model based on the supposition to explain observed phenomena.

Results: The concept of the Neuro-Landscapes Transfer (NLT) is proposed as an instrumental model for constructing further researches and interpreting the obtained data. The model allows us to take a fresh look at the "mechanism" of functioning of ASD and introduce Neuro-Landscapes Cloning (NLCln), Neuro-Landscape Contamination (NLCnt) and some other models for the presentation of possible processes of intraspecific transmission of acquired neuro-experience, important in describing the significant changes taking place in the mental and somatic field, also in the field of social interaction among autistic people themselves and among both autistics and neurologically typical persons..

Limitations and strengths of the study: The paper put forward an integrative interdisciplinary hypothesis that aims to reduce the descriptions of the various often-contradictory observed phenomena to a single conceptual platform, which is closest conceptually to neuroinformatics. It does not pretend to explain directly the whole ASD phenomena in the conceptual "apparatus" and terminological discourse of particular scientific context of applied researches including: psychiatric, immunological, neurological, biochemical, social, cultural and similar studies of the problem of autism. In other words, the paper presents the framework approach model, focusing in unifying the former particular approaches to study the field of ASD. There is the consideration of the presenters that is the more detailed functioning of the mechanism of the Neuro-Landscapes Transfer (NLT) must be remain beyond the scope of the present work, because requires a separate study for a further observation and making a deeper research in the future.

Practical/Social value: The ASD model proposed allows explaining numerous phenomena, individual symptoms and social manifestations of autism within the single conceptual approach framework using a single conceptual description based on idea of neuro-landscapes that allows researchers to move to a not imaginary oriented, but more phenomenologically centered "common language" description in the general field of ASD.

Originality/Conclusions: According to the proposed model, ASD is caused by a deficit of a specific "mechanism" for transpersonal transferring of acquired "neuro-experience" which normally forms at an early age of the child's development and further uses the individual's access to the collective "neuro-experience" of the human population, determining the individual ability of mind and somatic field in optimally respond to environmental factors, regulate the mental and physical components of physiological processes in the body, organize cognition of the environment world, planning actions and communication with other individuals in society.

Keywords. ASD, autism spectrum disorder, autism, disease of the nervous system, mental illness, neurobiology, psychiatry, psychology, social behavior, social life.

1. Introduction

Traditionally, autistic disorders of childhood is considered as a neurodevelopmental disorders, characterized by disorders of social interaction, verbal and non-verbal communication, as well as restriction of manifestation and repetitive patterns of behavior.

The problem of autistic disorders of childhood in the world is becoming increasingly acute. Globally, autism is estimated to affect 21.7 million people as of 2013. As of 2010 (Collaborators, 2015) the number of people affected is estimated at about 1–2 per 1,000 worldwide. About 1.5% of children in the United States (one in 68) are diagnosed with ASD as of 2014, a 30% increase from one in 88 in 2012. The rate of autism among adults aged 18 years and over in the United Kingdom is 1.1%. The number of people diagnosed has been increasing dramatically since the 1980s (Newschaffer, 2007)

Signs of autism usually appear in the first years of life. This is not just some kind of local mental abnormality, but a multifunctional systemic disorder, based on problems of various origins: immunological, neurological, biochemical, social, cultural etc. Usually, ASD symptoms are typically recognized between one and two years of a child's age (American Psychiatric Association, 2013) and do not fully disappear even when they reach adulthood, even with the most favorable treatment and social rehabilitation scenarios.

The reason for this, according to the authors of this article, is explained by the absence of workable models or the generally accepted theory of ASD, which could suggest approaches to this problem. At present, we cannot see in this field any fundamental progress or significant achievements in the search for practical, effective and understandable solutions.

2. Related Work

This paper attempts to interpret some of the latest experimental data published by the Israeli researchers from Weizmann Institute of Science (Endevelt-Shapira, 2018), related to investigations of the altered responses to social chemosignals based on laboratory studies of adult subjects (both autists and neurotypical) and a comparative analysis of their reactions shown.

In the experiment, which now is tried to explain to general public by the most of famous world scientific magazines, for example Neurosciencenews.com, two groups were exposed to either to the "smell of fear" or to a control odor. The smell of fear was sweat collected from people taking skydiving classes, when they felt emotional stress, and control odor was sweat from the same people, only this time it had been collected when they were just exercising in gym etc. — without feeling fear.

This is where differences emerged: Although neither group reported detecting dissimilarities between the two smells consciously, their bodies reacted to each in a different way. In the control group, smelling the fear-induced sweat produced measurable increases in the fear response, for example in skin conductivity, while the everyday sweat did not. In contrast, participants with ASD perceived the smell of sweat from skydivers (which was the "smell of fear" for typically developed participants) calmly, without giving out any signs of fear that sensors connected to the bodies of the tested autistic people recorded (Neuroscience News, 2017).

We – the authors of the present article have tried to explain or to provide deeper and illustrative insight into the possible "mechanism" of this phenomenon, discovered by the Israeli research team, which could serve as the source of a special response of neurologically typically developed (TD) persons that distinguishes them from individuals with ASD. Or, on the other hand, to explain what is behind the lack of autistic response to the specific smell, which TD persons have demonstrated.

The authors proceeded from the assumption that there is a certain, yet unexplored, mechanism of the phenomenon, which manifests itself in various stimulus situations and event contexts and has a common "functional core" at some "deep" level. The mechanism that is a common in these situations and contexts, which, according to our assumption, functions differently for autistics and TD persons, which leads to the essential differences that determine the distinctions between persons with and without ASD at the "superficial" phenomenological level, including the biological, cognitive, behavioral, communicative etc. sides of its manifestation.

3. Results and Discussion

3.1 Methodology/Approach based on the model proposed

As a starting point of their work, the authors of the present article put their attention to studies done by the third-party researchers (Endevelt-Shapira, 2018), mentioned above, who identified differences in the responses of the persons with and without ASD to the specific socially significant stimuli-chemosignals. As this study has shown, persons with ASD response in a different way than TD when they are given certain odors, which are strong enough stimuli for TD persons, initiating in them a whole spectrum of specific vegetative (i.e. manifested by the autonomic nervous system activity) etc. responses associated with this stimulus and not consciously controlled. The study clearly demonstrated that persons on the autism spectrum as well as typically developed ones, do not notice these smells, or, to be precise, do not recognize them consciously, but, in contrast to TD, do not exhibit specific involuntary physiology responses to these odors that demonstrate by typically developed persons.

This in itself is quite unexpected news, revealing previously unknown characteristics distinguishing TD individuals from individuals with ASD. The authors of the aforementioned Israeli study present this as a valuable scientific result, which coincides with the opinion of the authors of this article, who see in this result a real scientific discovery revealing new previously unknown aspects of the manifestation of the nature of autism. Its significance is undoubted, even though the authors of the original research did not accompany him with any conclusions or theoretical explanations revealing the nature or cause of the detected phenomenon. However, in our opinion, the results published by researchers from the lab of Prof. Noam Sobel in the Weizmann Institute's Neurobiology Department (Endevelt-Shapira, 2018), allow us to take it a step further and provide some kind of deeper explanation of the observed phenomenon and to draw much more far-reaching conclusions that are absent in the aforementioned original study.

According to the authors of this article, the lack of response from the persons with ASD to a specific olfactory marker used in the study mentioned may indicate not the "weakness" of olfactory receptors, nor the low olfactory sensitivity or the lack of ability to recognize/differentiate faint odors that have been demonstrated by autistic participants of the experiment, but means that they have not previously experienced acquired "interpreting" corresponding to specific sensory stimulus associated with some "neuro-response", in other words, have not previously experienced this kind of signals manifesting themselves as a sensory "trigger" causing this kind of response.

It can be assumed, paraphrasing the above, that the result obtained in the experiment means that the autistic neural network is not trained to respond to this stimulus in the same way that the neural network of typically developed subjects, who participated in the experiment, responded to it.

As an additional conclusion, which follows from the statement formulated above, it can be suggested that this study revealed that individuals with ASD are characterized by the lack of functioning of the special kind of neuroregulatory mechanism - currently not yet studied by modern science, which is present in typically developed individuals. We are presuppose the mechanism of transferring "neuro-experience", "imprinted" into the neural network of the carrier of this experience, from one individual to another - which is supposedly implemented in TD people, in the base of transferring neural "programs" (managing informational structures), which we called "neuro-landscapes" and which, in our opinion, play an essential role as information management structures "embedded" in a human neural network.

To clarify the possible patterns of operation of these neural control informational structures, or "neuro-landscapes", we used the following simplified model. We believe that the neural network of the tested TD subjects, which showed in the experiment specific response on stimulus substance mentioned, already contained information about this substance, which at some point in the past was "embedded" in the "memory" of the neural network. If we leave out the information when and how this embedding occurred, and focus on how the neural network trained in this way should respond to the significant chemical signal being presented, information about which is already embedded in the neural network, then in the simplest case (if using the extremely simplified model describing the reaction to a certain combination of concentrations of two substances in a mixture), such a model can be represented by the following graph.
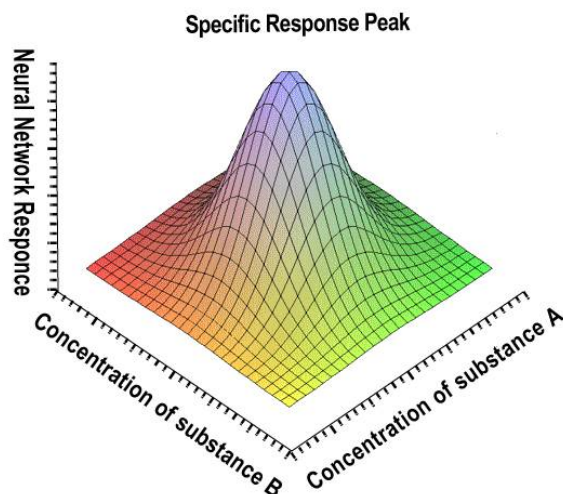
Fig. 1. Neurochemical landscape explaining response to a specific combination of stimuli, presented as a mixture of two substances (simplified model)

The coordinates that determine the position on the horizontal plane in the Fig.1 above, set the concentrations of substances A and B, respectively, and the vertical axis displays the response of the neural network to different mutual concentrations. This first-step-explanation-provided-model that was created under the presupposition that only a single combination of the concentration of substances in the mixture should cause a clear peak of the response (but this is not the case, in the general case – even for simple two-component mixtures, not to mention the field of biochemistry of chemicals with complex chemical formula not reducible to a simple mixture, having a mechanism of action inside a living organism that have can being very sophisticated).

In general case, the response picture may be different and contain several peaks and/or valleys, even if we have only two input variables and the response described by only one variable, as in Fig.2, showing below as a visualization of a 3 dimensional graphic representation of a function of 2 variables taking from a mathematical work unrelated to the subject of this article, which we took simply as a visual presentation of our reasoning about how many peaks and valleys one can found in the "landscape" of visualized graph of function of 2 variables in a more complicated cases.
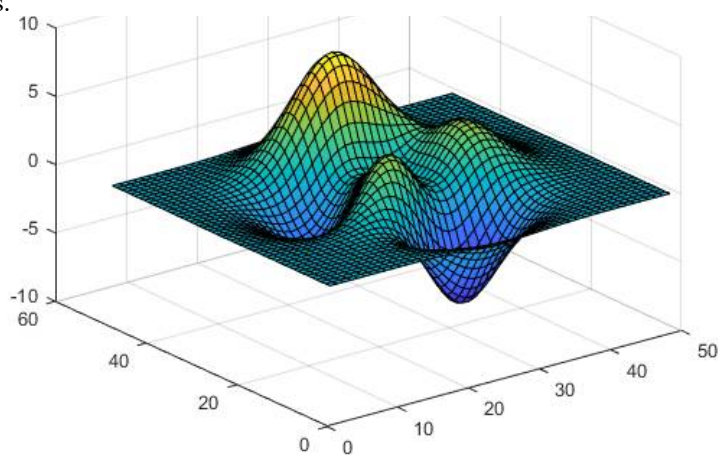

Fig. 2. In the general case of landscape it may be more complicated and contain several peaks and/or valleys, even if we have "input" only with 2 variables, and the response described by 1 variable
(the picture copyright by © The MathWorks, Inc.)

For comparison with the Fig. 1. let's give the Fig. 3. as a picture illustrating the situation of the absence of a response to an irritant in the form of a specific combination of the concentration of two chemicals. In the Fig. 3

below the coordinates, which determine the position on the horizontal plane, also determine the concentrations of substances A and B, but the reaction of the neural network to different mutual concentrations, displayed on the vertical axis, is absent or is a constant value that makes the different concentrations of stimulus substances mutually indistinguishable.
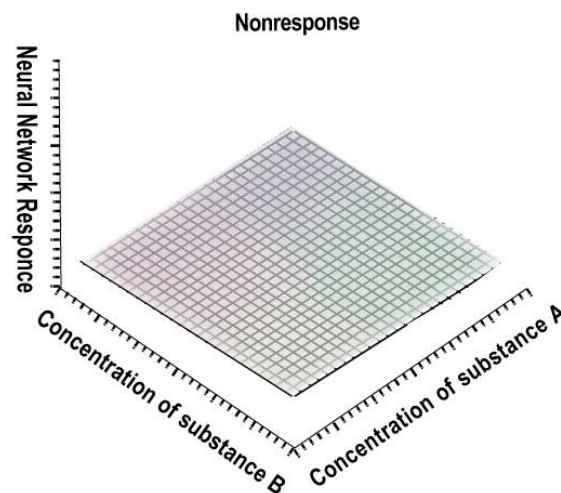

Fig. 3. Neurochemical landscape explaining an absence of response to a specific combination of stimuli, presented as a mixture of two substances (simplified model)

We believe that this neuro-landscape, when it lacks the previously acquired experience "imprinted" into the neural network, is representative of autism spectrum disorders and means that an individual with such a "flat" neuro-landscape will not be able to distinguish/react to certain aspects/changes of his biological state and/or "stimuli combinations", which determine the current state of the environment, living in a poorer world of subjective experience than a subject with "convex" neuro-landscapes.

We also believe that the figures given here illustrate a very simplified model of what we call a "neuro-landscape", and that essentially serves as an illustration of how a neural network responds to a state change in which a living organism finds itself with a neural network trained in some way of responding.

Unfortunately, it is impossible to display an example of a neuro-landscape with a number of variables defining a stimulus state greater than 2 with a simple graphic illustration. Obviously, this restriction results from the inability to depict a more than 3-dimensional geometric figure in its projection on a flat sheet of paper. As is known, the number of elementary stimulus signals that a living organism perceives at each moment in time is so huge that it exceeds all imaginable limits, often calculating with hundreds of thousands, millions and even billions. Nevertheless, a human neural network contains such a number of neurons (according to well-known estimates, there are about 90-95 billion neurons in the human brain (Azevedo, 2009), (Williams, 1988)), which allows processing them with combinations (the number of which is much more than the number of nodes of the neural network itself) large numbers of individual stimuli. For example, the retina contains about 150 million receptors (rods and cones), from which 1 million optic nerve fibers go to the brain (Wikipedia, 2018), and the number of visual images with which a neural network can operate can be much much more.

Thus, this simplified model can also be generalized to cases of a much larger number of stimulus signals, without losing, in our opinion, its practical value to be an adequate description of the neural network response mechanism not only to a change in the state of the internal biochemistry of the organism (referred to as "neurochemical landscape") and/or external smell/taste stimuli perceived by the smell/taste receptors (which we call the "sensory olfactory/gustatory neuro-landscape"), but also possible types of neuro-landscapes that detect internal body states ("neuroimmune landscapes", "neurohormonal landscapes", etc.), as well as neuro-landscapes "organizing" sensory perception processing ("sensory neuro-landscapes" - visual, auditory, kinesthetic, as well as other perceptional modalities).

Moreover, we believe that the neuro-landscape model is applicable not only for the situations of detection/perception of input information, but also for outputting information to the outside when organizing an individual's impact on the external environment etc., as well as for the organization of inner mental activity and

communication ("neurocognitive", "neuro-communicative", "neuro-speechproducing", etc. landscapes). We are deeply convinced that the neuro-landscape model is a universal way of describing the regulation of not only the nervous and mental manifestations of human life, but also the management of its visceral state, including the regulation of processes in the general case, any biochemical, immune and other biological nature inside the human body.

We believe that certain neuro-landscapes are congenital, that is, the baby is born with them and they organize such processes as heartbeat, respiration, basic hormonal regulation, etc., without which the human body would not have the ability to maintain life. However, after birth, during the life of a person, new neuro-landscapes are acquired that were not present at birth and that appeared in certain life circumstances as acquired qualities/skills of adaptations to the environment. In this case, undoubtedly, some neuro-landscapes are formed directly by the environment during human interaction with it, but some can be transferred from individual to individual because of the neuro-landscape transfer (NLT) process, which, we are convinced, realizes a specific mechanism unconsciously sharing biological/social experience. This mechanism, as we believe, works throughout the entire history of human civilization, and its work goes unnoticed by the individual consciousness of representatives of the human species.

And we believe that this mechanism crashes in the case of ASD, which is manifested in its "disconnection" in some children at an early age, who since then lose the innate ability to transfer neuro-landscapes from other people to their nervous system, or in another words, the ability to "build in" the neuro-experience borrowed from others into own neural network of themselves.

Thus, we have suggested that the human beings with ASD have no or have "damaged" mechanism for transferring acquired "neuro-experience", currently not studied yet, that is "imprinted" into the neuro-network of the carrier of this experience, and that has a role of "transmitter" of embodied experience from one individual to another, which is supposedly present in TD people, but is suppressed (disturbed) in autistic neural network. Based on the proposed assumption, a conceptual model has been proposed for explaining the observed phenomena of autism spectrum disorders (ASD).

3.2 Some interpretations that follow from the proposed model

Within the framework of this particular model, which the authors of this article adhere to, the development of the psyche in case of ASD goes along a special path, when at some stage of human life (in early age) their vital capabilities are regulated exclusively by prenatal and, in some cases, also early postnatal neuro-landscapes of "low visceral level" that have less efficiency in some complicated contexts in front of the high-efficiency neuro-landscapes cloned inside TD- typically developed member's community field of social communication. This allowing a TD individuals, which possesses such acquired neuro-landscapes, to get access (or to move themselves physically and mentally) to the states inside the zone of higher mental and physical comfort-and-capabilities than in the case of absence of neuro-landscapes of "high efficiency". The lack of access to neuro-landscapes for "high efficiency" inside autistic neural network taking people with ASD away the state of more psychophysical comfort — to a kind of "psychosomatic periphery", or to a state space surrounding the comfort zone, which can also be called a marginal or "twilight" zone of psychophysical state space located around the highly comfort zones available for typically developed human beings.

Due to the fact that they lack a highly efficient neuro-landscapes "borrowing mechanism", that is present in typically developed neural network, the individuals with ASD, who have not such mechanism, are not able to independently achieve a comfort zone, mentioned above, presenting in a space of states and accessible to TD persons. Therefore, they in most cases can be in the state of comfort solely due to external supervision — that is, the care and efforts of the typically developed patrons, as a rule, of their families. In the absence of care, or when falling outside the friendly social environment, taking care towards them, people with ASD tend to "slip" further and further out of the area of psychophysiological comfort state space - until they reach the states bordering on the states of cessation of vital activity of the organism, or immersion in deep pathological conditions that pose a threat to life as a result of the lack of access to physical resources to maintain a physical resource of vital activity and comfort. As an example, we can cite cases of dehydration of persons with autistic disorder left unattended, heat stroke, cooling the body, poisoning, forced starvation, physical injury, etc.

Of course, congenital "low-level" neuro-landscapes also work in ASD, not allowing going beyond the limits of physical comfort in fairly simple situations of getting unpleasant sensations of cold or excessive heat, highly bright light or deafening noise at home or in a familiar habitat. People on the autism spectrum in these situations do an excellent job of discomfort, leaving a place (room, another location of space) where they feel discomfort

from cold, excessive heat, bright light or noise, and other excessive stimuli, instinctively or consciously moving to a zone with more comfortable conditions.

Such manifestations of simple patterns of adaptive behavior among persons with autistic disorder (even the most low-functioning ones) are well known and do not require special evidences. One of the authors of this article has personal observations of this kind of behavior in some ASD cases, including experience of interaction and making quite successful attempts of therapy of manifestations of ineffective maladaptive ASD behavioral patterns (Tanasiienko, 2017)).

Possessing the ability to move in state spaces that are quite simple in a topological sense, a person with ASD is not able to go beyond such a space if it is necessary to solve the problem of "overcoming boundaries" between topologically mutually disconnected (fragmented) domains of state space, one of which contains uncomfortable or dangerous conditions, contact with which must be avoided, and in the other one – the necessary physical resources or states that must be achieved. An autistic person moves within such connected state spaces domains using a right-hemispheric (eidetic) "mechanism" of neuro-landscape, within which he is, in a certain sense, "locked" inside because the right-hemisphere regulation mechanisms can only implement smooth continuous "movement" in such a continuous state space, from which there is "no way out" for him.

We believe that any "path" or exit from such a state space domain in which he is "locked" is not a right hemispheric, but a left-hemispheric exit, and requires special left-hemispheric cognitive, motor and mental skills that are most likely absent from a person on the autism spectrum, if he has not been trained by such skills earlier.

3.3 Imaginary experiment "Autistic Labyrinth"

As an analogy to explain this point, perhaps not immediately clear from the first attempt, let us show the following figurative reasoning behind, or an imaginary experiment we can make. Imagine that an autistic person is in a labyrinth of interconnected passages between rooms without a ceiling (another words in spaces separated by walls or partitions), which is a familiar place for him and is a surroundings he know previously in which he has repeatedly wandered, moving from place to place. If he becomes uncomfortable somewhere in the space of this labyrinth because of cold, overheat, unpleasant smell or sound, etc., present in some local room or point of such a labyrinth, nothing prevents him from moving to another place/room where he will feel more comfortable and more confident. However, he will immediately find himself in an impasse, in the event of flooding of the labyrinth with water gushing from outside into all the rooms or passages of the labyrinth.

You cannot hide from the water – all the labyrinth's space have water on the floor, on which the person with ASD stands – because the water immediately fills all the rooms inside the labyrinth. Trying to escape water, a person with autistic disorder will randomly rush from room to room, moving erratically in the space of the labyrinth, since nowhere in it will he find a dry place. A typically developed person in the same situation most likely will jump over the wall of the labyrinth and will come outside – to the external space outside the labyrinth, where there are no factors of discomfort affecting him inside the labyrinth, for example – water flooding the floor inside the room.

The described "hopeless" behavior may continue for a person with ASD for a long time, if not infinitely. On the other hand, gaining an exit by jumping over a wall (and in the general case, moving from a strategy of moving in two-dimensional space on a plane to moving in a new dimension along the vertical) is, in general, an act that is impossible for an autistic person, since in his experience history (and in his map of reality, after all) there is only a movement inside the horizontal plane in the labyrinth space, but there is no experience of jumping over its walls, which requires the possibility to aware that it can move not only horizontally, but also vertically. He also has no heuristic abilities that would allow him to find independently such an exit or a new way of moving by drastically changing the direction of movement and moving from a horizontal way of movement - to a vertical one if this method is not present in his previous experience.

3.4 From the imaginary "Labyrinth" – to the real life cases

The media describe quite a number of cases in which lost autists died from hunger, either not knowing how to ask for help from unfamiliar people, or getting lost in a deserted area, or received humiliation, physical injuries, including those incompatible with life etc. as a result of aggression by those who misinterpreted nonverbal signs of persons with ASD that have been faced with, as threatening or offensive to their dignity, or were attacked or raped by people prone to sociopathy and seeing in they potential victims to be encountered, bullying of which would not lead to inevitable penalties (Argumenty i Fakty, 2018), (CNN International, 2014), (GuildHall, 2018), (Life.ru, 2018).

The authors of this article believe that the described tragic cases that occurred with a number of person on the autism spectrum who, due to accidental circumstances, left the familiar comfort zone, are proof that in the overwhelming majority of cases, it is impossible for persons with autistic disorder due to their own physical, mental, etc. abilities or resources (generally due to the neuro-resources/neuro-landscapes available to them) to find a "path" in the state space, leading back to the comfort zone from which they "fell out". Moreover, this does not necessarily have to be the space of physical locations (physical space). Just as in the physical space, an person with ASD may well be "lost" in the space of a state of another kind - cognitive, neurochemical, or others, if he, for example, suffered a "mental or somatic catastrophe" when his mind was in a state of pathological dysfunction, or if his protein and other biochemical metabolism was significantly crashed, and he was no longer able, without experiencing somatic problems, to eat the food he was used to.

However, even if no serious disasters happen to persons with ASD, they nevertheless in the most cases are not able to improve independently their condition by performing a certain sequence of actions taken their selves making their own choice, except for the simplest cases of choosing previously learned behavior, appropriate in the present event-driven context. For them, not only is the "way out of the labyrinth" closed, if they happened to be there, they are also not capable of finding paths to new comfort zones that they have not experienced earlier inside state space, since they lack the whole spectrum of neuro-landscapes necessary for this, as well as they have no ability to "adopt/borrow" a resource neuro-landscape from another person, even if this person is physically and mentally close to an autistic person and is a "carrier" of such a resourceful neuro-landscape.

3.5 Results

The concept of Neuro-Landscape Transfer (NLT) proposed by the authors of this article, as an instrumental model for building further research and interpreting the data obtained in the field of ASD research, allows us to take a fresh look at the "mechanism" of functioning of autistic disorder and introduce into consideration the related ideas of Neuro-Landscapes Cloning (NLCln), Neuro-Landscape Contamination (NLCnt) and some other model representations of possible processes of intraspecific transmission of acquired neuro-experience, important in describing significant changes that have occurred in the mental and somatic field, as well as in the field of social interaction among people with ASD.

Speaking about the criteria of a "good theory of autism" that will solve this problem in the future, F. Happe gives us the following valuable guidelines:

"What work must a theory do for us? How can a theory open our eyes to facts, and how can we avoid being blinded by our preconceived notions? ... a good theory of autism must:

- generate ways of testing the theory;
- give a causal account;
- explain the specific pattern of deficits and abilities in autism;
- fit with what we know about normal development" (Happe, 1995) .

If we try to apply these criteria to the NLT model we considered, one can see that this model:

1. It assumes the procedure for testing the hypothesis of NLT by:
   a. replicating in experiment:
      i. specific conditions contributing to (hindering) the transfer of neuro-landscapes, and a more detailed study of these *processes*
      ii. the conditions allowing to check the presence/absence of previously formed human neuro-landscapes of a certain type (as a result of a previous transfer) in the tested autistic persons and in the control group of typically developed (TD) persons (as an illustrative example, we can mention the conditions created in studies of the altered responses to social chemosignals by Israeli research group in Weizmann Institute of Science (Endevelt-Shapira, 2018)),
   b. studying the detailed symptoms and signs of autism and drawing up a "census of the manifestations" of these signs in the overall picture or in the "spectrum" of specific manifestations of ASD (biological, cognitive, behavioral, communicative, etc.) focusing on detected "deficiencies" of different nature (biological, cognitive, behavioral, communicative, etc.) present in individuals the autism spectrum, but replenished in neurologically TD persons,

         in order to compile a "global map" of specific neuro-landscapes that are "responsible" for replenishment of specific deficiencies,

    c. studying the social phenomena of the "interactions" of representatives of TD and ASD subpopulations (subcultures) to understand the peculiarities of the influence of one subpopulation (subculture) on another and find out how these differences correspond to the NLT model.

2. Provides explanations of the causes of ASD as a biological, psychological and social phenomenon, resulting from the autistic deficit of a specific "mechanism" of transmission, acquired "neuro-experience", which normally forms at an early stage of a child's development and later uses the individual's access to collective neuro-experience "of the human population;

3. Can explain what is typical for autism itself by offering the deficiency based disorder model of ASD, according to which the ASD is not deviant forms (deviation from normal development), but deficient forms (lack of skills, ways, models and forms of information representation in the human mind that present enough in neurologically TD mind, but not enough in autistic one);

4. Fit with the notions of normal mental development adopted in the modern scientific world, since it does not try to change the existing theory of the development of the psyche in the mental norm, but focuses on the description of mental phenomena and processes that go beyond the norm in ASD, namely it introduces a description of a particular way of development of the psyche for autism spectrum disorders.

5. Finally, as we add, developing the original idea of F. Happe (Happe, 1995), it sets the direction for finding effective strategies for learning and adapting people with ASD.

4. Limitations of the study

The paper not pretend to explain directly the whole ASD phenomena in the conceptual "apparatus" and terminological discourse of particular scientific context of applied researches including: psychiatric, immunological, neurological, biochemical, social, cultural and similar studies of the problem of ASD.

In other words, the paper presents the framework approach model, focusing in unifying the former particular approaches to study the field of ASD. The limited scope of this article did not allow us to carry out a more detailed comparative analysis of the concept of "Neuro-landscape model", the "Model of internal action" (Mostofsky, 2011) and like, that were previously introduced as the scientific notion for this field. We also have not investigated the role of mirror neurons in the work of this Neuro Landscapes Transferring (NLT) mechanism, as it requires special studies, but we are looking in this direction with a certain optimism. There is the consideration of the presenters that is the more detailed functioning of the mechanism of the NLT must be remain beyond the scope of the present work, because requires a separate study for a further observation and making a deeper research in the future.

We also did not try to create a systemic description of the "neuro-landscapes map", to reveal the "hierarchical structure" of neuro-landscapes such as "congenital/prenatal - acquired/postnatal lifelong - acquired/modified during life", etc., although we believe that such a hierarchy objectively exists.

Strengths of the study:

The paper put forward an integrative interdisciplinary hypothesis that aims to reduce the descriptions of the various often-contradictory observed phenomena to a single conceptual platform, which is closest conceptually to neuroinformatics.

We believe that the above limitations should not be considered as a disadvantage of this article, since its main value, in our opinion, is to offer a new fresh look at a field already sufficiently mastered by numerous researchers and practitioners that without doubt needs a new perspective of study and new interpretation known facts and phenomena that can give a significant impetus to accelerate the pace of research in this field.

The ASD model proposed in this paper makes it possible, based on a single conceptual base, to explain numerous phenomena, individual symptoms and social manifestations of ASD in whole that can lead to the consolidation of researches of ASD, having place in the various fields, to the framework of single conceptual platform.

5. Conclusions (and Future Work)

According to the proposed model (hypothesis), autistic disorders are caused by a deficit of some kind of unconscious "mechanism" of transferring acquired "neuro-experience", which normally forms at an early stage of a child's development and later uses the individual's access to the collective "neuro-experience" of the human population making the possibility of the psyche and the body as a whole optimally respond to environmental factors, regulate the mental and somatic components of the physiological processes in the body, organizing knowledge of the world, planning actions and communications with other individuals in society.

This model, proposed by the authors of this article and called the Neuro-Landscape Transfer (NLT) model, give a new understanding and explanation of known phenomena of ASD manifestations at the "superficial" phenomenological level, including levels of biological, cognitive, behavioral, communicative, etc.

Moreover, offering such a generalized interdisciplinary view on the problem of autistic disorders of childhood, presented by the authors of the article, which, according to their deep conviction, carries the potential and provides "road map" contained in it, which makes it possible to find a new understanding and explanation of known facts and data. The authors express the hope that in future this will allow proceeding to the creation of new effective methods for a radical solution of this problem - in the medical, pedagogical, psycho-neurological, social, economic sense, and will provide significant assistance in other aspects of solving this problem of modernity that is extremely important for humanity.

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7. Authors contributions

Oleksii Tanasiienko and Olena Tanasiienko conceived of the presented idea. Oleksii Tanasiienko gathered information, developed the theory and performed the explanations. Olena Tanasiienko contributed to the interpretation of the results in the base of her professional background, including clinical Neurology and Psychiatry. Oleksii Tanasiienko took the lead in writing the manuscript.

All authors provided critical feedback and helped shape the research, analysis and manuscript.

Conflict of interest

The authors report no conflicts of interest relevant to this article.

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