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THE NEUROBIOLOGY OF NEURODYSFUNCTIONAL COGNITIVE STATES ASSOCIATED WITH SUBCLINICAL PARENTAL AFFECTIVE NEGLECT AND AFFECTIVE ATTENTION DEFICIT

Fabiano de Abreu Agrela Rodrigues
Post-PhD in Neurosciences, esp. Genomics
Heráclito Research and Analysis Center (CPAH),
Department of Neurosciences and Genomics, Brazil & Portugal
https://orcid.org/0000-0002-5487-5852

Flávio Henrique dos Santos Nascimento
Psychiatrist specializing in Neurosciences
Heráclito Research and Analysis Center (CPAH),
Department of Neurosciences and Genomics, Brazil & Portugal
https://orcid.org/0009-0007-3760-2936

Adriel Pereira da Silva
Physicist, esp. People and Project Management
Heráclito Research and Analysis Center (CPAH)
Department of Physics, Brazil & Portugal
https://orcid.org/0009-0003-1157-8318

Abstract: Research in neurogenetics and human neurobiology, through the use of functional neuroimaging with proton emission (fMRI), describes in an objective and analytical way, a clinical set based on neurobiology and social neurosciences, which organizes a series of situations by the individuation of objectivity and subjectivity. The most predominant neurological mechanisms are biobehaviors, all of which depend on the neurological component and develop in response to the quality of affective attention from biological parents, and present a hierarchical nosology of cumulative causal factors that have been delimited from descriptive clinical practice, like most diseases in medicine. A clinical construct of pre-diagnosis is presented, based on neuropathophysiology, which has been carried out in the practical field, and assists in the understanding and organized identification of a serious public health problem, and a hidden setback in the family courts. The aim is to contribute to the problem of parental neglect (PN), and its medical and specialized characterization, as well as its well-known social and psychological consequences. The quality of care is directly reflected in maladaptive neurological development, with deficits in emotional regulation, intelligence and family and social skills, family synchrony and chronic states of cognition and behavior that distort the real values of mental health and the importance of interpersonal relationships (IR). Several pieces of evidence show that complex PTSD or a history of childhood abuse (or both), as well as the presence of four or more Adverse Childhood Emotions (ACE) situations, negatively impact parenting and multiple physical and mental comorbidities and social risk behaviors, in addition to generating "intergenerational cycles" of trauma. This study should be reflected on by family law and family medicine professionals, as there is no assessment, let alone protective care interventions for child neurodevelopment, which is sensitive to ACEs, which determine or limit the child's social, mental and organic life.
Keywords: Metabolic Syndrome, Hypodopaminergic, Addiction, Dopamine.

INTRODUCTION

The care of children and adolescents is culturally and legally the responsibility of the parents who have custody, and the coexistence of these children is potentially the most protective and appropriate space for their development. The community and the state provide complementary protection, information and collective policies, as established by the Brazilian legislation , always aiming for well-being and thus guaranteeing the best possible state of health. The expression "potentially more protective" reflects that, although there is an expectation regarding the care offered within families, it is also known that this is not always an effective space for protection, and the family environment can also be hostile, with violations of children's rights that are often hidden and addictions. The violations are diverse and multiple: physical, psychological and sexual violence, abandonment and neglect. Parental neglect (PN) is the most reported type of violence and the one that most motivates the removal of children and adolescents from their family context. According to the World Health Organization (WHO -2020), PN corresponds to the failure of parents or caregivers to ensure the child's development, whether in terms of health, education, housing, nutrition and safe living conditions. Child abuse can also be defined as the failure to provide care when protective resources are available and which has repercussions on one or more areas of development. According to the WHO, child abuse is defined as: "Child abuse or maltreatment includes all forms of physical and/or emotional maltreatment, sexual abuse, neglect or negligent treatment, or

commercial exploitation, resulting in actual or potential harm to the child's health, survival, development or dignity, in the context of a relationship of responsibility, trust or power."

In scientific reality, particularly in behavioral neurobiology studies, there is a voluminous and overwhelming amount of evidence on adversity in childhood and there is an accumulation of clinical data on damage to various dimensions of children's mental health (MH), such as psychological, social, neurological, genetic, epigenetic, hormonal, inflammatory and psychiatric. However, there are no objective and precise studies, combined with the hidden flaw of the methodological preference for statistics-dependent research. There is a lack of initiative and concern on the part of the communities responsible for organizing minimal, albeit reductionist, care, and the reality of the epidemic of family conflicts and Mental Disorders (MD), which are influenced by psychosocial factors, shows a progressive and subtle increase, especially since the Covid-19 epidemic.

Currently, in the basic health network in Brazil, there is no attention to mental health, apart from persistent professional narratives, which feed the vicious culture of underestimating MD, often justified by the lack of significant evidence, or belief in complex problems that are difficult to solve, and thus there is a lack of attention to mental health, which is just as important as organic health, but with different values. The lack of technical, in-depth and specialized knowledge in the area of family and worker health is evidence of disinformation, disorganization and outdated scientific knowledge, which is not a priority in public health policies, as well as a lack of professional motivation to carry out research and actions, and social conflicts are directly related to social disorders such as family crime, domestic violence and parental alienation, which are reflected in workers' health and public spending.

Medicine does not professionally approach family MH in a technical and comprehensive way, and currently Family Law is causing lasting complications in children's health, in several cases of family conflicts that are neurodysfunctional and even pathological, due to the lack of a medical approach, combined with a lack of understanding and sense of the real problem or concrete basis, which only the doctor has the ability to identify diseases. The central focus is on the health and rights of children and families, who are suffering from professional negligence and recklessness on the part of lawyers, and negligence and incompetence on the part of doctors, as there are no practical plans for SM care in the family.

Neurodysfunctional or neuromal adaptive behaviors present emotional and affective dysfunctions, which have a neurological predominance in their mechanisms, along with hormonal dysfunctions and long-lasting epigenetic mechanisms, since the child presents active neurodevelopment up to the age of eight, and adverse emotions must be avoided. However, with advances in recent years in research into neurogenetics and human neurobiology, through the use of functional neuroimaging with proton emission (fMRI), we objectively and analytically describe a clinical set based on neurobiology and social neuroscience, which organizes a series of situations by individuating objectivity and subjectivity. The most predominant neurological mechanisms with the greatest clinical presentation are biobehaviors, all of which depend on the neurological component and develop in response to the quality of the affective attention of the biological parents, and present a hierarchical nosology of cumulative causal factors that have been delimited based on descriptive clinical practice, like most diseases in medicine.

NEURODYSFUNCTIONAL INTERPERSONAL RELATIONSHIPS IN THE FAMILY ENVIRONMENT

According to Leisman G et al, children are suffering damage as a natural consequence of universal child development and therefore NOT as a consequence of variations in child rearing practices and financial status, but rather resulting initially from the processing of affective attention components, with economic and educational factors being built in a posteriori, and consequently resulting in specifically predictable behavioral patterns. The activity of the human mind has increasingly been shown to depend on the functioning of the neurobiological complex, which consists of natural phenomena involving neuronal activity, hormones, action potentials, neurotransmitters, genetic products and others.

Human consciousness has objective (neurobiological) and subjective components, in which each person has a unique narrative of how volition, habituation, performance capacity and the environment interact and influence over time, and thus provide experiences and learning. A better understanding of the network presented could help advance treatments for neuropsychiatric conditions related to aberrant predictive processing and promote cognitive improvement in healthy individuals. The neurocognitive variable related to the development of executive attention is called effortful control, representing the ability of an infant or an adult to inhibit a dominant response in order to execute a subdominant response. To be responsible for an action is to have the sense, notion and judgment, in the sense of feeling the effect of a medium or stimulus (positive or negative) and the reactions of the causal chains that led to the existence of the conscious intention that determined the action, whether active or passive, as well as self-control.

Individual values are personal convictions with a sense of consideration and importance, which generate significant motivation to seek or do, and can be derived from culture, belief, beauty, ethics, morals and others. Interests are related to the pleasure of doing something and are reflected in a preference for certain activities over others, and may or may not be congruent with values.

Volition is the cognitive and behavioral process by which an individual decides to carry out an action that he or she desires. It is defined as a psychological function of mental state and a neurological function of deliberate effort. A complex, continuous and standardized volitional process that involves the causality of acts and personal cognitive states, values and interests, which can be neurodysfunctional and even pathological. When we determine a choice to do an activity, this state is called immanent volition, and when we execute it, this act is called immanent, executive or imperative volition. When an immanent or determined choice controls or governs a series of voluntary acts, we classify it as a state of predominant volition, while subordinate volitions are those acts of will that put into practice the object desired by the predominant or governing volition. Volitional processes can be applied consciously and can be automated as habits over time, so they consist of a state and an act, like a thought or a behavior.

Several neuroscientists and researchers of the psychic apparatus have highlighted the importance of the defense mechanisms of the human mind, but a comorbidity has emerged that is unique to these, which affects interpersonal relationships and has an elementary function: Emotional Survival. The presence of family synchrony is fundamental and necessary for the proper neurodevelopment of the newborn's entire emotional cascade. When affective attention is absent or deficient, a series of maladaptive mechanisms occur in the

child's brain in response, which have the primary function of avoiding the initial discomfort of the absence of family synchrony, with amygdala behaviors, and a series of associated dysfunctions described below occur.

A set of eight Common Neurodysfunctions (ONCs) has been identified and described in clinical practice, which in a hierarchical construction, represent an initial personality microstructure, as it precedes and contributes to the onset of the development of some psychopathologies and some Personality Disorders (PD). Thus, an ONCs microstructure is initially formed, is clearly delimited, with various adaptive neuromal pathophysiological mechanisms, and expresses neurocognitive and behavioral states with affective attention deficit, and simultaneously involuntary affective neglect that is hidden in several cases. The microstructure can evolve with internalizing or externalizing states and typical association with different types of stress.

Several empirical evidences have established that the long-term response profiles of the stress system are programmed to correspond to the quality of the social and physical environments experienced during the first sensitive windows of life.

The following are the clinical and neurobiological elements of ONCs:

- Deficit of Neurological Familial Synchrony (DNSF) and limbic neuromaladjustment (Familial Schemas).
- Hormonal and immunoinflammatory dysfunctions.
- Dysfunctions of familial neurodynamics and neuromirroring.
- Neurodysfunction of the reward system and dopamine homeostasis.
- Neurodysfunctions of neural networks with emotional engrams, with deficits in primitive and higher mental functions (Neuroschematic Survival Syndrome).
- Simultagnosia and cognitive impairment.
- Dissociative Disorders of Neuroadaptive Consciousness.

These are subtle and automatic states such as Alexithymia, Anosognosia, Anosodiaphoria, dissociation of Consciousness, cognitive intelligence deficit due to secondary simultagnosia, deviant behaviors, secondary to activated pathological neurobehaviors such as family schemas, automatisms, fear and stress. They produce illusions of emotional survival.

- Secondary Simultagnosia: Inability to effectively identify more than four objects at the same time.
- Secondary Alexithymia: Inability to effectively self-observe (self-identify) emotional and affective awareness at the same time.
- Secondary Anosognosia: Inability to effectively identify the emotional and affective state of another person.
- Anosodiaphoria: Inability to identify one's own health condition, associated with denial of one's own condition.

The neural mechanisms underlying these difficulties are the same in individuals with dysfunctional parenting and other PT traits and familial and occupational social RINs. In the current literature, there is a growing number of clinical methods of emotional measurement, which analyze using physiological markers, associated with other underlying markers that influence the pathophysiology of physical and mental clinical diseases, as well as interfaces and social disorders.

According to Miglin R et al, there is a growing number of transdiagnostic clinical approaches that assess behavioral functioning in real time, and thus it is possible to measure the emotional socialization of parents, along with the emotionality of children, as well as the quality and effectiveness of these interactions in everyday life. A history of chil-

dhood adversity should be considered in the differential diagnosis of developmental delay, dyslexia, dermatitis, asthma, recurrent infections, somatization, sleep disorders, but also for psychological and behavioral functioning similar to Autistic Spectrum Disorders (ASD) and ADHD. With a prolonged ontogeny, relatively high levels of glucocorticoid receptors and persistent postnatal neurogenesis, the hippocampus is particularly vulnerable to the effects of stress.

ENGRAMS

Neural representations of context, dependent on the repeated activation of neural ensembles, remain stable for a period of time to facilitate recall and integration. An engram is a significant and long-lasting physical or chemical change in a neural network due to activity in a subset of neurons caused by episodic stimuli, which can be reactivated on presentation of all or part of the original stimulus set, leading to memory retrieval. In addition, engrams can be described as networks of individual engram cells that act together to store the components of memories, and the reactivation of this network is necessary and sufficient for the retrieval of this encoded memory. An engram can be understood as the physical record of a representation, with the activated set becoming reactivatable within a given set of stimuli (context), resulting in retrieval.

The activation of engrams may even be sufficient to induce a false memory in the form of generalizing a fear response in one context to a neutral context or even to construct a representation of a context that has never been physically experienced. Kitamura et al. found that engrams are actually formed simultaneously in the early stage of context memory acquisition, both in the HPC and in the medial prefrontal cortex (mPFC), where long-term memory is stored.

The Standard Consolidation Model states that newly acquired episodic memories are initially stored only in the HPC and then transferred to the cortex as long-term memories, accompanied by the "deletion" of engrams from the HPC over time. The mPFC engram cells that were generated at the initial stage are not reactivated during the recent memory retrieval state, but exist as "silent engrams". These silent engrams become functionally mature over time, concomitant with the transition of memory to the basolateral amygdala (BLA), which is necessary for fear memory, while the HPC engram cells gradually become silent over time.

Matos et al. demonstrated that the activity of a small subset of mPFC neurons is sufficient and necessary for remote memory expression, and selective disruption of cAMP response element binding protein (CREB) function in mPFC engram cells after CFC impairs remote memory formation. Several studies have shown that experience-activated neurons play a key role in memory. Learning-activated neurons are a cellular substrate for memory storage and retrieval and constitute engram cells.

The relatively low overlap between sets of neurons activated during learning and retrieval (10-40%) shows how engrams change throughout memory consolidation, through the dynamism of neurons "leaving" or "entering" the engram. Knowledge of the temporal profile of engrams elucidates how their composition is related to mnemonic properties, such as memory selectivity, an essential characteristic for adaptive behavior. Tomé DF et al. demonstrated, using a spiking neural network model, that memory engrams are dynamic and that changes in their composition are mediated by inhibitory plasticity. As such, they are fundamental to the emergence of memory selectivity during memory retrieval and consolidation.

The generalization of fear is a maladaptive response to harmless stimuli or situations that is characteristic of post-traumatic stress disorder and other anxiety disorders. Competition between engram and non-engram cells in the dentate gyrus determines fear generalization. The overgeneralized fear response to innocuous signals may result from oversensitized memory retrieval resulting from dysfunctional activity in the hippocampus.

Research into engrams is currently growing. Eligible neurons within a given brain region have been shown to compete for allocation in an engram, and relative neuronal excitability determines the outcome of this competition, which determines how engrams interact. Studies have shown long-lasting changes in engram cells, such as increased synaptic strength and spine density in resting-state (offline) neurons, as well as preferential connectivity with other downstream engram cells. Therefore, both increased intrinsic excitability and synaptic plasticity act simultaneously in the formation of engrams, as well as participating in the processes of memory consolidation and retrieval.

Technological advances have made it possible to target individual cell subtypes through gene expression, which can include constitutively active proteins or more transient expression caused by neuronal activity. According to Albarran et al., increasing the stability of neocortical dendritic spines improves learning, while decreasing the size of neocortical dendritic spines leads to decreased performance in a motor task. Recently, it has become possible to label synapses between neurons, thanks to the Reconstitution of GFP between Synaptic Partners (GRASP), which has been adapted to engram pre- and postsynaptic neurons with a genetic method based on the Immediate Expression Gene (IEG) cFos and has made it possible to visualize the engram at the synaptic level.

The genetic system based on the cFos IEG provides only transient labeling and it is unclear whether other genetic schemes based on other IEGs would assist in the labeling of structural synaptic engrams. Murthy BKB et al. demonstrated through the use of the GRASP system in the dorsal hippocampus of mice, under the control of two different IEG promoters commonly used to identify neuronal engrams: cFos and Arc, and demonstrated the possibility of identifying and labeling functional engrams for different periods.

CHRONIC NEURODETERMINANT STATES

According to Vygotsky, the human mind has two types of functions: elementary psychological and higher psychological. The human species is essentially social, since it is only through interpersonal interactions that the development of humanization occurs. The microstructure of the emotional survival personality of ONCs presents a series of dysfunctions of the higher and primitive psychic functions, which function as neural networks, which are true engrams of maladaptive emotional systems, synonymous with neuronal signatures or cognitive and behavioral schemas, and present a dysfunction of neuronal hyperconnectivity. Such cognitive states with associated dysfunctional alterations are subtle, and can generate micro-illusions, dissociation of consciousness, self-deceptions, choices, convenient values of emotional survival, which impair neurosignification.

The whole is made up of chronic neuro--schematic activations, with variations of dysfunctions in general intelligence, executive function, processing speed, volition, emotional memory, reasoning, perceptual comprehension, verbal comprehension, interpersonal communication deficits, language dysfunction, fixation of survival values, family and occupational RINs. On a second level,

cognitive dysfunctions, which are objective and involuntary in their onset, permeate the sense of voluntarism in what presents itself in our daily consciousness, in which a group of neuro-schemas of memories, of psychosocial coping (social coping).

The routine functioning of these network systems and underlying sub-networks can present functional and neurofunctional networks working simultaneously, which represents emotional neurodeterminism.

NEUROBIOPSYCHOSOCIAL CONDITIONING

Biopsychosocial conditioning in the family environment represents the activity of several schemas simultaneously, for long periods, as they are activated by the family context, with environmental or family cues. They have the function of coping with biopsychosocial stress, and begin with sudden onset of amygdala hyperactivity, which produces a narrowing of consciousness, since the amygdala system is the main component of momentary dominance and control and its maintenance, as well as being responsible for sudden emotional defenses and excess reason that brings resistance and rigidity, making irrational interaction or behavior, which is illusory and based on belief, not self-perceived. The amygdala system expresses the clinical schemas in the family environment, dysfunctionally habituated in self-attention, presenting insufficient interoception (alexithymia), cognitive inflexibility to correlate several pieces of knowledge simultaneously (secondary simultagnosia). Presence of neuronal hyperconnectivity dysfunction in value-driven attentional capture (VDAC), or fixation, associated with attention deficit in interpersonal and written communication.

A large body of literature suggests that neural activity consists of predictions and prediction errors that are common throughout the brain, and thus the vast majority of fMRI experiments in affective neuroscience are designed to limit predictability, including clinical data from visual, auditory, somatosensory and motivated behaviors. Predictions are important for the control function of emotional and material survival, but can be derived from semantic cues (verbal instruction) or newly learned associations stored in memory (conditioning). The ascending connections of the Superior Colliculus are candidates for an early plastic effect in higher, more "experience-dependent" circuits of the social brain. Evidence shows that the Superior Colliculus contains the largest amounts of GABA and the highest density of GABAergic synaptic terminals in the brain. They can refer to stimulus attributes (from low-level sensory features to object perception and complex social interactions), stimulus timing (even when "unstable"), expected motor responses (button presses, eye movements), expected somatosensory stimulation (sensation of pressing a button), expected stimulus sampling given motor responses (eye movements, pupil dilation) and also visceral changes (changes in heart rate, breathing), among others. Given that the pre-stimulus period probably consists of different brain states at different times (rather than a stable baseline), this raises the question of whether the pre-stimulus brain state has implications for the brain-behavior relationship.

The brain is in constant motion, and when a stimulus interrupts its trajectory, the functional activity observed in response to the stimulus reflects a deviation from the trajectory. The predictions developed over the years vary between individuals depending on their personal development history and are probably difficult to modify. Animal research has shown that early sensory areas exhibit plasticity related to valence processing, which is considered a "central" affective feature of our emotional lives. Alternatively, a predicti-

ve processing approach suggests that greater activity in these early areas may be driven by prediction errors at relatively lower levels of the hierarchy.

In typical image visualization task designs in affective neuroscience, low-level predictions might concern when and where to position the eyes, how much to dilate the pupils, and the expected changes in visual sensory information given these motor movements ("active inferences") as generated by eye movements. To the extent that affect involves a multi-level cascade of predictions and prediction errors, it is quite possible that predictions are generated in sensory cortical areas other than those receiving direct input. An evocative image of a screaming child can drive predictions in the auditory cortex, and these predictions can play a constitutive role in affective experience.

A psychological state can involve different brain regions at different times (degeneration), depending on how a stimulus interrupts (introduces prediction error) ongoing brain activity. The complete set of predictions constitutes a person's internal model and can be idiosyncratic to a person's experience. Direct inference involves inferring the probability of activation in a brain region given the previous brain state, as well as the psychological state induced by a stimulus. Chikazoe et al. employed representational similarity analysis and identified brain regions that exhibit continuous activity and reflect a continuous dimension of subjective valence, spanning neurological states from negative to positive affect.

While simple feature detection models show that there is a specific and reliable pattern of activation, and therefore underlying affective experience, located in limbic and paralimbic regions. As predictions are not stationary and prediction errors are naturally contingent on predictions, the neural activity underlying affective experience will depend on which aspects of an evocative stimulus are significant and present ongoing predictions of threat or violation. Current models of predictive processing suggest that there may be many different brain states that give rise to feelings of (dis)pleasure or arousal. The idea that the baseline state involved low levels of activity spread evenly across the brain gave way to the discovery that a certain set of "default mode" brain regions were actually more active during rest than during task engagement.

Some of the key regions of the default mode network include portions of the anterior medial prefrontal cortex, ventrolateral prefrontal cortex (PFC), posterior cingulate complex, hippocampus and other medial temporal lobe structures, and lateral temporal and parietal areas. This "default mode" is not an inert or "resting" baseline for psychological function. Although default mode areas often experience reduced overall activity during certain cognitive and attentional performance tasks, they experience increased activity during social cognitive tasks. Thus, the brain does not return to a stable functional baseline, at least in the spatio-temporal resolution of the fMRI data.

When a higher-order common factor is used to model the correlations between response inhibition, working memory updating and mental set change, this common factor predicts the inhibition factor almost perfectly. However, there is significant variation in the update and change factors that are not related to the common factor.

Resting-state and functional connectivity data suggest several distinct configurations (networks) of the PFC and other brain regions: the lateral "frontoparietal" ("central executive") network (FPN), anchored in the dorsolateral (dl) and dorsomedial PFC and posterior parietal cortex; the "cingulate-opercular" network (CON), which overlaps with a "salience" network and includes the ACC, insula and subcortical regions; the "ventral

attention" network, which includes the inferior frontal gyrus, regions of the insula and the temporoparietal junction; and the "dorsal attention" network, which includes the frontal field and the intraparietal sulcus; and the "default mode network" (DMN) comprising regions of the medial PFC that interact with certain posterior cortical regions.

The brain processes three sources of motivation: extrinsic rewards, moral values and image concerns. According to decision neuroscience, when choosing between accepting or rejecting an offer that weighs up two types of attributes (moral values and money), the brain assigns a value to each option and compares them by calculating their difference. This scheme has been applied successively in the field of value-based decision-making in relation to various types of benefits (money) and costs (waiting for a long delay). A neurobehavioral and cognitive pattern that shares the same brain activation mechanisms characterizes the primary NDE with an emotional survival function and the secondary NDE with a financial/physical survival function.

Although it may seem like a split-second phenomenon, deliberating over which emotions we perceive unfolds over several stages of decision-making processing. General neurocognitive models of perception postulate that our brain first extracts sensory information about the world, then integrates this data into a percept and finally interprets it. Furthermore, the left amygdala was responsive in all classes of decision-making paradigms, regardless of the demands of the task. Bilateral brain processes for non-verbal decisions, left brain processes for verbal decisions.

The mechanistic explanation of emotion perception consists of constructivist theories, which argue that the emotions of others can be accurately inferred from a combination of motor expression perception, contextual processing and conceptual knowledge about the relationships between emotions, desires and beliefs. The perception of motor expressions can inform the emotion inference process not because motor expressions reflect emotions on their own (there is no one-to-one mapping), but because the observer has learned through experience to associate certain motor expressions with certain emotional experiences through a bootstrapping process.

Perception

Our perception of free will is composed of a desire to act (volition) and a sense of responsibility for our actions (agency). Lesions that disrupt agency also occur in many different places, but fall within a separate network defined by connectivity with the precuneus. Together, these networks may be the basis of our perception of free will, with implications for neuropsychiatric illnesses in which these processes are impaired.

Recent research has therefore focused on understanding this perception, dividing it into two processes: the intention or motivation to act, called volition, and the sense of responsibility for one's own action, called agency. This view has received considerable empirical support from studies showing that spatial and temporal discrepancies between the execution of an action and the visual feedback of the action reduce the feeling that the observed action is one's own. Thus, the introduction of a spatial transformation between an action and its visual consequences reduces participants' sense of agency in proportion to the induced incompatibility.

The so-called "intentional binding" effect provides another line of evidence for the role of temporal contiguity between action and outcome in the construction of agency. The intentional binding effect was first reported by Haggard et al. and refers to the subjective compression of the temporal interval between a voluntary action and its external sensory

consequences. The intentional binding effect would constitute an implicit but reliable measure of agency, since it only occurs when events in the external environment are accurately recognized as consequences of the action itself. In comparative accounts, a positive sense of agency is the default operation when there is no mismatch between anticipated and actual states.

Thus, a reliable and explicit sense of agency can only be formed when re-aferent signals (visual, motor or proprioceptive) become available for matching with intentions. Consequently, agency can only be attributed retrospectively, even though it is informed by online cues about orientation and motor control. However, an alternative possibility is that the sense of agency is also generated prospectively, before the action itself and before the actual effect of the actions is known.

The onset of a visual stimulus of random dots marks the beginning of the decision--making process. Useful information is encoded by a set of neurons in the visual cortex. The flow of information from the stimulus is processed by specific regions in the visual cortex, which provide a flow of evidence for downstream processes. The flow of momentary evidence comes from neurons in the visual cortex, concentrated in the middle temporal brain region (MT). Other neurons, residing in the association cortex, represent the accumulation of this momentary evidence. A fundamental property of the neurons in these areas - the vast majority of the cortical mantle in primates - is their ability to sustain firing for long periods in the absence of immediate sensory input or immediate motor effect. While MT neurons are firing at a roughly constant rate, neurons in the IPL gradually increase or decrease their firing rate as more evidence accumulates for or against one of the choices.

If the stimulus is turned off and a delay period occurs, the MT neurons return to their baseline firing rates, but the LIP neurons whose response fields contain the chosen target emit a sustained discharge that indicates the outcome of the decision. However, the firing pattern of the neurons representing the momentary evidence is entirely caused by input from other neurons, many of which are already in a continuum of activity and others of which are "asleep". The prefrontal cortex plays an important role not only in determining which events to perceive, but also which corresponding response dispositions to select and update in manifest behavior. Thus, action selection is the result of competition between response tendencies in the context of prefrontal bias signals that represent goal drives and efforts.

Action selection can be dissociated from impulses and efforts as a result of a lowering of the threshold for action selection. The emotional inhibition task involved the OFC and amygdala, while a thinking-not-thinking task involved the hippocampus, consistent with the work of Anderson, who demonstrated that memory retrieval can be inhibited by a dlPFC-hippocampal pathway via relays in the medial temporal lobe or retrosplenial cortex.

The term categorical perception describes the subjective experience in which a perceived dimension jumps abruptly from one category to another at a certain point along a continuum, rather than changing gradually. Categorical and continuous perception often occur simultaneously when processing the emotions of others: the former allows for a gestalt perception of a single emotion, while the latter allows us to perceive subtle variations within an emotional construct. However, categorical perception seems to dominate the way we process and attribute emotions in others, and the reason for this may be to obtain cognitive efficiency by analyzing information in meaningful but limited blocks of information.

The influence of context and language also increases in the inference of emotional state, because the richer the emotional expression in situational information (a loud laugh), the less need there is to rely on context to infer the respective emotional state. So far, less attention has been paid to how higher cognitive functions (language processes, access to semantic knowledge) contribute to the formation of holistic perception and its interpretation in various contexts.

Perception occurs when incoming sensory information is made available to higher-order brain regions and compared to a mental model. In the ventral visual cortex, this mental model consists of semantic categorical representations, such as a prototype of a stimulus, or how a familiar face involuntarily stimulates. In the dorsal visual cortex, the mental model consists of visuo-optical and audio-motor sequences potentially stored in our procedural memory, demonstrating how emotional expressions and emotional statements evolve over time. These models allow us to perceive and discriminate the actions of other individuals, including facial movements and speech.

A later stage in the process of emotional perception concerns emotional categorization or verbal labelling. By converting the set of sensory information into a percept that can be communicated, an individual is able to relate to and describe the emotional state of another individual. In relation to this stage, a significant task-dependent role is attributed to the frontal cortex in matching incoming sensory information with a mental model. Although there are reviews and meta-analyses on the multiple roles of the inferior frontal cortex (IFC) in the perception of a large class of stimuli, there are no systematic reviews for the perception of emotional expressions, despite abundant empirical data.

Another frontal brain structure consistently recruited during perceptual decisions about emotions is the dorsomedial frontal cortex (dmFC). This structure is predominantly involved in social cognition, such as forming impressions about others and inferring beliefs, desires and intentions. Emotional expressions conveyed by others are inherently social stimuli and are processed differently from other classes of stimuli, such as inanimate objects. The involvement of the dmFC in this specific decision-making process suggests that facial, bodily and vocal emotional expressions are not only proxies for mental states, but also that observers spontaneously infer traits and mental states (beliefs, desire, intention) that are integrated into emotional evaluation.

In addition to the frontal brain structures targeted by the ventral and dorsal processing streams, other brain structures that do not belong exclusively to either processing stream also contribute to perceptual decisions about emotions. One of these structures is the amygdala, which works simultaneously with the sensory and higher-order cortexes to mark incoming sensory information with contextual relevance and subsequently detect this relevance in the next encounter with that stimulus. The fear conditioning procedure instills an initially neutral stimulus with the aim of eliciting biologically relevant responses and behaviors (freezing or fleeing) after consistent association with an unconditioned aversive stimulus. In addition, the amygdala probably processes various emotional expressions, such as facial expressions and vocal prosody characteristics, as relevant social cues.

The amygdala may serve as one of the interfaces between the sensory cortexes and higher-order brain structures. The overwhelming evidence suggests that the right pSTS is involved in decoding and understanding meaningful social actions conveyed by gaze direction, body movement, and other types of meaningful goal-directed movement or implied by spoken words.

Neurodysfunctional attention

Attention plays an essential role in motivating behavior and cognition, such as language and memory, and selectively enhances the processing of relevant sensory information. Attention is our ability to focus on relevant information rather than irrelevant information. Attention has qualities and intensities. When focusing on a task, attention can be distracted by new, unexpected events that are irrelevant to the task. This is the case with distracting sounds, which impair performance in children as they are part of the long-term development of attention control.

The ability to focus attention and ignore new sounds that are irrelevant to the task develops considerably between the ages of 4 and 6. Different sources of motivation contribute to the regulation of sensory processing in the cortex and perceptual behavior, such as goal--oriented attention for cognitively demanding tasks, which is often driven by external incentives. Attention levels can also be increased by an internal desire to complete a task without any apparent change in external incentives, but this requires cognitive effort. The ability to act based on the current incentive value of action outcomes is a defining characteristic of purposeful or goal-oriented behavior, distinguishing goal-oriented responses from stimulus-elicited habits that are unaffected by changes in outcome values.

Some studies show that V4 neuronal activity in the visual cortex is increased as a result of increased cognitive effort in response to the increased demands of the attentional task. Poort et al. demonstrated that distinct response suppression mechanisms are carried out by inhibitory and excitatory neurons in the visual cortex, associated with top-down input models, and thus generate enhanced sensory processing due to learning and attention. The social brain in an adaptive neuromal state promotes dysfunctional inattention in order to avoid threats of emotional distress and indirectly generates neglect effects and low diligence processes.

The term "unity and diversity" (UD) is used by neuroscientists to describe the relationships between these diverse frontal lobe processes, responsible for an "irrational variety" in human reactions, even with restricted and non-progressive lesions of the prefrontal regions, characterized as "compulsivity" or "behavior abnormally linked to stimuli". The common and basic element of UD is "neglect of purpose or disregard of a known task requirement". The study of the PFC is a great ally in deducing the organization of the mediation of a variety of cognitive processes, such as the mastery of automatic or dominant responses, interference controls, alternations and coordination of tasks, updating of working memory, monitoring and planning.

Social cognition is the process that guides behavior in relation to other individuals of the same species. Several brain structures play a fundamental role in controlling social behavior: the ventromedial prefrontal cortex, the amygdala, the right somatosensory cortex and the insula. What we pay attention to is influenced by the reward of learning. Humans automatically attend to stimuli previously associated with reward and to stimuli that have been experienced and conditioned during visual search, even when it is disadvantageous in current situations.

Several studies have shown that associative reward learning alters the brain's processing mechanisms for visual stimuli, in the face of learned reward cues that are difficult to ignore. The neuroanatomical connectivity of the PFC associated with most cortical and subcortical regions mediates various neural networks, and thus generates cognitive states of control and attention in different functional domains (spatial, visual and verbal). However, changes in mental state require several sub-processes, such as interference control, retrieval and reconfiguration of task sets.

Changes due to the influence of previously learned stimulus-reward associations, but which may currently be considered irrelevant, is a phenomenon called "value-driven attentional capture" (VDAC). VDACs are representations of stimuli associated with reward that undergo plasticity in the sensory cortex, automatically capturing attention during the initial processing of any lived experience. Goal-directed behavior or associated outcomes present motivational elements based on cognitive values, which influence decision--making and aid interpretation to distinguish motivational control from value-based processes. Studies of selective attention typically consider the role of task goals, but attention can also be captured by stimuli previously associated with reward or emotional defense.

Many studies show that reward learning induces visual cortical plasticity, which modulates early visual processing to capture attention; learned value modulates spatial signals in visual cortical areas, an effect that correlates with VDAC. Attentional capture by previously rewarded targets as the modulating effect of reward on priming, as well as the uncoupling of reward history and prior task relevance on value-driven attention.

Studies using magnetoencephalography have investigated modulations by reward learning and have shown that VDAC is supported by learned value signals that modulate spatial selection throughout the posterior visual and parietal cortex, which can still occur in the absence of changes in visual processing in the cortex. This value modulation is influenced by the strength of the VDAC behavioral effect and persists in subsequent target processing. Recent studies have shown that VDAC is based on Pavlovian conditioning, and behavioral evidence distinguishes VDAC from other established control mechanisms, suggesting a distinct underlying neurobiological process. VDAC persists perennially even without reinforcement, unlike other forms of learning, where the removal of reinforcement typically leads to extinction. Evidence suggests that the time course of resources and reward is flexible, with some restriction on the learning of the resource-reward association. When these value-signaling stimuli appeared as distractors in the test phase, they continually shaped attentional selection, despite their irrelevance to the task. The allocation of rule-guided attention to different stimulus dimensions produced discriminated patterns of activation in the visual cortex, providing a signature of top--down bias in perception.

Survival in a constantly changing environment requires qualities that predict social reality. Our reasoning seeks patterns of information that provide predictions. The brain tries to make it easier to predict the behavior of others without communication, because coordinated repetitive movements of closely related individuals are more predictable for the brain. Cognitive development and social cognition require individuals to connect and coordinate with relatives (and/or peers) in order to capture patterns of information that provide predictions. The differentiation of "facial expressions" is a process of increased mental activity, which has considerable applications in the clinical setting of emotions, as attentional bias towards threat is implicated in the etiology and maintenance of anxiety disorders.

In fMRI studies of adults exposed to familiar and unfamiliar videos, neuroadaptations have been shown to lead to closer connectivity between the ACC and the anterior insula, consolidating an interface that combines information from exteroceptive and interoceptive sources to support attachment representations. Seeing one's own child as opposed to a familiar child was associated with activation in the amygdala, insula, anterior paracingulate cortex and posterior superior temporal

sulcus. Seeing the face of an unfamiliar child compared to that of an unfamiliar adult involves areas associated with attention as well as facial perception. In response to images of children, parents also exhibit higher plasma concentrations of oxytocin, as well as greater activation in brain regions important for decoding facial emotions (caudal middle frontal gyrus), mentalization (temporoparietal junction) and reward processing (medial orbitofrontal cortex).

In summary, socioemotional studies show a mixed pattern of affected functions; fMRI and neural hodology studies have shown connectivity dysfunctions in the amygdala and parietal networks, aberrant frontoparietal and temporoposterior networks with relative preservation of the posterior part of the default mode network and the visual network. They also showed a significant disconnection in the frontal pathways. Several neuroscientists have shown that value signals automatically guide attention to new situations and associations, which may or may not be beneficial, depending on their congruence with current goals. Cognitive control allows stimulus-response processing to be aligned with internal goals and is therefore central to intelligent and purposeful behavior. Control depends on the active representation of task information in the prefrontal cortex (PFC), which provides a source of contextual bias in perception, decision-making and action. Studies analyzing the strength of neuronal connectivity in the PFC have shown that the inferior frontal sulcus and intraparietal sulcus during context-dependent decision-making are functionally active at rest and during task performance. Attentional focus ensures that emotionally salient features of complex events are preferentially retained in memory, which may be an evolutionary disadvantage. The superior colliculus (SC) dominates visual behavior during the first months of life, is active at birth for complex visual tasks and has a significant influence on several hemispheric regions.

The SC is the main brain center, with a subcortical structure, which permanently integrates visual and non-visual, external and internal information (inferior upwards and superior downwards, respectively), and has the enigmatic ability to make non-conscious decisions about where to focus attention. It is also a sentinel that triggers the subcortical mechanisms that drive social motivation to follow faces from birth and respond automatically to emotional stimuli. Through indirect connections, it also simultaneously activates several cortical structures necessary for the development of social cognition and the multi-attentional task required for conscious social interaction in real-life scenarios. It also plays a crucial role in the integration of external and internal senses with emotional, autonomic and endocrine functions, as well as in visual/motor transformation, target selection and goal-oriented motor responses. Its multiple direct connections from the cortex are responsible for the shift from covert to overt attention and for the interaction of the medial and lateral cortical brain networks, which regulate and integrate endogenous attention with external attention, respectively.

With the description of the "Sprague effect", a syndrome of hemineglígence produced by a unilateral lesion of the CS, or the resolution of hemineglígence in a patient with a frontal lesion, after inactivation of the contralateral CS, evidence was given of the significant influence of the CS on hemispheric functions. In cortical blindness, the primary visual cortex is compromised, but the SC and the magnocellular visual pathway are spared and the individual is able to react to stimuli. This is evidence of the SC's role in continuous, multi-attentional and non-conscious emotional processing, including autonomic and motor reactions. Affective and motivational aspects

of visual attention and saccadic control activate the "Emotional System" or "Alarm System" of the SC, and thus simultaneously trigger attentional, autonomic, endocrine and cognitive functions via the dopaminergic reward system, the adrenergic alert system, the cholinergic system and the endocrine system.

Abstraction is an intellectual operation that consists of isolating, in a concept, one element to the exclusion of others, from which the abstraction is then made. The notion of abstraction is important for understanding some philosophical controversies in relation to empiricism, universalism and evidence--based medicine. Abstraction is the cognitive operation by which something is chosen as the object of perception, attention, observation, consideration, research, study, judgment and so on. It is isolated from other things with which it is in a greater relationship.

Spatial cognition corresponds to an individual's ability to perceive spatial relationships between objects, as well as to present themselves with the notions of depth, solidity and distance.

The Heteromodal Association Area of the Posterior Parietal Cortex is important because it is associated with different syndromes that significantly involve deficits in spatial cognition. The main sensory pathways (visual, tactile, proprioceptive, auditory and vestibular) that receive stimuli for the development of the spatial cognition process. A spatial fixation point is the place of conscious attention, where we usually focus our attention; where we fixate, it is possible to allocate some attention away from the fixation point (covert attention). This covert attention is known for shifting or compressing the visual receptive fields towards the attended location to improve visual acuity at the attention location, although covert attention also defines a reference center that affects the visuomotor response. This cognitive capacity is closely correlated with spatial perception, which is formed by the end result of the organization and integration of various sensory stimuli, which are intended to help the understanding of consciousness in an overview of the relationships and forms of the external environment.

Neuroaesthetics

Perhaps it would be more appropriate to say that beauty is in every sense of the observer. The experience of the world is primarily multisensory and integrated into different sensory modalities, so many of our decisions are based on the aesthetics perceived by multiple sensory modalities, rather than by a single sensory modality. Aesthetics can refer only to the external design, or material, as if a food looks good but doesn't taste good, most of us won't choose to eat that food, and we won't buy a perfume just for the color, but also for the smell. Thus, multisensory cues can, separately or in combination, influence our perceived attractiveness or aesthetics of an individual or object, and our attitudes and actions towards that person or object.

It is therefore important to deepen our understanding of how the human aesthetic process operates across different sensory modalities and how this process is distinct from basic perceptual processing. Karim AKMR et al. present a model based on hierarchical styles of information processing, distinguishing aesthetic processing from basic perceptual processing, and demonstrate how affective and cognitive influences interact to modulate aesthetic preferences under top-down and bottom-up control. In support of this model, we present findings from cognitive neuroscience, neuroaesthetics, affective science, psychology and the arts that highlight the crucial role that different cortical regions play in recognizing objects or stimuli and appreciating their beauty in visual and non-visual modalities, and how their roles can be mediated by experience.

Basic perception depends on the explicit properties of the stimulus and the perceptibility of the cognitive agent, while aesthetic perception or appreciation may or may not depend on the explicit properties of the stimulus, but on the individual characteristics of the observer's cognitive agent. Personal characteristics of the cognitive agent that can further shape aesthetic preference include culture, experience, interest, aesthetic mindset, emotional state or motivation. These arise from the dynamic interaction between the cognitive agent and the object, rather than just explicit "objective" properties of the object or "subjective" characteristics of the cognitive agent.

A projected image may not be appreciated by a particular religious community because the people in that community believe that there is no place for images, and so it goes against the religious code, belief systems and values, and so it is perceived as non-aesthetic and non-beautiful, suggesting that beauty depends on value and is in the eye of the beholder. Thus, the perceived quality of an object reflects the observer's opinion or judgment of its (aesthetic) quality regardless of its actual physical qualities, and so an unfair opinion or judgment can arise.

An aesthetic property is distinguished from a descriptive or basic physical property because the perception of an aesthetic property involves cognitive evaluation, hedonic valuation and often knowledge-dependent concepts, but the perception of a descriptive physical property does not. A descriptive property, such as being rectangular or being red, can be attributed without any belief about its evaluation and hedonic status, whether positive, negative or neutral, are natural attributes. The perception of the descriptive property (being a circle, a triangle or a square; lexical status of sequences of letters) can operate with or without awareness, or attention, but the perception of the aesthetic property cannot.

Basic perception is a non-evaluative form of cognitive process or a purely non-cognitive process that generally does not induce any emotional feelings, whereas aesthetic perception or appreciation is not only a definite cognitive evaluative process, but also induces emotional feelings. However, a complexity associated with aesthetic perception is the conflicting aesthetic emotions elicited by the composition of multifaceted stimuli. The coexistence of aesthetic and non-aesthetic properties in the same stimulus is likely to simultaneously induce positive and negative emotions in the cognitive agent. In such an approach-avoidance dilemma, aesthetic preference can be determined by the resulting impact of the two opposites on the elicitation of aesthetic emotions.

AUTOMATA AND COGNITIVE CONTROL

Automatic information processing is not a unitary construct, but is diagnosed by considering the presence of different characteristics such as uncontrollable, efficient, unconscious and sudden. The characteristics of automaticity are not intrinsic to the processes, but point to the conditions under which neural processes operate or to the variables that influence their occurrence.

Psychological processes should not be diagnosed as automatic or non-automatic in a categorical way, but rather as more or less automatic than other processes, depending on the number and extent of the characteristics. Distraction is a functional emotional regulation strategy used to alleviate a state of emotional discomfort or suffering. From the perspective of the attention economy, distraction is increasingly associated with the use of digital technology, performance deficiencies and interference with higher-order cognitive processes. Distraction can be conceptualized as the result of a reaction to exogenous (orien-

ting system) or endogenous (alerting system) signals, or as the result of a conflict between these two networks that are competing for attentional resources.

Endogenous signals (alert system) are the bottom-up signals in the form of expectations, worries and persistent thoughts that lead to distraction or daydreaming. The executive system is implicated when a conflict arises between exogenous and endogenous signals, leading to discontinuity of attention and therefore misallocation of attention, causing difficulties in inhibitory or executive control, which are dependent on dopaminergic neurons.

Cognitive control (CC) is a term generally associated with the healthy functioning of the PFC and its related regions, such as the cingulate cortex, and is considered synonymous with the earlier notion of executive function (EF). It also involves a central process of behavioural regulation that optimizes its goal orientation and counteracts automaticity. The SC allows stimulus-response processing to be aligned with internal and external goals, which is essential for conscious (purposeful), intelligent and rational action. The PFC's role in the CC essentially consists of biasing attention contextually (through instructions) to resolve conflicts and exert attentional control.

Several fMRI studies show that activation of the ACC was accompanied by activation of the dorsolateral (dl) PFC associated with top--down adjustments of response control, which can be termed a "multiple demand" (MD) system. The cellular physiology of these regions is characterized by rapid firing of neurotransmitters such as dopamine, and they have neural plasticity properties that allow functions such as goal maintenance in working memory. The three functional abilities of the SC are: inhibition of a prepotent response (interrupting an automatic response, sometimes to make an alternative response), updating working memory (continuously replacing no longer relevant information in working memory with newly relevant information as detected in the environment) and switching mental sets (alternating between two alternative tasks). The CC operates in different internal and external states, such as stress, which alters the neurochemical environment, and the "inverted U" functioning of the PFC, which translates into effective work performance and general intelligence.

Individual differences in response inhibition tasks may be particularly related to this capacity, because if a goal is inactive or ineffective, more automatic or overbearing responses will take over, leading to poor performance in these tasks. They characterized the unity of frontal lobe functions in terms of goal-related processes, specifically the ability to form and carry out goals at multiple levels of abstraction. Studies showed that goal neglect was more closely related to general brain atrophy than to focal frontal lesions, and that these general goal-related processes are related to the MD network, a network of frontal and parietal regions that are commonly activated in tasks. Several studies have shown moderate to large correlations between measures of intelligence, particularly measures of fluid intelligence (such as reasoning), and measures related to CC. Hybrid organizational systems can incorporate MD features in certain regions of the PFC, but also allow for the specificity of neural connectivity to mediate specific aspects of response inhibition, updating and cognitive flexibility. In the case of working memory, the lateral frontal cortex in primates, already implicated in the spatial delayed response task, was known to contain cells that exhibited activity in periods of delay in response to stimuli in various sensory modalities.

Electrophysiological evidence, as well as human functional imaging, suggests that the inferotemporal/perirhinal and anterior parietal cortex also exhibited maintenance ope-

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rations, although the dlPFC appears to have important roles in resisting interference (distraction) in working memory. Recent studies have shown the role of posture in alertness and found evidence of top-down executive control in maintaining alertness. Alertness has been linked to the noradrenaline system that modulates frontal and parietal structures. The executive network is involved in detecting errors, resolving conflicts and other aspects of performance, and involves the anterior cingulate and the anterior insula (operculum).

Many psychiatric and neurological disorders are associated with specific symptoms that may be, at least in part, the product of impaired CC, or with more general cognitive deficits that, when accompanied by emotional behaviors, may express prolonged neurocognitive states and moments of "moral dementia". Many theories and debates about human intelligence have presented theories as single regions, or specific overlapping networks, but the discoveries of neural hodology and the reconnection of inter-hemispheric neurons may help to understand better. The emphasis on the multi-network connectivity of the whole brain, and the inclusion of dysfunctional weak connections in some regions and strong connections in others, motivates the prediction that intelligence will depend on functional connections that are distributed globally throughout the connectome.

Using resting-state fMRI data, we expand our understanding of the neurobiological substrates that give rise to intelligence and emphasize the importance of considering neural representations of lower activity in emotional and maladaptive neurosystems.

Alexithymia and Anosognosia

According to Taylor et al, alexithymia is a personality trait essentially characterized by deficits in the ability to identify and describe emotions and reduced tendencies to engage in fantasies and reflect on emotional experiences. The term alexithymia, which literally means "lack of words for emotion", is therefore an identification of a neurological state based on clinical observations in many patients with psychosomatic illnesses, who have a restricted affective life and hardly benefit from psychodynamic therapy.

Some authors define it as a personality trait characterized by difficulties in recognizing (identifying) and then accurately verbalizing one's own emotions, using a cognitive style oriented towards external events rather than intrapsychic experiences. Attention predominates in the awareness of external reality and therefore presents difficulties in identifying feelings, deficits in automatic facial expressions in states of neuroadaptation. The neuropsychological state of alexithymia is associated with various psychiatric disorders, such as depression, anxiety and eating disorders, and is therefore considered a general vulnerability factor for the development of mental disorders. Furthermore, it seems likely that alexithymic individuals receive negative feedback from the social environment about their deficits in perceiving, feeling and communicating emotions and their superficial ways of thinking.

Nemiah presented a deficit model in which a reduced capacity for fantasy formation and the experience of feelings is proposed, and a deficient representation of feelings and a diminished affective response are assumed. Different neurobiological models have been proposed to explain the etiology of alexithymia. It has been suggested that inadequate neural connections between limbic and neocortical areas may be a contributing factor to the development of alexithymia.

According to Buchanan et al., as a right hemisphere advantage has been described in the perception of emotion, it has been hypothesized that alexithymia could reflect disturbances in the functioning of the right hemisphere.

A popular etiological model of alexithymia represents the interhemispheric transfer deficit or functional commissurotomy model, according to which emotional material is disconnected from the left hemisphere when verbally expressive situations occur.

According to the hypoactivation model, alexithymic individuals are characterized by a reduced activation of the sympathetic nervous system in response to affective stimuli. Individuals who spontaneously develop stronger physiological responses to emotional stimuli should become more quickly aware of them and also make them more accessible to conscious reflection. Alexithymic individuals show low reactivity to negative emotional stimuli, in which the brain regions responsible for evaluation, coding and affective response, such as the occipitotemporal areas, amygdala and insula, function less, and are characterized simultaneously with anosognosia with the same deficits in perceiving others, by automatic activation again of the alexithymic circuits.

fMRI studies on alexithymic individuals have shown poor feeling states, few affective responses and deficits in emotional reactivity. Alexithymic individuals suffer in interpersonal relationships due to deficits in expressing themselves, feeling, perceiving, communicating, in front of "normal" people who also don't perceive the alexithymic's real problem. Alexithymic individuals show low reactivity to negative emotional stimuli, in which the brain regions responsible for evaluation, coding and affective response, such as the occipitotemporal areas, amygdala and insula, function less. fMRI studies in alexithymics have shown poor feeling states, few affective responses and a deficit in emotional reactivity. These are neuronal connection dysfunctions between limbic and neocortical areas. The reduced response of the fusiform gyrus to facial emotions with poor physical perception in alexithymic individuals can affect the brain's visual processing and thus impair the recognition of other people's emotional facial expressions. This process is currently classified by modern neuroscience as anosognosia. fMRI studies on alexithymic patients and masked individuals observed fewer hard responses and showed little activation of the amygdala to unidentifiable faces, with or without threat.

The alexithymic features may be consequences of deficits in interhemispheric communication, low limbic-neocortical connectivity and/or right hemisphere dysfunction and excessive amygdala activity. It is conceivable that alexithymic features phenomenologically represent a kind of final common pathway for the automatic processing deficits in alexithymia.

Several studies show that maltreated children show deficits in recognizing, expressing and understanding emotions. Higher levels of maltreatment in childhood or adolescence have been associated with higher levels of alexithymia. Researchers suggest its presence as a transdiagnostic mechanism. Other pathological situations of alexithymia are when patients have schizophrenia, psychopathy, autism, acute neurointoxication of substances, neurodysfunctions and long-lasting epigenetics, such as relapse states, allostatic cycles, pathological demotivation.

Duan et al. showed negative associations between the difficulties in identifying feelings subscale and activity in response to masked facial surprise in the fusiform, parahippocampal and superior temporal gyri. Pollatos et al. presented results of difficulties in identifying and describing feelings, associated with lower electrodermal responses to briefly presented negative images (but not to positive or neutral images). Sonnby-Borgström examined facial electromyographic (EMG) activity of the corrugator and zygomatic muscles in response to masked (and unmasked) emotional facial expressions in patients with alexithymia, and

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found that individuals with severe alexithymia showed less imitation of the corrugator muscle in response to masked stimuli (and lower levels of automatic processing). Reduced activation in this network in response to emotional stimuli, as observed in alexithymia, may prevent the effortless and unintentional calculation of their affective value.

Although most of the available evidence from neurobiological priming studies relates to visual emotional stimuli, there are also early indications that rapid, unintentional processing of auditory emotional stimuli may be impaired in alexithymia. However, it should be noted that not all the findings of neurobiological studies on the automatic processing of emotion and alexithymia suggest that alexithymia is related to cerebral hyporeactivity during the processing of emotion. In particular, the results of Mériau et al. show that activation of the anterior cingulate cortex to threatening faces irrelevant to the task is increased in alexithymia. Van der Velde et al. argued that the increased response of the anterior cingulate gyrus to emotional stimuli in alexithymic individuals may reflect greater cognitive demands to attend to and understand the emotional value of the stimuli. Alexithymic characteristics may be the consequence of deficits in interhemispheric communication, low limbic-neocortical connectivity and/or right hemisphere dysfunction. Although emotions are usually elicited involuntarily and arise without conscious effort, it is surprising that little attention in the etiological considerations of alexithymia has been paid to deficits in the automatic processing of emotion and their neurobiological underpinnings.

MEMORY

In the last decade, advances in cognitive neuroscience have begun to unravel the biological mysteries surrounding the persistence of emotional experiences in humans, with implications for understanding memory disorders in affective disorders. According to Josselyn SA et al, memory is the ability to use the past in the service of the present or the future; it is central to our daily lives and defines who we are; without it, we are condemned to an eternal present.

Episodic memories are encoded by neuronal ensembles activated by experience that remain necessary and sufficient for retrieval. Emotion has significant influences on learning and memory that involve various brain systems at different stages of information processing. They are influenced by the arousal and valence of the amygdala, and its interactions with the frontal and temporal lobes.

Currently, studies have accumulated data on the effects of emotion on memory systems, such as declarative memory (events, episodic, explicit) and non-declarative memory (implicit, fear conditioning). Recognition memory has two dissociable processes: familiarity discrimination and recall. Familiarity discrimination for individual visual stimuli is carried out in the perirhinal cortex of the temporal lobe.

A systematic review showed that the number of memories stored by a familiarity detection network depends on the rule of synaptic plasticity (storage depends on processes that produce synaptic weakening). Neural signs of visual familiarity have been observed as reductions in responses to repeated presentations of a stimulus, a phenomenon known as repetition suppression. Memory of a stimulus is degraded in two ways: plasticity events obscure existing memories and plastic weights weaken over time. Memory-selective neurons prefer new or familiar stimuli and scale the response according to confidence. They signal subjective choices, regardless of truth and values. Trust-selective neurons signal trust, regardless of the familiarity of the stimulus. Together, this functional separation reveals the action-independent coding of familiarity based on declarative memory and trust in individual choices.

Research in multisensory neuroscience uses clinical stimuli to investigate the impact of their content on cross-modal integration, and their functional variations are translated by the term "semantic". In several studies, most tasks that influence semantic factors have been found to lack cortical networks that are more likely to mediate these effects. Cortical regions are particularly responsive to variations in the content and states of semantic matches ("congruent") and mismatches ("incongruent"). Recent fMRI studies point to the functional differentiation of the temporal and frontal cortical regions, the former being more responsive to semantically congruent stimulation and the latter to semantically incongruent audiovisual stimulation. Doehrmann and Naumer showed that in "normal" individuals angry faces were associated with increased processing and effective connectivity of the inferior occipital regions, in relation to the ventrolateral prefrontal regions, and thus convey disapproval with subsequent evocation of excessive fear responses and negative cognitions.

Emotional episodic memory

The effects of memory enhancement by emotional arousal involve interactions between subcortical and cortical structures and the engagement of central and peripheral neurohormonal systems that are coordinated by the amygdala, but limit the field of consciousness. Memory enhancement by arousal involves similar brain systems in positive and negative valences. However, the retention advantages of emotional valence in the absence of high arousal partially reflect semantic and strategic processes that are regulated in the frontal lobe and that benefit declarative memory without the involvement of the central amygdala.

The contributions of the amygdala, PFC and MTL memory systems extend beyond the initial period of memory consolidation to initiate the retrieval of emotional memories, including especially those from the personal and intimate past. According to Hamann, autobiographical memory research allows for ethical assessments of more intense and remote emotional episodes, as well as investigations of emotional influences on memory phenomenology, but not on memory accuracy. The exact time of consolidation is the subject of considerable debate, and the stabilization of memory traces is a long process that can last months to years. Emotional arousal has complementary and immediate effects during encoding that are time invariant and are interpreted to reflect attentional influences on memory.

Recent studies have demonstrated the retrieval of items from emotional contexts with activation of limbic structures (amygdala, insula and cingulate) and various regions of the temporal and frontal neocortex. Studies of retrograde amnesia support Markowitsch's proposal that retrieval of remote personal memories involves interactions between the inferior PFC and its connections with the anteromedial temporal lobe running through the uncinate fasciculus. In addition, fMRI studies analyzing autobiographical retrieval in healthy adults have shown activity in the frontotemporal regions, as well as in other regions, such as the medial PFC, the retrosplenial cortex and the extrastriate cortex, which perform self-referential processing and visuospatial imagery. Emotional intensity affects the perceptual and phenomenological properties of autobiographical memories, such as the degree to which the memory is relived in retrieval, the vividness of the memory and narrative details.

Understanding how emotion transforms the experience of recall that accompanies autobiographical memories can advance knowledge about the complex and subjective characteristics of emotional memory. Superficial beliefs are illusory or self-deceptive in relation to a deep or concrete belief.

Contextual memory

Contextual learning is a critical component of episodic memory and important for living in any environment. Although we may be focusing on a specific event or person at the moment, many other streams of information occur simultaneously around the target to initiate the formation of contextual memory or "context".

External components collected by sensory systems, such as visual, olfactory, sound and tactile information, contribute to the formation of spatial-contextual information. External information and internal states are used. Internal elements are collected through the emotional, hormonal or stress states experienced in the situation. The effects of internal states can predispose a circuit to be more or less responsive to a given cue. External components are the elements of the environment or an object.

We can describe the context as the specifics of a place that is not the place itself. Thus, external elements are easier to manipulate and are often used as the primary means of modifying contexts. According to Marks et al, context modulates decisions, retrieval processes and plays an important role in the initial processing and reconstruction of episodic memories. It also aids in the agility of object representations, motivational determination and the evaluation of actions.

There are several tasks in which place memory can be included as part of a context-dependent memory paradigm, such as contextual fear conditioning (CFC). The entorhinal cortex (EC), one of the main contributors to the functionality of the hippocampal circuit, plays a key role in contextual memory processes. Lesions in this region result in a decrease in contextual learning, but not in avoidance learning. Hippocampal damage impairs CFC in a time-sensitive manner, with recent memories being erased by the damage and long--term contextual memories remaining intact.

Conceptual Memory

Storage and retrieval are mediated by subpopulations of neurons which are therefore considered cellular engrams. Human memory makes associations between different concepts. According to the Hebbian postulate, connections between neurons with correlated activity patterns are strengthened, while connections between neurons whose activity patterns are clearly correlated are depressed or even lost. This phenomenon increases the likelihood that patterns of neural activity that occur during coding will occur again at later times. Therefore, the subset of synapses between coactive neurons can also be considered a memory substrate, or a synaptic engram.

The episode "with my friend in this place" gave rise to an association between two existing concepts: before the trip (the episodic event), you already knew your friend (first concept) and had seen the place (second concept), but only after the trip did you associate these two concepts. Concepts are encoded in the human medial temporal lobe (MTL) by neurons called "concept cells" that respond selectively and invariably to stimuli that represent a specific person or place.

Each concept is believed to be represented by a set of concept cells that increase their firing rates simultaneously on presentation of an appropriate stimulus. With shared neurons, the activation of a first assembly (place) can also activate a second assembly (person). Firstly, for the brain to function properly as a memory network, it must be possible to remember the two associated concepts separately (place without its friend) rather than automatically both together. However, if the concepts share too many neurons, it becomes likely that the two memory items can no longer be distinguished, but are merged into a single larger concept encoded by a larger number of active neurons.

Shared concept cells can be visualized as an overlap between two memory engrams. Associative memory in recurrent networks, such as area CA3 of the hippocampus, has been modeled with attractor neural networks where each memory item is encoded as a memory engram in a fixed, random subset of "pattern" neurons, so that no pattern has an overlap above chance with another. Chains of association can form the basis of a "flow of thought" where the direction of transitions from one concept to the next is based on learned associations.

According to Romani-Tsodyks et al, memory engrams are independent of finite size effects and stimulate neuron sharing in some pairs of engrams above chance, which allows sequential retrieval in the presence of periodic background input. Gastaldi C et al. showed that in large sparse coding level networks, neurons shared by chance are not sufficient to reliably induce retrieval of a chain of concepts, since overlaps greater than chance, represented by experimentally learned associations, are required. Instead of transitions triggered by oscillations, transitions can also be triggered by two adaptation mechanisms that act on different time scales without the need for periodic inhibition.

Attractor networks with sparse patterns and random connectivity are suitable candidate models for biological memory because of two features: memory retrieval after stimulation with a partial cue and sustained activity after removal of a stimulus.

OBJECTIVE

The aim of this article is to assist in the resolution with the use of medical evaluation based on neuroscience and neurobiology, which have been organized from clinical practice faithful to reality, with the identification of a phenomenon harmful to collective integral health, observed with methodology and systematization of accumulated data from scientific publications from the Pubmed digital library, all selected with clinical abstraction and thus convenience, by identifying a clinical and pathophysiological causal link, which follows from a "continuum" of research. In this paper, we describe the cognitive and behavioral aspects that influence the quality of care and the effects on development in contexts of parental neglect, and in situations where care resources are unavailable.

METHODS

We present a pre-diagnostic clinical construct, based on neurophysiopathology, which was carried out in the practical field, and assists in the understanding and organized identification of a serious public health problem and a hidden setback in family courts. The aim is to contribute to the problem of NP, and its medical and specialized characterization, as well as its well-known social and psychological consequences. With an update and concrete clinical delimitation, with the organization of disorders with a clinical and pathophysiological causal link, which have significant genetic, epigenetic, neurodysfunctional, hormonal, inflammatory and metabolic influences.

RESULTS

The quality of care is directly reflected in maladaptive neurological development, with deficits in emotional regulation, intelligence and family and social skills, family synchrony and chronic states of cognition and behavior that distort the real values of mental health and the importance of interpersonal relationships (IR), in addition to influencing various aspects of stress in children and adolescents, and having a significant and direct influence on MD such as depression and anxiety and psychosomatic and metabolic disorders.

The studies reviewed, along with the description of neurodysfunctional behaviors

that interfere with affective attention, as other types of attention and values predominate, which are distorted in many cases for predominantly neurological reasons. Currently, there is no attention to this problem, and here, like other studies, they provide resources with real chances of prevention and improvement in various MD treatments and chronic organic diseases that have an important neuropsychological component.

DISCUSSION

Instead of applying psychological tests, we have identified through clinical neuromarkers, neurodysfunctional behavioral and cognitive states and amygdala automatisms, which are expressed by alexithymia and anosognosia, family schemas, chronic oscillatory hypodopaminergic state, which are neurodevelopmental responses in EAI environments and, consequently, NP in a subtle and hidden way. In addition to these states of momentary activation, there is a concomitant deficit of Mentalism or affective attention, which has mechanisms dependent on neurobiology, such as peripheral dopaminergic neurons and oxytocin. And with the habit of not intervening in harmful behaviors, what is neuromal-adaptive and even pathological becomes normal, and normal and merely adaptive are scarce and not identified with consonant concepts.

The evidence shows that reality is not moving in the same direction as current legal laws, human rights and objective medical codes of ethics are moving in the opposite direction, even though the reference we should be following would be civil laws, laws on children's rights, human rights and codes of ethics. In Brazil, there is a lot of research on the judicialization of medicine, in which a major problem is medical error, which in many cases is due to professional negligence, either through bodily injury or an ineffective doctor-patient relationship. Several pieces of evidence show that complex PTSD or a history of childhood abuse (or both), and even the presence of four or more Adverse Childhood Emotions (ACE) situations, negatively impact parenting and multiple comorbidities, physical and mental, and social risk behaviors, in addition to generating "intergenerational cycles" of trauma.

CONCLUSION

This work has described common and predominant states that occupy the space and time of emotional and affective attention, which is currently subtle and hidden from professionals and family members, elucidating a significant participation of a neurobiological order, which always acts simultaneously with subjective or personal components, and lived as an experience, and begins to understand the danger of the rigidity of a pattern that is believed to be normal, where normal does not present neuromal adaptation, but adaptation. This study should be reflected on by family law and family medicine professionals, as there is no assessment, let alone protective care interventions for children's neurodevelopment, which is sensitive to ACEs, which determine or limit the child's social, mental and organic life.

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