

ASPP

Neurobiological structures and functions that underlie selected unconscious and nonconscious phenomena:
Dissociation, a special case

Outline

Schematic of Brain

Autonomic NS

Branches of ANS

Left and Right Hemispheres

Hippocampus and Amygdala; schematic from Encyclopedia of SW, figures

Polyvagal SX

conscious(left hemi) generally thought of responsible for self-regulation; and explicit knowledge & awareness
unconscious(mid -to -upper right hemi)location of unconscious material, i.e., repressed material, implicit
nonconscious(low right hemi, amygdala and brainstem)location of dissociated material, sensory and not narrative(van der Kolk & Fessler)implicit

Dissociation from forensic workshop

be sure to note that high SNS leads to PNS and dorsal vagal shut-down

dissociation (right amygdala project directly to brain stem startle center and more from p. 283, Schore 2012)

Appendices

Brief description of adaptive and defensive projective identification.

A naturally occurring and early developmental way that emotions are regulated is through “adaptive projective identification”(Schore, 2003a, pp.71-88; Sroufe, 1996). Simply put, an infant learns that signaling distress (crying)brings about comfort by the care-giver(wants to stop the painful crying). Enough repetitions of the well handled signal and response experience will bring about the eventual ability of the young mind to comfort itself, beginning when they are taught to use their words to supplant acting out behaviors to get their message across to others. Research now shows that with maltreatment the default defenses are projective identification(Schore, 2003a) and dissociation(Perry, 2001).

An important clue to the process of “defensively projecting” is the impact that the immature and unpleasant behaviors have on others. This is also known as transference. The exercise for the case that follows will address our reactions to projective identification. Why would persons with the insecure attachment strategies and, more worrisomely, personality disorders, will be heavily dependent on projective identification? Primarily because, since childhood, their minds have relied on extruding their difficult (“dreaded affects”) toward others. Re-creating childhood, they may involve themselves with others who will often nonconsciously help them by feeling similar feelings, by encouraging, reassuring, and many other emotion management skills. A critical point is that when the person behaviorally creates their own emotional states in others in a bid for assistance, a dissociative process can occur. Now the person has rid themselves temporarily of difficult to bear emotions or experiences. It is at this point that a clinician may register(also known as counter-transference) that they are thinking or feeling in a way alien to him-or-herself or inappropriate to the moment, such as suddenly sad, incompetent, upset, self-doubting, and on and on(Smith, 1990, Heiman, 1950). This may be a reaction to something the client says, does not say, leaves out, moves around in the chair, hesitates, accuses, etc.

APPENDICES

Appendix A: Amygdala

Structures affecting and interacting with the amygdala include the following:

- anterior cingulate (involved with emotional and somatic (bodily) experience (Cozolino, 2006,77);
- orbitofrontal areas of the prefrontal cortex and frontal areas of temporal lobes (mature management of emotions) {Cozolino, 2002, 179-180};
- amygdala has direct connections to the autonomic nervous system (regulation of level of arousal in body) {Cozolino, 2002, 1810};
- Sapolsky (2005, 110) would add the septum (inhibits amygdala) as part of the limbic system; puts the "brake" on aggression as generated by the amygdala (Sapolsky, 2005, 110);
- hippocampus (explicit, retrievable memory, can be made conscious) {Cozolino, 2002};
- the frontal cortex is an inhibitor of the amygdala (Sapolsky, 2005, 104);
- insula involved in resonating with somatic and emotional states of others (Damasio, 1999; Craig, 2002 as cited in Buchanan, Tranel, & Adolphs, 2009, 305); and
- Hypothalamic-Pituitary-Adrenal Axis (HPA axis) {stress response system}.

List 3.4. Brain structures which process experiences differently

Each of the following structures have different and separate ways that experiences listed below are processed: amygdala, anterior cingulate, insula-orbitofrontal and frontal portions of the temporal lobes (Schore, 2003b, 234; Cozolino, 2002, 179-180) which are separate state-dependent affective, cognitive, behavioral functions:

- a. each contains different stored models of ways of processing affect related, meanings (Teasdale, Howard, Cox, Ha, Brammer, Williams & Checkly, 1999) ;
- b. different levels of implicit memory and self-states;
- c. self-states and somatic states located in the lowest section of the right hemisphere can be blocked from being passed upward through and to the higher structures for processing;
- d. memory in amygdala generalizes and hippocampus more finely discriminates among external data (Sherry & Schacter, 1987 as cited in Cozolino, 2002, 97).

List 3.4. Brain structures which process experiences

Appendix C: Right hemisphere functions Montgomery, 2013

The prefrontal system, the hierarchical apex of the limbic system, acts as the senior executive of the emotional brain. The following are selected functions of the upper right cortex (Schore, 2003a, 2003b).

Modulates emotional experience through interpreting and labeling emotional expressions

Affective shifts

Self-reflective awareness

Detecting changes of emotional state & breaches of expectation

Processing feedback information

Contains the coping system which is specialized to act in contexts of uncertainty or unpredictability

Detects “somatic markers” or “gut feelings “that are experienced in response to both real and imagined events, including threatening stimuli

Plays a primary role in optimizing cautions and adaptive behavior in potentially threatening situations

Regulation of autonomic responses to social stimuli

Modulate processing of pain & coping with painful stimulus

Evaluating facial expressions

Processing emotion-evoking stimuli without conscious awareness

Controlling allocation of attention to possible contents of consciousness

Mediates between the internal environment and external environment

Emotional “hunches”

Cognitive-emotional interactions

Processing of affect-related meanings

Associates emotions with thoughts

Social adjustment, control of mood, drive & responsibility (personality traits)

Processing of “self” and self-regulation

Self-concept/self-esteem

Attachment

Highest level of control of behavior

Danger appraisal

Appendix E: the Polyvagal System

Information about the arousal system greatly enhances clinical skill in understanding both the manifestations of the intrapsychic and interpersonal behaviors in the clinical encounter. The polyvagal theory adds such interesting information regarding the release of the vagal brake allowing an action to be taken. So instead of activating the sympathetic branch and utilizing the arousal system (sympathetic nervous system), which may need to be held in reserve, releasing the vagal brake preserves that energy. Additionally, the concept of an older “reptilian” and newer “mammalian” system of low energy is easy to remember and helps differentiate between calm (parasympathetic nervous system) and “freeze” (vagal system) states in clients. The social engagement system requires a calm parasympathetic response so that people can approach without fear. If that does not work, then the sympathetic branch will become activated and fight or flight will occur. And if the person is trapped, the immobilization (freeze) response will occur. These experiences may occur repeatedly in clinical work, yet remain unnoticed by clinician and client, so subtle might they be.

Brain Asymmetries

Brain asymmetries and the implications for clinical work

Key points:

- Darwin coined the concept of “descent with modification,” meaning that ancient structures can be co-opted for new functions; sometimes that original function may be also utilized, usually under unusual or extreme circumstances. (MacNeilage, P.F., Rogers, L.J., & Vallertigara, G. July, 2009. *Origins of the Left & Right Brain. Scientific American*, 60-67)
- The therapeutic alliance accounts for more therapeutic outcome than the treatment model (the main element is the emotional bond with the clinician).
- Affect dysregulation is the fundamental mechanism to all psychiatric disorders.
- All psychotherapies promote affect (emotional) regulation.
- The degree of emotional regulation is correlated with somatic (bodily) regulation/dysregulation.
- Brain plasticity implies that improved affect regulation can occur throughout the life span leading to new emotional learning and can lead to successful clinical treatment
- Schore, A.N. (2003b). *Affect Regulation and the Repair of the Self*. New York.London: W.W. Norton & Company,

500 million years ago vertebrates already had left/right specialization, so that did not originate with humans (except where noted, MacNeilage, et al, 2009)

Left brain

controls right side of body

(exception is around the eyes, source of most nonverbal information in face, both sides of the brain enervate area around eyes)(Schore, 2003a,b)

controls *well-established* patterns of behavior

speech and right-handedness may have evolved from specialization for the control of *routine* behavior ; especially dexterity of right hand (primates have right-handed preference)

self-motivated behavior

Right brain

controls left side of body

detecting and responding to *unexpected* stimuli, e.g., how objects interrelate in space

face recognition & processing spatial relations may trace their heritage to a need to sense predators quickly(*emergencies*)

environmentally-motivated

(what is thought about)
(*bottom-up control*)

behavior (what is reacted to)
(*top-down control*)

Communication issues

Left

Birds: left hemi controls *routine* vocalizations, e.g., singing in birds ; marmoset and humans open mouths wider on right when greeting;
with dogs, monkeys, & sea lions, the left hemi controls the perception of calls by species-mates; whales eat more on right side
(there are exceptions in animal world, however)

Right

nonvocal , *unusual*

limited, local focus on **details**
single items

takes in whole scene, patterns, **global**

Selective responses

familiar & well-worn responses
action

novelty & unfamiliar can mean take

Left

(from Schore, 2003, unless otherwise noted)

Right

Conscious, cognitive, rational
responses

un/nonconscious , rapid, automatic
responses

Historical opinion: “use rational thinking
to distract, cool, dampen
emotion

‘hot’ cognitions and negative emotions,
i.e., down-regulate emotions consciously
and *deliberately* “

new “decade of the brain” thinking;
adaptive function of positive

& somatic(bodily) forces underlying
those emotions (e.g., ANS, Vagal, RAS)
moment-to-moment processing is
unconscious

explicit and *conscious and aware* and

implicit and below conscious

in control of thought and emotions

can appraise and adapt to personally meaningful experiences by making changes *outside of conscious*

awareness

treatment strategies lateralized to left verbal hemi in prefrontal cortex(PFC) : verbal reappraisal, mental self-talk to regulate anxiety states touch,

treatment strategies lateralized to right nonverbal hemi in (PFC): appreciating/noting changes in facial expression, prosodic tone of voice,

accessed

gesture, bodily states which are

affect/somatic

in very high or very low

coping

states; right hemi is dominant for

to the

with stress and uncertainty leading

arousal of intense emotion

expression of

internal detection ,reception,

emotion

BOTH positive and negative

flexibly

Empathy, human stress response, regulation of homeostasis(ANS),

with

alters internal environment to cope

take

external disturbances, all of which

awareness

place extremely rapidly beneath

Maintains coherent, continuous, unified implicit sense of self

Active mental structure

Left

Right

content
mental state

process
psychobiological state

verbal conscious self

relational unconscious self

both the conscious left & un/nonconscious right hemisphere can communicate with another minds; left mind to left mind and right mind to right mind; additionally, the upper cortex communicates with the upper cortex, the right limbic system to another right limbic system, the right amygdala to right amygdala, and even brain stem to brain stem(heart rate, blood pressure, respiration)

Below is a list of the chronological steps which occur in the process of projective identification with the attendant dissociation. Projective identification is the process which drives the reciprocal mutual influences within the therapeutic moment (which can be labeled, "transference/counter-transference," i.e., the actual content embedded in the exchange) {Schoore, 2003b, 28-31}. The process begins with an experience between two people. (This material can be found on page 262 in Montgomery, 2013)

Resulting in sudden rupture of therapeutic alliance

- Right brain is nonconsciously comparing current misalliance(cue/triggers) and earlier empathic failures, instantly activating "hot cognitions"(Greenberg & Saffran, 1984)
- Early interactive representations encode expectations of imminent dysregulation
- Brain suddenly shifts dominance from a mode of left hemisphere linear processing to right hemispheric nonlinear processing
- Dysregulating transaction occurs
- Reconstructs "model scene"(Lichtenberg,1989)
- Introduces into consciousness a chaotic state , which had been defended against
- Dreaded state of mind (Horowitz,1987){bodily state evoked due to state-dependent recall}
- Triggering splitting (the instant evaporation of the positive and sudden intensification of the negative transference)
- Leads to malignant transference reaction=*hyperarousal-or-hypoarousal*
- Self disorganizes (explosively or implosively){increased right hemispheric activation}
- Somatic countertransference (the therapist resonates with the client's right brain state)
- Resulting in "somatic markers"=physiological responses that receive or block the client's distress-inducing projective identifications
- Depending on therapist reaction, can have enactment
- Leading to negative therapeutic reaction
- Hopefully, interactive repair will occur, with attempts to re-attune (must be able to manage emotional therapeutic withdrawal)
- Can lead to "working through" process of interactive repair (Tronick,1989) = therapist recognizing and regulating the negative affect within own self
- If therapist auto-regulates successfully, can resonate with client's internal state of arousal dysregulation, modulates it, communicates it back prosodically in a more regulated form, and then, verbally labels own state experiences and client's, as well

Moving from desymbolizing to symbolizing with "words during states of high emotional arousal is an important achievement in self-regulation"(Dawson, 1994, 358)

· Can lead to internalization of therapist's regulatory functions, reflective awareness

- Cortical and sensorilimbic connections are reworked in long-term dynamic psychotherapy (McKenna, 1994; PET imaging study (Schwartz, Stoessel, Baxter, Martin, & Phelps, 1996)

Amygdala

Structures affecting and interacting with the amygdala include the following:

- anterior cingulate (involved with emotional and somatic (bodily) experience (Cozolino, 2006,77);
- orbitofrontal areas of the prefrontal cortex and frontal areas of temporal lobes (mature management of emotions) {Cozolino, 2002, 179-180};
- amygdala has direct connections to the autonomic nervous system (regulation of level of arousal in body) {Cozolino, 2002, 1810};
- Sapolsky (2005, 110) would add the septum (inhibits amygdala) as part of the limbic system; puts the "brake" on aggression as generated by the amygdala (Sapolsky, 2005, 110);
- hippocampus (explicit, retrievable memory, can be made conscious) {Cozolino, 2002};
- the frontal cortex is an inhibitor of the amygdala (Sapolsky, 2005, 104);
- insula involved in resonating with somatic and emotional states of others (Damasio, 1999; Craig, 2002 as cited in Buchanan, Tranel, & Adolphs, 2009, 305); and
- Hypothalamic-Pituitary-Adrenal Axis (HPA axis) {stress response system}.

List 3.4. Brain structures which process experiences differently

Each of the following structures have different and separate ways that experiences listed below are processed: amygdala, anterior cingulate, insula-orbitofrontal and frontal portions of the temporal lobes (Schore, 2003b, 234; Cozolino, 2002, 179-180) which are separate state-dependent affective, cognitive, behavioral functions:

- a. each contains different stored models of ways of processing affect related, meanings (Teasdale, Howard, Cox, Ha, Brammer, Williams & Checkly, 1999) ;
- b. different levels of implicit memory and self-states;
- c. self-states and somatic states located in the lowest section of the right hemisphere can be blocked from being passed upward through and to the higher structures for processing;
- d. memory in amygdala generalizes and hippocampus more finely discriminates among external data (Sherry & Schacter, 1987 as cited in Cozolino, 2002, 97).

List 3.4. Brain structures which process experiences

Right hemisphere functions

Montgomery, 2013

The prefrontal system, the hierarchical apex of the limbic system, acts as the senior executive of the emotional brain. The following are selected functions of the upper right cortex (Schore, 2003a, 2003b).

Modulates emotional experience through interpreting and labeling emotional expressions

Affective shifts

Self-reflective awareness

Detecting changes of emotional state & breaches of expectation

Processing feedback information

Contains the coping system which is specialized to act in contexts of uncertainty or unpredictability

Detects “somatic markers” or “gut feelings” that are experienced in response to both real and imagined events, including threatening stimuli

Plays a primary role in optimizing cautions and adaptive behavior in potentially threatening situations

Regulation of autonomic responses to social stimuli

Modulate processing of pain & coping with painful stimulus

Evaluating facial expressions

Processing emotion-evoking stimuli without conscious awareness

Controlling allocation of attention to possible contents of consciousness

Mediates between the internal environment and external environment

Emotional “hunches”

Cognitive-emotional interactions

Processing of affect-related meanings

Associates emotions with thoughts

Social adjustment, control of mood, drive & responsibility (personality traits)

Processing of “self” and self-regulation

Self-concept/self-esteem

Attachment

Highest level of control of behavior

Danger appraisal

Polyvagal System

Information about the arousal system greatly enhances clinical skill in understanding both the manifestations of the intrapsychic and interpersonal behaviors in the clinical encounter. The polyvagal theory adds such interesting information regarding the release of the vagal brake allowing an action to be taken. So instead of activating the sympathetic branch and utilizing the arousal system (sympathetic nervous system), which may need to be held in reserve, releasing the vagal brake preserves that energy. Additionally, the concept of an older “reptilian” and newer “mammalian” system of low energy is easy to remember and helps differentiate between calm (parasympathetic nervous system) and “freeze” (vagal system) states in clients. The social engagement system requires a calm parasympathetic response so that people can approach without fear. If that does not work, then the sympathetic branch will become activated and fight or flight will occur. And if the person is trapped, the immobilization (freeze) response will occur. These experiences may occur repeatedly in clinical work, yet remain unnoticed by clinician and client, so subtle might they be.

Appendix Chapter 1: Schematic of human nervous system

Schematic of Human Nervous System

Central Nervous System

Divided into Brain & Spinal Cord

Further divided into Peripheral Nervous System

Sensory

Motor

Exteroceptive

Interoceptive

Somatic Nervous System
Voluntary

Autonomic NS
Involuntary

Autonomic Nervous System

Sympathetic Branch (excites)

Parasympathetic Branch (inhibits)

Glossary of selected terms: These definitions and descriptions of phenomena in the brain may be easily Xeroxed. The following are important terms and useful clinical explanations for *understanding selected important functions* of the autonomic nervous system (ANS):

Right Hemisphere of the brain: sensitive to the nonverbal, global experiences which color interactions with others; registers terror, excitement, elation, hopelessness, despair, panic (Schore, 2003b, p. 111) and primarily controls the sympathetic and parasympathetic branches of the ANS (Ericya et al., 1999; Wiltling, Block, Schweiger, & Genzel, 1998; Yoon, et al., 1997)

Left hemisphere of the brain: houses the cognitive processes such as the logical, analytical, linear style of thinking; registers guilt, anxiety, interest, and enjoyment and modulates these verbal social emotions by enhancing the positive and inhibiting the negative emotional behaviors (Schore, 2003b, p. 111)

Attunement: ability to resonate with the internal states of another person (Cozolino, 191, 2002); Stern, D.N., Hofer, L., Haft, W. & Dore, J. (1985)

Synchrony: the fine tuning and resonating with the internal state of another person (Schore, 2003a, p. 38) which a consequence of each partner's learning the rhythmic structure of the other and modifying his or her behavior to fit that structure (Lester, Hoffman, and Brazelton, 1985, p. 24)

Asynchrony: a break or rupture in attunement (Schore, 2000a,b; Beebe, B., 2005, Mother-Infant Research informs mother-infant treatment. *Psychoanalytic Study of the Child*. Vol. 60, 6-46)

State Regulation: affect synchronizing interactions between two right hemispheres wherein the internal experiences are similar and change almost simultaneously (Beebe)

Self regulation/auto regulation: managing own affect(s) either constructively or defensively (more negative, generally); (Valliant, (1997); Schore, 2003,a,b)

Dyadic regulation/interactive regulation: constructively regulating own affect/emotion in right-brain-to-right-brain manner with other person (Schore, 2003,a,b)

Valence: intensity of experience, positive or negative

Cognitive: involving the elements of perception; capable of being reduced to empirical factual knowledge (Webster's, 257, 1989)

Appraisal: (Lazarus, 1991,a) the brain generating internal evaluations of the personal significance of what is happening in an encounter with the environment and can elicit emotions to actual or expected changes in events that are important to the individual (Frijda, 1988) in Schore, 2003b, 37; the right hemisphere, especially the orbital frontal areas of the brain are

involved(Schore, 2003,b,38)

Mirror neurons: permit the experience of emotions which are similar to other's emotions

Psychological defenses: protective actions, beliefs, thoughts, emotions which serve to protect from psychological distress; can be adaptive or maladaptive, depending on the context (*Ego defenses: Theory and measurement* (1995).Eds: Hope R. Conte and Robert Plutchik. New York:John Wiley & Sons, Inc.;Vaillant, G.E. (1977). *Adaptation to life*. Boston: Little, Brown and Company.)

For clinical practice, some make a distinction between emotions, feelings, and affects (LeDoux, 1996) and others do not (Fosha, 2000,16). In this chapter it is easier to track the neurobiology of the interactions between the clinician and the client if there is not a fine distinction among these terms and to simply define emotion/feeling/affect as an reaction in the brain that causes a change in the internal state and signals actions, whether the action is completed or not.

Affect: the conscious subjective aspect of an emotion, considered apart from bodily changes (Webster's, 61, 1989)

Emotion: to stir up, the affective aspect of consciousness ; a state of feeling; a psychic and physical reaction subjectively experienced as strong feeling and physiologically involving changes that prepare the body for immediate vigorous action(Webster's, 407, 1989)

Feeling: to be conscious of an inward impression,, state of mind, physical touch (Webster's, 454, 1989)

All of the following have in common that affect management strategies, as described by various theorists:

Internal working model(Bowlby, 1988)

Selfobject (Kohut, 1971)

Internalized object relations(Kernberg,, 1976)

RIGS(Stern,1985)

Transference/Counter-transference: transference is experiencing others as have a figure from the past and counter-transference is the clinician's response to the client's transference

Experience-dependent regulation of affect: the human brain's capacity to regulates its own affect is profoundly influenced by it interactions with other brains, including interaction with care-givers, and any systematic force such as peers, school experiences, and, often overlooked, the cultural prescriptions and proscriptions for appropriately expressing certain emotions (Seigel, 2007; Cozolino, 2000; Applegate & Shapiro, 2005; Tronick, 2007; Fonagy, et al.,2002).
