

# A Review of the Neural Basis of Social and Emotional Function

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# Introduction



# Emotion includes...

Perceptual Components

Mnemonic Components (implicit, explicit)

Behavioral Components (automatic and voluntary)

Cognitive Components (attention allocation,  
decision making, problem-solving)

# Levels of Analysis

- Molecular
- Cellular
- Networks / Circuits
- Systems
- Behavioral
- Phenomenological



# Scope of the Presentation

A Fairly Brief Review of....

- Evolution of the nervous system and the complexity of emotional and social functions
- Major neurotransmitter systems
- Two major theories and models of emotion
- Neural structures / systems that mediate emotional and social function
- Several recent studies that have investigated the neural basis of emotional and social function
- Several Measures of Emotional and Social Function

# Darwin 1972

“Critical to survival is the ability to identify quickly in the environment emotionally salient information, including danger and reward, and to form rapid and appropriate behavioral responses”

# Evolutionary Perspective

First described by Paul McLean 30 years ago:

- A full understanding of human behavior requires an evolutionary perspective.
- Evolution typically does not discard structures, it reuses them in modified ways.
- Human behavior is not simply a product of the neocortex. Rather, human behavior results from the interactions of the neocortex with subcortical structures and older cortex.

(Taylor, 1999)

# Tripartite Phylogenetic System

- Reptilian brain:
- Paleomammalian brain
- Primate / Human brain

(Taylor, 1999)

# Reptilian Brain

- Anatomy: brain stem, related vestibular system, thalamus, hypothalamus, basal ganglia, some forebrain nuclei, the amygdala and the hippocampus.
- Functions: arousal, activation, balance, information input and output, homeostatic and procreative drives, and fight and flight.

# Paleomammalian Brain and Limbic System

- Anatomy: Mammillary bodies, fornix, corona radiata, hippocampus, parahippocampus, amygdala, hypothalamus, entorhinal cortex and pathways, septal nuclei and the cingulate gyrus.
- Functions: modifies appetitive drives and fight / flight. It generates emotion and provides emotional tone to perceptions. It is important in learning and memory.

# Neomammalian Brain

- Anatomy: Cerebral hemispheres, heteromodal association cortices, the cerebellar neocortex, and large parts of the corpus callosum.
- Functions: Part of the “action” brain and the perceptual integrating brain.

# Neurochemical Organization

(Stahl, 2000; CE presentation at WSH 12/03 by M. Schwartz, MD)

## Primitive NTs:

- DA, 5HT, NE, Ach
- Few in number, strategically located with many synapses with cortical neurons
- Neuromodulatory fx
- Second messenger receptors
- Slow acting (up to days)

## Cortical NTs:

- GABA, Glutamate
- Billions of neurons
- Fewer synapses
- Convey information
- Classic receptors (i.e., result in inflow and outflow of ions)
- Fast acting (milliseconds)

# Major Neurotransmitter Systems

- Dopamine (DA)
- Norepinephrine (NE)
- Serotonin (5HT)
- Acetylcholine (Ach)
- Gamma-aminobutyric acid (GABA)
- Glutamate

# NE: Pathways / Possible Actions

## Locus Cereleus (BS) to:

Frontal Regions:

- Mood and Attention

Limbic system:

- Psychomotor retardation / agitation, Energy Level, Fatigue

Cerebellum:

- Motor movements/ tremor

Brainstem:

- Blood pressure

Sympathetic NS:

- Heart rate, bladder function

# DA: Pathways / Possible Actions

Substantia Nigra to:  
basal ganglia-

- Movement

Midbrain ventral  
tegmentum to-  
Nucleus -Acumbens

- Reward system, pleasure, euphoria of drugs of abuse
- Delusions and hallucinations in psychosis
- Negative and cognitive symptoms of schizophrenia

Limbic Cortex-

# 5HT: Pathways / Possible Actions

## Raphe Nucleus (BS) to:

Frontal Cortex:

Basal Ganglia:

Limbic:

Hypothalamus:

Sleep Centers:

- Mood
- Movement (Akathisis, agitation)
- Obsessions and Compulsions
- Anxiety and Panic
- Appetite / Bulimia
- Insomnia

# ACh: Pathways / Possible Actions

## Basal Forebrain To:

Frontal

Neocortex

Hippocampus

Amygdala

Mediate higher cortical functions such as learning, problem solving and judgment

## Striatum to: Striatum

Movement

## Lateral Tegmental Area to:

Cerebellum

Rostral Projections

Caudal Projections

Wide variety of functions including focal cortical activation needed for focused mental activity

# GABA

- Widespread throughout the brain
- The predominant inhibitory neurotransmitter
- The inhibitor of the “action brain”
- Anti-kindling drugs work on GABA mediated ion channels
- The only output neurotransmitter of the cerebellar purkinje cell system, the caudate-putamen and the nucleus accumbens

# Glutamate

- Widespread, particularly in “action brain”
- Brain’s main excitatory amino acid neurotransmitter
- Function appears to be CNS homeostasis and facilitating new learning
- Too much release occurs in response to toxins and it is implicated in seizure focus spread

# Theories / Models of Emotion

- E. T. Rolls- Rewards / Punishers
- A. R. Damasio- Somatic Marker Hypothesis
- R. D. Lane- Levels of Awareness /  
(and colleagues) Neuroviseral Integration



# The Brain and Emotion

(Rolls, 2000)

“Emotions can be defined as states elicited by rewards and punishments.”

Rewards: Stimuli for which an animal (including humans) will work.

Punishers: Stimuli that an animal will work to escape or avoid.

## Rolls states that ...

- Emotions can be produced by recall of reinforcing events, as well as, external stimuli.
- Cognitive processing (whether conscious or not) is important in many emotions.
- The emotion elicited can depend on whether an active or passive behavioral response is possible (e.g., depression versus anger).
- Emotions (i.e., states elicited by reinforcers) have many functions and not all of these functions are associated with emotional feelings (e.g., pain).
- Neural systems allow the animal to evaluate which environmental stimuli are rewarding or punishing and influence selection of behavioral actions.

## Rolls states that...

- The amygdala and orbitofrontal cortex are the neural structures that mediate emotion. Data that support this include that electrical stimulation to the amygdala and orbitofrontal cortex is rewarding, and damage to these structures affects emotional behavior by affecting stimulus -reinforcement associative learning.
- He states that the amygdala and orbitofrontal cortex are the brain regions involved in learning the emotional and motivational value of stimuli.

## Rolls also says ...

- That the crucial site for stimulus reinforcement learning is probably in the amygdala itself, but he also suggests that the primate orbitofrontal cortex may replace many functions performed earlier (phylogenetically) by the amygdala.
- That the orbitofrontal cortex also has a mechanism that evaluates if a reward is expected and generates a mismatch signal if an expected reward is not obtained.

These signals suggest that the orbitofrontal cortex corrects previously learned reinforcement contingencies and is involved in emotional responses, particularly in situations described as frustrating.

# Rolls says that the output pathways for emotion are...

- The amygdala and orbitofrontal cortex influence autonomic and endocrine function via their connections with the brainstem and hypothalamus. He does not agree that “somatic states” generate emotions (i.e., James-Lange Theory or Damasio’s Somatic Marker Hypothesis) but rather thinks that these states prepare the animal for different types of action including fight, flight, feeding and sex.
- The amygdala and orbitofrontal cortex can influence the selection of behavioral actions through 1) brain systems that operate implicitly and have been present in primates and some other mammals for millions of years, such as the ventral striatum and other parts of the basal ganglia; and in humans 2) higher cortical systems that can process multiple “If..the” statements to implement a plan to obtain a reward or avoid punishment. Deferring action may be part of the plan.

# The Somatic Marker Hypothesis

(Damasio, 1994; Bar-on et al. 2003)

- The Somatic Marker Hypothesis proposes that deficits in emotional signaling (somatic states) leads to poor judgment in decision making especially in the personal and social realms.
- The model defines:
  - Primary inducers as 1) unconditioned stimuli innately set as pleasurable or aversive, or 2) conditioned stimuli which when present in the immediate environment automatically and obligatorily elicit a somatic response.
  - Secondary inducers are “entities” generated by recall, or thought, and they elicit a somatic state when brought into memory.

# Somatic Marker Hypothesis (continued)

- When a primary inducer is present a somatic state is triggered by the amygdala. Then signals are relayed back to the brain from the body about the somatic state that was triggered. The signals may 1) reach the brain stem and remain covert, or 2) reach the parietal cortex (insular cortex) and posterior cingulate cortex and be perceived as a feeling.
- When a secondary inducer is processed (i.e., recall of an emotional event) it can re-enact the somatic state characteristic of the feeling. The ventromedial prefrontal cortex (VMPC) is a trigger of somatic states from secondary inducers.
- Decision making is complex and there can be conflicts between a primary (e.g., positive) and a secondary (e.g., negative) inducer or between two secondary inducers (e.g., a positive and a negative thought). Regardless of how triggered all of the somatic states are enacted by the body and summed into one overall somatic state.

# Somatic Marker Hypothesis- continued

- This overall somatic state then sends signals to the brain that 1) may result in a feeling (possibly via the insula / somatosensory cortices), and 2) that provides input that biases selection of specific responses during decision making.
- This biasing may occur without awareness, at the level of the striatum (i.e., person acts without a conscious decision to do so).
- Or, this biasing may occur at the level that results in the conscious selection (lateral orbitalfrontal cortex) and volitional execution of a plan of action (anterior cingulate).
- The amygdala system is thought to be necessary for the development of the orbitofrontal system for triggering somatic states from secondary inducers (Bechara, Damasio & Damasio, 2003). Once the orbitofrontal system is developed triggering of somatic states from secondary inducers is less dependent upon the amygdala system.

# Summary of Neural Structures that mediate emotion and social behavior

- Amygdala
- Orbitofrontal / Ventromedial Frontal Cortex
- Insula
- Anterior Cingulate Cortex

# Human Neuropsychology of Amygdala

In humans the amygdala appears to participate in the processing of reward and punishment contingencies of stimuli, as well as their social significance (see review Adolphs, 2003). Specific findings include:

- Recognition of facial expressions: Research studies have demonstrated that damage to the amygdala can impair recognition of facial expressions without loss of recognition of facial identity (Rolls, 2001). Changes appear to be most pronounced with regards to fear, but the literature is inconclusive on this point (Phillips et al., 2003; Seibert et al., 2003; Canli et al., 2002).

Amygdala also appears to be involved in ....

- Memory for emotional stimuli and events. For emotional information, the amygdala may function similar to how the hippocampus functions for declarative memory (Sarter & Markowitsch, 1985; Bechara et al., 2003)

Seibert and colleagues (2003) recently studied 10 patients with bilateral amygdala damage due to Urbach-Wiethe disease. The UW pts exhibited impaired recognition memory for emotionally arousing pictures, whether positive or negative, relative to emotionally neutral pictures. Interestingly, they did not exhibit problems identifying basic emotions but they did have problems with emotion blends.

## The Amygdala can participate in generating knowledge about the social environment in three ways ....

- It can link early perceptual processing of stimuli with modulation of such perception via feedback (reciprocal and nonreciprocal) to sensory and association neocortex;
- It can link perception of stimuli to modulation of cognition by virtue of its connections with structures involved in decision-making, memory and attention; and
- It can link perception of stimuli to an emotional response by virtue of its output to structures such as the hypothalamus, brain-stem nuclei and peri-aqueductal gray matter.

Adolphs (2003)

# Human Neuropsychology of the Orbitofrontal Regions

- Lesions to the ventral frontal lobes can result in difficulties altering behavioral strategies in response to a change in environmental reinforcement contingencies (Rolls, 2000)
- Damage is associated with changes in social behavior (disinhibition) and problems identifying vocal and facial emotional expression (Rolls, 2000; Phillips, 2003)
- Studies described later indicate that bilateral orbitofrontal lesions cause more severe problems with social and emotional functions, but that unilateral lesions cause some subtle difficulties. Problems also appear to be more severe in patients with more diffuse damage (e.g., caused by head trauma or stroke versus surgical lesions)
- Results of studies are inconsistent regarding whether the laterality of the lesion is important in symptom presentation (Honak et al., 2003; Tranel et al., 2002).

# Human Neuropsychology of the Insula

- Functional imaging studies have implicated the insula in delay fear conditioning and during the anticipation of an aversive stimulus
- Studies suggest that the insula is involved in the recognition of displays of disgust, identification of facial expressions of disgust, and in taste perception
- The insula has also been implicated in the generation of affective states in response to emotive stimuli (i.e., feelings)
- Activity in the insula increases during states of pain, and during induced sadness and anticipatory anxiety in normal subjects.
- Insula activity has also been demonstrated during internally generated emotions and during the experience of guilt

(Phillips et al., 2003)

# Human Neuropsychology of the ACC

- Thayer and Lane (2000) propose that the ACC serves as a point of integration for viseral, attentional and affective information that is critical for self-regulation and adaptability.
- The ACC seems to be associated with the conscious allocation of attention (I.e. including inhibition of irrelevant informaton).
- The ventral and rostral regions of the ACC are associated with affective, motivated and autonomic behavior; whereas the dorsal region is associated with response selection as well as pain

# Recent Studies

- Exploring the neurological substrate of emotional and social intelligence (Bar-On et al., 2003)
- Changes in emotion after circumscribed lesions of the orbitofrontal and cingulate cortices (Hornak et al., 2003)
- Asymmetric functional roles of right and left ventromedial prefrontal cortices in social conduct, decision-making and emotional processing (Tranel et al., 2002)

# Exploring the neurological substrate of emotional and social intelligence

(Bar-On, Tranel, Denburg & Bechara, 2003)

- Subjects:** Patients with focal, stable lesions to bilateral ventral medial cortex or unilateral lesions to the right amygdala or right insular cortex; and Patients with focal lesions outside of these structures.
- Procedures:** Emotional Intelligence Inventory  
Decision making task (Iowa Gambling Task)  
Measures of social functioning, personality function and psychopathology.  
Standard measure of IQ  
Neuropsychological testing

Bar-On et al. (2003) continued....

Results: Only patients with lesions in the ventral medial frontal cortex (VMPC), right amygdala or right insula evidenced:

- Low emotional intelligence
- Poor decision making
- Disturbances in social fx

Despite:

- Normal standard IQ score
- An absence of psychopathology

## Changes in emotion after circumscribed lesions of the orbitofrontal and cingulate cortices (Hornak et al., 2003)

Hornak and colleagues analyzed the functions of different parts of the prefrontal cortex in emotion, by comparing patients with specific surgical lesions on four measures of emotion.

### Subjects:

35 patients with surgical excisions primarily due to epilepsy (n=13) or meningioma (=14). They ranged in age from 19 to 72 years, approximately half were men and time post-surgery ranged from 1 to 22 years. Exclusion criteria: damage outside PFC, alcohol / drug dependence, IQ < 75. Diagrams of lesions and performance data for each subject were provided.

## Hornak et al., continued

Groups: Bilateral OFC Damage (n=6)  
Unilateral OFC damage (n=6, R=5, L=1)  
Damage to BA9 / ACC (n=4, R=3, L=1)  
BA9 / ACC + OFC, and (n=8, R=3, L=5)  
DML / other medial group (n=11, R=7, L=4)

Procedures:  
Voice emotional expression identification  
Facial emotional expression identification  
Social Behavior (informant)  
Subjective experience of emotion

# Main Findings

Hornak et al. (2003)

## Bilateral OFC Lesions:

- 1) Patients with Bil OFC lesions were impaired on all tasks compared to the DL / OM group who were unimpaired. This demonstrates that OFC damage is sufficient to produce these emotional changes if bilateral.
- 2) The patients with circumscribed bil OFC lesions have alterations in social behavior, but they are not as socially inappropriate and disinhibited as patients studied previously with closed head injury.

## Main Findings cont....

### Vocal Expression Identification:

- 1) Patients with unilateral OFC lesions or unilateral medial lesions in BA9 / ACC (anterior ventral portion of ACC BA32/24) were severely impaired.
- 2) Even small unilateral OFC lesions were sufficient to cause as severe impairment as bilateral OFC lesions. There was no correlation between performance and size of lesion.
- 3) First study to show that unilateral medial lesions in BA9/ ACC even without OFC involvement can cause comparable impairment.
- 4) No difference between effect of right and left lesions.

## Additional findings... Hornak et al. 2003

- 5) Vocal sadness produced the biggest group differences and of the unilateral patients only those with BA9/ACC lesions were impaired. This supports the role of the ACC in maintenance of positive mood.
  
- 6) Patients with severe impairments in vocal emotion identification performed normally on voice discrimination and an environmental sounds tests (i.e., selective impairment in extracting affective information from the voice)

## Hornak et al. (2003) Main findings....

### Facial Expression Identification:

- 1) Some individual patients with BA9/ACC lesions were impaired on this test, but no group differences were significant (for unilateral groups)
- 2) No unilateral OFC lesions produced impairment on this task.
- 3) Some of the patients with bilateral OFC cortex were impaired.
- 4) Differences between the vocal and facial emotion identification tasks may reflect ability to use verbal compensatory strategies (e.g., corners of mouth turned down, therefore must be sad)

## Hornak et al. (2003) Main findings....

### Subjective Experience of Emotion:

- 1) Patients with BA9/ACC lesions on either side reported very marked changes in their subjective experience of emotion after their surgery. Significantly more change than reported by patients with DL or medial lesions outside this area.
- 2) Unilateral OFC patients reported small amounts of change, but they did not, as a group, differ from the DL/OM group.
- 3) Patients with bilateral OFC lesions reported large changes in emotional experience.

## Hornak et al. (2003) Main findings....

### Social Behavior:

- 1) Patients with bil OFC lesions had significantly lower scores on the social behavior questionnaire completed by informants than the DL /OM group.
- 2) Unilateral lesions had less marked effects, but there was a significant reduction in the social behavior score for the group of patients with BA9/ACC + orbital group.
- 3) Changes in the surgical patients were smaller than those previously reported in patients with larger ventromedial lesions from head injury or stroke.

# Asymmetric functional roles of right and left ventromedial prefrontal cortices in social conduct, decision-making and emotional processing (Tranel et al., 2002)

The researchers hypothesized that the right ventromedial prefrontal cortex (VMPC) is a critical component of the neural systems that subserve social conduct, decision-making and emotional processing, but that the left VMPC is not.

## Subjects:

Seven patients with focal, stable, unilateral lesions to the right (n=4) or left (n=3) VMPC were studied. Exclusion criteria included history of MR,LD psychiatric disorder, substance abuse or systemic disease capable of affecting the CNS.

## Tranel et al. (2002) ....

### Measures:

Social Conduct: Structured clinician ratings, family ratings and employment status.

Decision Making: Iowa Gambling Task (computerized version)  
Skin Conductance (SCR) recorded during the gambling task (punishment SCRs, reward SCRs, anticipatory SCRs).

Emotional Processing and Personality:

Minnesota Multiphasic Personality Inventory

Beck Depression Inventory (BDI)

Iowa Rating Scales of Personality Change (“Iowa Scales”)

# Results of Tranel et al. (2003)

	<u>Right patients</u>	<u>Left patients</u>
Social & Interpersonal Behavior	Profound Impairments	Normal
Employment	Difficulty maintaining	Stable
Emotional Processing	Profound abnormalities	Normal
Skin conductance	Impaired anticipatory SCRs	Normal
Personality	"acquired sociopathy"	Unchanged

# Measures of Emotional and Social Function

- Emotional Quotient Inventory (EQi, Bar-On, 1997)
- Mayer, Salovey, Caruso Emotional Intelligence Test (MSCEIT, 2002)
- Levels of Emotional Awareness Scales (LEAS; Lane, Quinlan, Schwartz, Walker & Zeitlin, 1990)
- The Awareness of Social Inference Test (TASIT; McDonald, Flanagan & Rollins, 2002)

# Emotional Intelligence (EI)

Goleman (1995)

- Emotional Intelligence refers to:  
*“the capacity for recognizing our own feelings and those of others, for motivating ourselves, and for managing emotional well in ourselves and in our relationships”*

# Emotional Quotient Inventory (EQi)

Bar-On, 1997

- Published by MHS, B Level test, adult and youth forms, normative data collected on over 85,000 people world-wide, can be computer administered via the web, or via software report, and several different types of reports can be generated including a Development Report, Individual Summary Report, Resource Report and Group Report.
- Can be used in workplace and clinical settings
- Adult version has 133 Likert Scale items, takes 30 minutes to administer, is available in English, French and Spanish
- Yields several indices, a total score, 5 composite scores and 15 individual scale scores
- Requires a 6<sup>th</sup> to 7<sup>th</sup> grade reading level
- Measures the ability to deal with daily environmental demands and pressures

# EQi Validity Scales

- Inconsistency Index
- Positive Impression Index
- Negative Impression Index

# EQi Indices and Scales

- Intrapersonal Scales: Emotional self-awareness, Assertiveness, Self-Regard, Self-actualization, Independence
- Interpersonal Scales: Interpersonal Relationships, Social Responsibility, Empathy
- Adaptability Scales: Problem-solving, Reality Testing, Flexibility
- Stress Management Scales: Stress Tolerance, Impulse Control
- General Mood Scales: Happiness, Optimism

# Strengths and Weaknesses of EQI from Neuropsychologist's Perceptive

## Strengths:

Large normative reference group

Short form is available

Reviewed in Buros, developed over nearly 20 years

## Weaknesses:

Utilizes a self-report format, rather than being an ability measure

Patients with neuropsychological deficits may have difficulty completing the measures if they have language deficits, poor insight, decreased attention

Potential Uses: Higher level patients with complaints of alterations in emotion and social domains; Vocationally oriented assessments; Assessments for treatment planning purposes

# MSCEIT

Mayer, Salovey, Caruso, 2002

- Published by MHS, based on an ability model of emotional intelligence and assesses a person's capacity to reason with emotional information.
- For ages 17 and older, B level product, English only, self-report / ability measure, requires 45 minute to 60 minutes, paper and pencil and internet administrations available.
- Yields 17 scores, including 2 validity scales, 7 Emotional IQ scores (Total, Experiential, Strategic, and four branch areas), and 9 diagnostic scores.
- MSCEIT has wide applicability, it can be used in all kinds of corporate, educational, research and therapeutic settings.
- Ability based, so difficult to “fake” a good performance.

# MSCEIT “Branches” in Hierarchical Order

Perceiving emotions: The ability to recognize how your and those around you are feeling (Faces Task, Pictures Task)

Using Emotions: The ability to generate emotion and then reason with this emotion (Sensations Task, Facilitation Task)

Understanding Emotions: The ability to understand emotions and emotional chains and how emotions transition from one stage to another (Blends Task and Changing Task)

Managing Emotions using Emotions: The ability to manage emotions in yourself and others (Emotional and Social Management Tasks)

# Strengths and Weaknesses of MSCEIT from Neuropsychologist's Perceptive

## Strengths:

- Ability based measure
- Theoretically based
- Informative report

Weaknesses: Unable to assess without experience with the tool

Potentially useful in some neuropsychological evaluations with clients experiencing social and emotional difficulties.

# Levels of Emotional Awareness Scales: A cognitive – developmental measure of emotion (LEAS; Lane, Quinlan, Schwartz, Walker & Zeitlan, 1990 )

- Emotional awareness is one component of emotional intelligence (Lane, 2000)
- LEAS was developed based on the theory that the ability to recognize and describe emotion in oneself and others is a cognitive skill that undergoes a developmental process similar to that which Piaget described for cognition in general (Lane & Schwartz, 1987)
- The model identifies five levels of emotional awareness:
  - Physical Sensations
  - Action Tendencies
  - Single Emotions
  - Blends of Emotions
  - Blends of Blends of Emotional Experience

# Levels of Emotional Awareness Scale (LEAS)

- LEAS is a written performance measure that asks the individual to describe his or her anticipated feelings and those of another person in each of twenty scenes described in two to four sentences.
- Scoring is based on specific structural criteria aimed at determining the degree of differentiation in the use of emotion words (specificity and range of words)
- Scoring is based on structure not content, and involves no inference
- Each of the 20 scenes receives a score ranging from 0 to 5, based on levels of emotional awareness model.
- Eight psychometric studies have been conducted and the LEAS has consistently demonstrated high interrater reliability and internal consistency. Test –Retest reliability has not been conducted. Norms for age, sex and socioeconomic status have been established.

# LEAS continued

Lane (2000) reviews data to support the claim that the LEAS is:

- 1) A measure of the schemata used to process emotional information, whether the information is verbal or nonverbal
- 2) A measure of the complexity of experience; and
- 3) Not simply a measure of verbal ability

Strengths: Theory based (Lane & Scwartz, 1987)

Potential Weaknesses: Language format, limits potential applicability of tool with neuropsychologically impaired clients. ? Could it be administered orally?

# The Awareness of Social Inference Test

(TASIT; McDonald, Flanagan & Rollins, 2003)

- Developed for assessing social perception after TBI
- Published in 2002 by Thames Valley Test Company
- Examines both the ability to interpret emotional expression from basic paralinguistic and nonverbal information and the ability to interpret social inference.
- Test involves watching a series of video- vignettes, there are three types of tasks included in the TASIT.
- The Emotion Evaluation Task (EET) assesses the ability to identify six basic emotions that are typically recognized across cultures. The actor enacts the neutral script according to one of six emotions- happiness, sadness, anger, surprise, disgust or fear or in no particular emotion. After viewing each scene the client selects the emotion displayed from the seven choices. There are 28 scenes depicting 4 examples of each emotion.

# TASIT continued

The Social Inference Test (SI) incorporate a) sincere verbal exchanges in which the literal meaning is sincere and consistent with the physical context and emotion of the speaker; and counterfactual verbal exchanges where the literal meaning of the verbal exchange is contradicted by the context thereby requiring viewers to make inferences about the true meaning of the exchange. The later category includes: Lies and Sarcasm. There are two SI tests, both with alternative forms, that examine the role of different types of cues in the comprehension process.

Comprehension Probe questions are also made to capture information regarding the inference processes used: beliefs, intentions, feeling and meaning.

# TASIT continued

- TASIT designed as a criterion reference test, (i.e., strong ceiling effect and low variability in individuals with normal range of social perception)
- The final version of the TASIT was given to a new sample 283 normal individuals to assess influence of demographic variables and intellectual ability on TASIT performance.
- Practice effects were also assessed in a group of 133 subjects who took part in the original study.
- Construct validity measures deemed not appropriate given restricted range of scores and novel nature of task, but performance of 12 severely injured TBI patients was compared with matched normal control subjects.

# Conclusions

- A great deal of progress has been made during the past 15 years in the understanding of the neural substrates of emotion and social behavior.
- Research on normal human emotional processes has been advanced as a result of functional neuroimaging technology.
- Lesion studies are still very important, however, in advancing knowledge regarding emotional processes

Current researchers are developing dynamic models of how neural systems subserve the various components of emotion (i.e., dynamic models include feedback and feedforward mechanisms)

It appears that the study of emotion has also lead to increased interest in the neural substrates of the self, feeling as distinct from emotional states, and consciousness.