

## Brain

**I**n the most basic terms, the brain can be seen as consisting of a posterior sensory system, an anterior motor system, and a more or less anterior and ventral appraisal system. The appraisal system assesses the motivational relevance and emotional significance of agents, actions, and objects perceived by the sensory mechanism in order to determine the appropriate mental or motor action to take with respect to stimulus.

We think and act on the basis of relevance or value. Value is of three kinds: homeostatic, sociostatic, and somatic. Homeostatic value relates to biological stasis and the basic functions of the body. We behave in order to maintain appropriate respiration, body temperature, satiety, and physical safety, and we appraise environmental stimuli in terms of their relevance to these functions. Sociostatic value relates to our innate tendencies to interact with conspecifics, to form attachments and achieve social affiliation. We pay attention to faces, voices, and bodily movements of others in order to determine their intentions and dispositions, and we act according to value determined by such social cognition. Finally, somatic value relates to value accrued in the lifetime of the individual and consists of preferences and aversions acquired through socialization, enculturation and education. Much of homeostatic value is evolutionarily inherited and innate. Sociostatic value may also be under genetic control to the extent it entrains us to be sensitive to the facial expression, voice, and musculoskeletal activity of others. Somatic value involves dispositions to form preferences and aversions, likes and dislikes based on experience during one's lifetime.

The major brain mechanisms involved in stimulus appraisal are the amygdala in the temporal lobes on the sides of the brain, the orbitofrontal cortex in the frontal lobes above the orbits of the eyes, and the body proper via the autonomic nervous system, the endocrine system, and the musculoskeletal system. The amygdala appears to make appraisals about stimuli in terms of what threats they pose to the organism. People with amygdala damage appear to have reduced sensitivity to stimuli that normal individuals

find fearful or threatening. However, some researchers believe that the amygdala is also responsive to rewarding stimuli. The orbitofrontal cortex seems to be involved in the appraisal of both positive and negative stimuli and seems to function particularly in determining changes in reward contingencies. In other words, the orbitofrontal cortex seems to subserve the recognition of positive stimuli that cease to be rewarding and negative stimulus situations that cease to be aversive.

Psychologists have been interested in defining the categories that we use to appraise stimuli. Several highly congruent models have been proposed, and that developed by Klaus Scherer appears to capture the dimensions identified in most of them. He identifies five stimulus evaluation checks: novelty, intrinsic pleasantness, goal/need significance, coping potential, and norm/self compatibility. The novelty check determines whether the stimulus is familiar or whether it is new. The pleasantness check determines whether the stimulus is intrinsically pleasant. The goal/need significance check assesses whether the stimulus situation will facilitate or interfere with the individual's meeting his or her needs or achieving his or her goals. The coping potential check evaluates whether the individual is capable of meeting the physical, mental, and emotional demands of the situation. The norm/self compatibility check assesses whether the stimulus situation is compatible with societal expectations and personal standards.

In sum, then, the brain inherits some preferences and aversions (homeostatic and sociostatic value) and acquires others (somatic value). One of the functions of society appears to be to capture or entrain an individual's appraisal system so that the individual will ultimately share the preferences and aversions of the culture of which he or she is a member. A society socializes individuals to preferences in foods, religious beliefs, social behaviors, and moral standards, as well as particular knowledge and skill domains.

An interesting way to observe the entrainment of stimulus appraisal systems is to observe how different societies socialize individuals to learn a second language. In Holland it is extremely rare to find a Dutch person with a university degree who is monolingual; educated people in Holland are likely to have a substantial command of English, French, or German. The acquisition and possession of this knowledge and skill is part of being Dutch. All academics in Holland know English. In general, this is not a product of identification with English speakers. In other words, in Holland one does not necessarily acquire English to become British-like or American-like. One acquires it to be a particular kind of Dutch person—a university teacher or researcher.

Dutch society expends considerable effort and resources to entrain its members' value systems to get them make the effort to acquire these second languages. English, for example, is required and taught at the elementary, secondary, and university levels, and a significant number of university courses are taught in English. English, French, and German movies on Dutch television are not dubbed; they are in the native language with Dutch subtitles. Dutch students who eventually receive university degrees are

encouraged by families and educational institutions to spend various periods during their education abroad.

In North America, particularly in the United States, there is very little expectation that people will acquire a language other than English. To be considered an educated American, it is not necessary to speak another language. A major reason for this is that there is no obvious language for the society as a whole to choose. The Dutch stress English because there are very few Dutch speakers in the world, and English is the language of commerce and science. France and Germany are neighbors with whom Holland has extensive relations. Therefore, when an American born to monolingual English-speaking parents *does* acquire a second language, it is because of a particular idiosyncrasy of his or her stimulus appraisal system. The system appraises some aspect of the language-learning situation positively—its speakers, the culture or the language itself. This appraisal creates an incentive motive, and then the learner makes efforts to learn the language to achieve that goal. His or her neural appraisal mechanism assesses stimuli in the environment (teacher, method, materials, the target language itself) and, if the appraisal is positive enough (in terms of pleasantness, goal/need significance, coping potential, and self and social image) such that the intellectual effort is made over a long enough period of time (generally several years), the language may eventually be acquired. But unlike the case in Holland, what language is learned and to what degree is very variable. English-speaking North American society does not organize to entrain its members' neural appraisal systems to acquire any particular second languages to any particular degree.

In sum, what society values has an impact on how the brain appraises certain stimuli, and that appraisal determines how the brain acquires and processes certain information. The brain, in turn, allows societal institutions to work. In societies where the acquisition of certain second languages is both necessary and expected, sufficient instruction will be provided and that instruction will be effective. This does not mean that second languages are taught better in Holland. It simply means that because the society needs its citizens to know English, German, or French, the society will provide the requisite instructional opportunities, and the citizens will make the effort to learn from those opportunities.

The simple view of the brain (sensory system, value system, motor system) provided here shows the brain's enormous power. The value system generates motor and mental activity vis-à-vis the stimulus situation. This simple neural system determines such large-scale societal phenomena as who learns what foreign language and how well. In general, the brain is not designed to like some things and to dislike others. Rather, it is designed to acquire such preferences and aversions, sometimes idiosyncratically as individuals (e.g., North Americans' acquiring a second language) or socially as groups (e.g., Dutch speakers' acquiring English). The preferences and aversions control what is learned and to what degree.

(See also *acquisition, category, contact, evolution, identity*)

## Bibliography

Brothers, Leslie

1997 *Friday's Footprint: How Society Shapes the Human Mind*. New York: Oxford University Press.

Damasio, Antonio

1994 *Descartes' Error: Emotion, Reason and the Human Brain*. New York: G. P. Putnam's Sons.

Edelman, Gerald

1992 *Bright Air Brilliant Fire: On the Matter of the Mind*. New York: Basic Books.

LeDoux, Joseph

1996 *The Emotional Brain*. New York: Simon and Schuster.

Rolls, Edmund

1999 *The Brain and Emotion*. New York: Oxford University Press.

Scherer, Klaus

1984 Emotion as a Multi-component Process: A Model and Some Cross-cultural Data. *In* *Review of Personality and Social Psychology*. Vol. 5: Emotions, Relationships and Health. P. Shaver, ed. Pp. 37-63. Beverly Hills, CA: Sage.

Schumann, John

1997 *The Neurobiology of Affect in Language*. Malden, MA: Blackwell Publishers.

Applied Linguistics

3300 Rolfe Hall

UCLA

Los Angeles, CA 90095-1531

[schumann@humnet.ucla.edu](mailto:schumann@humnet.ucla.edu)