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A Primer on Social Neuroscience

Olivier Serrat
Asian Development Bank

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Abstract
{Excerpt} Human history is not only social history but also neurobiological history. Throughout most of the 20th century, social and biological explanations were widely viewed as incompatible. However, from the 1990s, the emergence of social neuroscience vindicates Aristotle's pioneering deductions. The young science accepts that the brain is a single, pivotal component of an undeniably social species and that it is orderly in its complexity. It treats the human brain as a social organ, whose physiological and neurological reactions are directly and profoundly shaped by social interaction. (To a mammal, being socially connected to caregivers is indispensablefor survival: this, incidentally, suggests that Abraham Maslow's hierarchy of needs might need to be revised to ascribe more weight to social needs, e.g., love and belonging, and esteem, in relation to self-actualization.)

Nondualistic and nonreductionistic, social neuroscience, through a multilevel and integrative approach, aims to understand the role of the central nervous system in the formation and maintenance of social behaviors and processes. Spanning the social and biological domains, e.g., molecular, cellular, system, person, relational, collective, and societal, it exploits biological concepts and neurobiological techniques such as functional magnetic resonance imaging—which measures patterns of blood oxygenation responses in the brain as a subject engages in a particular task, to inform and refine theories of social behavior. In short, it focuses on how the brain mediates social interaction. (Brain scans captured through functional magnetic resonance imaging show that the same areas are associated with distress, be that caused by social rejection or by physical pain.)

Arguably, the potential benefits of social neuroscience are that it can inform debates in social psychology, provide tools for measuring brain–body activity directly and unobtrusively and provide information that would be impossible to assess using other techniques, and permit the examination of social processes by pointing to the importance of social variables (from context to culture) in altering processes within the brain and body.

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A Primer on Social Neuroscience

By Olivier Serrat

The human mind is driven by an emergent array of biological, cognitive, and social properties. Unconscious processes perform feats we thought required intention, deliberation, and conscious awareness. The breakthroughs of social neuroscience are fostering more comprehensive theories of the mechanisms that underlie human behavior.

Aristotle's Social Animal …

Aristotle[1] saw the city—what we now call the state—as a natural community.[2] Since the whole must necessarily precede the parts—for if you take away the man, you cannot say that a foot or hand remains—the city comes before the family that, logically, heralds the individual. And so, the city is last in the order of becoming but first in the order of being.

Aristotle, a forward-looking naturalist who relentlessly sought the reality behind appearances and all the time expected that it might be different from what it seemed, thought it obvious that man is by nature a social animal (and that whosoever is naturally and not accidentally unfit for society must be either inferior or superior to man). In his *Politics* and elsewhere—for example, in *The History of Animals*, *Metaphysics*, *On Memory and Reminiscence*, and *On the Soul*—he stressed the logic of relations between parts and wholes. Had later thinkers such as René Descartes[3] followed Aristotle in conceptualizing the mind as an array of powers or potentialities (rather than as a separate entity), attributing thereby physiological or psychological capacities to the whole organism, they would have edged closer to the truth; they would not have become ensnared in intractable problems of interaction between the mind and the body. (Dualism is the condition of being double. In psychology, it is the view that the mind and body function separately, without interchange; Cartesian dualism is summed up in the philosophical statement "Cogito, ergo sum." ["I think, therefore I am."]) In the 21st

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1 Aristotle (384–322 BC), a Greek philosopher and scientist, investigated an extraordinary range of subjects including agriculture, biology, botany, chemistry, dance, ethics, government, history, literary theory, logic, mathematics, medicine, metaphysics, music, poetry, physics, politics, psychology, rhetoric, theater, and zoology. A highly original and prolific writer, he radically transformed most, if not all, the areas of knowledge he touched. More than 2,300 years after his death, despite the unavoidable shortcomings of his wide-ranging, original thinking, he counts as one of the most influential scholars who ever lived.

2 Formed initially for the satisfaction of natural wants, according to him, the state exists thereafter for moral ends and the promotion of higher life.

3 René Descartes (1596–1650), a French philosopher, mathematician, and physicist, insisted that mental reality must be exactly as it seems.

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century, it is belatedly recognized that human beings are natural: they are part of nature and they are evolving naturally;[4] human thinking too is natural.[5]

… Meets Social Neuroscience …

Human history is not only social history but also neurobiological history. Throughout most of the 20th century, social and biological explanations were widely viewed as incompatible. However, from the 1990s, the emergence of social neuroscience[6] vindicates Aristotle's pioneering deductions. The young science accepts that the brain is a single, pivotal component of an undeniably social species and that it is orderly in its complexity. It treats the human brain as a social organ, whose physiological and neurological reactions are directly and profoundly shaped by social interaction. (To a mammal, being socially connected to caregivers is indispensable for survival: this, incidentally, suggests that Abraham Maslow's hierarchy of needs might need to be revised to ascribe more weight to social needs, e.g., love and belonging, and esteem, in relation to self-actualization.)

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> *Everything has beauty, but not everyone sees it.*
>
> —Confucius

… Through the Doors of Perception

Perception is the process of acquiring, interpreting, selecting, and organizing sensory information to attain

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4 Human institutions and related artifacts are the offspring of thought, skill, and social interaction. In the form of dyads, families, and groups, to cities, civilizations, and cultures, Homo sapiens has created emergent, constantly evolving and complex adaptive social structures that extend far beyond the individual. Over time, these have coevolved with the neural and hormonal mechanisms that support them because the allied social behaviors and processes have helped individuals stay alive, reproduce, and care for children sufficiently long that they too might survive to procreate and contribute adaptive socio-neural mechanisms to the gene pool. In so doing and as a result of doing so, Homo sapiens has evolved a brain and biology whose functions include formation and maintenance of social recognition, attachments, collectives, and alliances; and development of communication, oftentimes deception, as well as reasoning about the mental states of others. See John Cacioppo, Penny Visser, and Cynthia Pickett, eds. 2005. *Social Neuroscience: People Thinking about Thinking People*. MIT Press.

5 In comments on memory and learning phenomena, Aristotle distinguished between recalling information to mind and storing information—or, as he put it, between remembering (the reinstatement in consciousness of something that was there before) and memory (the existence, potentially, in the mind of an earlier perception or conception). In his opinion, the main difficulties were to explain (i) how the perception of a state of affairs can be stored; (ii) how it can later be brought to mind; (iii) how it happens that, when the perception of a state of affairs is brought to mind, the relation between the representation and the original state of affairs, now absent, is such that the first is a memory of the second and is known to be such. In modern parlance, these problems relate to storage of information, retrieval of information, and the question of how representations represent.

6 Traditional neuroscience has treated the nervous system as an isolated entity and has largely ignored the influences of the social environments in which human beings live. We now recognize the considerable impact that social structures have on the operations of the mind and body.

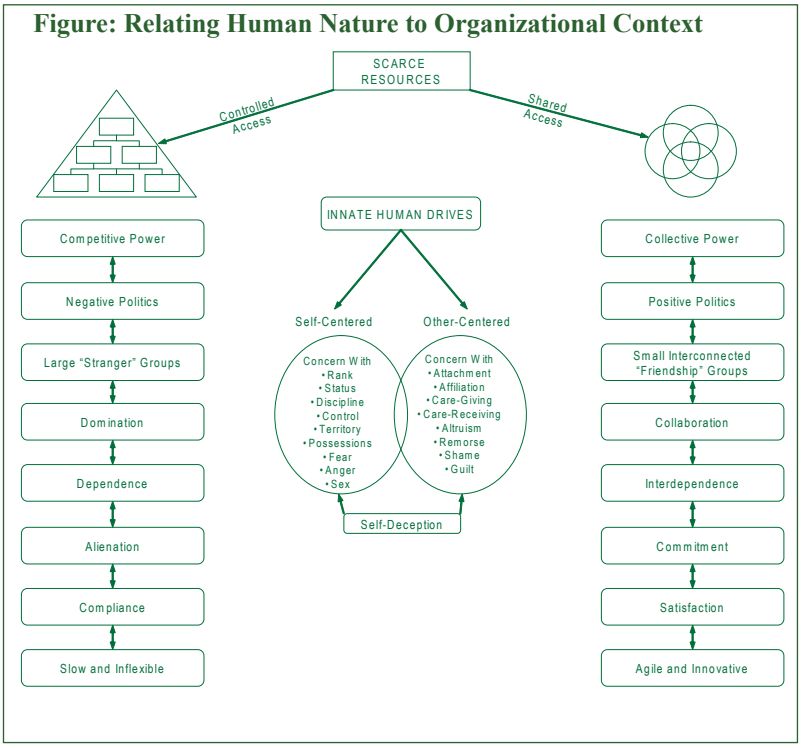
7 Magnetic resonance imaging is a relatively new technology: the first image was published in 1973. (In comparison, the first human X-ray was taken in 1895.) Unlike regular magnetic resonance imaging, functional magnetic resonance imaging captures a sequence of activity while it is in progress. The other techniques of neuroscience include positron emission tomography, event-related potentials, magnetoencephalography, transcranial magnetic stimulation, electrocardiograms, electromyograms, endocrinology, galvanic skin response, and studies of focal brain lesion patients.

8 In the last decade, social neuroscience has shed light on aspects of social life as diverse as social regulation; social rejection; impression formation; self-awareness; emotion regulation; and attitudes, beliefs, and memory involving social groups.

awareness. It involves cognitive and affective interaction between an organism and the external world. (In the case of people, what someone perceives is a result of interplay between the perceiver,[9] the situation, and the perceived.) Hence, perception is not a passive reaction to, say, events or circumstances: it is an active, pervasive, and significant process through which the structure and function of the sense organs and nervous system form a vital link between the organism and the external world. In society, perception is all-important because people's attitudes and behaviors are based on their discernment of what reality is, not on reality itself. The world as it is perceived is the world that is behaviorally important: perception is projection—we all have individual assumptions and theories that help guide us through life.[10]

Relating Human Nature to Organizational Context

Figure: Relating Human Nature to Organizational Context



Source: Charles Ehin. 2000. *Unleashing Intellectual Capital*. Butterworth-Heinemann.

By bringing together biological and psychological models of the brain, social neuroscience confirms that much of human life revolves around pain and pleasure. It should come as no surprise that social behavior is governed by an overarching organizing principle of minimizing threat and maximizing reward, informed by

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[9] The components of a person's perceptive makeup that, in combination with the situation and the perceived, will determine behavior, are physical, social, and personal. They can be influenced by culture, religion, values, ethics, emotions, authority, rapport, attitude, persuasion, coercion, hypnosis, and genetics. Combinations of these drive, in turn, cognition and affect.

[10] For a taxonomy of perception, see Maxine Ruth Moore. 1970. The Perceptual-Motor Domain and a Proposed Taxonomy of Perception. *Educational Technology Research and Development*. Vol. 18, No. 4, pp. 379–413. The paper identifies (i) sensation—behavior that indicates awareness of the qualities (informational aspects) of a stimulus (or of material) as perceived by the senses; (ii) figure perception—behavior that suggests awareness of an entity; (iii) symbol perception—behavior that reveals awareness of figures in the form of denotative signs (when associated meanings are not considered); (iv) perception of meaning—behavior that displays awareness of the significance commonly associated with forms and patterns and events and the ability to assign personal significance to them; interpretive ability; and (v) perceptive performance—behavior that evidences sensitive and accurate observation, ability to make complex decisions where many factors are involved, and ability to change ongoing behavior in response to its effectiveness.

brain networks used for primary survival needs.[11] Depending on the environment, these trigger different innate human drives vis-à-vis scarce resources, to which access may be shared or controlled, that Charles Ehin[12] terms self-centered or other-centered. (More common usage refers to selfishness or altruism.)

> *It is a pleasure to give advice, humiliating to need it, normal to ignore it.*
>
> —Anonymous

Charles Ehin offers a comprehensive framework to understand how human nature can support (or undermine) voluntary workplace collaboration and innovation. He suggests that for these to thrive, organizations must develop an organizational "sweet spot." To that intent, David Rock and Jeffrey Schwartz[13] have put forward a brain-based model—reminiscent of Charles Ehin's innate human drives—that caters to the primary reward or primary threat circuitry (and associated networks) of the brain.[14] The model, which defines five domains of social experience deeply important to the brain—status, certainty, autonomy, relatedness, and fairness[15]—allows exploration of what nuanced actions to reduce threats and increase rewards might be taken in each domain to support the expansion of Charles Ehin's organizational sweet spots.[16] (Supportive measures lie in the areas of managing oneself,[17] coaching and mentoring,[18] training, leadership development, and organizational systems.) Usefully, David Rock also makes suggestions for further research, which serve to underscore the potential of the approach. Questions that beg answers—and the potential of social neuroscience is such that the list could be endless—include the following:

- Which of the domains in the SCARF model generate the strongest threats or rewards given different types of organization?
- What are the links between the five domains?
- What are the best techniques for minimizing threats and maximizing rewards in each domain?
- Does the relative importance of each domain vary across, say, individuals, gender, or tenure?
- What are the implications of the model for organizational design?

> *Nature is trying very hard to make us succeed, but nature does not depend on us. We are not the only experiment.*
>
> —Buckminster Fuller

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[11] Brains are built to detect perceived changes in the environment. Error detection signals are generated by the orbital cortex, which is closely connected to the fear circuitry in the two amygdalae. (The amygdalae perform a primary role in the processing and memory of emotional reactions.) Next, the orbital cortex and the amygdalae compete with and pull brain resources away from the prefrontal cortex, which promotes and supports higher intellectual functions, e.g., learning and comprehension. Animal instincts take over, with fight-or-flight responses.

[12] Charles Ehin. 2000. *Unleashing Intellectual Capital*. Boston: Butterworth-Heinemann.

[13] David Rock. 2008. SCARF: A Brain-Based Model for Collaborating with and Influencing Others. *NeuroLeadership Journal*. Vol. 8, No. 1, pp. 1–9.

[14] The approach–avoid response is a survival mechanism intended and designed to help people stay alive by quickly and easily remembering what is good or bad in the external environment. Not surprisingly, responses to threats tend to last longer than responses to rewards. See also Evian Gordon (ed.). 2000. *Integrative Neuroscience: Bringing Together Biological, Psychological, and Clinical Models of the Human Brain*. Overseas Publishers Association.

[15] As defined by David Rock and Jeffrey Schwartz, status is relative importance to others; certainty is the ability to predict the future; autonomy affords a sense of control over events; relatedness is the sense that one is safe with others, that they are friends rather than foes; and fairness is the perception that exchanges between people are evenhanded.

[16] See, for instance, David Rock. 2009. Managing with the Brain in Mind. *strategy + business*. Vol. 56.

[17] Thanks to the physiological perspective, we can now understand that individuals need to generate their own answers and, accordingly, that a solutions-focus is more advantageous than dwelling on problems. The power is in the focus.

[18] Learning new skills takes time because old patterns are hard-wired. Therefore, coaches and mentors—managers too—should refrain from giving advice: if they do, they should be unattached to the recommendations they make and flag these as options (certainly not as orders); advice puts people on the defensive because they perceive the person extending it as claiming superiority. They also need to focus on solutions with concentration and serenity. (In a threatened state, people are more likely to be "mindless.") According to David Rock, the science of attention is a cornerstone of coaching: the elements of his ARIA model are (i) awareness of dilemma, (ii) reflection, (iii) insight, and (iv) action. See David Rock and Jeffrey Schwartz. 2006. A Brain-Based Approach to Coaching. *International Journal of Coaching in Organizations*. Vol. 4, No. 2, pp. 32–44.

Table: The Approach–Avoid Response: A Survival Instinct

Response	Synonyms in Literature	Traditional Primary Factors that Activate the Response	Social Factors that Activate the Response
Approach	• Accost, address, advance, befriend, construct, come close, engage, interact, resource, reward, solve, strengthen	• Rewards in the form of food, water, sex, shelter, and physical assets necessary for survival	• Happy, attractive faces • Rewards in the form of increasing status, certainty, autonomy, relatedness, fairness
Avoid	• Abstain from, fight shy of, recoil from, retreat, steer clear of, turn away from, withdraw, withhold	• Punishment in the form of removal of resources • Threat from a predator or natural elements	• Fearful, unattractive, unfamiliar faces • Threats in the form of decreasing status, certainty, autonomy, relatedness, fairness

Source: Adapted from David Rock. 2008. SCARF: A Brain-Based Model for Collaborating with and Influencing Others. *NeuroLeadership Journal*. Vol. 8, No. 1, pp. 1–9.

Live Wires

Astonishingly, the study of the brain and nervous system is starting to allow direct measurement of thoughts and feelings. Inevitably, from applications in psychology, social neuroscience will foray into other fields.[19]

Organizational behavior, for one, draws considerably on social psychology and psychoanalysis. (Theories of motivation and personality are rooted in these social sciences.) There, brain-based approaches will help study the building blocks of what professionals do, such as solving complex problems, negotiating transactions, trying to persuade others, promoting change, making decisions under pressure, and sparking creativity and innovation. They can also shed light on the critical of matter of giving feedback, which most persons perceive as an attack on their status.[20]

Because of its very breadth, social neuroscience will bring new tools, methods, and approaches to the challenges people and their institutions face. It will, for instance, test orthodox thinking about responsibility and blame and will impact social policies. Notwithstanding, if the journey has begun, much work remains to be done before the revolution in neuroscience applies with effect new knowledge to real-world settings.

Further Reading

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Charles Ehin. 2000. *Unleashing Intellectual Capital*. Butterworth-Heinemann.

Eddie Harmon-Jones and Piotr Winkielman (eds). 2007. *Social Neuroscience: Integrating Biological and Psychological Explanations of Social Behavior*. The Guildford Press.

[19] Neuroeconomics, for one, is already born. Adding observation of the nervous system to the set of explanatory variables, it enriches analyses of social, cognitive, and emotional factors (that behavioral economics concentrates on) to better interpret the economic decisions of individuals as they interact, categorize threats and rewards, and evaluate decisions. Neuromarketing, a distinct discipline related to neuroeconomics, studies the brain activity of potential consumers to marketing stimuli.

[20] From the foregoing, one can be forgiven for concluding that traditional management techniques owe more to animal training than human psychology. If constant, disruptive change is the necessary, often painful, condition of mankind, the benefits of carrot-and-stick or command-and-control approaches can only be temporary (if they arise at all). Social neuroscience explains why people find change so disconcerting: therefore, it is best, with effective questions, to help people derive their own conclusions and develop homemade resolutions.

Knowledge Solutions

For further information

Contact Olivier Serrat, Head of the Knowledge Management Center, Regional and Sustainable Development Department, Asian Development Bank (oserrat@adb.org).

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ADB's vision is an Asia and Pacific region free of poverty. Its mission is to help its developing member countries substantially reduce poverty and improve the quality of life of their people. Despite the region's many successes, it remains home to two thirds of the world's poor: 1.8 billion people who live on less than $2 a day, with 903 million struggling on less than $1.25 a day. ADB is committed to reducing poverty through inclusive economic growth, environmentally sustainable growth, and regional integration.

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Asian Development Bank
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, Philippines
Tel +63 2 632 4444
Fax +63 2 636 2444
knowledge@adb.org
www.adb.org/knowledgesolutions