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Strategy as Central and Peripheral Processes

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Drawing on insights from natural science, this conceptual paper develops theoretical rationales to explain how corporate entrepreneurship and strategic renewal derive from complementary central and peripheral processes in corporate strategy making.

Introduction

Corporate entrepreneurship is deemed essential to uncover opportunities that shape the future strategic path and adapt the firm to environmental change (e.g., Covin and Miles, 1999; Wolcott and Lippitz, 2007). At the same time, rational central processes are important to execute strategic actions in a coordinated manner (e.g., Baum and Wally, 2003; Brews and Hunt, 1999; Goll and Rasheed, 1997). That is, the organization's adaptive responses and dynamic capabilities are embedded in integrative structures that accommodate dispersed business initiatives. The dual concerns for integration and entrepreneurial behavior are reflected in the conjoint need for effective routines and exploratory search in adaptive systems (e.g., Pfeifer and Bongard, 2007; Sutton and Barto, 1998). It has also been expressed as a need to balance exploitation and exploration (March, 2001) and configure ambidextrous organizational forms (e.g., O'Reilly and Tushman, 2008; Tushman and O'Reilly, 2004). In strategy research, optimization and rejuvenation perspectives have variously been described as intended and emergent strategies (Mintzberg, 1978; Mintzberg and Waters, 1985), top-down and bottom-up strategies (Nonaka, 1987), induced and autonomous strategy processes (Burgelman, 2005; Burgelman and Grove, 1996, 2007), central planning and decentralized initiatives (Andersen, 2000, 2004, Andersen and Nielsen, 2009). Burgelman and Grove (2007) outline such a combined strategy process and observe how central direction and dispersed exploration can change over time influenced by strategic leadership.

The need for organizational adaptation and strategic renewal has been conceptualized as dynamic capabilities (Teece et al., 1996). This concept has been expressed as the organization's ability to sense emerging changes in the environment, seize new opportunities, and reconfigure the organization to exploit new opportunities offered by the changing competitive context (Teece, 2007). Teece (2007) provides a comprehensive account of how dynamic capabilities enable organizational adaptation and ascribes this to the specific knowledge and creative activities of many often specialized actors within the organization. Ongoing attempts have tried to develop a better understanding of the multifaceted dynamic capabilities construct and provide useful insights for scholars and practicing managers (Helfat et al., 2007). However, these efforts fall short on precise executive guidance with respect to how one should organize the corporate strategy process in ways that hone effective dynamic capabilities. A particular research stream has emphasized the managerial role in the adaptive process conceptualized around dynamic managerial capabilities and delves into the influence of key managers when firms engage in strategic renewal (Adner and Helfat, 2003; Agerwal and Helfat, 2009).

Teece (2007) argues that dynamic capabilities to a large extent reside with the top management team and more recent studies focus explicitly on the effects of executive cognition as a way to gain new insights about the micro foundations of organizational adaptation (Helfat and Peteraf, 2010). This effort builds on a view of top managers as central instigators of organizational strategy-making where heterogeneity in the cognitive capabilities of executives among competing firms form the adaptive capabilities and thereby explain why some organizations are better as they sense, seize, and reconfigure along a new strategic path. However, since corporate strategy making comprises an amalgam of central and dispersed strategic activities (Bower and Gilbert, 2005, 2007), it is appropriate to extend the cognitive perspective to include decision-makers at all

levels of the organization. The ability to invoke dynamic capabilities is likely to require individual cognitive capabilities both at the top management level and among influential managers dispersed throughout the firm. Indeed, we claim that effective cognitive capabilities depend on a combination of central and peripheral processes as an interactive network of managers confronts their cognitive understanding with ongoing experiential observations and that this is the key to understand adaptive strategy making processes.

The theoretical rationales for combined central and peripheral processes in integrative strategy making are developed in the following. The dynamic of complementary processes in natural sciences are considered to understand how human cognition flourishes on interplays between direction and unexpected encounters enhanced by particular process characteristics that coincide with basic elements of integrative strategy making. We show how this process dynamic converges around effective outcomes and discuss the implications for strategic leadership.

Dynamic systems

Firms that pursue different forms of competitive advantage and master multiple strategy modes, such as, decentralized strategy making and central planning are found to be associated with significantly higher economic performance (Andersen, 2004; Hart and Banbury, 1994; Miller and Dess, 1993). While the empirical evidence points to superior outcomes from complementary central and peripheral strategy making modes, it does not provide micro foundational insights that explain why the combined processes posses a higher value creating potential. Studies on integrative strategy making approaches do not fully explain how central end peripheral processes interact to create incremental value. The short answer to this is that combined central and peripheral processes improve performance because the underlying dynamic is stimulated. Here

we use the term 'dynamic' to describe the ability to take action, to interact, and to adapt. This constitutes an essential element of the dynamic capabilities construct, which by the very meaning of the word expresses the ability to perform the dynamic. By stimulating the dynamic we may create a system that will change according to certain laws described and modeled by differential equations. The cell, the brain, the human being, the organization, the general economy, and also surrounding weather patterns constitute such dynamic systems.

Dynamic systems can be difficult to predict because they are nonlinear like other interesting phenomena in the real world. As Pfeifer and Bongard explain (2009, p. 93): "One of the implications of nonlinearity is that we can no longer, as we can with linear systems, decompose the systems into subsystems, solve each subsystem individually, and then reassemble the system into complete solutions. In real life this principle fails miserably… A system must always be treated as a whole." In other words, from an organizational perspective individual actions operate in conjunction with many other actions in different parts of the firms that together with a variety of ongoing events in the environment can have unpredictable effects. That is, an integrative structure circumscribed by dispersed actions can be construed as a single cohesive dynamic system where the elemental parts together form an organizational response capability.

Let us infer the dynamic perspective onto the integrative strategy making process comprised by a combination of decentralized emergent strategic initiatives and central strategic planning activities. Decentralized strategic actions derive from individual initiatives and interaction between numerous involved people inside and outside the organization and as such constitute a nonlinear process. Central strategic planning, though it also may entail interaction between many individuals, is characterized by rational deduction and linear computations with the aim of comprehending, predicting, and creating a more certain way forward. Hence, an essential

characteristic of the combined central and peripheral activities of integrative strategy making is that it establishes a contrasting difference between nonlinear and linear processing modes. A quick examination of two different dynamic systems from the natural sciences illustrates how the interaction between nonlinear and linear processes can create a certain dynamic. First we consider the *biological cell* and then we describe the same aspects applied to the *human brain*. Then we use contemporary insights about *human cognition* to explain creativity and innovation as complementary interaction between nonlinear and linear processes.

Embodiment of mind

When it comes to the central strategic planning of genetic control, the environment must be considered. Nijhout (1990) argues that "when a gene product is needed, a signal from its environment, not an emergent property of the gene itself, activates expression of that gene." Hence, the cell membrane, at the periphery of the cell, is an information processing system that creates new strategies in relation to the cell's environment based on the potential of its genetic code. This new science of empowerment is referred to as *epigenetics*. According to this view, genes are not our destiny because the environment can influence and modify the genes without changing their basic blueprint and this modification can be passed on to future generations. What is more, Darwin's hereditary factor can be modified much faster than we used to think. Hence, DNA is not the brain of the cell but its reproductive system and in many ways constitutes the memory of the cell that is updated on an ongoing basis. In short, the central nucleus and the peripheral membrane constitute a complementary pair in living cells and we can find similar central-peripheral pairs in all living systems including the human brain.

Until recently most descriptions of the brain were based on a metaphor of central strategic planning. I can decide with my brain to write a letter, and consequently pick up a pencil with my hand to complete an intended action. Hence, the human mind controls our subsequent actions. When the central executive functions of the frontal cortex in the brain are activated, we say that we are in control of the body. But, it is more complicated than that because, surprisingly, the body affects our thoughts (Tomasello, 2008). That is, the body shapes the way we think and communicate. It means that decentralized emergent strategies form the central strategic plan in the brain. This way modern brain science has brought the central and the peripheral mental processes together. The binding principle between our conscious understanding, 'concept', and unconscious observations, 'percept', is our physical interaction with the real world (see Figure 1). The body is always on duty and continuously experiments on-line and observes the effects of a multitude of environmental encounters. In contrast, the mental processes operate off-line and speculate about consequences and potential counter-effects. This particular paradigm is often referred to as 'embodiment of mind' (Gallagher 2005).

The processes of mental conceptualization that create understanding, meaning, and cognition are influenced by perceptual impressions from action encounters with the external environment. So, the human brain may be better understood in terms of complementary cycles of perception, cognition, emotion, and actions that link the brain intimately to its physical surroundings in continuously operating feedback cycles (Gossberg, 2000). The systems of central and peripheral processes are described as complementary dynamic structures with emergent properties. According to Kelso and Engstrøm (2006) the interaction between central and peripheral processes has a meta-stable dynamic that captures the principles of brain functions and human mental processes. Human cognition can be described as the dual process of decision

making (taking actions) and reasoning (judgment). Stanovich (2004) provides a list of 23 dual-process models all of which have something in common: Cognition is an interaction between two sub-systems. System 1 is old in evolutionary terms and humans share it with other animals. System 2 is only human and came about more recently in evolutionary terms.

The dual-process theories attached to the two sub-systems evolved over past decades. It was implicit in the research programs on heuristics and biases conducted by Kahneman and Tversky (1982) and gained support in recent neurophysiology research (Prado and Noveck, 2007). The cognitive processes of system 1 and system 2 are complementary and can be described as a relationship between central and decentralized processes (Evans 2003). System 1 is often referred to as the 'fast' system and system 2 is referred to as the 'slow' system (see Table 1).

Proposition 1: *The brain activity of individuals (reflecting human thinking) operates through complementary fast and slow processing systems whereby ongoing enactments with the environment are observed and assessed to determine appropriate forward moves.*

Proposition 2: *Individual human thinking operates through complementary fast and slow processing systems that operate simultaneously in conjunction with ongoing interaction between immediate responses to external stimuli and integrative analyses of these responses.*

Proposition 3: *Effective organizational strategy making comprises complementary processes whereby individuals can take responsive actions in view of environmental changes the outcomes of which are evaluated at the organizational level to assess the direction of the firm.*

The compass of emotions

Emotions are important to the way the fast and slow brain systems operate and how humans think. Feelings and thoughts interact in a clever way and there several models compete to explain

how this *emotional intelligence* operates. Here, we specifically draw on the work of Johnson-Laird (2006) and Mayer and Salovey (2000). Emotional intelligence is defined as: "the ability to perceive and express emotion, assimilate emotion in thought, understand and analyze emotions and regulate emotions in oneself and others" (Mayer and Salovey, 2000). Emotions are pretty much involved in everything that happens in the human brain and two areas of the brain seem to play particularly important roles: (1) the 'frontal lobes' of the brain, and (2) the 'limbic system' deep inside the brain. The limbic system has two areas, 'amygdala' and 'hippocampus', that are heavily involved in the dynamic systems processes. Hence, emotions and socially observed emotional outbursts are essential influencers in the brain and individuals can learn to navigate the emotions by understanding their feelings (Fredens and Prehn, 2009 pp. 175). To this end we can consider a 'compass' to navigate the human emotions. The proposed model is a modification of Watson and Tellegen's (1999) two-dimensional framework (see Figure 2).

There is a line across from the active to the passive-positive-negative. Effective organizations should strive towards conditions where employees, wherever they are in the firm, are located on the right hand side of this line in the active area. However, given the preferences between risk and safety, and between excitement and boredom, individuals in the organization should be able to navigate the compass so they retain this position. For more venturesome individuals, this entails ongoing experimentation with the way things are done. Unforeseen events in dynamic environments will also bring individuals into unexpected situations of fear and anger that, in turn, can lead to creative tension. Emotions play a crucial role in the brain's fast system that works in parallel with the slow system. The brain's rapid system is filled with ideas but it is the handling of emotions that lets the individual select the best of them, so the slow system can analyze their potential implications.

Proposition 4: *Effective organizational strategy making provides organizational members with sufficient autonomy to explore in ways that induce positive energy and motivation, and fosters an urge to create new ideas, develop creative solutions, and innovate.*

Proposition 5: *The ability to involve employees in effective interaction between complementary processes of dispersed experimentation and integrative organizational analysis requires that responsive initiatives are evaluated in conjunction with ongoing business activities.*

Proposition 6: *Good leadership ensures that organizational members are involved in major internal changes in the organization to create positive energy and motivation that drive creativity and innovation, and avoid situations of passive attitudes, fear, and anger.*

Cognitive load and collaborative learning

The discussion about the micro-foundations of dynamic capabilities is focused on the individual level. Teece (2007) claims that "enterprises with strong dynamic capabilities are intensely entrepreneurial" and thus implies that adaptation depends on individual entrepreneurial behaviors within the organization. Teece (2007) ascribes important roles to decentralized actors, middle-, and top managers as he outlines the micro-foundations of dynamic capabilities, whereas other scholars focus exclusively on the dynamic managerial capabilities at the executive echelons (Adner and Helfat, 2003; Helfat and Peteraf, 2010). The micro-foundations of dynamic capabilities recognize in passing that cognitive biases can have adverse effects on strategic decisions and thus require proper attention (Teece, 2007). In contrast, Helfat and Peteraf (2010) emphasize the cognitive field as a potential strategic differentiator and introduce the concept of "cognitive capability" as a factor that may facilitate strategic change in organizations. This focus on individual agent behavior in the organization is inferred from microeconomic analysis that constitutes a

branch of economics studying how key decision makers (e.g., in households and firms) allocate limited resources. Hence, the actions taken by individual agents somehow lead to aggregate and cumulative effects at the firm level. However, this perspective discards dynamic interaction between organizational agents that may play an important role by itself.

In cognitive science, cognitive capability is understood as an individual ability to learn and use acquired knowledge in everyday settings. Here actions build on implicit knowledge and problem solving relies on routine knowledge and skills. However, adaptation to new situations requires the presence of other cognitive attributes to deal with the challenges of unforeseen, uncertain and unknown circumstances. This is consistent with cognitive capabilities at the individual level as long as the problem is simple and we are dealing with familiar tasks and issues. If, however, the problem is highly complex and ambiguous it is very difficult to solve at the individual level. In this situation intense collaborative efforts between many individuals are required to produce viable solutions. To appreciate this, it is essential to understand our cognitive architecture, its limits, and possibilities. If an issue is complex and environmental factors are interrelated, the amount of information required to solve the underlying problem exceeds the working memory capacity of a single individual (Antonenko et al., 2010). This human limitation is a challenge to the 'cognitive capability' of individuals whether they operate on their own or together with other people in an organization or in broader society. This challenging limitation is addressed by cognitive load theory (Sweller, 1988; Paas et al., 2010).

Hence, cognitive capabilities are concerned with how humans acquire and handle knowledge particularly in organizational setting. When single humans deal with familiar tasks, the cognitive load can be managed individually and collectively by organizing the knowledge in specific domains and automating it. This knowledge is then used by individual experts each of which have a

finite cognitive capacity and possess limited resources of working memory. The individual approach to store information is based on evolutionary elementary skills, such as, means-end analysis and heuristics driven mostly by implicit knowledge. However, when dealing with unexpected situations and problems in unfamiliar situations there is a need for generalized knowledge and skills acquired in an explicit way. So, learning that requires the acquisition of new knowledge to assess rapidly changing conditions must employ non-routine approaches that can create insights, generate ideas, and inform new task experiences (Bransford et al., 1999). When issues are highly complex, the limitations of cognitive load can be prevented by learning collaboratively to solve the problems.

Since creativity and innovation can be described as learning processes with complementary interaction between central and peripheral courses of actions, these processes are by nature collaborative and require a certain cognitive tension between complementary processes to be effective. Numerous ways describe differences and individual preferences in cognition (Sternberg and Zhang, 2001). Two dimensions are of particular interest in unfolding the different cognitive styles of humans engaged in central and peripheral processes. Hence, a 'field independent' person is best at central strategies and a 'field dependent' person is most effective in peripheral processes. Yet, the two types need each other and intermediates blend both cognitive styles. Purely field-independent people see objects in an analytical way as distinctly separated from their environment and they are less able to manage interpersonal skills. By contrast, field-dependent people see their surroundings in a holistic context and are better able to manage collaboration. The analyst versus the holist is like a 'verbalizer' compared to an 'imager'. A holist looks at the full situation whereas an analyst will focus on one or a few aspects at the time. An extreme holist, however, is internal and passive since most of the attention is directed towards the inner

imagination and (s)he is not in favor of collaboration. An extreme analyst has no general view of the organization but is immersed in detailed analyses to uncover specific relationships.

Proposition 7: *Adaptive strategy making must engage elaborate networks of individuals with diverse knowledge, experiences, and insights to effectively address the possible range of future solutions to complex problems and ambiguous environmental conditions.*

Proposition 8: *When forming and engaging diverse (sub-)groups of individuals to deal with new emerging problems and strategic concerns it should comprise both field-dependent and field-independent types designated to handle peripheral and central strategy processes.*

Proposition 9: *The engagement of individuals to address changing conditions and deal with new strategic challenges requires an interacting process to form a collective understanding of appropriate future solutions among generated alternatives and point towards a common direction.*

Further development

A theoretical rationale based on the individual cognitive capabilities of top management is a common perspective on strategic management and leadership. But, in the light of collaborative learning this view has clear limitations and fails to recognize the importance of broad collaboration to deal with complex strategy issues under turbulence. An extension of the paper looks into the implications of this reasoning for the general role of strategic leadership and provides further examples of firms that fit the description of strategy as central and peripheral processes. Examples include the development of a medium sized high-tech company over the period 2005-07 and management transition in global pharmaceutical company during 2005-2008. The case observations are related to recent discussions about collaborative communities in specialized and

turbulent industries (Adler, Kwon and Heckscher, 2008) and high-performance relational practices (Gittell, Seidner and Wimbush, 2010).

The paper develops propositions based on reasoning from the natural sciences and modern cognitive psychology and provides theoretical support for the effectiveness of integrative strategy making comprised by complementary central and peripheral processes. Peripheral observations and responsive initiatives throughout the organization are exposed to central evaluation and these activities must be contemporaneous to ensure information updating and current environmental assessments. Effective organizations enable observance and responsive initiatives while encouraging intense management communication to assess ongoing developments. Insights from natural sciences suggest that these activities are intertwined and build on each other – one cannot go without the other. Adopting the concept of cognitive capabilities beyond the executive echelons to include individual decision makers throughout the organization, we identify strong rationales for peripheral strategic initiatives that thrive on central analytical scrutiny. Hence, an important leadership role is to enact the corporate entrepreneurship potential through a combination of peripheral and central strategy making processes with the potential to both improve performance and reduce risk (Sathe, 2003).

REFERENCES

Adler PS, Kwon S, Heckscher C. (2008). Professional work: The emergence of collaborative community. *Organization Science* 19(2): 359-376.

Adner R, Helfat CE. (2003). Corporate effects and dynamic managerial capabilities. *Strategic Management Journal* 24(10): 1011-1025.

Andersen TJ. (2004). Integrating decentralized strategy making and strategic planning processes in dynamic environments. *Journal of Management Studies* 41: 1271-1299.

Andersen TJ, Nielsen BB. (2009). Adaptive strategy making: The effects of emergent and intended strategy modes. *European Management Review* 6: 94-106.

Atonenko P, Paas F, Grabner R, Gog van T. (2010). Using electroencephalography to measure cognitive load. *Educational Psychology Review*. Published online: April 29, 2010.

Baum RJ, Wally S. (2003). Strategic decision speed and firm performance. *Strategic Management Journal* 24: 1107–1129.

Benner MJ, Tushman M. (2003). Exploration, exploitation and process management: The productivity dilemma revisited. *Academy of Management Review* 28(2): 238-256.

Bower JL. (2005). Modeling the resource allocation process, Chapter 2 in Bower J.L., Gilbert C.G. (eds.) *From Resource Allocation to Strategy*. Oxford University Press, Oxford.

Brews PJ, Hunt MR. (1999). Learning to plan and planning to learn: Resolving the planning school/learning school debate. *Strategic Management Journal* 20: 889-913.

Burgelman RA. (2005). The role of strategy making in organizational evolution, Chapter 3 in Bower JL, Gilbert CG. (eds.) *From Resource Allocation to Strategy*. Oxford University Press, Oxford.

Burgelman RA, Grove AS. (2007). Let chaos reign, then rein in chaos-repeatedly: Managing strategic dynamics for corporate longevity. *Strategic Management Journal* 28: 965-979.

Csikszentmihayi M. (1996). *Creativity: Flow and the Psychology of Discovery and Invention*. Harper Perennial, New York, NY.

Christakis NA., Fowler JH. (2009). *Connected: The Surprising Power of Our Social Networks and How They Shape Our Lives*. Little, Brown and Company, New York, NY.

Covin JG, Miles MP. (1999). Corporate entrepreneurship and the pursuit of competitive advantage. *Entrepreneurship Theory and Practice* 23(3): 47-43.

Evans JStB. (2003). In two minds: dual-process accounts of reasoning. *Trends in Cognitive Sciences* 7 (10): 454-459.

Fredens K, Prehn A. (2009). *Coach Dig Selv – og Få Hjernen Med til en Forandring*. Gyldendal, Copenhagen.

Gallagher S. (2005). *How the Body Shapes the Mind*. Claredon Press, Oxford.

Grossberg S. (2000). The complementary brain: A unifying view of brain specialization and modularity, *Trend in Cognitive Sciences* 4: 233-246.

Hart S, Banbury C. (1994). How strategy-making processes can make a difference. *Strategic Management Journal* 15: 251-269.

Helfat CE, Finkelstein S, Mitchell W, Peteraf MA, Singh H, Teece DJ, Winter SG. (2007). *Dynamic Capabilities: Understanding Strategic Change In Organizations*. Blackwell Publishing, Malden, MA.

Helfat CE, Peteraf MA. (2010). Cognitive capabilities and the micro-foundations of dynamic managerial capabilities. Paper presented at the *Academy of Management Annual Meeting*, Montreal.

Johnson-Laird P. 2006. *How We Reason.* Oxford University Press, Oxford.

Kelso JAS, Engstrøm DA. (2006). *The Complementary Nature*. A Bradford Book. The MIT Press, Cambridge, MA.

Nijhout HF. (1990). Problems and paradigms. Metaphors and the role of genes and development. *BioEssays* 12: 441-446.

Paas F, Gog van T, Sweller J. (2010). Cognitive load theory: New conceptualizations, specifications, and integrated research perspectives. *Educational Psychology Review* 22:115-121.

Pfeifer R, Bongard J. (2009). *How the Body Shapes the Way We Think: A New View of Intelligence*. A Bradford Book, MIT Press, Cambridge, MA.

Sathe V. 2003. Corporate Entrepreneurship: Top Managers and New Business Creation. Cambridge University Press, Cambridge.

Stanovich KE. (2004). Balance in psychological research: The dual process perspective. *Behavioral and Brain Sciences* 27: 357-358.

Sweller J. (1988). Cognitive load during problem solving: Effect on learning. *Cognitive Science* 12: 257-285.

Teece DJ. (2007). Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal*, 28: 1319-1350.

Tomasello M. (2008). *Origin of Human Communication*. A Bradford Book, MIT Press, Cambridge, MA.

Tushman ML, O'Reilly CA. (2004). The ambidextrous organization. *Harvard Business Review* 82(4): 74-81.

Wolcott RC, Lippitz MJ. (2007). The four models of corporate entrepreneurship. *MIT Sloan Management Review* 49(1): 75-82.

Table 1. Comparative characteristics of the 'fast' and 'slow' brain systems in humans

The fast brain system (System 1) ***Decentralized processes***	**The slow brain system** (System 2) ***Central processes***
▪ Evolutionary old ▪ Autonomous ▪ Fast execution ▪ Execution is mandatory when the stimuli are triggered ▪ No heavy load on central processing ▪ Not dependent on input from high-level control systems ▪ Operate in parallel ▪ Many processes can be executed at the same time ▪ Behavioral regulation by emotions ▪ Unconsciously adaptive	▪ Evolutionary new ▪ Conscious and aware ▪ Slow execution ▪ Reasoning and judgment before decisions are made ▪ Computationally expensive ▪ Dependent on input and updated stimuli from system 1 ▪ Operate serially ▪ Only few processes can be executed at the same time ▪ Language and rule-based ▪ Adaptive consciousness

Figure 1. Interaction between external stimuli and internal cognition in the human brain

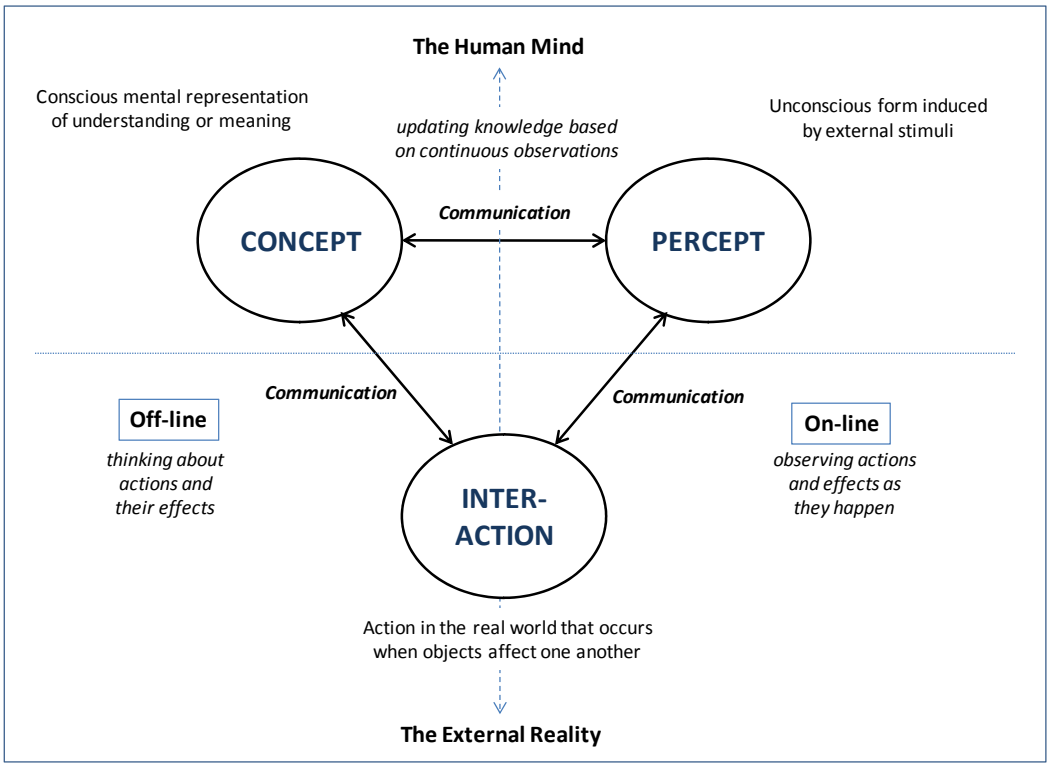

Figure 2. A compass to navigate the different stages of human emotional intelligence