The Natural Learning Research Institute

P.O. Box 1867, 54385 Pine Crest Avenue,
Idyllwild, California, 92549
Phone: 951-659-0152 Fax: 951-659-0242
http:// naturallearninginstitute.googlepages.com

NATURAL LEARNING:
THE BASIS FOR RAISING AND SUSTAINING HIGH STANDARDS OF REAL WORLD PERFORMANCE

Chapter 2 The Perception/Action Dynamic of Living Systems

GEOFFREY CAINE, LL.M.
RENATE N. CAINE, PH.D.

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CHAPTER 2
THE PERCEPTION/ACTION DYNAMIC OF LIVING SYSTEMS

The central underlying dynamic that drives the natural learning process, and that engages all the principles described above, is what biologists call the perception/action cycle (Fuster, 2003).

Simply put, all organisms in the real world have to do two basic things in order to survive:

- They have to gather information about their environment and themselves (*perception*) and
- based on this information, they have to manipulate their environment, and themselves, in a way that is advantageous to them (*action*).

As a result of acting, the organism gets feedback - new information from the world and from itself. That feedback provides the guidance about how the organism needs to act next time. This may cause a change in the organism and in its capacity to perceive or way of perceiving. This can also lead to changes in the capacity of the organism to act and/or to perform different types of action. In short and it learns.

In human beings the process is more complex and we therefore call it the natural perception-action dynamic. At its most basic, people observe, act and get feedback. The key is to learn from the feedback.

Perception)$\longleftrightarrow$ *action* $\longleftrightarrow$ *feedback* $\longleftrightarrow$*new learning*

The perception/action dynamic operates at different levels. For instance there is the natural, spontaneous engagement and interaction of perception, decision and action in every moment of life. Then there are the more complex, long term projects and activities that call for goal setting and planning over time, such as any research project. So the dynamic functions at two levels: in part it is automatic and "instant," and in part it is extended over time for the purpose of projects and other activities.

The Perception/Action Dynamic Involves the Whole Person

All of the system principles of natural learning described in Section 1 come into play in the course of the natural perception/action dynamic. It is a living system process that uses the whole system. For instance:

- Every situation in which a person finds him or her self is framed, to some extent, by what the person cares about and is trying to accomplish – the search for meaning;

- The situation is perceived in terms of the patterns – categories and constructs – that have been developed over time, and this awareness is colored by the person's emotional state;

- The situation involves a whole physical context and a scenario of some sort that is playing itself out, and while some aspects of the context are selected for attention, the rest is still having an impact on what is being perceived and the decision making process;

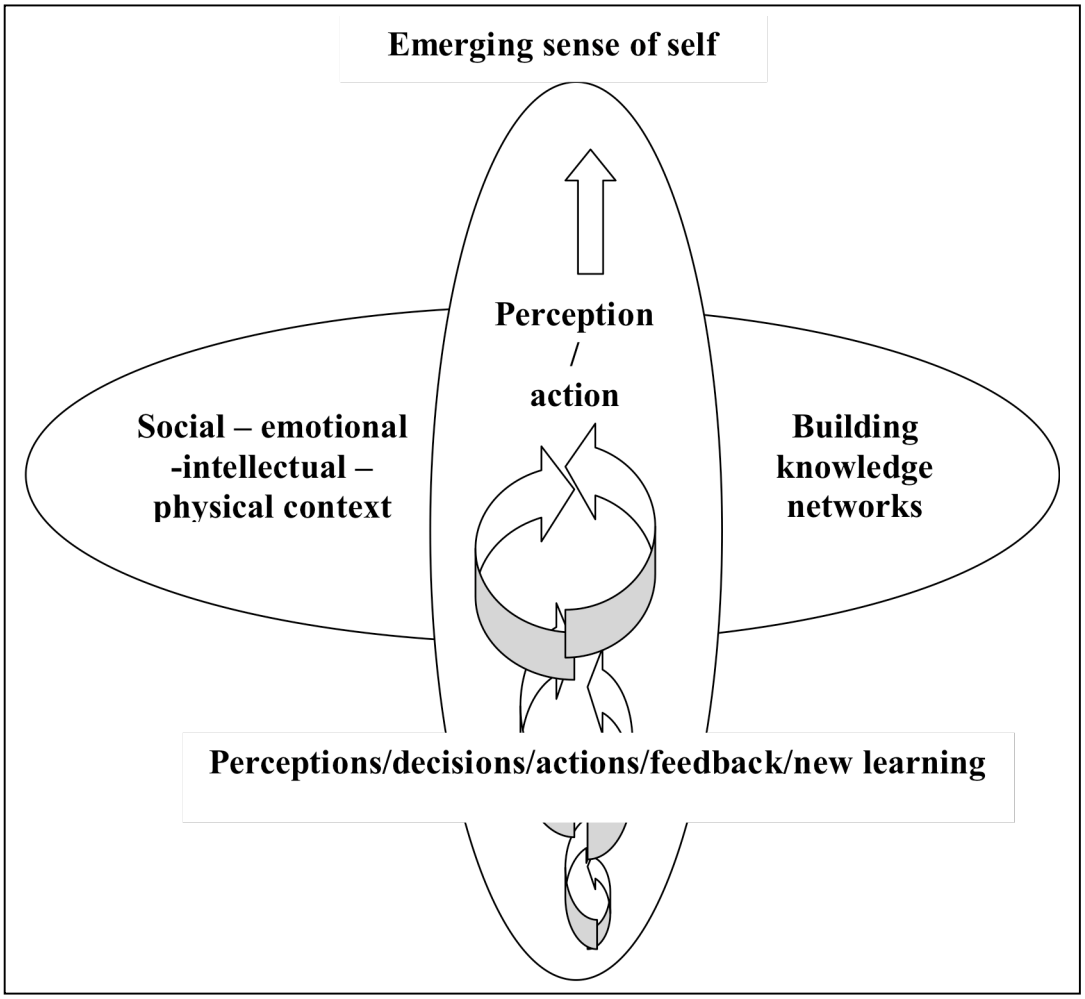
- The person's interpretation of what is happening is taking place at both conscious and unconscious levels, and engages a host of different but interconnected memories;

- The action that is taken calls for the implementation of performance knowledge structured in memory;

- All of this is influenced and shaped by the person's past and present social awareness and context;

- And the person's state of consciousness and capacity to take charge of and regulate his or her reactions and behavior play a large part in what transpires now and in plans for the future.

Thus, the process looks more like this:



In very general terms, then, at the heart of natural learning is the process of making sense of experience. Psychologists call it the construction of meaning or constructivism. Among the fathers of constructivism are Piaget (1972) and Vygotsky (1978). The construction of meaning, we now know, is a whole-system process that involves both individuals and the societies in which they live, with the perception/action dynamic at its core.

An infant learns through this natural process. It observes and focuses in on an object, reaches for it, gets feedback, learns. Adolescents interact with their video games similarly, as do all people when they play. They get involved, observe, make decisions, act on the basis of their current skills and knowledge, get feedback, reflect on what they need to change – and thereby improve. Moral and ethical values become internalized on the basis of action and feedback. The same process is at the heart of all creative work and the arts. It is the foundation for sports of all kinds and the essence of scientific research and essential to all innovations. People on the

job learn this way. People with expertise in any field gain mastery by taking charge of their capacities for natural learning. This process is the biological foundation for making sense of things – what psychologists call the construction of meaning or constructivism.

The art of effective coaching, mentoring, guiding, parenting, supervising and more, all engage and capitalize on this natural perception/action dynamic. Unfortunately, this natural way of learning has largely been discarded at the classroom door. In most schools there is almost no opportunity to try things out, test perceptions in real world settings, make authentic decisions in any subject area from history to science, get in-the-moment feedback, experience real world consequences and adapt as a living human being to what is needed.

The Role of Decision Making

The perception/action dynamic is driven in large measure by decision making (Fuster, 2003). People are always making decisions. Some decisions are conscious, some are unconscious. Some are instant, and others take time. They include decisions about what to attend to, how to act, how to interpret feedback and more. Thousands upon thousands of decisions are made as people "cognitively interact" with their world of daily experience.

But all decision making is not the same. Elkohhenon Goldberg (2001) has proposed a very elegant and useful distinction between types of decisions. According to Goldberg, veridical decisions are either right or wrong. An example might be naming the capital of Georgia. Actor [learner] centered adaptive decisions, on the other hand, are called for every time a person is in an ambiguous situation and has to work out a path of action, such as who to vote for in an election. An example might be: "what is the best way to get to Georgia?" Veridical decisions confirm or dispute a known truth; adaptive decisions refine ways of perceiving and acting.

So the adjustments and adaptations that people make is a consequence of the feedback that comes from the decisions they make and the actions they take in countless real world situations. It is at the heart of the way that infants learn in the moment (Gopnik et. al., 1999). And, although often functioning at a different and deeper level, it is at the heart of

the naturalistic decision making found in the literature and research exploring the development of expertise (Zsambok and Klein, 1997).

Most schooling, unfortunately, is full to the brim with veridical questions and decisions. Actor centered questions and decisions – those for which there is personal responsibility resulting in real world consequences – are largely excluded from the curriculum. However, they are the primary focus of student concerns in the playground, in social relationships in the classroom, after school and outside school. They drive the influence of technology and ways in which students use technology to interact and entertain themselves. That is why the lives of so many students are more impacted by what they experience on the play ground and in video arcades than by what they experience in the classroom.

Action

Decisions lead to actions. A person will join a particular group, participate in a specific event, try out different things, dress in particular ways, visit particular places, behave in specific ways and so on.

Feedback

Actions lead to consequences. Other people respond, the environment may change, new information may become available, a person's inner state may shift and more. All of this is feedback, to be interpreted, assessed and responded to. In addition, the provision of feedback can also be a more formal process in which others assess or evaluate decisions and actions.

Learning

Learning occurs when a person is able to capitalize on the feedback, and adapt and adjust as appropriate. The key, ultimately, is for a person to be able to monitor him or her self and take charge of his or her own learning. Psychologists approach this capacity in many ways, through such notions as emotional intelligence (Goleman, 1995) , self-regulated learning (Boekarts and Corno, 2005), metacognition (Perfect and Schwartz, 2002) and what Costa and Kallik (2000) call "habits of mind." Schon (1990) captures the overall process in his notion of "the reflective practitioner."

Neuroscientists deal with this self-monitoring and reflective capacity in terms of what they call the executive functions of the prefrontal cortex (see e,g, Goldberg, 2001). When the perception/action cycle is engaged, and people have to make decisions in ambiguous situations and then live with the consequences, the executive functions are invoked. They include (Denkla, 1999) the abilities to:

- engage working memory, which involves future goals, and not being easily distracted;
- use reason, assess risk, and make sense of ideas and behavior;
- moderate emotions;
- see ahead or have a sense of an extended future;
- demonstrate flexibility in thinking and be able to shift or add tasks
- think critically and creatively;
- reflect and engage in self-critical consciousness and metacognition.

The prefrontal cortex is primed to mature in late adolescence. However, like other capacities, that maturation needs to be supported by appropriate experience which includes multiple opportunities to make adaptive decisions, beginning early in life and continuing throughout adolescence.

Unfortunately, the consequence of traditional schooling - in which adaptive decision making is so neglected - is that maturation of the prefrontal cortex and the executive functions is undermined throughout the k-12 schooling experience.

So the challenge for education can now be reformulated:

> **The challenge is to guide and support the operation of the natural but complex perception/action dynamic for the purpose of helping students grapple with their curriculum in a rigorous way that also develops the basic capacities of brain and mind that are the birthright of every student.**