The Science of LEGO® SERIOUS PLAY™

Play

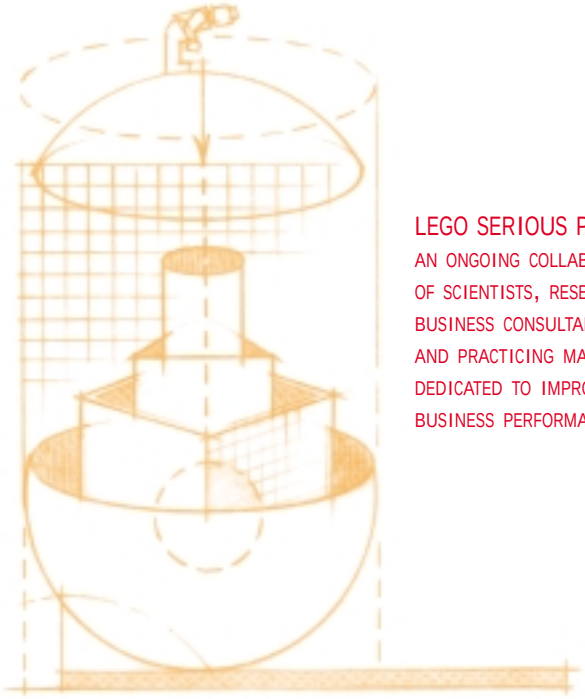
Construction

Imagination

www.rasmussen-and-associates.com

LEGO SERIOUS PLAY™

Introduction



LEGO SERIOUS PLAY IS AN ONGOING COLLABORATION OF SCIENTISTS, RESEARCHERS, BUSINESS CONSULTANTS, AND PRACTICING MANAGERS, DEDICATED TO IMPROVING BUSINESS PERFORMANCE.

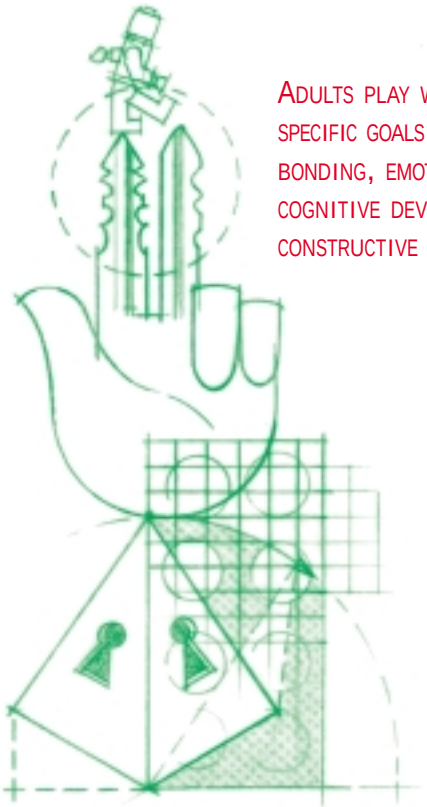
This booklet presents many of the core ideas, research, and experience that went into designing the LEGO® SERIOUS PLAY™ concepts. We hope this booklet will provide some of the answers as to why SERIOUS PLAY might work for your business.

SERIOUS PLAY is our name for the process we have developed to bring the creativity, the exuberance, and the inspiration of play to the serious concerns of adults in the business world.

Our presentation here is divided into four main sections, corresponding to the four key elements that make up the theoretical foundation of LEGO SERIOUS PLAY: 1) Constructionism, 2) Play, 3) Imagination, and 4) Identity. To put it briefly, we will explore the science behind our conviction that constructing a metaphorical 3-D model of your business in a playful manner will unleash your creative imagination to develop an innovative and dynamic business strategy based on a clearer sense of your company's identity.

SERIOUS PLAY is a concept developed over several years by Executive Discovery, a member of the LEGO Group. It emerged out of the research and experience of a number of academics and practitioners searching for more effective ways to meet the increasingly complex and challenging demands of the business world.

Play: Learning Through Exploration and Storytelling

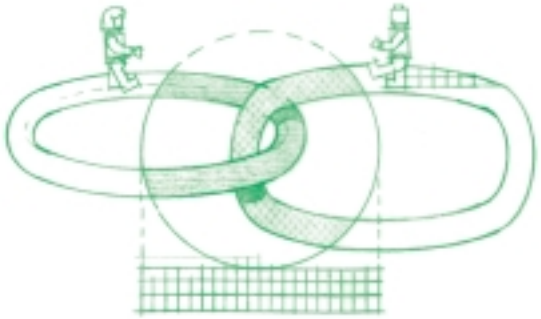


ADULTS PLAY WITH ONE OR MORE SPECIFIC GOALS IN MIND: SOCIAL BONDING, EMOTIONAL EXPRESSION, COGNITIVE DEVELOPMENT, AND CONSTRUCTIVE COMPETITION.

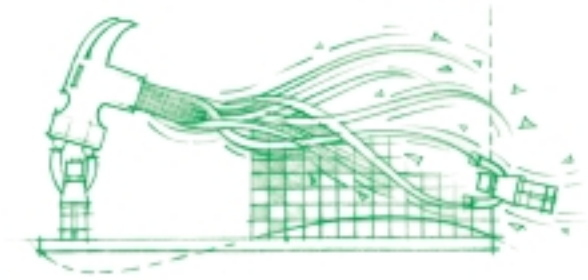
At first glance, all this emphasis on play may seem incongruous. Most people view play as the very opposite of work, as something frivolous, as an activity to fill the leisure time when we are not attending to our more serious concerns. Indeed, the very term "SERIOUS PLAY" may seem like an oxymoron.

The LEGO Group has always taken play very seriously. While play is usually fun, it is seldom, if ever, frivolous. The literature on play is in agreement on this fact: play always serves a purpose. We define play as a limited, structured, and voluntary activity that involves the imaginary. That is, it is an activity limited in time and space, structured by rules, conventions, or agreements among the players, uncoerced by authority figures, and drawing on elements of fantasy and creative imagination.

Yet, adult play is not precisely the same as a child's play. When adults play, they play with their sense of identity. Their play is often, though not always, competitive. Adult play is often undertaken with a specific goal in mind, whereas in children the purposes of their play are less conscious. We have identified four purposes of adult play that are especially relevant to our discussion of LEGO SERIOUS PLAY: 1) social bonding, 2) emotional expression, 3) cognitive development, and 4) constructive competition.



SOCIAL BONDING IS A SIGNIFICANT BENEFIT OF PLAY. IT BRINGS A SENSE OF PARTNERSHIP, COHESION, SECURITY, COOPERATION AND CULTURAL EXPRESSION.



PLAY CAN "DRIVE HOME" ABSTRACT CONCEPTS AND COMPLEX ISSUES THAT MAY OTHERWISE BE DIFFICULT TO COMPREHEND.

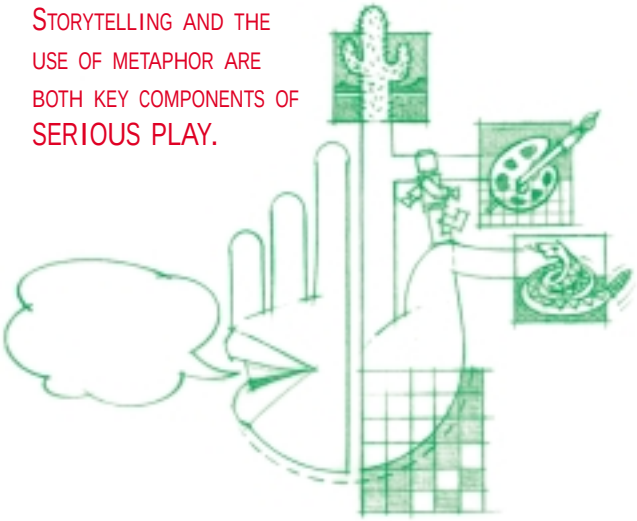
Social bonding is an important purpose because it brings a sense of partnership, cohesion, security, and role attribution through cooperation and cultural expression. Moreover, social bonding provides numerous possibilities to develop leadership, cooperation, teamwork, perseverance, altruism, etc., all of which contribute to the development of a discriminative self-appraisal and a constructive concept of the self.

The motivational basis for play is described in the literature as primarily emotional (Fein 1984, Vygotsky 1978). The representations used in play are in fact representations of the player's own affective knowledge. Emotions such as love, anger, or fear motivate and shape the different forms of play in which a player engages, as well as the symbolic expressions the player produces. Since play involves the capacity to pretend, and to shift attention and roles, it provides a natural setting in which a voluntary or unconscious therapeutic or cathartic experience may take place.

In terms of cognitive development, we will see, in our discussion of constructionism, how play can contribute to learning and understanding. Through the use of modeling and metaphor, the objects of play can take on meanings and can embody abstract concepts, thus concretizing formal relationships that can otherwise be quite difficult to comprehend.

Play: Learning Through Exploration and Storytelling

STORYTELLING AND THE USE OF METAPHOR ARE BOTH KEY COMPONENTS OF SERIOUS PLAY.



By constructive competition, we mean the sort of competition that allows us to measure our own skills against those of our opponents, not only for the purpose of "winning" but to enable us to strive to perform at our best. Huizinga believed that the major form of human play is contests, and that contests have a civilizing potential, developing social interest around which the society constructs its values (Huizinga, 1955). These “contests” need not be amongst the players, but can just as well serve a cohesive group “competing” for a shared objective. The critical feature is that play for adults can be as much tied to the real challenges of life as it is for children. Play is uniquely suited to hone our competitive intelligence.

Storytelling and Metaphor

Storytelling and the use of metaphor are both key components of play. When children play, ordinary objects are transformed into mommies and daddies, animals, trucks and cars, and all sorts of characters in the narratives that children create in their play.

Of course, it is not only children who engage in such activities. Storytelling has been an integral part of the whole of human experience. Through myths, sagas, fairy tales, and family legends, people have used stories as a means for expressing ideals and values that are important to them. In stories, we deal with issues of

culture, religion, social and personal identity, group membership, good and evil, etc. We often use the characters in our stories to express our hopes, deal with our fears, and resolve our conflicts.

Storytelling – or, more accurately, storymaking – is a fully active and concrete endeavor. As active participants, we step in and out of the process to elaborate, refine, or evaluate the characters, the setting, or the plot, as we go along. In doing so, we place ourselves in a unique position to make sense of the social, cultural, and interpersonal material that makes up the story in an active, dynamic way.

In organizations, stories contribute to the production, reproduction, transformation, and deconstruction of organizational values and beliefs. Organizational members dramatize organizational life through stories transforming mundane events into symbolic artifacts that contribute to the organization's history. In this respect, members have the power to "challenge" their organizations with a new story (Boje, 1991). Boje defines the storytelling organization as a "collective storytelling system in which the performance of stories is a key part of members' sense making and a means to allow them to supplement individual memories with institutional memory." (Boje, 1991, p. 106)

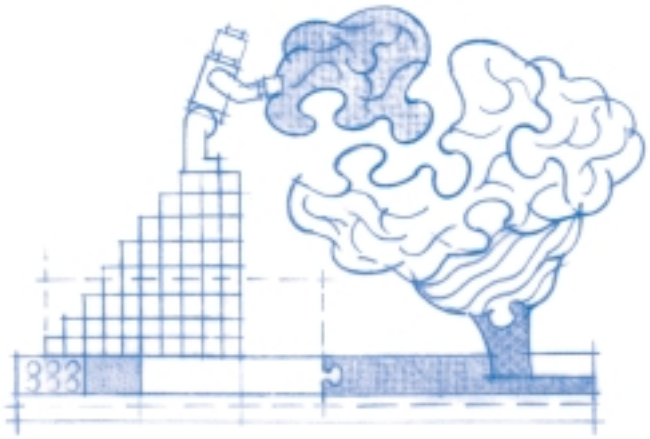
In organizational contexts, narratives serve a number of purposes: the socialization of new members, the legitimization of bonding and organizational identification, cultural control, and they serve as a lens through which organizational action may be understood and interpreted. (Putnam, 1995.)

The most vivid storytelling makes ample use of the linguistic construct known as metaphor; that is, a form of thinking and language through which we understand or experience one thing in terms of another. MIT professor Donald Schon has argued that metaphors can actually generate radically new ways of understanding things (Schon, 1971.) He observed how product development researchers, trying to make an artificial bristle paintbrush, had a breakthrough when one member of the group observed, "A paintbrush is a kind of pump." According to Schon, metaphor is much more than just "flowery language"; it can play an active, constructive, and creative role in human cognition.

IN ORGANIZATIONS, STORIES CONTRIBUTE TO THE CONSTRUCTION, REPRODUCTION, OR TRANSFORMATION OF VALUES AND BELIEFS.

Constructivism and Constructionism: Building Knowledge by Building Things

WE BUILD KNOWLEDGE STRUCTURES BASED ON OUR EXPERIENCE IN THE WORLD.



LEGO SERIOUS PLAY draws on many ideas from the fields of psychology and behavioral science. In this section we will explore two such ideas:

Constructivism – a theory of knowledge developed by Jean Piaget, his colleagues and his institute in Geneva, Switzerland.

Constructionism – a theory of learning developed by Seymour Papert and his colleagues at MIT in Cambridge, Massachusetts (USA).

Although both Piaget and Papert developed their theories through observing the behavior and learning activities of children, Papert, especially, believes that these findings are equally applicable to adults. In what follows, we first discuss how these theories were developed and then see what their implications are for LEGO SERIOUS PLAY.

Constructivism

Jean Piaget is perhaps best known for his stage theory of child development. But even more fundamental than his stage theory was his theory that knowledge is not simply "acquired" by children bit by bit, but constructed into coherent, robust frameworks called "knowledge structures." Children build these structures based on their experience in the world.

Constructivism and Constructionism

Piaget discovered that children are not just passive absorbers of experience and information, but active theory builders. In one of his more famous experiments, Piaget discovered that young children believe that water can change in amount when poured from a short, wide glass into a tall, thin one. These children have built a theory – which, indeed, works most of the time – that states "taller means more." This theory was no doubt built out of many experiences (measuring children's heights back to back, building block towers, amount of milk in one glass) into a robust structure. Mere insistence could not convince these children that the water did not change its amount. In other words, you could not simply tell these children the "right" answer. They wouldn't believe you if you did. They have to build a new, more sophisticated knowledge structure, that takes into account the theory, again based on their experience, that "wider" can also mean "more", before they will consider that the water does not change its amount.

Piaget's theory of knowledge, stipulating that knowledge is built or constructed by the child, is known as constructivism. Children are not seen as empty vessels into which we can pour knowledge. Rather, they are theory builders who construct and rearrange knowledge based on their experiences in the world.

Constructionism

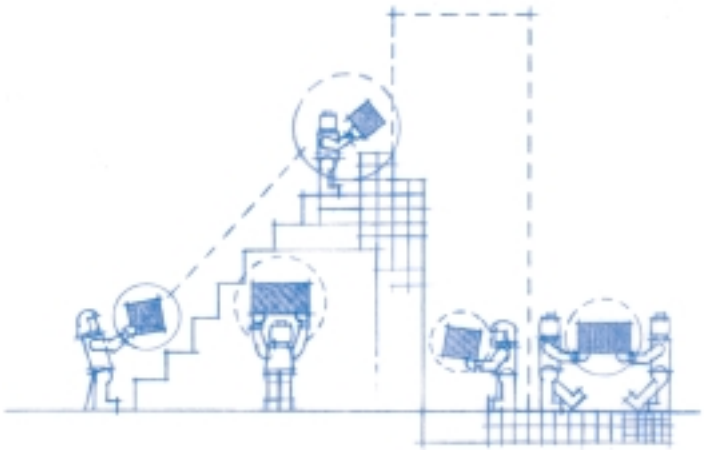
Seymour Papert was a colleague of Piaget's in the late 1950s and early '60s. He was convinced of Piaget's theory of constructivism but wanted to extend Piaget's theory of knowledge to the fields of learning theory and education. He wanted to create a learning environment that was more conducive to Piaget's theories. He saw conventional school environments as too sterile, too passive, too dominated by instruction. Such environments did not allow children to be the active builders that he knew they were.

Papert eventually called his theory "constructionism." It included everything associated with Piaget's constructivism, but went beyond it to assert that constructivist learning happens especially well when people are engaged in constructing a product, something external to themselves such as a sand castle, a machine, a computer program, or a book.

Since constructionism incorporates and builds upon Piaget's theory of constructivism, two types of construction are actually going on, each reinforcing the other. When people construct things out in the world, they simultaneously construct theories and knowledge in their minds. This new knowledge then

Constructivism and Constructionism: Building Knowledge by Building Things

LEARNING HAPPENS ESPECIALLY WELL WHEN WE ACTIVELY CONSTRUCT SOMETHING EXTERNAL TO US.



enables them to build even more sophisticated things out in the world, which yields still more knowledge, and so on, in a self-reinforcing cycle.

Papert first began thinking about constructionism in the late 1960s, after observing a group of students, over several weeks, become deeply and actively engaged in creating soap sculptures in an art class. The experience left a deep impression on him. Several things struck him: the level of engagement of the children; the elements of creativity and originality in the actual products; the interaction and collaboration among the children; the longevity of the enterprise, and the sheer sense of fun and enjoyment that permeated the experience.

Being a mathematician by training, Papert could not help wondering why most mathematics classes were so unlike these art classes. He observed that math classes, by comparison, were dull, boring, unengaging, passive, dominated by instruction, and anything but fun. Why was this so? He knew from his own experience that mathematics was exciting, beautiful, challenging, engaging, and every bit as creative as making soap sculpture. Why was it being ruined for so many children?

Papert's contemplations on that soap sculpture class led him on a many-year journey to design a more constructable mathematics. He knew he would have

to work with media more sophisticated and powerful than simple art materials.

In the 1970s, Papert and his colleagues designed a computer programming language called Logo, which enabled children to use mathematics as a building material for creating pictures, animations, music, games, simulations (among other things) on the computer. Then, in the mid-1980s, members of his M.I.T. team developed LEGO TC Logo, which combined the computer language with the familiar LEGO construction toy. LEGO TC Logo enabled children to control their LEGO structures by creating programs on the computer. The resulting behaviors of such machines can be arbitrarily complex.

It was out of the repeated experience of seeing children use these sorts of materials – not just in order to learn about mathematics and design but to actually be mathematicians and designers – that led Papert to conclude, "Better learning will not come from finding better ways for the teacher to instruct, but from giving the learner better opportunities to construct."

The Value of Concrete Thinking

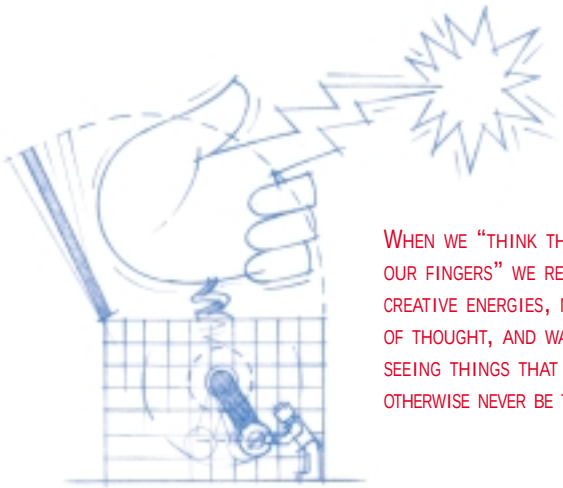
Although Papert's constructionism embraces and builds upon Piaget's constructivism, over time, Papert eventually came to see some drawbacks to Piaget's stage theory. In 1990, Papert wrote

"...I think now that the ...most outstanding corrections one must make to Piaget's epistemology are related to his supervaluation of the logical, the formal, and the propositional forms of thought. His most important contribution is recognizing the importance of what he calls concrete thinking. His major weakness is his resistance to giving up the value system that places formal thinking "on top." This resistance leads him to see concrete thinking as children's thinking, and so keeps him from appreciating the full breadth of his discovery of the "concrete" as a universal form of human reason."

– Papert, 1990

Papert came to view the notion of "concrete thinking" not as a stage that children outgrow, but rather as a style of thinking that has its benefits and uses, just as logical or formal thinking has its benefits and uses. In other words, unlike Piaget, he does not see concrete thinking as the cognitive equivalent of baby talk. He sees concrete thinking – i.e. thinking with and through concrete objects – as a mode of thinking complementary to more abstract, formal modes of thought. It is a grave mistake, in Papert's view, to forsake or cast off concrete thinking, (as a snake sloughs off its skin,) in favor of purely abstract thought, for to do so would seal oneself off from valuable modes of thinking and pathways to knowledge not as accessible by other means.

Constructivism and Constructionism: Building Knowledge by Building Things

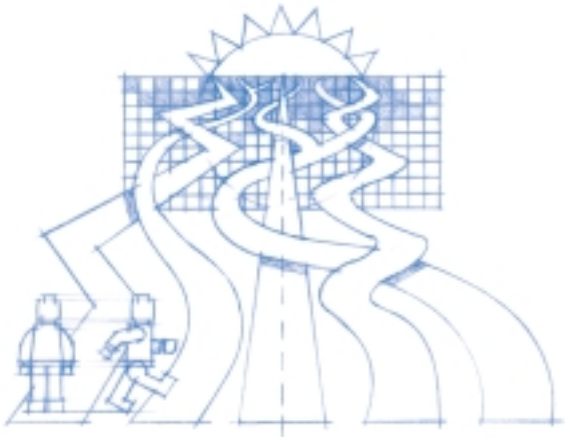


When we "think through our fingers" we release creative energies, modes of thought, and ways of seeing things that may otherwise never be tapped.

Thus, constructionism is not just a theory about how to facilitate children's learning. It applies to adults as well. Constructionism is a way of making formal, abstract ideas and relationships more concrete, more visual, more tangible, more manipulative, and therefore more readily understandable.

The emphasis that constructionism places on concrete thinking has obvious import for LEGO SERIOUS PLAY. At the core of both ideas is the notion that when we "think with objects" or "think through our fingers" we unleash creative energies, modes of thought, and ways of seeing that most adults have forgotten they even possessed. But we were all children once, and we all knew how to play. LEGO SERIOUS PLAY stakes its reputation on the belief that adults can regain their ability to play, can dust off those modes of concrete thinking and put them to use again, and that when they do, great benefits are in store for them.

A business or company is so much more than a building and the people in it. It is a vast network of interconnections and complicated relationships on many different levels. Conveying such abstract relationships on paper through graphs, flowcharts, block diagrams, etc. often fails to capture the dynamic nature of the enterprise. While computer modeling and simulations are a step up from static models, these too are limited. It is often very difficult to comprehend the totality of these



THE NOTION OF CONCRETE THINKING - THINKING THROUGH CONCRETE OBJECTS - REMAINS A VALUABLE PATHWAY TO KNOWLEDGE EVEN AFTER CHILDHOOD.

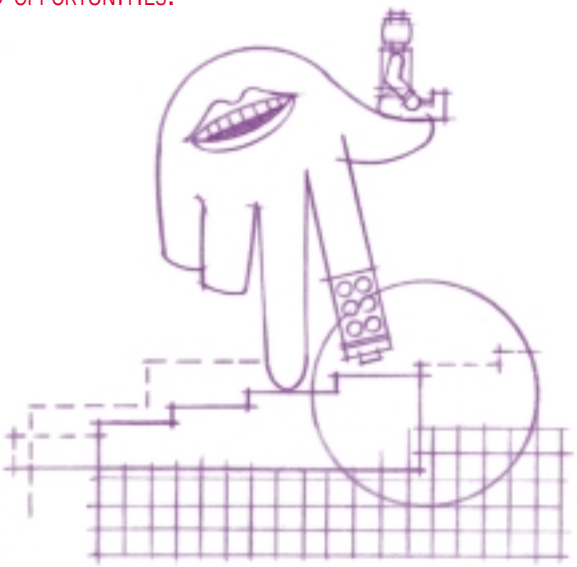
complex interrelationships. LEGO SERIOUS PLAY is our bold attempt to take the power of constructionism and apply it to the complexity of the business world, thereby making the abstract network of interrelationships that make up any business, concrete, appropriable, and comprehensible.

In our experience, when such a "model" of a business is constructed – not of the buildings, but of the business in a systemic sense – people see things they couldn't see before. They can look at a 3-D metaphorical model of their business and its landscape and visualize strategies that were formerly opaque and closed off to them. They can see their business enterprise in a more holistic sense. They can manipulate it, play with it, and ask all sorts of "what if" questions by physically manipulating their business model. "What if our key supplier goes bankrupt?" "What if we relocated our marketing team to Asia?" "What if our sales suddenly doubled?"

Getting managers and employees to "play" with their business may seem like a radical departure from the serious concerns of the boardroom. But that depends on your notion of play. Seeing play not as a leisure pursuit but as a serious activity that can unleash creative energies so sorely needed in the business world today, leads us even more deeply into the core ideas of LEGO SERIOUS PLAY, and that is where we shall turn next.

Imagination: Tapping Into Our Creativity

DESCRIPTIVE IMAGINATION NOT ONLY REVEALS WHAT IS HAPPENING IN THE OFTEN CONFUSING WORLD "OUT THERE", BUT IT ENABLES US TO MAKE SENSE OF IT AND TO SEE NEW POSSIBILITIES AND OPPORTUNITIES.



Throughout history, the term "imagination" has been given many different cultural and linguistic connotations. While all share the basic idea that humans have a unique ability to "form images" or to "imagine" something, the variety of uses of the term "imagination" implies not one, but at least three meanings: to describe something, to create something, to challenge something. From the point of view of LEGO SERIOUS PLAY, it is the interplay between these three kinds of imagination that make up what we call strategic imagination – the source of original strategies in companies.

Descriptive Imagination

The role of DESCRIPTIVE IMAGINATION is to evoke images that describe a complex and confusing world "out there." This is the imagination that identifies patterns and regularities in the mass of data generated by rigorous analysis and informed by judgment based on years of experience.

The literature on strategic management prescribes a wealth of techniques to stimulate our descriptive imaginations. Value chains, 2-by-2 matrices, flowcharts, as well as more artistic pictures of the business environment are all examples of such techniques, as is the delineation of future business scenarios. Each of these methods focus on revealing patterns and seeing

things in a new way. Without Descriptive Imagination, strategy makers have only blind variation and luck – or lack of it – to rely on.

Descriptive Imagination, then, enables us to see what's going on in front of us, to make sense of it, but also to see new possibilities and opportunities within an often complicated, dynamic array of interactions.

Creative Imagination

CREATIVE IMAGINATION occupies a central role in the literature on strategy making. It is the essential feature of visioning, "skunk works," brainstorming, and thinking "out of the box." Whereas Descriptive Imagination enables us to see what is there in a new way, Creative imagination allows us to see what isn't there; that is, to create something really new, something totally different.

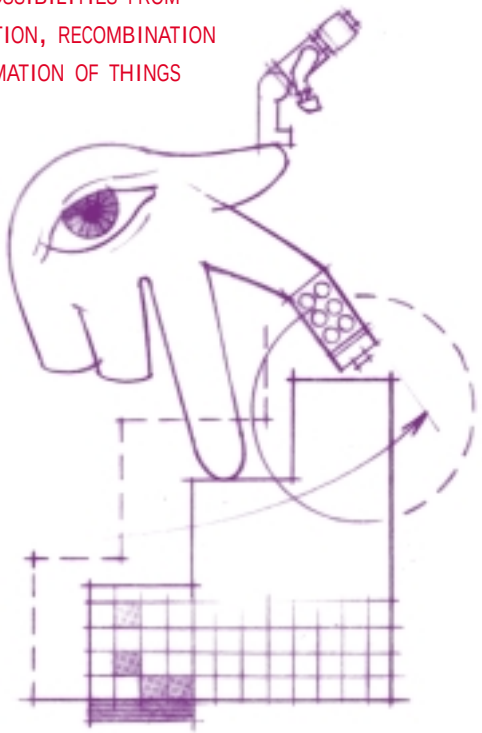
Creative Imagination is associated with innovative strategies where companies sought to make their competitors irrelevant rather than just beating them at their own game, in the spirit of what Hamel and Prahalad call "competing for the future," or what Kim and Mauborne call "value innovators."

Creative Imagination was at work when Michael Dell developed the strategy of make-to-order mass production for PCs and when companies like Victorinox, Harley Davidson, and Nike extend their brands to new markets and new products.

The motivation for Creative Imagination lies in the dissatisfaction people feel with current choices. Many management concepts and techniques, like TQM, stimulate managers to innovate "new ways of being" that are better than the current state. Often cloaked in mystery, the Creative Imagination is described, at times, by such terms as "thunder bolts," "God-given talent," or "genius." However, more sober minds find creativity everywhere and in everyone, and realize that, far from being mystical, it results from a lot of experience and analysis work, including (in the business world) market, competitive, and profitability analyses.

Imagination: Tapping Into Our Creativity

CREATIVE IMAGINATION ALLOWS US TO SEE WHAT ISN'T THERE. IT EVOKES TRULY NEW POSSIBILITIES FROM THE COMBINATION, RECOMBINATION OR TRANSFORMATION OF THINGS OR CONCEPTS.



Challenging Imagination

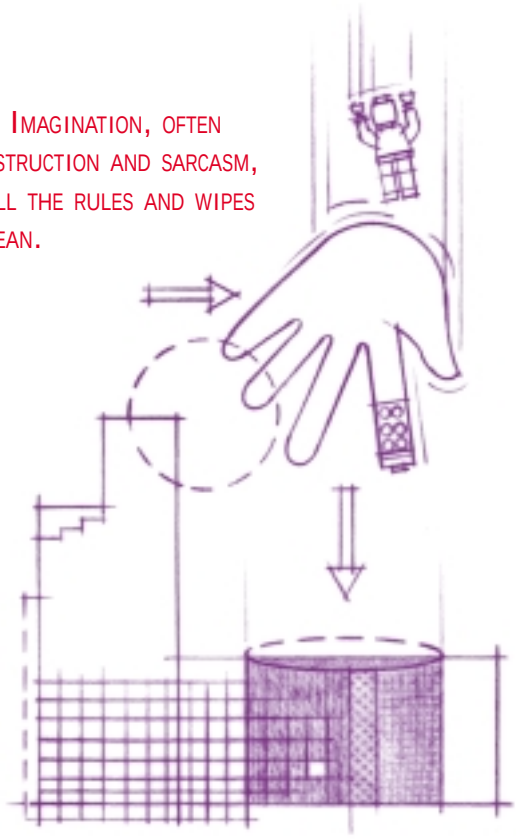
CHALLENGING IMAGINATION is completely different from the other two kinds. It is with challenging imagination that we negate, contradict, and even destroy the sense of progress that comes from descriptions and creativity. Challenging Imagination overturns all the rules and wipes the slate clean. It goes beyond creative imagination in that it does not merely add on a new element to what's already there. Challenging Imagination starts from scratch and assumes nothing.

The methods of Challenging Imagination include deconstruction and sarcasm. An example of deconstruction is Michael Hammer's notion of "re-engineering." The whole idea of re-engineering – an idea frequently misunderstood – is not about improving existing practices. Rather, it is about "throwing it away and starting all over; beginning with the proverbial clean slate and reinventing how you do your work." (Hammer 1995:4)

The Challenging Imagination was necessary at Nokia when the company left behind its tradition of wood products and rubber boots to become a telecom innovator. The Challenging Imagination was also essential in the re-invention of such companies as IBM, Phillips, and Alcatel.

Deconstruction in this sense is often paired with sarcasm. Sarcasm is the recognition that there is no sacred thing

CHALLENGING IMAGINATION, OFTEN USING DECONSTRUCTION AND SARCASM, OVERTURNS ALL THE RULES AND WIPES THE SLATE CLEAN.



as the "Truth." The most popular manifestation of this approach is the comic strip "Dilbert." Scott Adam's sarcasm and parody of the business world has become a vital force within conversations among strategy makers across industries throughout the world.

Of course, one can take this deconstruction too far and negate and reject everything, leaving oneself with nothing. The trap or pitfall of Challenging Imagination, then, is a kind of strategic nihilism, in which all choices are seen as flawed, all plans unfeasible, all positioning imprecise and deceptive.

What we are calling STRATEGIC IMAGINATION is a process that emerges from the complex interplay among these three kinds of imagination. While this interplay of imaginations is not directly observable, what we can observe are the manifested social dynamics among the strategy makers. These social dynamics fall into three categories: 1) the construction of knowledge gathered from knowledge and experience; 2) the sharing of meaning emerging from that knowledge; 3) the transformation of identity assimilating the new knowledge.

REFERENCES and RESOURCES

Play

Bateson, G. Steps Into an Ecology of Mind. New York, NY: Ballantine, 1972.

Berk, L. & Winsler, A. Scaffolding Children's Learning: Vygotsky and Early Childhood Education. Washington, D.C.: National Association for the Education of Young Children, 1995.

Caillois, R. Des Jeux et des Hommes. Paris: Gallimard, 1958.

Château, J. Le Jeu de L'enfant Après Trois Ans, sa Nature sa Discipline. Paris: Vrin, 1946.

Csikszenmihalyi, M. Flow: The Psychology of Optimal Experience. New York, NY: Harper and Row, 1990.

Duflo, C. Jouer et Philosopher. Paris: PUF, 1997.

Fry, W. Jr. Sweet Madness: a Study of Humor. Palo Alto, CA: Pacific Books, 1963.

Garvey, C. Play. Cambridge, MA: Harvard University Press, 1977.

Geertz, C. The Interpretation of Cultures. New York, NY: Basic Books, 1973.

Huizinga, J. Homo Ludens: A Study of the Play Element in Culture. Boston, MA: Beacon Press, 1955.

Jung, C.G. Errinerungen, Träume, und Gedanken. Zürich: Rascher, 1962:202-207.

Kafai, Y. Minds in Play. Hillsdale, NJ: Lawrence Erlbaum. 1995.

Kearney, R., The Wake of Imagination: Toward a Postmodern Culture. Minneapolis: University of Minnesota Press, 1988.

Mellou, E. "Creativity: The Imagination Condition." Early Child Development and Care 114 (1995): 97-106.

REFERENCES and RESOURCES

Nicopoulou, A. "Cognitive Development, and the Social World: Piaget, Vygotsky and Beyond." Human Development 36:1 (1993).

Oliver, D., & J. Roos. Striking a Balance: Complexity and Knowledge Landscapes. Maidenhead: McGraw-Hill, 2000.

Papert, S. The Connected Family. Atlanta: Longstreet Press, 1996.

Piaget, J. La Formation du Symbole Chez L'enfant: Imitation, Jeu et Rêve, Image et Représentation. Neuchâtel: Delachaux et Nièstlé, 1945.

Piaget, J. The Child's Conception of the World. London: Routledge, 1951.

Putnam, H. "The Face of Cognition." Journal of Philosophy (Sep. 1995).

Rieber, L. "Seriously Considering Play." ETR & D 44(2) (1996): 43-58.

Schon, D. The Reflective Practitioner: How Professionals Think in Action. New York: Basic Books, 1971.

Sutton-Smith, B. The Ambiguity of Play. Harvard University Press, Cambridge, MA: 1997.

VanderVen, K. "Play, Proteus and Paradox" in Pronin Fromberg, D. and D. Bergen (Eds.), Play from Birth to Twelve and Beyond: Contexts, Perspectives, and Meanings. New York: Garland, 1998.

Varela, F., E. Thompson, and E. Rosch. The Embodied Mind., Cambridge, MA: MIT Press, 1991.

Wilson, F. The Hand: How Its Use Shapes the Brain, Language, and Human Culture, New York, NY: Pantheon Books, 1998.

Storytelling and Metaphors

Boje, D. "Organizations as Storytelling Networks: A Study of Story Performance in an Office-supply Firm," Administrative Science Quarterly 36 (1991): 106-126.

Lakoff, G., and Mark Johnson. Metaphors We Live By. Chicago: University of Chicago Press, 1980.

Morgan, G. Images of Organization. Thousand Oaks, CA: Sage Publications, 1997.

Oliver, D., and Johan Roos. Striking a Balance: Complexity and Knowledge Landscapes. New York: McGraw-Hill Publishing, 2000.

Ortony, A. (ed.). Metaphor and Thought (2nd Edition). Cambridge, UK: Cambridge University Press, 1993. *See especially the introduction by Andrew Ortony, as well as articles by Max Black, Richard Boyd, Raymond Gibbs, Thomas Kuhn, and Donald Schon.*

Tsoukas, H. "The Missing Link: A Transformational View of Metaphors in Organizational Science." Academy of Management Review 16 (1991): 566-585.

Constructionism

Gruber, H and J. Vonèche. (eds.) The Essential Piaget. New York, NY: Basic Books, 1977.

Harel, I. and S. Papert. (eds.) Constructionism. Norwood, NJ: Ablex Publishing Corporation, 1991.

Harel, I. (ed.) Constructionist Learning. Cambridge, MA: M.I.T. Media Laboratory, 1990.

Kafai, Y., and M. Resnick. (eds.) Constructionism in Practice: Designing, Thinking, and Learning in a Digital World. Mahwah, NJ: Lawrence Erlbaum, 1996.

REFERENCES and RESOURCES

Papert, S. Mindstorms. New York, NY: Basic Books, 1980.

Papert, S. The Children's Machine. New York, NY: Basic Books, 1993.

Papert, S. "What's the Big Idea? Toward a Pedagogy of Idea Power." IBM Systems Journal 39.3-4 (2000).

Resnick, M, Bruckman, A. and F. Martin. "Pianos Not Stereos: Creating Computational Construction Kits." Interactions 3:6 (1996).

Imagination

Fein G. "Pretend Play: Creativity and Consciousness." in G. Görlitz, D. and J.F. Wohlwill. (eds.) Curiosity Imagination and Play. Hillsdale, N.J: Lawrence Erlbaum, 1987.

Hamel G. and C.K. Prahalad. Competing For The Future. Cambridge, MA: Harvard Business School Press, 1994.

Hammer, M. The Reengineering Revolution: A Handbook. New York, NY: Harper Business. 1995.

Kearney, R. The Wake of Imagination: Toward a Postmodern Culture. Minneapolis: University of Minnesota Press, 1988.

Kim W. Chan and R. Mauborne. "Value Innovation: The Strategic Logic of High Growth." Harvard Business Review (Jan-Feb. 1997).

Mellou, E. "Creativity: The Imagination Condition." Early Child Development and Care 114 (1995): 97-106.

Singer J. & D. Singer. "Fantasy and Imagination." in Bergen, D and D. Fromberg. (eds.) Play from Birth to Twelve and Beyond: Contexts, Perspectives, and Meanings. New York, NY: Garland Publishers, 1998.

Sutton-Smith, B. The Ambiguity of Play. Cambridge, MA: Harvard University Press, 1997.

Vygotsky, L. S. Mind in Society: The Development of Higher Psychological Processes. Cambridge, MA: Harvard University Press, 1978.