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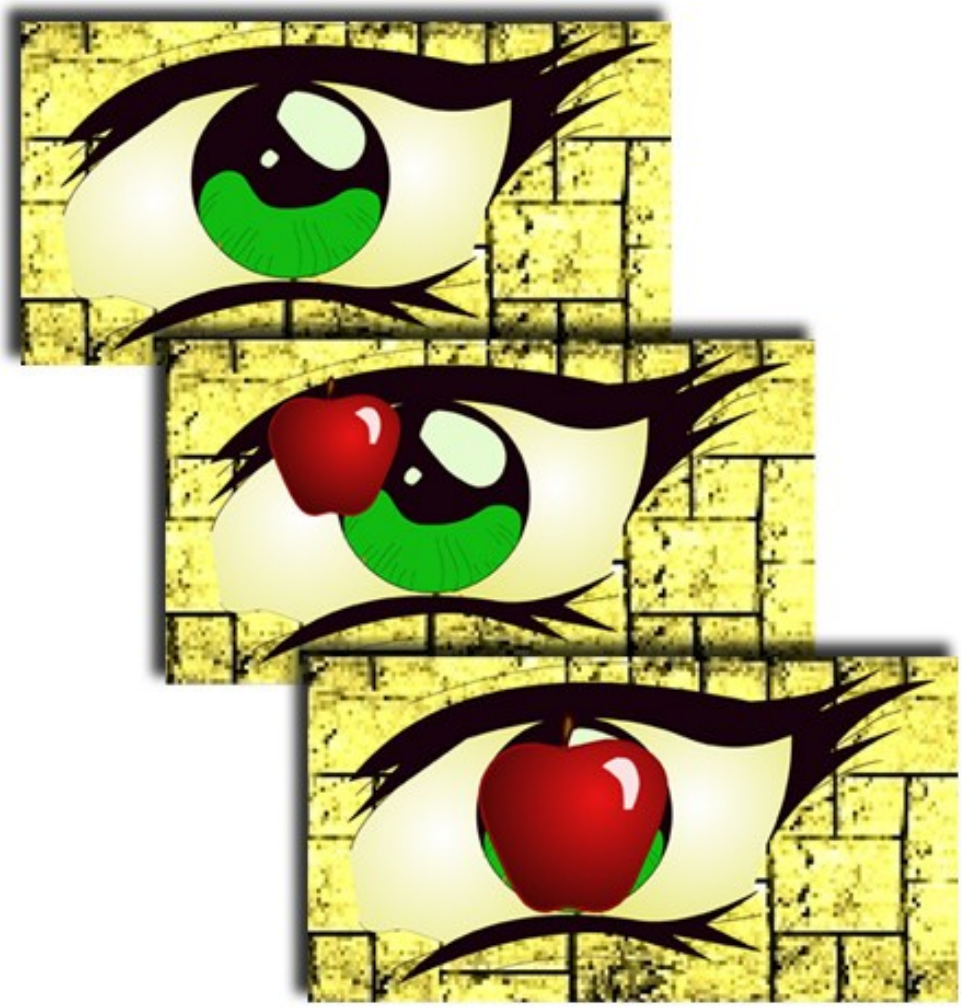
Abstractions: The "Basics" of Innovative Intelligence

Rose Management Group



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Abstractions: The "Basics" of Innovative Intelligence

In Obama's weekly address on February 5, 2011, the President of the United States set a 21st century 'put a man on the moon' goal for his country:

"out-educate" and "out-innovate" in a globally competitive marketplace.

When we alter something in a novel way, we use abstractions, the basic units of intelligence.

Just a month earlier, the *Wall Street Journal* reported a steady fall in scores on a commonly used test for creativity. Can innovation, a much sought-after, yet often elusive, intelligence skill, be taught, and how?

Developing our "everyday creativity"

Innovation and creativity is an outcome of our intelligence as human beings. The act of creation, or innovation, is satisfying to us because we have resolved some problem, whether it was a small annoyance like a drippy facet stopped with chewing gum used as putty, or "inventing" abstract art when tripping over paint cans. When we alter something in a novel way, we use an abstraction, or often a combination of abstractions, the basic units of intelligence.

Our ability to create, or innovate, is as inherent to intelligence as the human use of language. *Psychology Today* recently featured a cover story on everyday creativity. Art Markman gives the example of language use as everyday creativity in his *Tools for Innovation*, "Every day we use language to speak sentences that have never been spoken before. We express thoughts that have never been expressed. All this is so deeply ingrained that we don't notice how creative it is."

Abstractions: The "Basics" of Innovative Intelligence

Rarely is there a system so the skills of being creative can then be transferred to other situations.

We recently were invited to present on the topic of innovation and creativity for a large, international educational conference in Boston. One of the keynote speakers was Howard Gardner, a leading intellectual whose work on multiple intelligences has influenced education for the past 20 years. Dr. Gardner identified desirable student outcomes and capacities for education today and in the future. He specifically referred to the student's capacity to "be creative, put forth new ideas and develop fresh ways of thinking."

But, what is it that we, as humans, do when we utter a novel piece of language, or innovate a new something? For decades, educators have said, 'what can be identified, can be taught.' Can we identify the basics of innovation or creativity? These building blocks, fundamental skills, are already measured on standardized intelligence tests, even existing tests of creativity, like the Torrance Tests of Creative Thinking. Parents, as a child's first teacher, and professional teachers will probably find that they already engage in activities that encourage students to develop creativity skills. However, such efforts are usually NOT consistent and deliberate. Often, the principle guiding the activity is not shared with the learner, teacher, or parent. Rarely is there a system generating the learning activities so the skills of being creative can then be transferred to other content areas, or life situations.

The $H_2L^{®}$ *Abstraction Types*

Compare	Group	Simile ("Like – As")
Reverse	Sequence	Analogy ("Is-As")
Add	Pattern	Metaphor ("Is")

Compare -

the intelligent activity of looking for similarities

Building on the work of psychologists, educators, and philosophers, we have identified nine abstraction types that are fundamental to intelligence. Here are definitions of the various abstraction types, with some illustrations.

Compare - This is the intelligent activity of looking for **similarities**. Similarity is the abstraction that is basic to all abstraction types.

An everyday activity that illustrates this is organizing the shopping list we have on the refrigerator. The list may be:

Milk

Oranges

Spaghetti

Apples

Laundry detergent

When we get to the store, we know that oranges and apples are both fruit, and they

will be found in the produce section. Fruit is a similarity of apples and oranges.

Think of the cliché in English, *compare apples to apples*. The idiom means that you should compare the same types of things.

Reverse –

finding the opposite of something or doing the process backwards

Reverse – Think of the opposite. Negate something, or do it backwards. A thinker reverses when finding the opposite of something or doing the process backwards.

To continue the fruity illustration, reverse the letters in *lime*. The word is *Emil*.

Or if you enter the grocery store, what if you reverse the way that you go up and down the aisles? This may be a good exercise to loosen the grip of routine, but your ice cream could melt before you get to the cashier.

Add –

adding or inserting; subtracting or removing

Add – Intelligent activity often involves adding, or inserting. Let's include subtract and remove here because they are the reverse of add. See how we are already combining abstraction types for problem-solving and innovation?

Let's add to the word, "fruit." Language teachers are familiar with teaching prefixes and suffixes. Adding a suffix makes words like *fruitful, fruitless*. Richer, or more extensive, vocabulary is a characteristic of a more intelligent person. We can add letters to the word *apple* and get *scrapple*. This type of adding gets another word, and breaks the limitation of prefix-suffix exercises. Adding letters to a word in a novel way produces neologisms. A dictionary definition of *scrapple* is a Pennsylvania Dutch culinary concoction. Use abstractions to define

scrapple and you could invent a new game that is a combination of *Scrabble* and *Apples to Apples*.

When we subtract letters from *apple*, we get the word *ape.* Are we monkeying around with words here? (This bit of humor anticipates another abstraction type.)

Group –

Thinkers sort experiences into groups

Group – It is another characteristic of intelligence that we put things together in a group. Thinkers sort into groups. Grouping or sorting experiences is fundamental to intelligence. We group apples and oranges when we say they are both *fruit*. With this type of abstraction, we can now compare apples to oranges because they are both fruit.

The ability to group within a classification system, apples and oranges are both fruit, vs. apples and oranges both grow on trees, get a thinker more points on a standard intelligence test like the Wechsler Intelligence Scale for Children (WISC).

Sequence -

put things in some order

The ability to group things in a novel way, apples and oranges could both be used as balls if the trees in an orchard played catch when no one was looking, would get the thinker points on a creativity assessment.

Sequence - Intelligence puts things in some order. This is another skill found on standard intelligence tests. The person taking the test is given a series of pictures that have been mixed-up and is asked to arrange them in an order that makes a sensible story. A sequence is a type of grouping, an arrangement.

Pattern –

an arrangement

that has a design or

a repeated series

For our illustration, consider the sequence, order, of items in the grocery store. Is the arrangement of fruit and vegetables in the produce section deliberate? You can bet the silent persuasion of marketing is at work. It is no accident that the bananas, one of the most frequently bought fruit, are found in the middle area. Shoppers must go past other items to get to the bananas. Why does refrigerated salad dressing appear in the produce section? Shoppers don't need to go out of their way, add to the sequence of their shopping, to get that item in their cart, and pay for it.

Pattern - A pattern is an arrangement that has a design or a repeated series. Sequences are usually patterns, but not all patterns are sequences.

Illustrations – Think of a fruit, or apple, orchard. The pattern of any apple orchard is that the different varieties are together. The reason is simple. When the farmer started, he planted the seedling Red Delicious trees, then the Golden Delicious trees, etc. It would be creative to pattern a row of apple trees – Red Delicious tree, Golden Delicious tree, Gala tree; Red, Golden, Gala; red, yellow, mixed; but not very labor effective.

There is a reason that playing an instrument has been linked to increased intelligence. Patterns are found in music. Perhaps even more familiar than the fact that the archer's arrow split an apple on his son's head is the pattern of Rossini's *William Tell Overture*:

Ta da dump, ta da dump, ta da dump dump dump

Simile–

uses the words "like" or "as" to connect two items

Analogy–

establishes a relationship

Metaphor—

makes two things the same

Simile - A simile in English uses the words *like* or *as* to connect two items. The $H_2L^{®}$ system uses those English words, *Like – As*, to label that type of abstraction.

Our illustration continues the apple / fruit example. "… as American as apple pie…" is an idiom in American English.

Analogy - An analogy establishes a relationship that is the same between two sets of items. An apple is to a tree as a watermelon is to a vine. The relationship of the apple to the apple tree is the same as the relationship of the watermelon to the watermelon vine. Most of us are familiar with the formal use of analogies in which only the main words are used. Apple : tree :: watermelon : vine

The $H_2L^{®}$ system continues word play by using the language of analogies to label them, *Is – As*. See the pattern forming, *Like – As, Is – As*,… ?

Metaphor - When a thinker uses a metaphor, this abstraction makes two things the same. Something **is** something else.

Illustration – A father is very fond of his daughter. In American English, the metaphor is "She is the apple of his eye."

These three types of abstractions – simile, analogy, metaphor – are easy to remember using the mnemonic: *Like – As, Is – As, Is*.

Innovation Development through Abs Training

Now it is possible to "out-innovate" others because we have identified the skills used. The novelty component of innovation or creativity comes about when a thinker uses an abstraction, or a combination of abstractions, in a way that is different – for that person or in a community, whether smaller like a family or classroom, or larger, in a national or global perspective. Abstraction types have been articulated; we know what skills need to be developed to have intelligent thinkers who can innovate. We can work out those abs!

Innovation, or creativity, comes about when a thinker uses abstraction in a way that is different – for that person or in a community.

When we use the various abstraction types, we can elicit that "oooh" exclamation from our family and friends by producing a response that was unexpected. When we are teaching, we can apply abstraction types to help learners organize their thoughts for writing or speaking. We could even apply these abstraction types to items on a standardized test of creativity, thus getting higher marks, or appropriately in a job interview to show a potential employer that we have command of those sought-after innovation skills.

Every thinker has the power to use "everyday creativity" to innovate every day. The H_2L ® system identifies the intelligent use of abstractions, allows learners to practice using them, and develops mastery of what was once the mystery of innovation.