

# **Review of the Main Principles of the Creative Process.**

## **Introduction**

There are tens of known creativity stimulating techniques, but it is worthwhile reviewing the main principles behind the creative process, for the purpose of developing real artificial creativity using computer software, similar to artificial intelligence.

Creative ideas could be discoveries, modifications, new combinations, integration or adaptation in response to an analogy, need, opportunity, or problem etc.

Creative ideas are usually original, because there are usually an infinite number of possibilities for combinations and associations, and hence it is unlikely that the same combination is repeated by random.

## **Definitions**

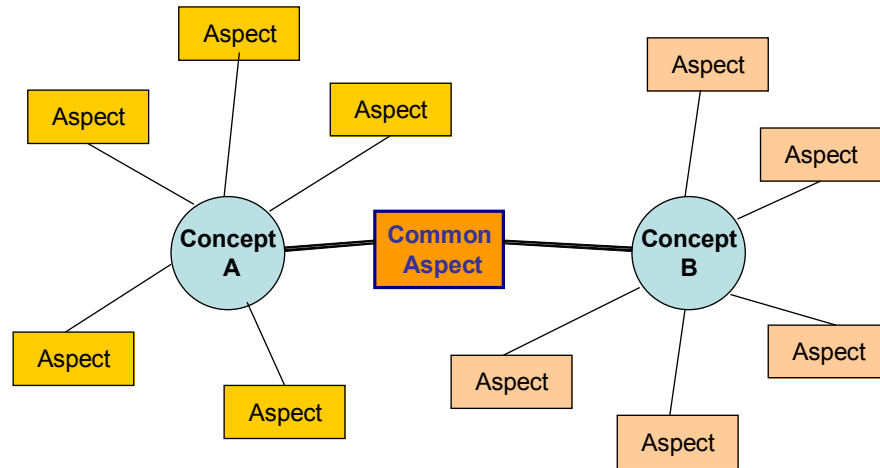
A concept (idea, object, etc) is defined by its aspects (attributes, features).

Example: The concept Bike has features such as: "Two wheels", "Mobility", "Exercise", "pedaling", "Balance", "light weight", etc. Apple as concept has aspects such as "sweet", "fruit", "round", "healthy", etc.

Note: There are different ways to visualize concepts and aspects, as shown below in the graphs, or one can present aspects as oval shapes containing the concept. In the latter case we find the concept in the overlap area of the different aspects.

Analogies: **Similar Concepts** refer to concepts that share one or more aspects(s) (features, attributes) called **common aspect(s)**

## Similar Concepts Means Sharing One, or More Features



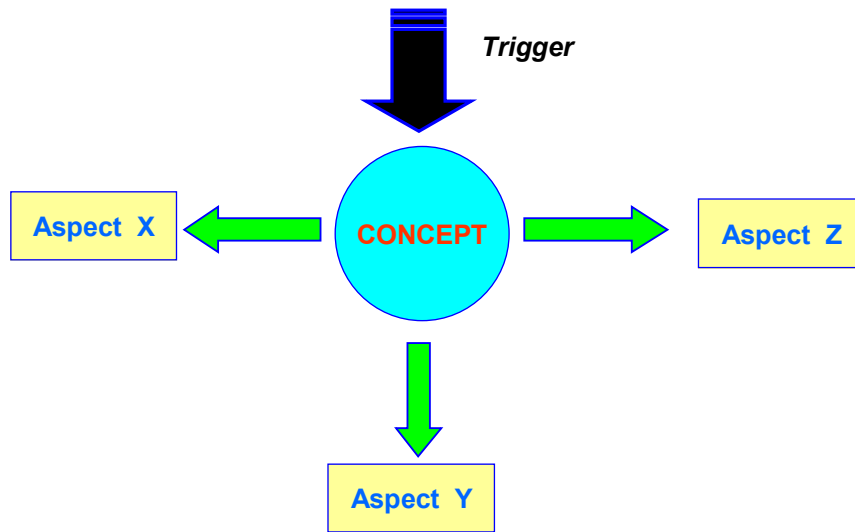
**Compatibility:** **Compatible** concepts or aspects are those that can fit together. For instance, a "break" is compatible with "bicycle", a "rearview mirror" is compatible with "car", "shock absorber" is compatible with "bicycle" etc

**Characteristic aspects** are the fundamental (Most relevant) features that define a given concept or aspect, away from the irrelevant details. Example: A characteristic aspect of Bicycle is "Mobility", of email "Communication", of Apple "fruit"

### Activation of a Concept in The Mind

Once a concept is activated in the mind, all the directly relating aspects are easily activated, and the mind automatically conducts a specific level of analogies. Creativity stimulating techniques can systematize this process.

### Activation of a Concept In The Mind Activates Aspects

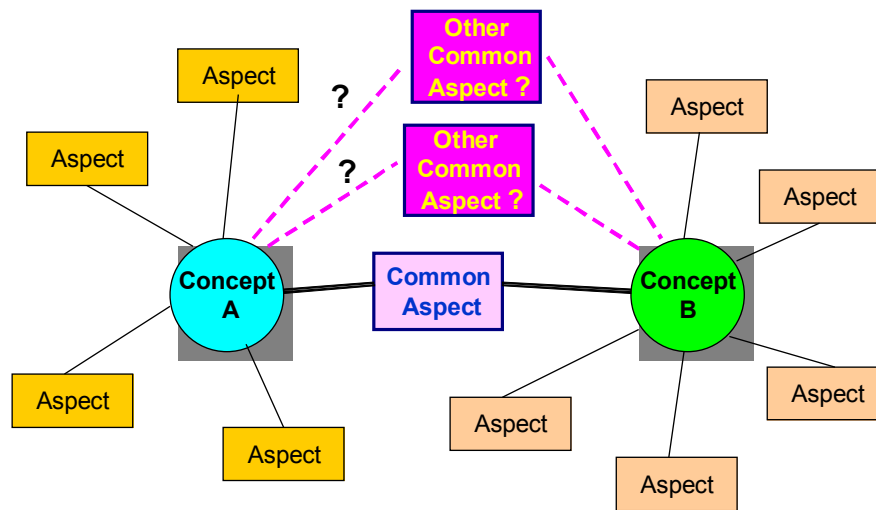


### The Different Principles behind Discoveries

- ❖ When two concepts are quite similar (Analogy) , i.e. they have more than one common aspect, they are **LIKELY** similar in other aspects, i.e. they have other common aspects (These are considered discoveries if these aspects were unknown before). Clarification: Concept (A) and Concept (B) have a Common Aspect (1). Concept (B) has the aspect (2). When looking closer, we discover that Concept (A) has also the Aspect (2).

Example: Bicycle and car have the common aspect "Mobility on wheels". Car has another aspect called "Air resistance dynamics", which also applies to the bicycle. (Note: This principle could apply to concepts having one common feature only. With some effort, one might discover other common features.)

## Discoveries: Similar Concepts are Likely to have other Common Aspects



- ❖ A Characteristic aspect of a characteristic aspect is usually a characteristic aspect of the concept: When a concept is characterized by some aspect (1), and this aspect (1) is characterized by an aspect (2), then the original concept is characterized by the aspect (2) (Deduction). This stimulates new ideas and new connections. Example: Water is a liquid. Liquids can evaporate. Hence water can evaporate.
- ❖ Finding the causes and purpose of things, i.e. asking the WHY question (This can be related to above two rules), including sequential WHY questions to get to the real origins, and to deal with different levels of causes or purpose.

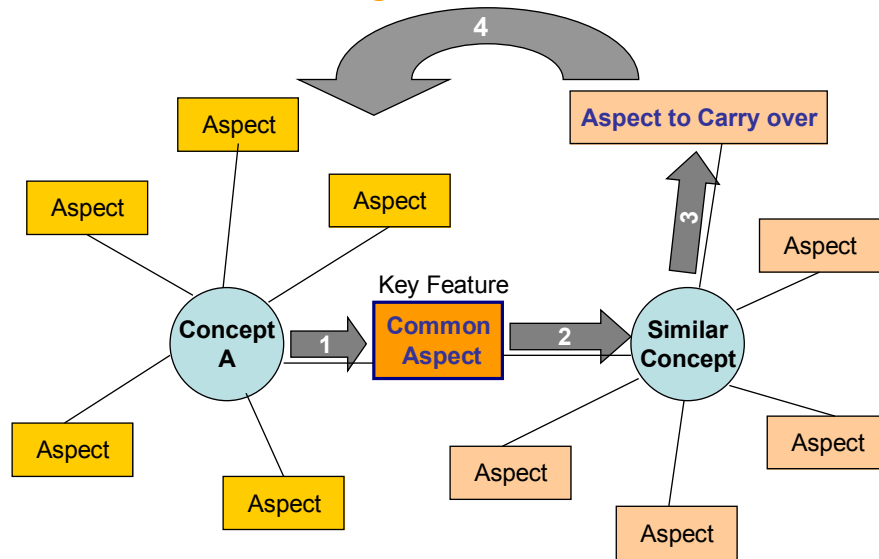
Example of sequential WHY questions:

Why is the room dusty? Because we have to keep window open.  
 Why do we have to keep window open? Because we need fresh air.  
 Why do we need fresh air? Because we are exercising and sweating.  
 Why are we sweating? Because we are not using deodorant. etc

### Role of Common Aspects

**Common aspects** act as **channels (bridges)** to move from one idea (Concept) to another. Therefore, one can perform **multiple trip analogies**: From one concept (1) to a similar concept (2), then move to an aspect at concept (2), and find a concept (3) similar to concept (2) and so on.

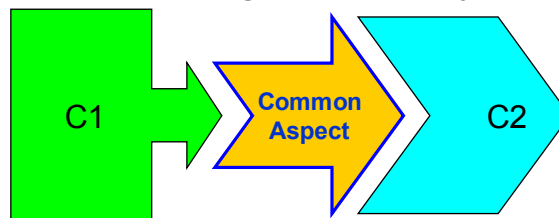
**Second Approach: Finding Similar Concepts and Extracting Useful Features**



Common aspects act also as **bonding pieces** for combination of similar concepts.

Basic Rule

- Common aspects act as the bonding pieces for combination: Compatibility.
- Similar concepts are likely to have compatible aspects, i.e. they can be borrowed and integrated easily.



## Issues of Compatibility

Aspects of similar concepts (similar means they have one or more common aspect(s)) are usually compatible, i.e. are likely to fit (be integrated) to the other concept.

Example:

One Aspect of bike is "mobility on wheels"

What is similar, i.e. with same aspect? >>> Reply : car, train, motorcycle etc.

What is another feature of car? >>>> Reply: Gear, stop light, turning signal, shock absorber etc

>>> Result: New combinations: Bike with gear, Bike with stop light, Bike with turning signal, bike with shock absorber etc.

Common aspects act as the bonding pieces for combination of similar concepts  
This is why similar concepts are likely to have compatible aspects i.e. that can be borrowed and integrated easily with each other.

As long as starting point and final destination of **analogies** are connected, including multiple trips, they are most likely compatible.

### In brief

When two concepts are quite similar, i.e. they have a number of common features, then it is likely that:

- Other unknown common features can be found (Discovery)
- Many features are compatible for Integration (New Products)

## The WHY Questions

The why question makes a transition to the levels of causes or purpose: "Why is it like this?" (Cause), or "Why do we do it?" (Purpose).

The why question, and indeed successive type "Why" questions, lead to broader perspectives. More options for combinations or solutions are available in this broader scope.

Example:

Why do we have to be more competitive? >>> Because we need to sell more

Why do we need to sell more? >>> Because we want to keep growing

Why do we want to keep growing? >>> Because we want to make more money

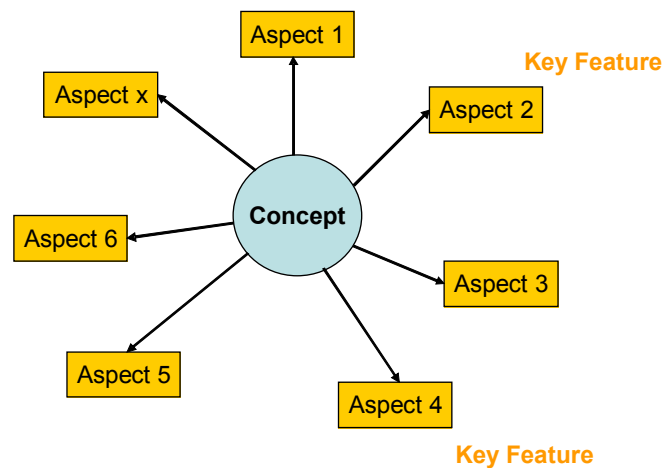
Why do we want to make more money? >>> etc

## Analysis

Analysis or attribute listing (aspects, features) is considered as one of the most powerful creativity technique, and acts as the feedstock for creativity. With an organized structure of ideas, the brain can perform associations and find new ideas more easily, but also modify aspects: Analysis goes as follows:

- One identifies and lists the aspects of the concept, i.e. key features, attributes, characteristics. Concept could be anything, an idea, product, process etc. One should at least identify some 6 aspects.

### First Approach: Identifying the Features of a Specific Concept: Feedstock for creativity



- Then one figures out ways to modify, or improve each feature.
- And / Or one strikes analogies in respect to each feature and learn or borrow from the similar concepts.

With aspects defined and written, it is easier to make analogies related to respective aspects.

All types of questions should be asked to define the aspects, such as why, what, how, who, where, when etc. Furthermore, in order to get useful (and practical) new ideas or combinations later, one should cover in the aspects the elements of needs, problems, difficulties, goals, markets, customers, users, applications etc.

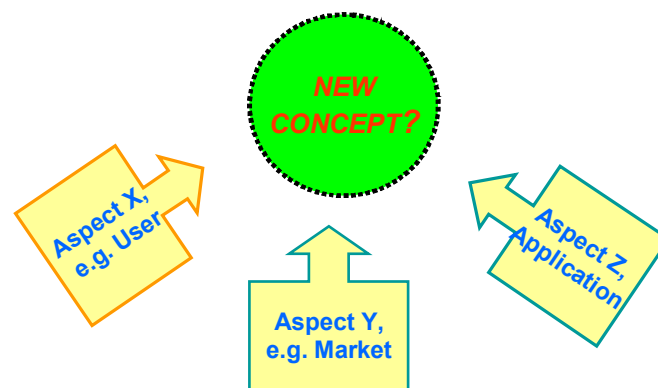
## Synthesis

This very significant creativity process involves combinations, integration, added value, added functions etc. A large share of creative ideas is created through the synthesis process.

### Types of combinations:

- ❖ Combinations of Similar concepts
- ❖ Combination (integration) of a concept with features of similar concepts (Learning, Borrowing).
- ❖ Combination (association) of a concept with a random concept.
- ❖ Combination of different aspects to create a new concept (Quiz type).

Synthesis: Generation of a New Concept (Idea)  
from combination of different Aspects: Quiz type.



- ❖ Combination for adaptation (Adjustment to a specific market or application etc)

**Generation of a New Concept (Idea) from combination of different Aspects:** (Quiz type, i.e. overlap of different aspects). This is the opposite to analysis of a concept. Analysis is similar to finding the meaning of a word in the Dictionary, while synthesis is the opposite process, deriving the word from the required meaning.

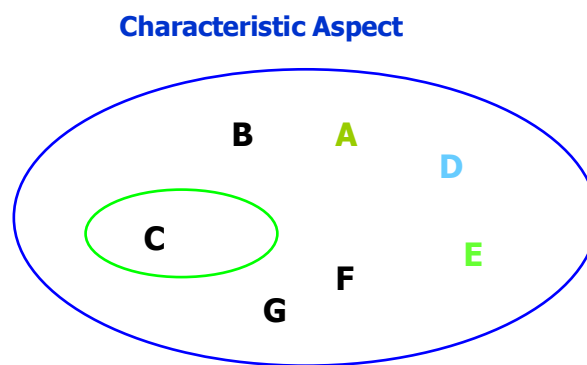
If concept is not known, the more aspects are provided, the easier it is to pinpoint the concept (as with a quiz): A realistic top number of aspects to combine (overlap) is 6, otherwise the average mind will be too strained.



## Characteristic Aspects

**Characteristic aspects** are the fundamental (Most relevant) features that define a given concept or aspect, away from the irrelevant details. They also serve as logical deduction, since a characteristic aspect of a characteristic aspect is also characteristic of the related concept: e.g. Apple (concept) is a fruit (characteristic aspect), and fruit is a plant (characteristic aspect) hence apple is a plant.

### Characteristic Aspect: Wide Scope



Characteristic aspect can be identified when performing analysis, i.e. when listing aspects of the concept.

Characteristic aspects are important in creative thinking because they deal with the main features, away from the secondary aspects: They have a broader scope (Containing many concepts to link to). Characteristic aspects act as expander of scope, i.e. where more possibilities are available. They are very effective when overlapped with other aspects and concepts. They are very stimulating to creativity.

Example: One of the characteristic aspects of bicycle is "Mobility". We can find unlimited number of concepts having this feature, e.g. car, horses, trains, boat, insects etc, hence we have a wide pool of concepts to borrow from. If we say "Mobility on two wheels" we narrow the scope appreciably.

### Application Example for Characteristic Aspects:

We are seeking new applications for an existing product in a given market. To proceed, one defines the characteristic aspects of the present application, and seeks to match such with the given market.

Specifically: we are producing an electronic weighing scale for laboratories & seeking applications in travel markets! Characteristic of product is "weighing" (and not for laboratories). We ask: Where is "weighing" needed in travel? >>> Maybe one can develop a small portable scale for weighing luggage, which can be even incorporated into the luggage, or maybe develop a small portable scale for fitness weight watch during holiday etc. Had we defined aspect narrowly as "weighing device for laboratories" it would have been unlikely to find the new product idea.

Another example in solving problems: we define characteristic aspects of problem and ask where else do we find such aspects, i.e. we seek analogies, to learn from.

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