

The Paper on

THEORY OF DEVELOPING CONCEPTUAL BASES: THE PARTICULAR APPROACH TO EVOLUTION

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Abstract:

Among the great diversity and similarity of the universe, philosophers, scientists, theologians seek to relate one phenomenon to another and to recognize the causes and effects of phenomena. In this way, they have developed explanations for the changing of the seasons, the movements of the sun and stars, the structure of matter, the history of life on Earth, and many other occurrences.

Alternative models, processes, formulas, and theories in many areas are developing to help our understanding of how the universe works. The theory of evolution is one of the most important ideas ever generated by the application of scientific methods to the natural world.

Evolutionary theories incorporate a large body of scientific facts, laws, tested hypothesis, and logical inferences but it is much harder to support scientifically all things in one process, one model, one formula, or one framework. This is because of the great diversity and similarity among the universe, the development of an explanation for the change of everything is so difficult. Today, we see evolution plays in many theories having explanation can not be applied to different kinds of evolution.

For instance, biological evolution provides an explanatory framework for the processes of natural change, but that it can not be applied uncritically to cultural phenomena, the evolutionary formulas for making a universe and making life can enable everything- with the exceptions of man-made things, such as computer or buildings, and of complicated things, such as wooden boxes with nails in them, require thought, intelligence, and careful workmanship.

This research underscores the importance of studying a theory that can explain how evolution works in terms of one process, one model, or one framework and that can be applied to all kinds of evolution. The DCB theory of evolution is now required.

Keywords: Evolutionary Theory, DCB Theory, Evolution

1. Introduction

Evolution is an extremely active field of research, with an abundance of new discoveries but evolutionary theory, like all science theories, continues to develop as new information and ideas deepen our understanding. Today, there is a growing interest in the topic of evolution and in the search for a general theory that can explain what evolution is and why and how it happens.

This paper is about the general theoretical framework for understanding and studying evolution is called "Theory of Developing Conceptual Bases". It was found by Mr.Charoenchit Panpetch, Thai theorist in 2004. Theory of DCB defines how evolution works in terms of the single process in explaining the process of become different, the way to become different, the act of passing something, the result by which something passed, and the relation in process of evolution. It also provides systematic tools for each activity of evolutionary studies- for indicating kinds of evolutionary results, for analyzing the directions of evolution, and for adapting the evolutionary result. Thus, DCB is theory which explanation can be applied to all kinds of evolution becoming as the particular approach to evolution.

I describe the theory of DCB in detail. I then present the systematic tools for each activity of evolutionary studies, including several examples. Thus, the paper serves as a step-by-step guide for understanding and studying evolution in the DCB.

2. Theory of Evolution

What is evolution? This is a question that has puzzle humans for ages. Evolution in the broadest sense explains that what we see today is different from what existed in the past and generally refers to any process of change over time.

The terms "evolution" usually refers to the biological evolution of living things. But processes by which planets, stars, cultures, and the universe form and change over time are also types of evolution.

Theory is a well-established system or body of statements that explain a group of phenomena. Evolutionary theory is a body of statements about the processes of evolution that are believed to have caused the history of evolutionary events.

3. Laws of Evolution:

What is the change? This is one of questions that is harder to understand directly. The movement of the sun and stars, the growth of plants, the migration of population, and the transformation of matter, like evolution concern changes of something. In the quest for understanding evolution, I think that there is a need for explanation that can explain the change of everything.

In historical science like evolution, something that happened in the past which we can not directly observe a phenomenon, hypothesis can be made in explaining phenomena. I have some hypothesis in explaining how the change works like these;

If the attributes of this thing is Y, when I pass it from one state to another, X will happen. For instance, if the attributes of this matter is the fixed shape and volume, when I pass into another state as the liquid state, the fixed volume and shaped by the container will happen. I deduce that a phenomenon is called "change" occurs when something passed from one state to another.

If the state of this thing is Y, when I pass its characteristics or positions, X will happen. *For instance, if the state of this matter is the solid, when its temperature is increased, another state as the liquid will happen.* I deduce that a phenomenon is called “change” happens in the positions or with characteristics of thing. Thus, there are two variables that relate to states of thing, these are the position and characteristic.

What is the state? This is one of questions that is harder to understand directly. In the quest for understanding evolution. I think that there is also a need for explanation that can explain the state of everthing. I have some logics in explaining how state work like these;

Is there a difference between states? It is harder to identify the difference between states, but that does not mean that I can not prove them scientifically like this;

- | | |
|---------------------------------|----------------------------------|
| 1) <i>fruit with green skin</i> | 2) <i>fruit with acid juice</i> |
| 3) <i>animal with four legs</i> | 4) <i>animal with four wings</i> |

These are some states of things, State 1 refers to many kinds of plant such as coconut, mango, etc but State 2 refers to a few kinds of plant such as lemon, State 3 refers to many kinds of animal such as cow, zebra, pig, dog, etc. but State 4 refers to a few kinds of animal such as scorpionfiles. Therefore, I induce that there are some states underlying a common class of things, and some states underlying an identical class of things.

Is there a similarity between states? It is harder to identify the similarity between states, but that does not mean that I can not prove them scientifically like this;

- | | |
|-----------------------------------|----------------------------------|
| 1) <i>fruit with green skin</i> | 2) <i>fruit with round shape</i> |
| 3) <i>fruit used for drinking</i> | 4) <i>fruit with acid juice</i> |

There are some states of plants. State 1 refers to plants such as lemon, mango, etc. State 2 refers to plants such as lemon, melon, etc. State 3 refers to plants such as lemon, coconut, etc., State 4 refer to plants such as lemon, orange. Therefore, I induce ther there are some states underlying a class of the same things. Thus, there are two kinds of state that relate to a class of things.

What is the CB state? Among the diversity of languages, I think that the “state” is harder to identify similarly, the definition of state which everybody can understand directly is required. The “state” in terms of the relationship between the position and characteristic underlying a class of things representing at some point in time is called “Conceptual Base” or “CB state” is created, such as;

Tree with green leaves: Position as leaf of tree, and characteristic as green color.

Animal with eight legs: Position as leg of animal, and characteristic as eight pieces.

Tool for catching animals: Position as function of tool, and characteristic as catching animals.

I can classify it into two kinds like these; the “state” in terms of the relationship between the position and characteristic underlying a common class of things representing at some point in time is called “Common Conceptual Base” or “CCB state”, and the “state” in terms of the relationship between the position and characteristic underlying an identical class of things representing at some point in time is called “Identical Conceptual Base” or “ICB state” like this;

- 1) *fruit with green skin* 2) *fruit with acid juice*
 3) *animal with four legs* 4) *animal with four wings*

These are the CB states of things, State 1 as the CCB state because of this state underlying a common class of plants, but, State 2 as the ICB state because of this state underlying an identical class of plants such as lemon. State 3 as the CCB state because of this state underlying a common class of animals, but State 4 as the ICB state because of this state underlying an identical class of animals such as scorpionflies.

In addition, the set that there are elements as states in terms of the relationship between the position and characteristic underlying a class of the same things representing at some point in time is called "Set of Conceptual Bases" or "CB set" like this;

The CB set of lemon = {plant with many fruits, leaves with green color, fruit with round shape, fruit with green skin, fruit used for drinking, juice with acid taste}

Laws of Conceptual Base

Although, the Conceptual Base is made for explaining the state of things, I have two laws in explaining how Conceptual Base works like these:

Law of Time of Conceptual Base: The CB state is not different at the same time but it may be different at different times, like this,

- Time 1 : tree with 11 feet high* *Time 2 : tree with 12 feet high*
Time 3 : tree with 12 feet high *Time 4 : tree with 12 feet high , tree with 13 feet high*

The CB state at Time 1, at Time 2, and at Time 3 are according to law of time of Conceptual Base, but at Time 4 not. This law states that there is only Conceptual Base that can occur at the same time. Likewise, its other states can occur at the other times. This is the reason why the change of things could have happened.

Law of Set of Conceptual Bases: The CB state is not different in the same set but it may be different in different sets, like this,

- Set 1 = {tree with 12 feet high, fruits with round shape, juice with acid taste}*
Set 2 = {tree with 13 feet high, fruits with round shape, juice with acid taste}
Set 3 = {tree with 12 feet high, tree with 13 feet high, fruits with round shape, juice with acid taste}

The CB states in Set 1, and in Set 2 are according to law of set of Conceptual Bases, but in Set 3 not. This law states that there is only Conceptual Base that can be element of the same set. Likewise, its other states can be element of the other sets. This is the reason why the relation between things could have happened.

Two laws state that all things are related and that they have changed over time. Evolution concerns a phenomenon is called "change" that occurs when something passed from one state to another, happens in the positions or with characteristics of thing, and must have no the conflict with laws of Conceptual Base. I have inferred that laws of Conceptual Base as well as laws of evolution.

4. Developing Conceptual Bases:

DCB (Developing Conceptual Bases) is the theoretical framework for the process of evolution in terms of the set of Conceptual Bases and is based on the discovery of the laws of evolution, explained how process of change over time works in explaining the process of become different, way of become different, act of passing something, result by which something passed, and relation in the process of change over time.

Process of Evolution

Evolution generally refers to any process of change over time. In DCB, explained how evolution works, in terms of the process of change in the set of Conceptual Bases from one generation to the next. The process is called "Process of Evolution" as shown in DCB model.

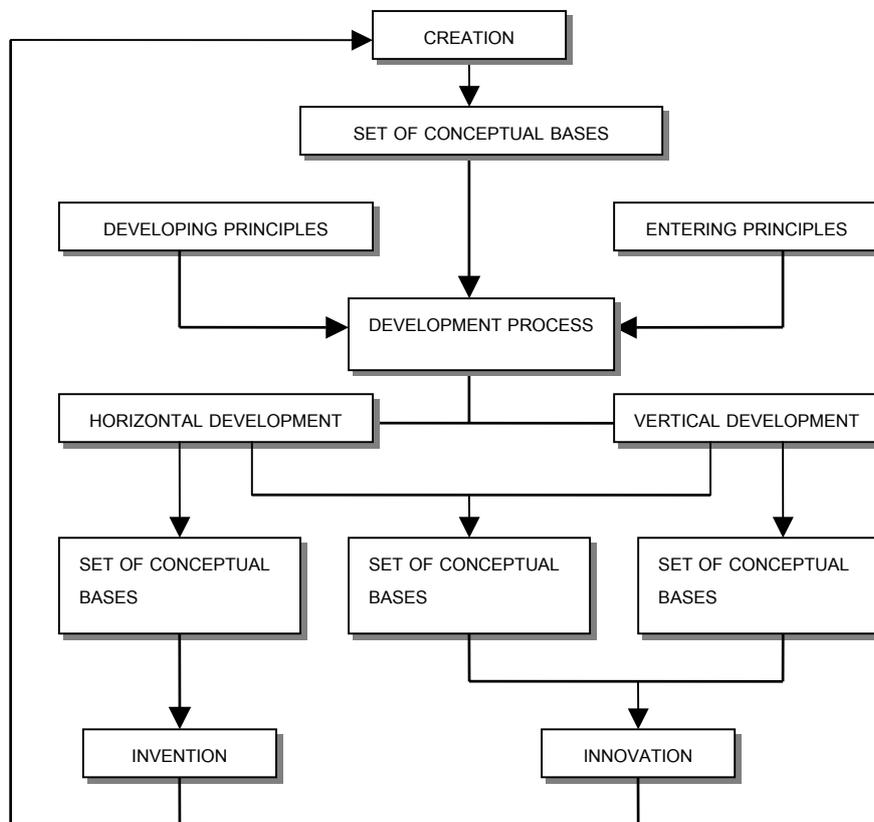


Figure 1: DCB Model

In DCB model, one generation as Creation, changing in the set of Conceptual Bases with element modification using the Development process in support of principles-both as the Developing Principles and as the Entering Principles. The set of Conceptual Bases passed the Development process becomes the next generation as Invention or as Innovation.

Development Process

Evolution, like other changes, generally refer to any process of becoming different. In DCB, explained how a process of becoming different works, in terms of processes of change into another state of Conceptual Base. The processes are called "Development Process" like these;

1. Horizontal Development Process: This is the process of change into another state of Conceptual Base in its old sort like this;

Horizontal Development process like this: $(C - D) \cup A_1 \cup I$

When C = The set of Common Conceptual Bases

I = The set of Identical Conceptual Bases

D = The set of the deleted elements of set C

A_1 = The set of another state of elements of set D in its old sort

It is used for changing into another state of Conceptual Base which all characteristics and positions have been in existence.

Example: Function 1 of Object A \rightarrow *Function 2 of Object A*

In this process, "Function 1 of Object A" is changed, it is deleted from the set of Conceptual Bases, then its another state as "Function 2 of Object A" is entered instead of it. (Function 2 have been in existence)

2. Vertical Development Process: This is the process of change into another state of Conceptual Base in its new sort like this;

Vertical Development process like this: $(C - D) \cup A_2 \cup I$

When C = The set of Common Conceptual Bases

I = The set of Identical Conceptual Bases

D = The set of the deleted elements of set C

A_2 = The set of another state of elements of set D in its new sort

It is used for changing into another state of Conceptual Base which some characteristic or position be not existing before.

Example: Function 1 of Object A \rightarrow *Function 1 and 2 of Object A*

In this process, "Function 1 of Object A" is changed, it is deleted from the set of Conceptual Bases, then its another state as "Function 1 and 2 of Object A" is entered instead of it. (Function 2 not existing before)

Developing Principles

Evolution, like other changes, generally refer to any way of becoming different. In DCB, explained how the way of becoming different works, in terms of ways of change into another state of Conceptual Base. The ways are called "Developing Principles" like these;

1. Combining: This is the way of change from the CB state that occurs in different positions with different characteristics to the state that occurs in the same positions with different characteristics- all characteristics occupied by the old positions.

Example: Function 1 of Object A and Function 2 of Object B → Function 1 and 2 of Object A

2. Separation: This is the way of change from the CB state that occurs in the same positions with different characteristics to the state that occurs in different positions with different characteristics- all characteristics occupied by the old positions.

Example: Function 1 and 2 of Object A → Function 1 of Object A and Function 2 of Object B

3. Addition: This is the way of change into another state of Conceptual Base that occurs in the same position with the same characteristic making greater in degree- the continuous degrees.

Example: Object A with five inches wide → Object A with ten inches wide

4. Subtraction: This is the way of change into another state of Conceptual Base that occurs in the same position with the same characteristic making shorter in degree- the continuous degrees.

Example: Object A with ten inches wide → Object A with five inches wide

5. Copying: This is the way of change into another state of Conceptual Base that occurs in the same position with the same characteristic making greater in degree- the discontinued degrees.

Example: Object A with six legs → Object A with eight legs

6. Reduction: This is the way of change into another state of Conceptual Base that occurs in the same position with the same characteristic making shorter in degree- the discontinued degrees.

Example: Object A with eight legs → Object A with six legs

7. Move: This is the way of change into another state of Conceptual Base that occurs in the same position with the different characteristic- the old characteristics.

Example: Function 1 of Object A → Function 2 of Object A

8. Replacing: This is the way of change into another state of Conceptual Base that occurs the same characteristic within the different position- the old positions.

Example: Function 1 of Part A → Function 1 of Object B

9. Deletion: This is the way of change from the CB state that occurs in the same positions with different characteristics to the state that occurs in different positions with different characteristics- some characteristics occupied by the old positions.

Example: Function 1 and 2 of Object A → Function 1 of Object A

10. Entering: This is the way of change from the CB state that occurs in different positions with different characteristics to the state that occurs in the same positions with different characteristics- some characteristics ever occupied by the old positions.

Example: Function 1 of Object A → Function 1 and 2 of Object A

Entering Principles

Evolution, like other changes, generally refer to any act of passing something. In DCB, explained how the act of passing something works, in terms of ways to make Conceptual Base entering the set of Conceptual Bases. The ways are called "Entering Principles" like these;

1. Joining: This is the way to make Conceptual Base entering the set of Conceptual Bases by moving characteristics into the same positions, such as;

- *Contain the object inside another.*
- *Have the object perform multiple functions.*
- *Pass an object through a cavity of another object.*
- *Transition from a heterogeneous structure of an object to a homogeneous structure.*
- *etc.*

2. Parting: This is the way to make Conceptual Base entering the set of Conceptual Bases by moving characteristics into different positions, such as;

- *Make an object sectional.*
- *Divide an object into independent parts.*
- *Transition from a homogeneous structure of an object to a heterogeneous structure.*
- *Have different parts of the object carry out different functions.*
- *etc.*

3. Scrolling: This is the way to make Conceptual Base entering the set of Conceptual Bases by moving a characteristic in degree, such as;

- *Change an object's aggregate state.*
- *Change density distribution or degree of flexibility, temperature, etc.*
- *etc.*

4. Alteration: This is the way to make Conceptual Base entering the set of Conceptual Bases by moving in positions with the same characteristics, such as;

- *Use a simple copy instead of an object which is complex.*
- *Use an intermediary object to transfer or carry out an action.*
- *Replace an expensive object by a collection of inexpensive ones.*
- *Replace solid parts of an object by gas or liquid.*
- *etc.*

5. Rotation: This is the way to make Conceptual Base entering the set of Conceptual Bases by moving characteristics within the same positions, such as;

- *Replace a symmetrical form with an asymmetrical form.*
- *Change the color of an object or its surroundings.*
- *Replace linear parts or flat surfaces with curved ones.*
- *Replace a linear motion with rotating movement.*
- *Incline the object or turn it on its side.*
- *Turn the object upside-down.*
- *etc.*

Evolutionary Results

Evolution, like other changes, generally refer to any result by which something passed. In DCB, explained how results by which something passed differ, in terms of sets of Conceptual Bases passed the Development process. Below is a list of evolutionary results;

1. Invention: It is one kind of evolutionary results by which some elements of the CB set passed into another state of them in their old sorts as well as it was created from the set of Conceptual Bases passed the Horizontal Development process.

2. Innovation: It is one kind of evolutionary results by which some elements of the CB set passed into another state of them in their new sorts as well as it was created from the set of Conceptual Bases passed the Vertical Development process or by which some elements of the CB set passed into another state of them in their old sorts and

some elements of the CB set passed into another state of them in their new sorts as well as it was created from the set of Conceptual Bases passed both Horizontal Development and Vertical Development processes.

In DCB, the evolutionary result covering Invention and Innovation as well as it was created from the set of Conceptual Bases passed the Development process is called “Creation”, the set of Conceptual Bases passed both Horizontal Development and Vertical Development processes at first time is “The Original CB Set”.

The Relation in Process of Evolution

Evolution generally refer to any relation in process of change over time. In DCB, explained how process of becoming different, way of becoming different, and act of passing something relate, in terms of the relationship among the process of change into another state of Conceptual Base, the way of change into another state of Conceptual Base, and the way to make Conceptual Base entering the set of Conceptual Bases.

The relationship among Development Process, Developing Principles and Entering Principles, as shown in Table DCB.

DEVELOPING PRINCIPLES	ENTERING PRINCIPLES					DEVELOPMENT PROCESS
	JOINING	PARTING	SCROLLING	ALTERATION	ROTATION	
COMBINING						HORIZONTAL
SEPARATION						HORIZONTAL
ADDITION						HORIZONTAL
SUBTRACTION						HORIZONTAL
COPYING						HORIZONTAL
REDUCTION						HORIZONTAL
MOVE						HORIZONTAL
REPLACING						HORIZONTAL
DELETION						HORIZONTAL
ENTERING						VERTICAL

Table 1: Table DCB

Example: “Function 1 of Object B” is another state of “Function 1 of Object A” by Replacing using Horizontal Development process entered the set of Conceptual Bases with Alteration- such as use a simple copy as Object B instead of Object A which is complex.

5. Tools of DCB:

DCB tool is the particular tool for scientists entering the field of evolutionary studies. The power of tools are based on the DCB methodology. There are three tools of DCB like these: Matrix DCB, Graph DCB, and Technique DCB. Tools are provided for each activity; use the matrix to collect evidences for indicating the kinds of evolutionary results, use the graph to present the evolutionary results for analyzing the directions of evolution, and use the technique with the following steps for adapting the evolutionary result.

Matrix DCB: Tool for indicating kinds of evolutionary results

Evolution, like other changes, having result by which something passed. In DCB, there is the systematic tool for collecting evolutionary results called "Matrix DCB". It is the matrix that there are elements as sets of Conceptual Bases passed the Development process in different times, as shown in figure 2.

Here, the original element as $(H_1 \cup V_1)$ and the next element as $(H_2 \cup V_1)$ or $(H_1 \cup V_2)$ or $(H_2 \cup V_2)$.

$$\begin{bmatrix} (H_1 \cup V_1) & (H_2 \cup V_1) & (H_3 \cup V_1) & \dots & (H_m \cup V_1) \\ (H_1 \cup V_2) & (H_2 \cup V_2) & (H_3 \cup V_2) & \dots & (H_m \cup V_2) \\ (H_1 \cup V_3) & (H_2 \cup V_3) & (H_3 \cup V_3) & \dots & (H_m \cup V_3) \\ \vdots & & & & \\ (H_1 \cup V_n) & (H_2 \cup V_n) & (H_3 \cup V_n) & \dots & (H_m \cup V_n) \end{bmatrix}$$

Figure 2 : Matrix DCB

This is the evolutionary formula for making elements of Matrix DCB.

$$(H_m \cup V_n) = ((H_{m-1} \cup V_{n-1}) - D) \cup (A_1 \cup A_2) \cup I$$

$$\text{that } H_0 = C \text{ and } m \in I^+$$

$$V_0 = C \text{ and } n \in I^+$$

When H = The set of Conceptual Bases passed the Horizontal Development process

V = The set of Conceptual Bases passed the Vertical Development process

C = The set of Common Conceptual Bases

I = The set of Identical Conceptual Bases

D = The set of the deleted elements of set C

A_1 = The set of another state of elements of set D in its old sort

A_2 = The set of another state of elements of set D in its new sort

Methodology regarding the next element of Matrix DCB;

1. If the CB set passed the Horizontal Development process occurs, makes greater in the Set H of its former element.

$$(H_1 \cup V_1) \rightarrow (H_2 \cup V_1)$$

2. If the CB set passed the Vertical Development process occurs, makes greater in the Set V of its former element.

$$(H_1 \cup V_1) \rightarrow (H_1 \cup V_2)$$

3. If the CB set passed both Horizontal Development and Vertical Development processes occurs, makes greater in both sets of its former element.

$$(H_1 \cup V_1) \rightarrow (H_2 \cup V_2)$$

Matrix DCB with the following steps as shown below;

1. Identify the Creation

This step involves identifying the evolutionary result as Creation being studied by which its positions and characteristics such as distinguishing quality, property, feature or capability are identified.

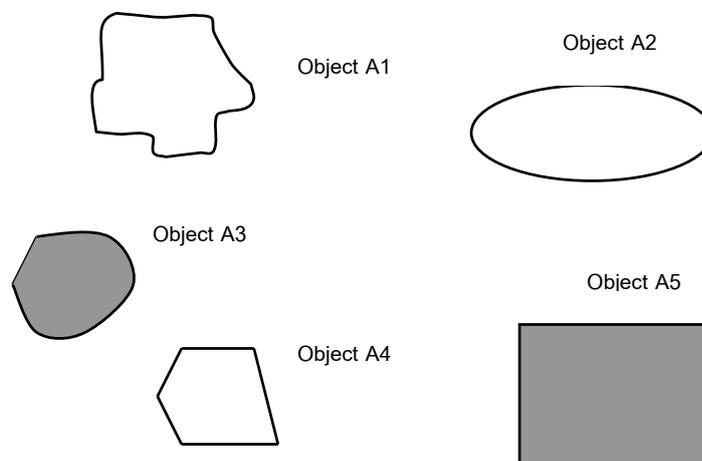
Example: We can identify Object A like this; an asymmetrical form, white color, small size, curved surface, and no angle.



2. Collect generations of Creation

This step involves collecting generations of Creation by which things having states underlying a class of the same things being studied. To collect the evolutionary results of a thing that occur in different times.

Example: We can collect generations of Object A like this;



3. Arrange generations of Creation

This step involves arranging generations of Creation by which things having states underlying a class of the same things being studied. To arrange the evolutionary results of a thing that occur in different times by the following ages- the oldest to the youngest.

Example: We can arrange generations of Object A by the following ages like this; Object A1, Object A2, Object A5, object A4, Object A3

4. Transform the Creation to the set of Conceptual Bases

This step involves transforming generations into sets of Conceptual Bases, according to laws of Conceptual Bases. To transform the evolutionary results into sets of Conceptual Bases having the same pattern like this; the first element of all sets is *CB state 1*, the second element of all sets is *CB state 2*, the third element of all sets is *CB state 3*, etc.

Example: We can identify the CB set of Object A like these;

- The CB set of Object A1 = {object with asymmetrical shape, object with curved surfaces, object with white color, object without angle}

- The CB set of Object A2 = {object with symmetrical shape, object with curved surfaces, object with white color, object without angles}

- The CB set of Object A5 = {object with symmetrical shape, object with flat surfaces, object with gray color, object with angles}

- The CB set of Object A4 = {object with asymmetrical shape, object with flat surfaces, object with white color, object with angles}

- The CB set of Object A3 = {object with asymmetrical shape, object with curved and flat surfaces, object with gray color, object without angles}

5. Analyze the difference between sets

This step involves analyzing the difference between sets, especially between set before and after, such as Set 1 compared with Set 2, Set 2 compared with Set 3, etc. To consider each element of two sets like this; the first element of Set 1 compared with the first element of Set 2, the second element of Set 1 compared with the second element of Set 2, etc. if the difference occurs, seeks the way of becoming different, then indicates kind of the Development process.

Example: We can analyze the difference between the CB set of Object A like these;

- The CB set of Object A1 compared with the CB set of Object A2

Element 1 of the CB set of Object A2 is another state of element of the CB set of Object A1 using the Horizontal Development process.

- The CB set of Object A2 compared with the CB set of Object A5

Element 2 and 3 of the CB set of Object A5 are another state of elements of the CB set of Object A2 using the Horizontal Development process and element 4 of the CB set of Object A5 is another state of element of the CB set of Object A2 using the Vertical Development process.

- The CB set of Object A5 compared with the CB set of Object A4

Element 1 and 3 of the CB set of Object A4 are another state of elements of the CB set of Object A5 using the Horizontal Development process.

- The CB set of Object A4 compared with the CB set of Object A3

Element 2, 3, and 4 of the CB set of Object A3 are another state of elements of the CB set of Object A4 using the Horizontal Development process.

6. Summarize result of comparison

This step involves summarizing results of comparison, according evolutionary results. If some elements of the CB set passed into another state of them in their old sorts, summarizes that this CB set passed the Horizontal Development process. If some elements of the CB set passed into another state of them in their new sorts, summarizes that this CB set passed the Vertical Development process. If some elements of the CB set passed into another state of them in their old sorts and some elements of the CB set passed into another state of them in their new sorts, summarizes that this CB set passed both the Horizontal Development and Vertical Development processes.

Example: We can summarize results of comparison between the CB sets of Object A like these;

- The CB set of Object A1 is the original set.
- The CB set of Object A2 is the CB set passed the Horizontal Development process.
- The CB set of Object A5 is the CB set passed both Horizontal Development and Vertical Development processes
- The CB set of Object A4 is the CB set passed the Horizontal Development process.
- The CB set of Object A3 is the CB set passed the Horizontal Development process.

7. Contain in Matrix DCB

This step involves containing sets of Conceptual Bases in the matrix, according methodology regarding the next point of Matrix DCB.

Example: We can identify the Matrix DCB of Object A like these;

The CB set of Object A1 as $(H_1 \cup V_1)$, the CB set of Object A2 as $(H_2 \cup V_1)$, the CB set of Object A5 as $(H_3 \cup V_2)$, the CB set of Object A4 as $(H_4 \cup V_2)$, the CB set of Object A3 as $(H_5 \cup V_2)$.

Matrix DCB = $[(H_1 \cup V_1) (H_2 \cup V_1) (H_3 \cup V_2) (H_4 \cup V_2) (H_5 \cup V_2)]$ or

Matrix DCB = [E11 E21 E32 E42 E52]

From this Matrix DCB, Generation 1 and Generation 3 of Object A as Innovation and Generation 2, Generation 4, and Generation 5 as Invention.

Graph DCB: Tool for analyzing the directions of evolution

Evolution, like other changes, having result of which something passed. In DCB, there is the systematic tool for presenting evolutionary results called "Graph DCB". It is the graph that there are points referring sets of Conceptual Bases passed the Development process in different times, as shown in figure 3.

Here, the original point as (H_1, V_1) and the next point as (H_2, V_1) or (H_1, V_2) or (H_2, V_2) .

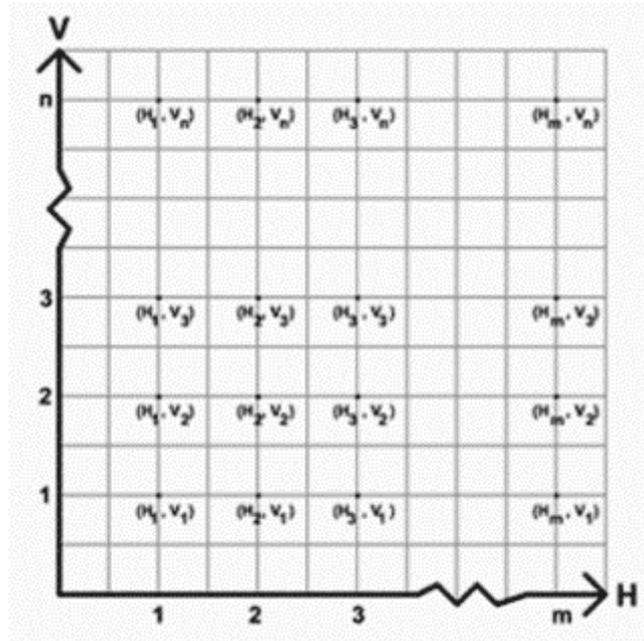


Figure 3 : Graph DCB

This is the Evolutionary formula for making points of Graph DCB.

$$(H_m, V_n) = ((H_{m-1} - D) \cup A_1 \cup I, (V_{n-1} - D) \cup A_2 \cup I)$$

that $H_0 = C$ and $m \in I^+$

$$V_0 = C$$
 and $n \in I^+$

When H = The set of Conceptual Bases passed the Horizontal Development process

V = The set of Conceptual Bases passed the Vertical Development process

C = The set of Common Conceptual Bases

I = The set of Identical Conceptual Bases

D = The set of the deleted elements of set C

A_1 = The set of another state of elements of set D in its old sort

A_2 = The set of another state of elements of set D in its new sort

Methodology regarding the next point of Graph DCB;

1. If the CB set passed the Horizontal Development process occurs, moves one point in the horizontal direction from its former point.

$$(H_1, V_1) \rightarrow (H_2, V_1)$$

2. If the CB set passed the Vertical Development process occurs, moves one point in the vertical direction from its former point.

$$(H_1, V_1) \rightarrow (H_1, V_2)$$

3. If the CB set passed both Horizontal Development and Vertical Development processes occurs, moves one point in the diagonal direction from its former point.

$$(H_1, V_1) \rightarrow (H_2, V_2)$$

Graph DCB with the following steps as shown below;

1. Identify the Creation

This step involves identifying the evolutionary result as Creation being studied by which its positions and characteristics such as distinguishing quality, property, feature or capability are identified.

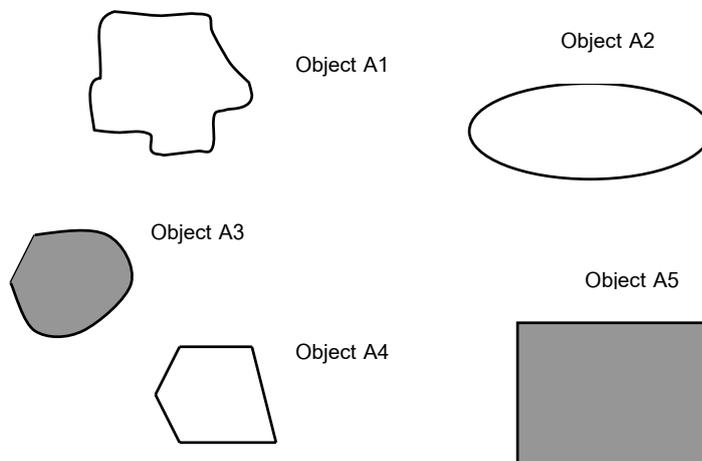
Example: We can identify Object A like this; an asymmetrical form, white color, small size, curved surface, and no angle.



2. Collect generations of Creation

This step involves collecting generations of Creation by which things having states underlying a class of the same things being studied. To collect the evolutionary results of a thing that occur in different times.

Example: We can collect generations of Object A like this;



3. Arrange generations of Creation

This step involves arranging generations of Creation by which things having states underlying a class of the same things being studied. To arrange the evolutionary results of a thing that occur in different times by the following ages- the oldest to the youngest.

Example: We can arrange generations of Object A by the following ages like this; Object A1, Object A2, Object A5, object A4, Object A3

4. Transform the Creation to the set of Conceptual Bases

This step involves transforming generations into sets of Conceptual Bases, according to laws of Conceptual Bases. To transform the evolutionary results into sets of Conceptual Bases having the same pattern like this; the first element of all sets is *CB state 1* , the second element of all sets is *CB state 2* , the third element of all sets is *CB state 3* , etc.

Example: We can identify the CB set of Object A like these;

- The CB set of Object A1 = {object with asymmetrical shape, object with curved surfaces, object with white color, object without angle}

- The CB set of Object A2 = {object with symmetrical shape, object with curved surfaces, object with white color, object without angles}

- The CB set of Object A5 = {object with symmetrical shape, object with flat surfaces, object with gray color, object with angles}

- The CB set of Object A4 = {object with asymmetrical shape, object with flat surfaces, object with white color, object with angles}

- The CB set of Object A3 = {object with asymmetrical shape, object with curved and flat surfaces, object with gray color, object without angles}

5. Analyze the difference between sets

This step involves analyzing the difference between sets, especially between set before and after, such as Set 1 compared with Set 2, Set 2 compared with Set 3, etc. To consider each element of two sets like this; the first element of Set 1 compared with the first element of Set 2, the second element of Set 1 compared with the second element of Set 2, etc. if the difference occurs, seeks the way of becoming different, then indicates kind of the Development process.

Example: We can analyze the difference between the CB set of Object A like these;

- The CB set of Object A1 compared with the CB set of Object A2

Element 1 of the CB set of Object A2 is another state of element of the CB set of Object A1 using the Horizontal Development process.

- The CB set of Object A2 compared with the CB set of Object A5

Element 2 and 3 of the CB set of Object A5 are another state of elements of the CB set of Object A2 using the Horizontal Development process and element 4 of the CB set of Object A5 is another state of element of the CB set of Object A2 using the Vertical Development process.

- The CB set of Object A5 compared with the CB set of Object A4

Element 1 and 3 of the CB set of Object A4 are another state of elements of the CB set of Object A5 using the Horizontal Development process.

- The CB set of Object A4 compared with the CB set of Object A3

Element 2, 3, and 4 of the CB set of Object A3 are another state of elements of the CB set of Object A4 using the Horizontal Development process.

6. Summarize result of comparison

This step involves summarizing results of comparison, according evolutionary results. If some elements of the CB set passed into another state of them in their old sorts, summarizes that this CB set passed the Horizontal Development process. If some elements of the CB set passed into another state of them in their new sorts, summarizes that this CB set passed the Vertical Development process. If some elements of the CB set passed into another state of them in their old sorts and some elements of the CB set passed into another state of them in their new sorts, summarizes that this CB set passed both the Horizontal Development and Vertical Development processes.

Example: We can summarize results of comparison between the CB sets of Object A like these;

- The CB set of Object A1 is the original set.

- The CB set of Object A2 is the CB set passed the Horizontal Development process.

- The CB set of Object A5 is the CB set passed both Horizontal Development and Vertical Development processes

- The CB set of Object A4 is the CB set passed the Horizontal Development process.

- The CB set of Object A3 is the CB set passed the Horizontal Development process.

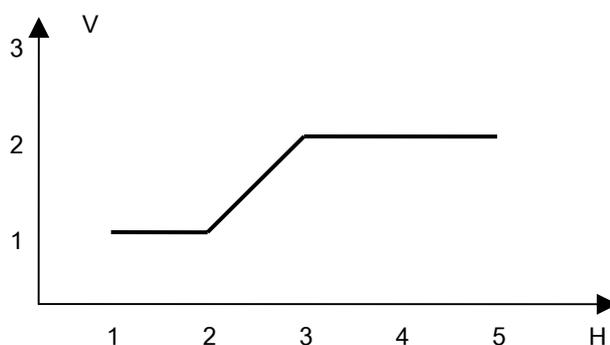
7. Present in Graph DCB

This step involves presenting sets of Conceptual Bases in the graph, according methodology regarding the next point of Graph DCB.

Example: We can identify the Graph DCB of Object A like this;

The CB set of Object A1 as (H_1, V_1) , the CB set of Object A2 as (H_2, V_1) , the CB set of Object A5 as (H_3, V_2) , the CB set of Object A4 as (H_4, V_2) , the CB set of Object A3 as (H_5, V_2) .

Graph DCB



From this Graph DCB. the evolution of Object A has a sloping direction.

Technique DCB: Tool for adapting evolutionary result

Evolution, like other changes, having result of which something passed. In DCB, there is the systematic procedure for adapting evolutionary result called “Technique DCB” with the following steps as shown below.

1. Identify the Creation

This step involves identifying the evolutionary result as Creation being studied by which its positions and characteristics such as distinguishing quality, property, feature or capability be identified.

Example: We can identify Object A like this; an asymmetrical form, white color, small size, curved surface, and no angle.



2. Transform the Creation into the set of Conceptual Bases.

This step involves transforming the Creation into the set of Conceptual Bases according to laws of Conceptual Bases. To identify the set that there are elements as states in terms of the relationship between the position and characteristic underlying a class of the same things.

Example: We can identify the CB set of Object A like this:

The CB set of Object A = {object with asymmetrical shape, object with curved surfaces, object with medium size, object with white color, object without angles}

3. Identify the other states of Conceptual Base.

This step involves identifying the other states of each Conceptual Base according to ways of the Developing Principles.

Example: We can identify the other states of each element like these;

- *Another state of the first element is “object with symmetrical shape”.*
- *The other states of the second element are “object with flat surfaces” and “object with curved and flat surfaces”.*
- *The other states of the third element are “object with big size” and “object with small size”.*
- *Another state of the fourth element is “object with gray color”.*
- *Another state of the fifth element is “object with angles”.*

4. Analyze the way for entering the set of Conceptual Bases.

This step involves analyzing ways to make each Conceptual Base entering the set of Conceptual Bases according to ways of the Entering Principles. To seek acts of passing state according to way of becoming different (Developing Principles).

Example: We can identify the act of changing into another state like these;

- "Object with symmetrical shape" is another state of the first element by Move entered the CB set with Rotation- such as replace an asymmetrical form with a symmetrical form.

- "Object with flat surfaces" is another state of the second element by Move entered the CB set with Rotation- such as replace curved surfaces with flat ones.

- "Object with curved and flat surfaces" is another state of the second element by Combining entered the CB set with Joining- such as have the object with multiple surfaces

- "Object with big size" is another state of the third element by Addition entered the CB set with scrolling- such as change an object's aggregate state.

- "Object with small size" is another state of the third element by Addition entered the CB set with scrolling- such as change an object's aggregate state.

- "Object with gray color" is another state of the fourth element by Move entered the CB set with Rotation- such as change the color of an object or its surroundings.

- "Object with angles" is another state of the fifth element by Entering entered the CB set with Joining- such as contain angles inside an object.

5. Adapt the set of Conceptual Bases.

This step involves adapting the set of Conceptual Bases with element modification using the Development process. It suggests that If element is changed, it is deleted from the set of Conceptual Bases, then its another state is entered instead of it.

Example: We can identify the CB set of Object A passed the Development process like these;

- Set 1 = {object with symmetrical shape, object with curved surfaces, object with big size, object with white color, object without angles}

- Set 2 = {object with asymmetrical shape, object with curved and flat surfaces, object with small size, object with gray color, object without angles}

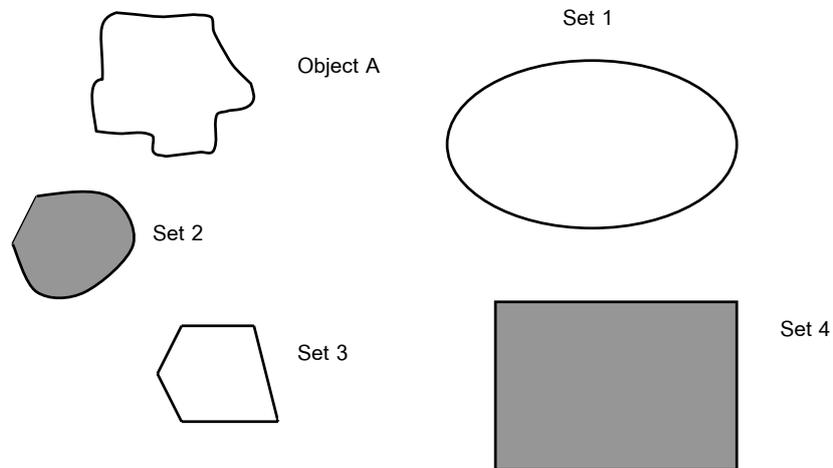
- Set 3 = {object with asymmetrical shape, object with flat surfaces, object with small size, object with white color, object with angles}

- Set 4 = {object with symmetrical shape, object with flat surfaces, object with big size, object with gray color, object with angles}

6. Transform the set of Conceptual Bases into the next Creation.

This step involves transforming the set of Conceptual Bases into the Creation. To use the set of Conceptual Bases passed the Development process as guideline for creating the next generation as Invention or as Innovation.

Example: we can create the next generations of Object A like this;



Conclusion

Researchers in evolution science and other disciplines continue to adapt the methods, principles, and frameworks. Likewise, applied research in medicine, agriculture, and other areas has increasingly attract scientist trained in evolution. A general theoretical framework that can be applied to all kinds of evolution will help scientists for handle an enormous amount of diverse observations related to evolutionary events, and reducing conflicts among evolutionary theories. The development of the higher systematic tools for each activity of evolutionary studies based on the single framework will make greater and powerful.

Acknowledgement

My work began in 2004 when I studied the inventive theory such as TRIZ. After studying, I developed the inventive method is call "Technique DCB", continued to adapt as the evolutionary theory. I would like to thank my brother for his helpful comment and my parent who kindly supported the budget for this research.

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Appendix:

There is a topic that contains in this appendix. This is a glossary that collects the definitions regarding theory of Developing Conceptual Bases.

Glossary

Addition: The way of change into another state of Conceptual Base that occurs in the same position with the same characteristic making greater in degree- the continuous degrees

Alteration: The way to make Conceptual Base entering the set of Conceptual Bases by moving in positions with the same characteristics

CB set: Set of Conceptual Bases

CB state: Conceptual Base

CCB state: Common Conceptual Base

Combining: The way of change from the CB state that occurs in different positions with different characteristics to the state that occurs in the same positions with different characteristics- all characteristics occupied by the old positions

Common Conceptual Base: The state in terms of the relationship between the position and characteristic underlying a common class of things representing at some point in time

Conceptual Base: The state in terms of the relationship between the position and characteristic underlying a class of things representing at some point in time

Copying: The way of change into another state of Conceptual Base that occurs in the same position with the same characteristic making greater in degree- the discontinued degrees

Creation: The thing that was created from the set of Conceptual Bases passed the Development process

DCB: Developing Conceptual Bases

Deletion: The way of change from the CB state that occurs in the same positions with different characteristics to the state that occurs in different positions with different characteristics- some characteristics occupied by the old positions

Developing Principles: The ways of change into another state of Conceptual Base

Development Process: The processes of change into another state of Conceptual Base

Entering: The way of change from the CB state that occurs in different positions with different characteristics to the state that occurs in the same positions with different characteristics- some characteristics ever occupied by the old positions

Entering Principles: The ways to make Conceptual Base entering the set of Conceptual Bases

Graph DCB: The graph that there are points referring sets of Conceptual Bases passed the Development process in different times

Horizontal Development process: The process of change into another state of Conceptual Base in its old sort

ICB state: Identical Conceptual Base

Identical Conceptual Base: The state in terms of the relationship between the position and characteristic underlying an identical class of things representing at some point in time

Innovation: The thing that was created from the set of Conceptual Bases passed the Vertical Development process or from the set of Conceptual Bases passed both Horizontal Development and Vertical Development processes

Invention: The thing that was created from the set of Conceptual Bases passed the Horizontal Development process

Joining: The way to make Conceptual Base entering the set of Conceptual Bases by moving characteristics into the same positions

Matrix DCB: The matrix that there are elements as sets of Conceptual Bases passed the Development process in different times

Move: The way of change into another state of Conceptual Base that occurs in the same position with the different characteristic- the old characteristics

Parting: The way to make Conceptual Base entering the set of Conceptual Bases by moving characteristics into different positions

Process of Evolution: The process of change in the set of Conceptual Bases from one generation to the next

Reduction: The way of change into another state of Conceptual Base that occurs in the same position with the same characteristic making shorter in degree- the discontinued degrees

Replacing: The way of change into another state of Conceptual Base that occurs the same characteristic within the different position- the old positions

Rotation: The way to make Conceptual Base entering the set of Conceptual Bases by moving characteristics within the same positions

Scrolling: The way to make Conceptual Base entering the set of Conceptual Bases by moving a characteristic in degree

Separation: The way of change from the CB state that occurs in the same positions with different characteristics to the state that occurs in different positions with different characteristics- all characteristics occupied by the old positions

Set of Conceptual Bases: The set that there are elements as states in terms of the relationship between the position and characteristic underlying a class of the same things representing at some point in time

Subtraction: The way of change into another state of Conceptual Base that occurs in the same position with the characteristic making shorter in degree- the continuous degrees

Technique DCB: The procedure with the following steps for adapting evolutionary result

Vertical Development process: The process of change into another state of Conceptual Base in its new sort