

A Note on Movement and Contradiction in Technology and Institution

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1. Introduction

Dialectical logic had been widely taught in former Soviet Union. Attitudes to review this dialectical logic by Genrikh S. Altshuller gave TRIZ a powerful possibility. Every philosophy, every thought even every method was appeared to the earth by attitudes of the originator to review existing one. It is a valuable lesson taught from history for us if we forgot to continue to review every philosophy, every thought or every method they stopped to expand and even corrupted. Originally dialectical logic teaches us the way of object how to interact each other and how to change all the time. We should continue to review dialectical logic.

Correct way of changing something consists of managing correct granularity of object and enumeration of objects and methods to adapt correct dialectical logic under correct value.

Usually we do an act of changing objects remaining unconscious of granularity of object, enumeration of objects and value.

In this note I propose a way to manage granularity of object and enumeration of objects consciously which gives a formal ground of Radical Thinking for Enumeration of previous papers.

[TS2009] [TS2011]

And movement or contradiction is re-formulated by managing granularity and enumeration.

Granularity of object and enumeration of objects are mutually related. So after getting first definition of movement or contradiction by enumeration of elements of movement or contradiction in time domain, I must enumerate elements of movement or contradiction again. Then I must re-define movement or contradiction by summarizing enumerated elements of movement or contradiction.

In this consideration I learned a lesson from historical example of process of beginning of barter which traditional concept of movement or contradiction did not deal with.

Invention of tool brings about labour and technology. Invention of language brings about communication.

As same as tool and language, "barter" was invented at some stage of the history of human. What brings about "barter"? What "barter" brings about? We must answer these two questions.

Before the age of barter, human being does not have the consciousness of individual, community nor possessing.

But in this stage common idea on next three items in representatives of each community start institution of barter.

1. Recognition that my community has some product and other community has other product.

2. Image that we will give you something we have and you will give us something you have.

3. When, where and what quantity?

This is the solution of the contradiction for the representatives of each community to have the same common idea. It is important that two terms of representatives of each community and their relation are generated simultaneously.

But traditional contradiction did not deal with this movement of generating common idea in both two leaders of each community. And also the contradiction did not deal with power from outside.

As a result I only generalized contradiction of G.S. Altshuller. This is a note on movement and the definition of contradiction.

2. Review of Basic Concepts

Anything perceptible is called Object. I recognize three kinds of Objects as follows. [TS2006] [TS2007]

1. Matter: System Object

2. "Idea": System Object

21. Information of individual or common notion which is taken by physical entity

22. My idea

3. Movement or Action: Process Object

Movement is process from a viewpoint of time and action from a viewpoint of relation between itself and other thing to change itself and other thing.

Object is I, Other Person, Matter and Movement at different granularity.

Let us summarize some other basic concept of my previous paper. [TS2006] [TS2007] [TS2008]

Object world is complex of objects.

Granularity is size, magnitude or scope in space and/ or time and degree of abstraction.

Density is density of inner structure.

Function is primarily meaning of Process Object, secondly meaning of attributes of Object.

Structure is granularity and inner structure.

Attributes is content of Object with specific description. Attribute of Object should be grasped accurately and treated at adequate granularity.

We have three granularities of attributes in Object.

Attributes 1 is everything that concretely describe Object.

Attributes 1 includes attributes 2 in narrow sense and inner structure.

Attributes 2 in narrow sense shown as Attributes in Fig.1 includes attributes 3 in most narrow sense which is difficult to change and state which is easy to change. [TS2008]

Object has inner structure and attributes which produce function to the outside.

Structure is an assemblage of elements and their relations. Structure of something consists of the relation between the whole and itself and inner structure of the one. The granularity of Object is a part of structure because it provides the relation between the whole and itself.

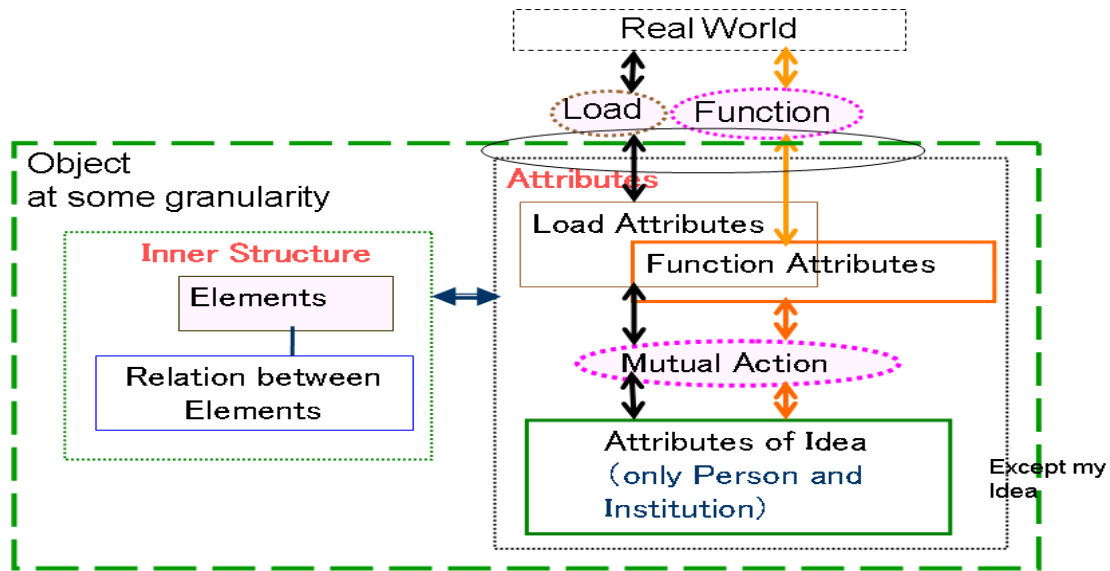


Fig. 1 Structure of Object [TS2008]

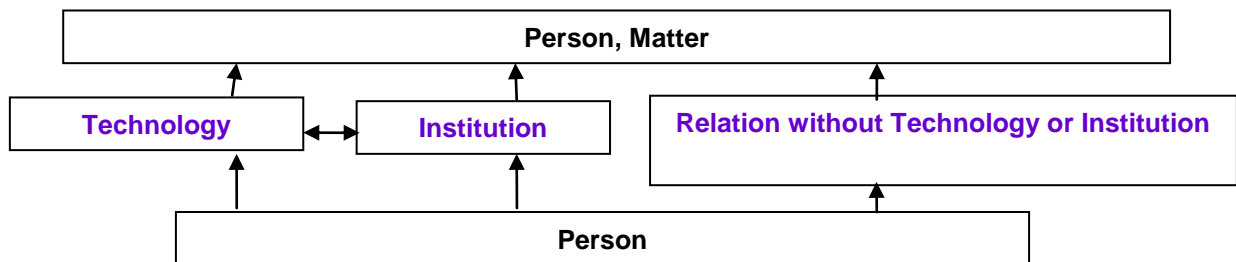


Fig.2 Human Life via Technology and Institution [TRIZJ2003Jun]

Technology is an assemblage of technical means and its process of generation and movements. Institution is an assemblage of common idea and its process of generation and movements.

Examples of institution: Politics, Economy, Family, Company, Religion.

Granularity is size, magnitude or scope in space and/ or time and degree of abstraction of attributes of object which is specified by points of view.

Object of granularity is everything. But we restrict our target to object and value.

Size, magnitude or scope in space of value is for whom the concerned object or change of object is useful.

Size, magnitude or scope in time of value is in what time range the concerned object or change of object is useful.

Degree of abstraction of attributes depends on what contents of attributes of the concerned object or change of object is useful.

3. Granularity and Enumeration

We have two kinds of timing of managing granularity and enumeration.

We should review granularity and enumeration in advance.

And at present we decide granularity and enumeration. That is to live. And the way of life is the attitudes and method to decide granularity and enumeration.

Granularity of object and enumeration of objects is the base of relation between objects and movement of object. At first sight granularity and enumeration are important only in the situation of changing objects adequately.

But we notice the importance of them in the situation of making a discovery of a type or law from among various phenomena later.

For simplification we use "object etc.". Don't forget this means object, relation between objects and/or movement of object.

31. Relation between Granularity and Enumeration

1) General Constraint between Granularity and Enumeration

11) Principle of Enumeration

Principle of Enumeration: Enumeration of "object etc." depends on total granularity of "object etc." and granularity of "object etc.".

Inner structure of "object etc." is the granularity of each sub-"object etc." and relations between them.

Total "object etc." is specified by enumeration of "object etc.", function or granularity of total "object etc." or inner structure of "object etc.".

Let us enumerate objects in a large box. This box has a hundred balls in it. A hundred balls are divided into ten small boxes having ten balls each. In this case specifying the large box is to decide the granularity from among the total world. And whether the object is ten small boxes or a hundred

balls depend on granularity of object or inner structure of the large box. In this case granularity depends on granularity of size, magnitude or scope in space.

If these a hundred balls have various colors, whether objects are divided into three kinds of red-group, blue-group and brown-group, thirty kinds of red, orange, etc. or a hundred objects of each color depends on granularity of attributes of the object in this case.

In Japan, rainbow has seven colors. In some country it has five or six colors. Every country seems to have colors of rainbow as a fixed notion.

12) Types or kinds

Let us define **types or kinds**.

Types or kinds are what satisfy the following constraints under the premises of complete enumeration of object etc.

If we could classify "object etc." into not so many kinds of "object etc." at adequate granularity in which we can deal with the same type in the same way and deal with the different type differently, and which cover all "object etc." without leakage, we get types or kinds.

For recognition and changing object it is important to recognize types or kinds of "object etc.".

2) Meaning of Granularity and Enumeration

21) Meaning of granularity

Specifying granularity is useful both in definition fixing something for the present and re-grasping something or changing something.

22) Constraint that perfect enumeration is indispensable for correct granularity

We can get correct granularity of object only from among the perfectly enumerated objects. Without enumeration of objects we might miss the adequate granularity of object.

23) Correct logic needs correct granularity

Even if we could not get correct granularity of objects we could construct "correct" logic from the objects with some support of examples which we could find in almost all cases of thinking and argument.

Paradoxically this is the reason that we need correct granularity. It is desirable at least that we show granularity in every occasion explicitly

3) Relation between Granularity and Enumeration

31) Granularity decide details

Once granularity is set, the suitability of the granularity decide the accuracy of the detail of the object which could contribute adequate change of the object.

32) Enumerated details re-decide granularity

According to the granularity of object, we try to develop a notion of object by enumeration of sub-object or relation and movement of sub-object.

After the enumeration we got a notion of object which is different from the granularity of the first definition, so we can re-define object or granularity of object.

33) Cycles of granularity and enumeration give higher thought

Going back and forth between 31) and 32) gives us a higher results.

Chapter 4 is results of these cycles.

4) Integration of deduction and induction

We have one more relation between granularity and enumeration. It is on the possibility of integration of deduction and Induction. Enumeration of types could make accurate induction which is as strict as that of deduction.

32. Object of Managing Granularity

Practically object of managing granularity appears in the following scene.

1) In the case of Definition of Basic Concept

If we recognize or change object on the basis of the definition of it, the definition should be fruitful enough to satisfy the requirements passing through mutual interconnection of granularity and enumeration.

2) In the case of Recognition of the real world and Problem

b1. Granularity of the whole

b2. Granularity of elements of the whole which is usually selected from among existing objects.

33. Specifying Granularity

We have many ways of specifying something which consists of definition by space enumeration, definition by time enumeration and definition from outside and from inside.

Definition from outside is to express differences by descript function of "object etc." This is not sufficient for definition.

Definition from inside is to express differences by descript inner structure of "object etc.". This is not also sufficient for definition.

We can define something only by enumeration in time domain or by space enumeration.

Definition by time enumeration is somewhat different from the other definition.

Throughout unlimited time range from birth to disappearance, essence remains unchanged. Therefore something is defined as **the process that essence of something is generating and running.**

Technology is an assemblage of technical means and its process of generation, design, use and maintenance. Institution is an assemblage of common idea and its process of generation, design, use and maintenance.

Definition by space enumeration is to express differences only by enumerating "object etc.".

From the study of granularity and enumeration required for the change of objects, logical possibility of granularity and enumeration is revealed. Until now only a part of types of relation and movement were found out.

4. Movement

41. Minimum Approximation Model of the World

Requirements of approximating model of the world, which has moving elements and mutually related elements, is to have units whose synthesis makes approximation of a phenomenon of the world. As logic is movement or relation of thinking, this unit will also become a unit of dialectical logic.

What is a unit or element which satisfies these constraints?

Here I try to set the granularity of an element of the minimum model of the real world. Because this movement belongs to a basic concept, I try to set the granularity of the element using enumeration that something is generation and movement of essence of something from the viewpoint of time domain. The problem is what is the "essence of something" in "the process that essence of something is generating and running".

"Essence of something" is neither existence nor movement which is element of static object. If we do so we reproduce mistake of Marx who began from analysis of commodity.

A lesson from the history of barter taught us that the whole two things and its relation might be generated at the same time. We can only analyze barter by dealing **two things and its relation** simultaneously. This is the first lesson

from history.

The second lesson is that we should take into account outer power. It is the outer power that generates two things and its relation.

Under these preparations I will enumerate **two things and its movement and outer power**.

42. Power of Generating Movement and Structure Of Movement

Power of generating movement is autonomous power which interacts between two terms, objective power from outside, intentional human will and complex of these.

Objective power from outside consists of power of nature and assemblage of human actions in which each wills of individuals disappears in long hours.

Movement seems to be that of one term. But movement is found to be relation between two terms from the viewpoint of change object by movement.

The elements of movement are attributes of two terms, its value and inner structure.

So two terms appears to be two attributes of two objects, two attributes of one object or two values of one attribute Of one object.

Under these premises I try to develop structure and movement not taking into account of generation power for the time being.

43. Development of Movement

431. Types of movement

We have five types of movement as follows.

Change of attributes which don't cause qualitative change of object

Qualitative change of object

Generating object which is change of number of objects 0 to 1

Diminishing object which is change of number of objects 1 to 0

Change of number of objects except 1 to 0 and 0 to 1

432. Element of movement

We have several types of element of movement as follows. Combination of these elements makes a each type of movement.

1) Change of inner part of object

11. Quantitative change of attributes (in a narrow sense) which cause qualitative change of

object by outer power

12. Change of inner structure of object which cause qualitative change of object by outer power

13. Quantitative change of attributes (in a narrow sense) which does not cause qualitative change of object by outer power

14. Change of inner structure of object which does not cause qualitative change of object by outer power

2) Change of whole object

21. Add, delete or replace

22. Mediate

23. Combine, divide

433. Relation between types and element of movement

We have outlines how combination of element of movement makes types of movement as follows. Here I don't deal with generating power of movement.

1) Change of attributes which don't cause qualitative change of object

13. Quantitative change of attributes (in a narrow sense) which does not cause qualitative change of object by outer power,

14. Change of inner structure of object which does not cause qualitative change of object by outer power

cause

Change of attributes which don't cause qualitative change of object.

2) Qualitative change of object, 4) Diminishing object, 5) Change of number of objects except 1 to 0 and 0 to 1

11. Quantitative change of attributes (in a narrow sense) which cause qualitative change of object by outer power,

12. Change of inner structure of object which cause qualitative change of object by outer power,

21. Add, delete or replace,

23. Combine, divide

bring about

Qualitative change of object,

Diminishing object which is change of number of objects 1 to 0,

Change of number of objects except 1 to 0 and 0 to 1.

3) Generating object

11. Quantitative change of attributes (in a narrow sense) which cause qualitative change of object by outer power

12. Change of inner structure of object which cause qualitative change of object by outer power

21. Add, delete or replace,
22. Mediate,
23. Combine, divide
bring about
Generating object which is change of number
of objects 0 to 1.

434. Generation of movement

1) Generation of movement in the same object world

Several means bring about generation of movement in the same object world.

- 11) Mediation of matter
- 12) Mediation of common idea
- 13) Law of nature
- 14) Intentional will of synthesis
- 15) Division

2) Generation of movement in the different object world

Several means such as addition replace bring about generation of movement in the different object world.

44. Summary of Movement and Structure

1) Structure of Movement

As we are studying the minimum model of movement the number of objects, attributes and values of terms are both two or under. So we can classify two terms into the following types.

- Two attributes of two objects
- Two values of two attributes of two objects
- Two attributes of one object
- Two values of two attributes of one object
- Two values of one attribute of one object

- Two attributes of two objects and
- Two values of two attributes of two objects are treated as
- Two attributes of two objects.

- Two attributes of one object and
- Two values of one attribute of one object are treated as
- Two attributes of one object.

- Two values of two attributes of one object are abbreviated as
- Two values of one object.

- These are abbreviated as
- Two attributes of two objects,
- Two attributes of one object and

Two values of one object

These are more abbreviated as
Two attributes and
two values.

2) Function of Movement

21) Function of movement at usual density

One of the numbers of two is target and the other is the present or the two are going together. The former is the case of **resolving differences** having one variable and the latter is the case of **going together** having two variables. The case of going together in this narrow sense also belong to the case of resolving differences in broad sense as shown later in "logical" resolving differences.

Real movement includes movement in the real world and that in the brain.

Resolving differences having one variable of attribute or value is **usual change of object** in real movement. Structure is

- two attributes of two objects,
- two attributes of one object or
- two values of one object.

Resolving differences or **usual change of object** consists of usual making new function, solving issues and idealization. [TS2007]

Problem is that this may cause side effects.

Going together having two variables consists of the case of two attributes and two values.

The case of two attributes is "**Technical Contraction**" in TRIZ having the case two attributes of two objects or two attributes of one object.

This could happen in the case of coping with side effect caused by usual change of object or taking action not to cause side effect in advance. For example we have to going together bigger engine power and less engine weight.

Special case of the type of going together is that two attributes going together have the same value of the same attribute. [FIT2011] [TS2011]

The case of two values is "**Physical Contradiction**" in TRIZ having the case two values of one object.

This could also happen in the case of coping with side effect caused by usual change of object or taking action not to cause side effect in advance. The former case is to cope with our over action. An example of the case is cooling down over heated

room temperature. For the latter case we have Separation Principles in TRIZ. [LB]

22) Function of movement at the density of expressing movement

This does not express structure of movement but only shows movement exists or not.

This is similar to logical contradiction but this shows something changes or not physically, which is different from logical contradiction.

So I call this "logical" contradiction. "Logical" contradiction is expressed as two values of one object. Two values here are "be some state" and "not be some state".

Here movement is that of the real world and that of idea.

5. Contradiction

51. Overview of Contradiction

Structure and function of movement studied before is contradiction which is an assemblage of generating and movement of two terms and the outer movement that make them possible. Or contradiction is generation and movement of two terms which have relation with outer part.

Only outer movement can generate two terms and their relation. Outer movement consists of objective power and intentional personal will.

Two terms is two attributes of two objects, two attributes of one object or two values of one object. Two terms are used to be called opposites.

This contradiction is the minimum unit which describes relation and movement of element and synthesis of units via attributes or state can approximate phenomenon to become model of the world. And it becomes a unit of dialectical logic.

An assemblage of generating and movement of two terms and the outer movement that makes them possible which is approximation model of movement in real world and thinking world happen to be expansion of usual contradiction which includes autonomous contradiction by Marx and Engels and "Technical Contradiction" and "Physical Contradiction" in TRIZ by G. S. Altshuller. Here term is existence at the present.

52. Contradiction

In the following explanation, from the view of essence in generating and running I divide

contradiction into generation and running as follows.

Going together having two variables consists of the case of two attributes and two values is divided into

10) Generating two attributes or

11) Running movement of two attributes going together.

Resolving differences having one variable of attribute or value which is **usual change of object** in real movement is divided into

00) Generating resolving differences of two attributes or two values

01) Running movement of resolving differences of two attributes or two values

Expression of real change of two values is

2) "Logical" contradiction

"Logical" contradiction is not usual logical contradiction which is not contradiction of the real world. This is in the real world.

We have five types of contradiction as follows. I will show some issues in dealing with beginning of barter which is one of the greatest inventions of the human being in the world in description of "The Capital" Chapter 1 by K. Marx

11) Contradiction or movement of two attributes which already exists going together and run

Contradiction or movement of two attributes which already exists going together and run autonomously, by objective power and/or by intentional human will.

Two attributes are two variables.

Productivity and relations of production each of which consist of many objects is two attributes of an object of this type of contradiction.

K. Marx deal with the beginning process of barter which generate coin from the state of commodity having use value and exchange value as autonomous movement without considering outer power of urging people to seek for more efficient exchange. This stage is what I call the third stage of beginning barter. And K. Marx started description of "The Capital" with this stage. [DC]

Beginning barter has two movement or

contradiction which is mutual action between notions of two people and the one having two attributes of useful thing. This third stage has two movements or contradiction as in the first and second stage.

As many know the contradiction of the third stage of useful thing is resolved by separation of

useful thing into coin by substantialization of exchange value. This is contradiction type 11).

On the contrary the other contradiction of mutual action between notions of two people who are representatives of the community is type 01) shown later.

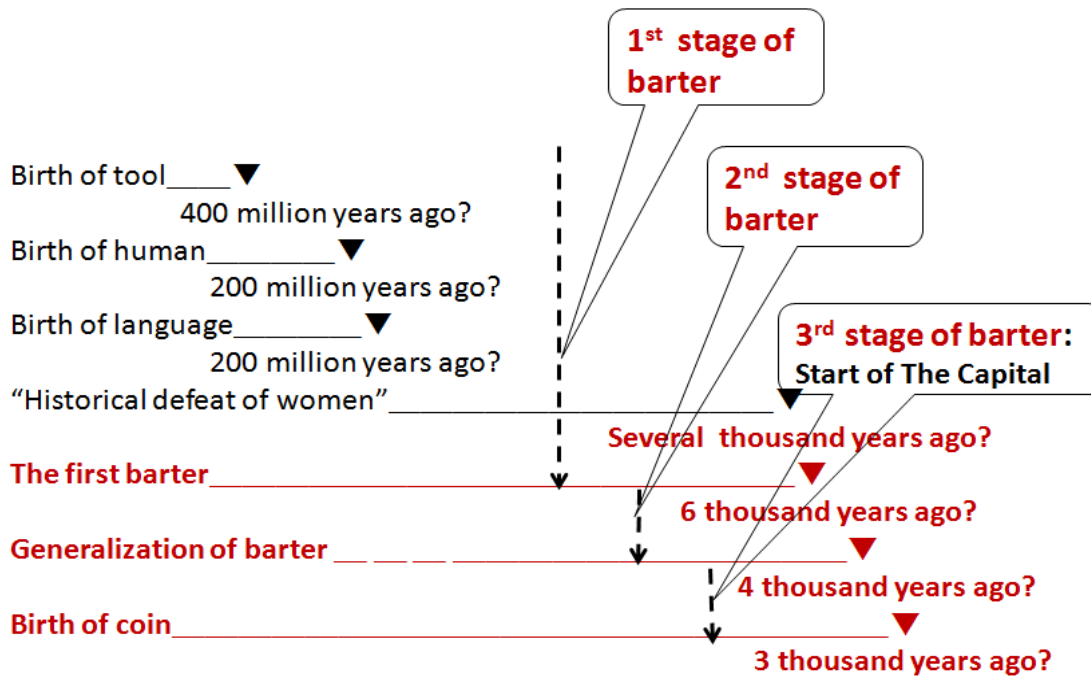


Fig.3 Stage of Beginning of Barter (Ages are not authorized)

10) Generating movement that will make two attributes go together. [TS2011]

Generating movement that will make two attributes go together by objective power and/or intentional human will make two attributes go together. [TS2011]

This is a movement of making relation. To share something is a special case that two values of two attributes going together are equal.

K. Marx does not deal with the next example as contradiction. [IEICE2012]

Example of contradiction generated by outer objective power or intentional will:

Invention of tool brings about labour and technology.

Invention of language brings about communication.

As same as tool and language, barter was invented at some stage of the history of human. What brings about barter? What barter brings about?

Before the age of barter, human being does not have the consciousness of individual, community nor possessing. But common idea of representatives of each community on next three

items starts institution of barter. In the first stage of beginning barter, ideas of two representatives of communities share next three notions that make barter possible.

1. Recognition that my community has something and other community has another thing.
2. Image that we will give you something we have and you will give us something you have.
3. When, where and what quantity do we give and take? [TS2010]

The invention of barter is the most important one in so-called "non-technical" area of usual TRIZ in the human history. This invention brought about institution including economy, politics, company, family, religion and nation in human society.

The outer power or intentional will in this case is a will to reduce human losses in the case of getting products from the other community and also surprisingly enough a will to enhance value of both communities or both representatives of communities. This is contradiction of type 10).

And also surprisingly enough at the moment ideas of two representatives of communities share

notion that make barter possible, the concerned useful thing become to have two attributes of usefulness and exchangeability. This is also contradiction of type 10).

Italic green letter shows the concerned part of [TS2011].

In [TS2011 3,

11) Structure of change in autonomous contradiction

111) Opposites are two attributes in one Object

112) Opposites are two attributes in two Objects

21) "Technical Contradiction" TC having two attributes

211) "Technical Contradiction 1", TC1

This is usual "Technical Contradiction" in TRIZ.

212) "Technical Contradiction 2" TC2

2121) TC21

2122) TC22

21221) TC221

21222) TC222

22) Contradiction of unity

20) "Physical Contradiction" having two values of one attributes

202) "Physical Contradiction 2", PC2 which is usual "Physical Contradiction" in TRIZ

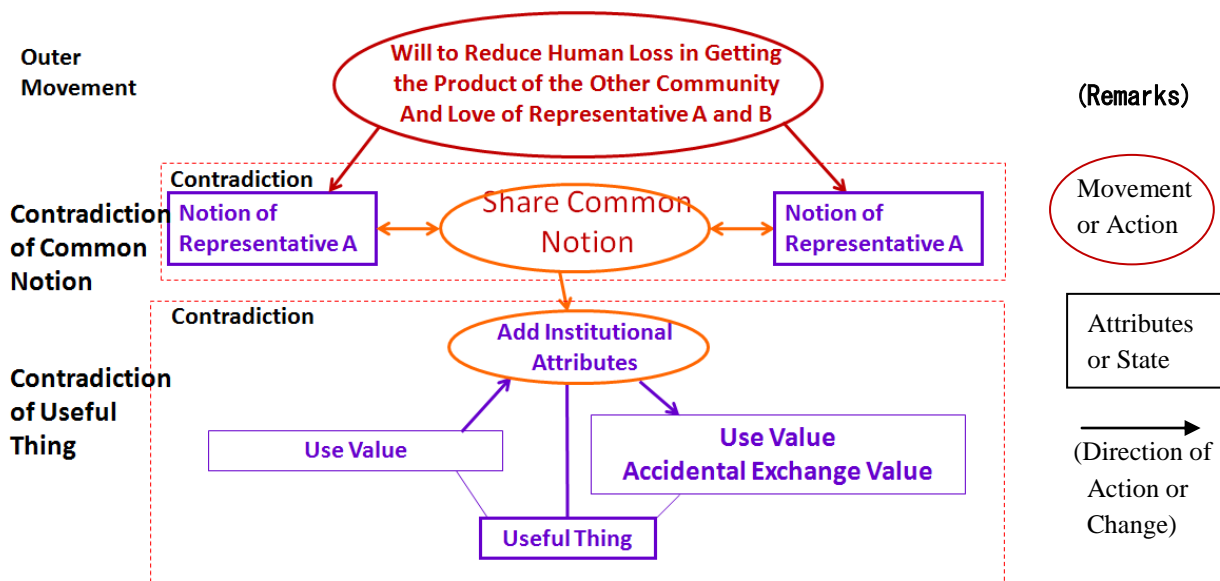


Fig.4 First Stage of Beginning of Barter

01) Contradiction or movement that resolves differences between two values or two attributes to make a new function resolve issue or idealize.

[FIT2011] [TS2011].

Contradiction or movement resolve differences autonomously, by objective power and/or intentional human will.

Two values or two attributes to resolve differences are one variable.

Two values of one object and

Expression of "Logical" contradiction

Two values of one object

are both dealt with types of resolving

differences which have same types until now.

K. Marx does not also deal with the next example of generalization of barter as

contradiction. Therefore he does not grasp whole movements as contradiction.

At the second stage of beginning barter shared notion of two representatives of communities has been deepened which is to be analyzed. This is contradiction of type 01). And shared notions are widely spread into community.

Accidental value of exchange which is one of two attributes in the other contradiction in the concerned useful thing is changing to fixed exchange value to become into existence of commodity. [TS2010]

This is also contradiction of type 01).

After this second stage "The Capital" begins the story of the third stage. The contradiction of the commodity was shown formerly as type 11). The other movement or contradiction in this

stage is mutual action between notions of two people who are representatives of the community. The shared notion is deepened into a spread of consciousness of other person, self-consciousness and consciousness of possessing. And shared notions are widely spread to all over community

This is contradiction type 01) which change value of attributes.

Example of contradiction of resolving differences by outer objective power or intentional will: Positional movement.

Example of contradiction of resolving differences by intentional will: To change the temperature of this room to the desired one.

00) Contradiction or movement which objective power and/or intentional human will generate two values or two attributes to be resolved differences to make a new function,

resolve issue or idealize. [FIT2011] [TS2011].

Contradiction or movement of generating two terms or two terms going together is called "Technical Contradiction" generalizing the term of usual TRIZ. [TS2008]

Contradiction or movement of resolving differences is "Physical Contradiction" generalizing the term of usual TRIZ or usual change of object which is making new function, problem solving or idealization.[TS2008] [FIT2012] [TS2012]

In [TS2011], 3.

A) Contradiction having two values of one attribute to resolve differences

20) "Physical Contradiction" having two values of one attributes

201) "Physical Contradiction 3" PC3

Contradiction to start action having a value "a" at this time and a value "b" of simple purpose at different time.

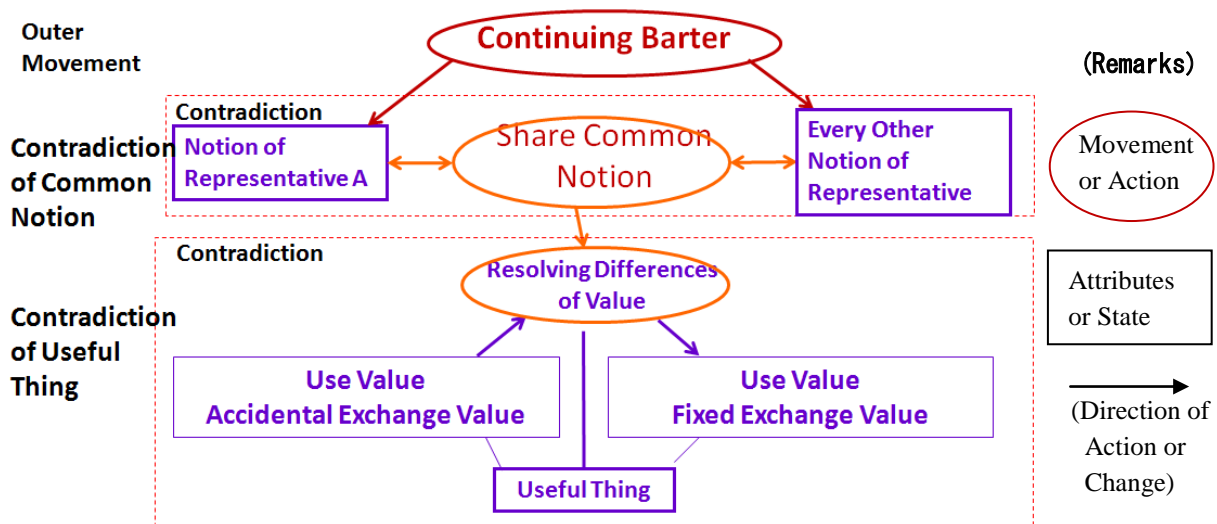


Fig.5 Second Stage of Beginning of Barter

2) "Logical" contradiction

"Logical" contradiction is not usual logical contradiction which is not contradiction of the real world. This is in the real world.

In [TS2011], 3.

A) 10) "Physical Contradiction 1"

Change itself in autonomous contradiction.

Phenomenon and Essence, or Concreteness and Abstraction are usually dealt with contradiction. But these are not contradiction but only two mutually dependent recognitions. Only when, for example, we seek essence from phenomenon as

purpose, both opponents and mutual action can be dealt with elements of contradiction. In this case this is "Physical Contradiction 3".

Examples of two mutually dependent recognitions are as follows.

- Part and Whole
- Phenomenon and Essence
- Concreteness and Abstraction
- Granularity and Inner Structure
- Function and Granularity
- Definition from outside and inside.[TS2011]

6. Resolving Differences

We get recognition of contradiction of changing of objects and related knowledge of unchanged objects. To change something is to generate a media of running or resolving contradiction by intentional will. The solution gives us compatibility or something going together or resolving differences to resolve problem.

As recognition at this time I have an individual recognition of accidental situation and inevitable situation and general recognition of inevitable situation.

Then I have a process of resolving differences and some issues to be solved are shown. [SSAA] is very informative.

1) I have types of purposes which consist of making new function, idealization and resolving problem in narrow sense [TS2007] [TS2008].

I can formulate any issues by any type of purposes to resolve "Physical Contradiction" in broad sense.

Example of acid attack: Cubes are placed in warm acid to investigate the effect of various acids on the cubes. Unfortunately, the container that holds the acid and cubes is corroded. The container is made from a gold and is very expensive to replace. Because the acid is so reactive and the test is performed often, the pan must be replaced frequently. This operation is very expensive and we would like to reduce the cost of replacing the container. [TS2006] [RH] [LB]

We can enumerate facts, purposes and method at any granularity. Some of the granularity are shown as follows.

Enumeration of System Object: Matter

Cube, Acid,

Vessel (Attributes1: Material,

Attributes2: Weight,

Attributes3: Form,

Attributes4: Size,

Attributes5: Inner Structure,

Attributes6: Cost), Air

Enumeration of Process Object: Movement, Action or Process)

Test of Cube (Attributes1: Temperature,

Attributes2: Barometric Pressure,

Attributes3: Time of Test, its value t),

Retaining Cube,

Corrosion of Vessel (Attributes1: Operation Time, its time t,

Attributes2: Number n of Replaces in time t),

Replace Vessel (Attributes: Working Cost, its value Cr)

Purposes at Granularity of Solving Issues

Item 1 includes item 2 or 3.

1. To minimize cost of replace per unit time
(C + Cr) n / t

2. To remove Process Object to corrode vessel by acid (To minimize C is to remove System Object to bring out C)

Minor change of 2: Remove vessel,

Minor change of 2: Replace to cheaper vessel such as air or water,

Minor change of 2: Not to corrode vessel,

Minor change of 2: Autonomous repairing vessel

3. To remove Process Object of replace vessel (To minimize Cr is to remove Process Object to bring out Cr)

Purposes at Granularity to idealize

To minimize resources is to cube itself hug acid or autonomous repairing vessel.

Purposes at Granularity to make a new function

To make a new function not to corrode vessel. [RH] [TS2010 3.4]

2) Types of purposes which consist of making function, idealization and resolving problem in narrow sense are converted to types of object change. [TS2007] [TS2008]

Types of object change are attributes change, generating object and deleting object. [TS2007]

21) If we can do so using The 40 Principle, USIT Operator and Principle U,P,D, etc. we do so. [TS2008]

Example of acid attack: To remove Process Object to corrode vessel by acid we remove vessel by the principle P. [TS2008]

Or 22) If we should resolve usual "Physical Contradiction" in narrow sense we do so.

3) Usually these actions cause side effects to bring out "Technical Contradiction" because every object is mutually related. In this case we resolve "Technical Contradiction" by 40 Principle etc.

Example of acid attack: Removing vessel causes side effect of deleting sustaining cube and acid by vessel. So we must resolve "Technical Contradiction".

We have various granularities of "Technical Contradiction". [TS2006] [TS2009]

1. To realize compatibility of testing cube and

removing vessel.

2. To realize compatibility of sustaining cube and acid and removing vessel.

3. To realize compatibility of contact of acid and cube and removing vessel.

4. To realize compatibility contact of acid and cube and no contact of acid and vessel.

5. To realize compatibility corrosion of cube and no corrosion of vessel.

4) If we cannot perform 2) 3), we have the next cases.

41) The case that we have no opposites.

This is the case that we are going to make entirely new function from the state without having anything. This is different from the situation of the case of acid attack and ASIT which make "new" function using the situation of the present from reversal point of view. In the case of acid attack opposites are in front of us and enumeration of objects is completed. But this difference is relative.

As shown before, K. Marx deal with contradiction that opposites already exist. The 40 Principle don't include the one which generates opposites. But generating opposites is important both theoretically and practically. We have two cases.

411) The case that we have to decide someone or something to act.

412) The case that we have no objective opposites.

In the both cases we must select from among enumerated candidates, from among candidates not enumerated or we must decide to select the one with no candidates. We have no method to decide this.

42) The case that we have opposites but cannot transform them. The issue in this case is whether transformation belongs to same granularity or dimension or not. So we have next two cases.

421) We have the case that we have opposites but cannot transform them although transformation belongs to same granularity or dimension. As the present principles are not enumerated, we might miss the transformation.

We can divide the issue of acid attack into two stages. The first stage is how acid contact cube without vessel.

The second stage is how the contact is continuing. This stage will become 422).

422) We have the case that we cannot transform opposites because transformation belong to different granularity or dimension.

At present in this case we should seek for method of domain-dependent ones such as "Effects" data-base in TRIZ.

Example of acid attack: The second stage of acid attack is to seek for means that acid corrodes cube without vessel. We can use gravity, pressure of wind, wind flow, cyclic flow of acid, centrifugal force, buoyant force or surface tension. [SSAAN]

The cases that we don't have means have been enumerated. But we can take next issues into consideration.

43) We can have approximate solution or quasi-solution. Or we can improve issues if we don't have radical solutions and vice versa. These solutions depend on whether we are restricted to only use-mode or we can re-construct all systems.

7. Conclusion

Granularity is size, magnitude or scope in space and/ or time and degree of abstraction of attributes of object which is specified by points of view.

Enumeration of "object etc." depends on total granularity of "object etc." and granularity of "object etc."

It is highly recommended to be conscious on granularity and enumeration.

In the enumeration of "object etc." throughout the history, if type of object and relation or movement of the type of concerned object went together satisfying constraints that might cause combinatorial explosion, we could find the new type and new law.

The usual present contradiction or dialectical logic is for many people that of Hegel, autonomous contradiction by Marx or "Three Laws" by Engels. In reality some of "The TRIZ Journal" in early ages shows an introductory description of "Three Laws" by Engels. Their view is splendid but narrow and restricted.

The re-formulation of contradiction which has a possibility of containing these usual ones is totally and only based on my generalization of contradiction of TRIZ by G. S. Altshuller which is

briefly summarized in "Essence of TRIZ in 50 Words" by NAKAGAWA. [NKGW]

Requirements of approximating model of the World, which has moving elements and mutually related elements, is to have units whose synthesis makes approximation of a phenomenon of the World.

Contradiction is generation and movement of two terms which have relation with outer part.

Only outer movement can generate two terms.

Two terms is two attributes of two objects or one objects or two values of one object.

This contradiction satisfies the requirements.

Synthesis of this contradiction via attributes or state can approximate phenomenon to become model of the world. And it becomes a unit of dialectical logic.

In case of two attributes we have two types. In the first type two attributes are the present attribute and the designated one. This is one of usual types of changing object. This has one variable to resolve differences.

In the second type two attributes are going together which is "Technical Contraction" in TRIZ. This has two variables going together. This could happen in the case of coping with side effect caused by usual changing object. For example we have to going together bigger engine power and less engine weight.

Special case of the type of going together is that two attributes going together have the same value of the same attribute. [FIT2011] [TS2011]

In case of two values we have the case two values are the present value and the designated one. This has one variable to be resolving differences which usual change of object. But this may cause side effect.

And we have one more case. This is the case of making two some different values of one attribute which is "Physical Contradiction" of TRIZ to prevent side effect in advance.

All movement is contradiction and all change is caused by movement. Therefore changing something is achieved either by making two attributes go together or making two values resolve differences.

I hope both Radical Thinking for Enumeration which manage granularity and enumeration and

contradiction which is the unit of dialectical logic will be the base of the method of technology and institution and also the base of the way of life.

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