

## Study about the Fuzziness

SHI Jian-Sheng  
Dept. of Chinese and Literature  
Jilin University  
Changchun City  
Jilin Province

## Abstract

The fuzziness is the most important issue of the fundamental theory in the fuzzy mathematics research, so, people are paying great attention to it. Now, several views have been given. This paper first will analysis and appraise to two of them which possess the representative quality. And it will give a new definition of the fuzziness. The fuzziness is that the border among several contradiction aspects is not clear in the same contradiction entity. So, the fuzziness is a special contradiction phenomenon. At same time it points out that the new definition will affect greatly for a fuzzy mathematics research.

## Keywords

fuzziness, imagination, intuition-thought,  
contradiction, entity, border,

The famous scholar E . A . Zadeh published his essay "Fuzzy sets" in 1965. He first put forward a bold idea of solving the problem of the fuzziness with the tool of mathematics. It was more than twenty years since then. And the fuzzy mathematics has developed vigorously in the past years. The obvious sign of the development is that the contingent of researchers is becoming bigger and bigger. Many well-known scholars have joined the contingent. And the number of people who oppose it is reducing. It is perfectly obvious fact. Today, the fuzziness has become a fanatical topic in the human researching work.

The researchers of the fuzzy mathematics have extended their antenna to every aspect of mathematics and have obtained many successes. But people are not forget oneself. Many people have begun to turn back to study hard the fundamental theory of the fuzzy mathematics. The history of mathematics tells us that the birth of a new theory in mathematics has such a character called "self-questioning". For example, Newton-Libniz founded the calculus, after a hundred years, mathematics start to work out its fundemental theory, put forward the concept such as "limit", ect. But it was only twenty years since the theory of fuzzy sets was set forth, people begin to study its fundamental theory. It is fortunate for it. Among all the basic theories, the most attractive one is what fuzziness is? For this question people have provided various definitions. I bevieve that the disscusion in a larger range will be launched. The people will be both headche and interested in Fuzziness, just as they tried to understand what is the "infinitreally" before.

There is a general idea about fuzziness: The vague intension and extension of the concept is the fuzziness.

Someone made further analysis and said that the vague intension of the concept arouses the vague extension of the concept. The concept of the vague intension must lead to the vague extension. Other people think, it is the destroy at the law of excluded middle in logic that cause the fuzziness. The traditional state of A and not

A and the relation of not this but that is disappeared, instead of it appearing a state that this is true and that is also true at the same time. I further analysis and regard that this is also caused by the vague intension of the concept. Because, when the concept of the vague intension goes into inference, it must lead to a unclear result. Therefore, I think that fuzziness is mainly produced the inside of the concept, but not outside.

Then, here comes a problem that the concept of unclear intension is still called a concept? Most people answer affrmly that it is still a concept. Although someone have not given it an answer, what they have done has proved it.

For this problem, my answer is just the opposite. I regard that it is not a concept. It must cause a confusion in logic field if we include this kind of nature language into the concept of logic. Take a simple example, how we distinguish a square and a triangle, if they are a concept of vague intension? So, I think, this pare of nature language should not be included into concept, instead it is a kind of new thing, it is different from the concept in essence. How to deal with this circumstance? I give a new name to it as "Imagination". Imagination, the basic form of thought, its character has been disscussed in a monograph of mine. I think, now humanbeing's method of thought should be divided into two kinds, one is the intuition-thought, and the other logic thought. The concept is a basic form of the logic thought, but the imagination is a basic form of the intuition-thought. They are different in essence. So there are many differences between the two basic form of thought. For the intension, the concept will not admit the vagur, but the imagination admit the vagur, even the

contradiction.

Then, why do people still include the fuzziness things into classification of concept? This is because people have not got rid of the restriction of traditional idea, they think that only logic thought can be called the thought, so only the concept is the basic form of thought. I recognise that concept is basic form of the thought, but it is not sole.

someone set forth another idea. They regard the fuzziness is a result that things in space from "many-dimension" go down to the "low-dimension". This idea seems reasonable. If a quantity in space of "five-dimension" is put into "three-dimension", to study, two factors will not be indicated. There arises the fuzziness. Here, I can easily provide anti-example. Suppose we distinguish one person, let us see a character of his face. His nose, mouth, are the quantities in space of many-dimensions and they are not standard. When others distinguish him, they certainly lower the number of the dimension. This will no doubt produce fuzziness. But on the contrary, people can distinguish him very easily. Obviously there is no fuzziness. Otherwise, people can not distinguish him. This shows that the quantity in space from many-dimension to lower the low-dimension may not all necessarily produce fuzziness in the knowing process.

Moreover, there are many kinds of views about the fuzziness. For example, someone regard that the essence of fuzziness, from the horizontal aspect is a whole of the continuity and the dispersed in moving, from the vertical aspect, it is a intermediary of relation among material. I can not admit this view. This definition is only the behaviour of fuzziness, but it is not the essence of fuzziness. About the behaviour of fuzziness, now people may easily give many examples. But when we discuss what is an essence of fuzziness, we feel that

this is a very difficult problem.

I think that now in the study of fuzziness there are the two problems, we must pay attention to. One is that people can not get rid of the restriction of traditional idea, and can not produce new theory; the other is that people can not deeply study fuzziness, but study on the surface of fuzziness, for example, people wrongly regard that the reason producing fuzziness is an essence of fuzziness, or people regard that every show of fuzziness is an essence of fuzziness. This will do no good to the research of fuzziness.

Here, I presumptuously give my view of the research fuzziness of many years, which I hope, can arise discussion. I regard the so-called fuzziness is that the border among several contradiction aspects is not clear in the same contradiction entity. So, it is a special contradiction phenomenon.

Here, three questions should be explaining to make the definition of fuzziness clear.

What is contradiction? People in our life and philosophers in their books give it a definition, that is the contradiction consists of two aspects of the contrary quality. For example, the life and the death constitute the contradiction; yin and yang, the correct and the wrong, constitute the contradiction. Here, the life and the death are clearly opposite in quality; the correct and the wrong, between them there is no compromise. So, making them together is called the contradiction. But, someone give the contradiction a more extensive meaning. They regard that difference is contradiction. Obviously, this definition contains the front one, and as a new concept, its intension is extensive. I agree to this view, I regard that difference is contradiction. For example, the fast and the slow constitute a contradiction. As long as the contradiction

is mentioned, there must be two aspects. This is the big premise. But, there is difference between the two aspects. It is the limit of the two aspects. The join of two aspects without difference was usually mentioned in the classical mathematics, but it is not the topic in this paper. Then, the slow and the not very slow constitute the contradiction; the fast and the not very fast, the fast and the very fast, also constitute the contradiction. Therefore based on this condition, the contradiction exists universally.

What is the entity? This is the essential difference from classical set. The description of the concept of set in the classical set is this: A set is an assumed pure entity consisted of many elements. We know through this describing that in the set if the male is supposed to be the element, obviously, woman can not be taken as element, nor can the "yin-yang man" (middleman). In the same set, if the fat is taken as the element, obviously, the thin can not be taken the element. Only this is called the "whole of single quality", and protects the "single quality".

But the definition of the entity I give is just contrary to this. In the set the male as elements contains the woman as elements at the same time, the yin-yang man be contained at the same time. In the set that the fat is element, the thin is also element of this set at the same time. They constitute the entity. This is called the "contradiction entity".

What is "the border among several contradiction aspects is not clear"? This concept of the border is different from classical mathematics. The meaning of the border indicates the difference of "existence" and "no existence", that is the place moving in the classical mathematics. But, this border means the boundary among several contradiction aspects, obviously containing the concept of border in classical mathematics. The state of

"existence" and "no existence" is one of usual contradiction state. The borders of several contradiction aspects must be clear, otherwise, how they can the contradiction, but the real world give us the difficult question which we have to solve. Here "the unclear border" has two meanings. One is the complex essence in the border's condition. For example, the fast and the slow of the speed of an automobile constitute the contradiction. Here the border of the fast and the slow is clear. If the speed of an automobile which is 120 kilometre per hour is called the "fast", then, obviously the speed 20 kilometre per hour is called the "slow". But, the fast and the not very fast also, constitute the contradiction. The border between them is difficult to distinguish. First between them exists the difference, and where are their borders? If the speed of automobile driving to 120 kilometre per hour is called the "fast", then, the speed that is called the "not very fast" must be 110 kilometre per hour, or 100 kilometre per hour, or ..... To distinguish the border is difficult. The second meanings is the comparative quality of dividing border. Linking above example, if the speed of automobile driving to 120 kilometre per hour is called the "fast", and the speed of newly made automobile driving to 150 kilometre per hour, then in the new contradiction entity, the latter one is called the "fast", and the frontier now is only called the "not very fast". This is the character of comparative quality of dividing border. So, we find that this dividing border have a characters of both the absolute quality and the comparative quality.

We make a example to discribe the definition of fuzziness. For example, the "fat" is the fuzziness word in nature, it exists in the entity of set including the normal man and the thin man. First, their relation is contradictional. The people who called the "fat", obviously are not thin. They exist in the entity at the same time. If there are not the normal and the thin, and certainly there are not the

"fat". However, to distinguish their three borders are not clear. How much the weight of the fat is more than the normal, the thin. Can the concept of the "fat" be established? This degree is not easy to master. This is the complex quality of the border. If the weight of the fat is 90 kilogram, when the fat and the person of over 80 kilogram to under 150 kilogram consists a new entity, then quality of the fat will change. In the new contradiction entity, the fat of weight 90 kilogram will only be called the thin man. This is the fuzziness of the concept "fat" in nature language. The word of "beautiful" in the nature language have the obvious character of fuzziness. When we appraise that a girl is beautiful, we always contact her with the normal and the ugly at the same time. But there is a contradiction among the three. When we appraise the beautiful girl, she must not be ugly. The three aspects of contradiction constitute the entity. The three aspects contact closely. If we only talk about the "beautiful" without linking the normal and the ugly, then we will not get any information. Under this condition, we still understand it, because we contact the "beautiful" with our past experience, so they constitute a new entity. The border between the "beautiful" and normal is not clear. When we appraise that a girl is beautiful, we take her into the of the usual. But if we take her into the ranks of beautiful film stars when we again distinguish her, she is only called the normal girl. This is the character of the comparative quality. This is the fuzziness of word "beautiful".

Here, my realization of fuzziness through studying is essential different from all the previous ones. There are two differences. Upon the essential method, my definition of fuzziness is abstracted from summary the objective things of the real world, so it is new. The research of the previous ones is that they improve the old basic theory, so it is get the new content based on the old concept. Upon the thought method, my research about fuzziness



based on the contradiction analysis, but the research of the previous ones still based on the logic tool. Of course, my research is only the view of mine.

One strange phenomenon is that the fuzzy set appeared only twenty years ago, now for this direction papers of thousands and tens of thousands have been, so someone seems to regard that the theory in fuzzy mathematics had already been almost fulfilled. It is a feat. I think, if we again advance one step, it will possibly arise a new wide space. I am worrying that every view about fuzziness I mentioned above still rule now the field of fuzzy mathematics. It will stand in developing of this mathematics branch.

I regard, fuzziness and the clear are two kinds of different things in essence, but someone do not regard this. Now, the research about fuzziness is deeply developing. It already expended to the fields of logic, language and medical science. This demands a higher level study for the researchers of fuzzy mathematics, because the study of fuzziness in every science fields deeply develops, and this conversly promotes the development of the fuzzy mathematics. I regard that to study and master fuzziness for mankind is possibly the aim of several centuries. As the classical logic that Aristotle created before two thousands and five hundreds years, but today man entered the times of computer, it maybe need founding new scientific theories in the fields of philosophy, language, etc. So, it is a heavy task. And the future condition comparing with the results of today's research will be completely different, but the brave exploring work of fuzzy mathematics researcher will be recorded immortally in the history of science. The footmark of the pioneers, will be never forgotten. This is the honour of researcher in fuzzy mathematics.

## References

- ① ) Shi Jian-sheng. On existence of the stage of intuition knowing. Contend 4 (1982) 89—95 (chinese)
- (2) Shi Ji-yan. On imagination. Contend 2(1986) 65—71 (chinese)
- (3) Shi Jian-sheng. On the exploring method. Jilin society science. 1 (1987) 37—41 (chinese)