The Mathematics Model of Fuzziness

Abstract

Making a mathematics model of fuzziness is one of the important problems in fuzzy mathematics. There, based on the definition of fuzziness, the author analyse a character of a mathematics model of fuzziness,and point out the charateristics of the whole,contradiction and unclearness of the border. When making a mathematics model of fuzziness, the author pays attetion to the comparision between the clearness and the contradiction. From the model,it can be found that the contradiction is a special one. Last,the author point out the importance of the mathematics model of fuzziness which concerns the developing direction of fuzzy mathematics.

Keywords

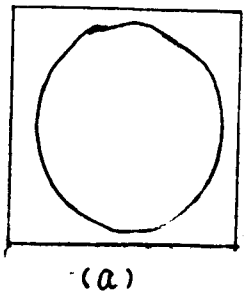
mathematics model of fuzziness, the whole, the contradiction, the unclearness of the border, significance,

Shi Jian-sheng
Dept. of Chinese Literature
Jilin University
Changchun city
Jilin province,China

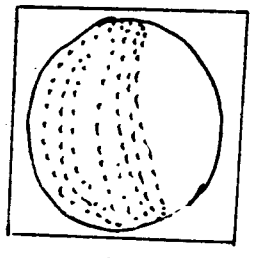
There is a simple and clear reason: For any thing and material,if we want to make its mathematics model,we must first understand its definition,the meaning of every items in the contents of the definition and the relation among every items, then we may make a reasonable mathematics model.

Of cause,the definition must be gotten from the observe and analysis of the material world,so,the mathematics model we make must be sent back to the material world to be tested whether it is correct or not. If there is no anti-example,we can admit it a reasonable mathematics model.

Based on a simple method ,we want make one mathematics model of fuzziness. It is important for fuzzy mathematics research.But it is not easy for us to do so. People usually think that fuzziness is the unclearness of the intension and the extension of concept. People make a deeper analysis, and they find that the condition arises by the unclearness of the intension of concept. So, there is a state of"both is this and is that". Someone think that it can be indicated by the membership relation of the clear concept. Based on the above definition and the analysis, I make a mathematics model as following:



(a)



(b)

Figure (a) is a mathematics model of the clear concept of which the intension and the extension are clear; figure (b) is a mathematics model of the so-called fuzzy concept. It indicats the part of the black points. I

analysed the figure (b) and then I found that it can not be called "concept". What is it ? It is a problem which should be solved. I do not think that the present definition is correct. So, the mathematics model we make based on the definition is certainly not clear.

Through my study for several years, I get the definition for fuzziness as follows: 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. Therefore I think that the fuzziness is generally different from the clearness in quality. The mathematics model of fuzziness can not be gotten from imp____roving a clear mathematics model.It need to be made from beginning. We carefully analyse the above definition,then,the new mathematics model of fuzziness must have obviously three charactres:

(1) The whole. The fuzziness concerns the whole.We understand the fuzziness in one entity, not in the part or in the section. So, without the whole,we will not understand the fuzziness.

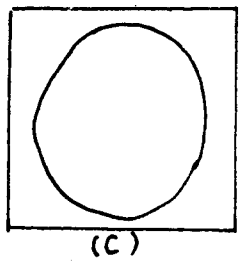
(2) The contradiction. It is the key of analysising the fuzziness. Comparing with the whole, the whole only be called "a big precondition". There araise a contradiction state of many elements in the entity.Among the many elements there are the opposite qualities or the different qualities, and the stipulate of unify quality is excluded. Among these elements both exclude one another and depend on one another.They have close contact.

(3) The unclearness of border. In the past, when people make a mathematics model, they almost say that is the dividing of the "existance" and the " no existance" state, or it is the place of material move. This owes to the classical "two-value" logic.But our border here means the dividing condition between "this" and"that".The dividing condition is the distinguishing between one aspect and the other different aspect. So, this kind of unclearness means

not only the difficulty in discerning the relation of quatity of these elements but also the difficulty in discerning of unclear the qualities among the elements. Therefore the unclearness appears.

Based on the above definition and analysis, I try to make a mathematics model of the fuzziness. My method is divided into three steps.

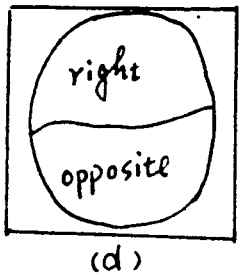
First step. I make a mathematics model of the whole.



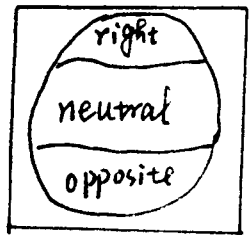
(c)

This is clear.THe one set contains many elements. See the figure (c).

The second step. We make a mathematics model of the contradiction.



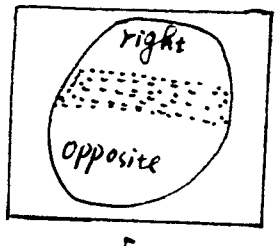
(d)



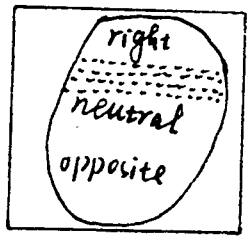
(e)

This set contains many elements.But , the quality among these elements is contradictional. See the figure (d) and the figure (e).

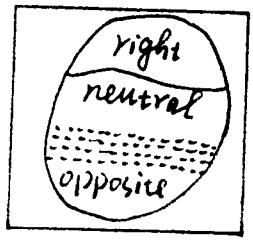
The third step. We make a mathematics model of the fuzziness.



(f)



(g)



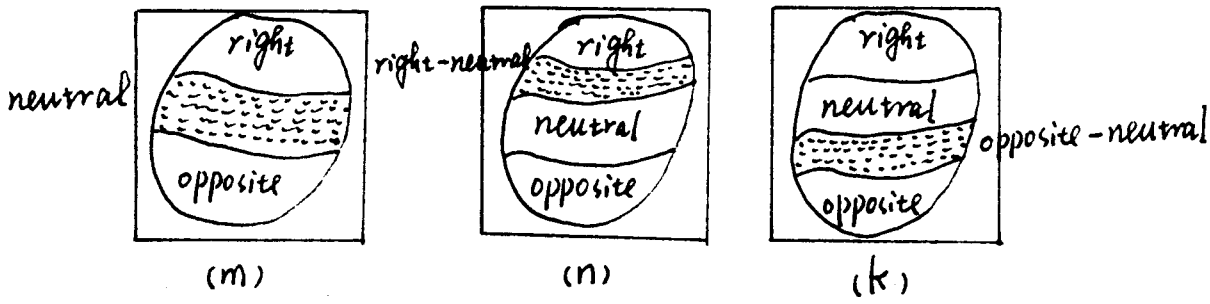
(l)

The border among the contradictional group is not clear.This is so-called the fuzziness, See the figure(f). There is a part of the black points between the right and the opposite. See the figure (g).There is a part of the black points between the right and the neutral. See the figure (I). There is a part of the black points between the neutral and the opposite.

We can see from the mathematics model that there are something to do between the clearness,the contradiction and the fuzziness. I think that the contradiction is the most important one;the clearness can be regarded as a special form of the contradiction;the fuzziness can be turned to the contradiction. Then,how can the fuzziness be turned the clearness ?I think that is one of the foundamental aims in the fuzzy mathematics research. Now, some schoolers do a lot in turning clear condition into the fuzzy condition. These this work is possiblly successful in simplifing the numerous tools and means of operation.But, it will never build up the independent existing value of the fuzzy mathematics,because its work always tails after the classical mathematics.If we take another way, that is to use a new creating tool through a limited procedure and make the fuzzy material gradully into the clear, then this research can establishs the history place of the fuzzy mathematics. The classical mathematics is incomparable. I think that the key of this research is,by the help of the imagination and the deduction, to catch the clear factor in the fuzzy material,then to turn the fuzzy material gradually into the clearness and master it at last.

Based on the above idea, I turn the fuzziness into the contradiction,because the contradiction is the clearness in the broad sense. Therefore,I throws off the state of the fuzziness, My method is this: To strengthen carefully the dividing classification;to make a new classification in the element's group of the contradiction quality,so that the contradiction of the higher stepts araises. It is the aim to appreach the clearness. The new

element of contradiction quality is given a new definition . Because the fuzziness has the characteristics of comparison, it arais comparing with the clearness. For example,the right compares with the opposite in the figure (f) ; the right compares with the neutral in the figure (g) ; the neutral compares with the opposite in the figure (l) .If we regard them as a new and independent kind, and give them a new definition,of cause, they will become a part of the clearness. Now we improve the figure (f) , the figure (g) , the figure (l) and get:



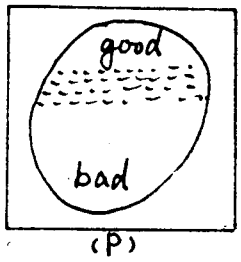
Here, the figure (f) comes from figure (m) . The wonderful thing is that the fuzzy part in the figure (f) is classified a new kind , and it is defined "neutral", so it becomes the clearness. The figure (g) comes from the figure (n) . The wonderful thing is that the fuzzy part in the figure (g) is classified a new kind, and it is definied "right-neutral",so it becomes the clear. The figure (l) comes from the figure (k) . The wonderful thing is that fuzzy part in the figure (l) is classified a new kind, and it is defined the "opposite-neutral",so it becomes the clear.

The method of making the more complex mathematics model is similar. The difference is that the model of the contradiction has the more steps. So, the mathematics model of the fuzziness also becomes a mathematics model of the contradiction. Its order increases only. From the analysis of the mathematics model, we can see that the fuzziness is a special representing form of the contradiction . .

Now I regard that there must arais a three sets in the mathematics range. They are the classical set, the fuzzy set and the contradiction set. I compare them. The mathematics model of the classical set emphasizes on the whole, and deny the contradiction and the unclearness of border. The mathematics model of the fuzzy set emphasizes on that the border is not clear, and deny the contradiction and remains not the impure whole. But, the mathematics model of the fuzzy set.emphasizes on the whole, the contradiction and the unclearness of border. From the characters of the mathematics model, we can see that the characters of the classical set and the fuzzy set are similar, but the character of the contradiction set is completely different from the classical set.

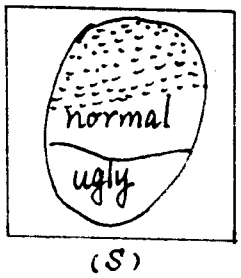
Here,we again come back to our real life. I like to give some examples of the nature language which people are familiar to try to explain the mathematics model of the fuzziness.

1. "not very good"



(P)

2."beatiful"



(S)

The black points part in the figure (p) indicates "not very good".The black points part in the figure (s) indicates "beatiful". From these model we can see that if we throw away the whole, the contradiction and the unclearness of border in the model, we will get no information

from the black points part.

The establish of the mathematics model of the fuzziness is one of the most important foundamental theory in the fuzzy mathematics . Because it directly concerns the definition of the concept,the establishing of the axioms system and the establishing of the operation principle in the fuzzy mathematics,it directly concerns the developing direction of the fuzzy mathematics.Suppose the mathematics models of the fuzzy set and the classical set were the same, we would not need to estadlish an independent concept, operation and axioms systems;we if could get a mathematics model of the fuzzy set through improving the mathematics model of the classical set ,then, the concept,the operation and the axioms systems of the fuzzy set could get through improving the concept,the operation and the axioms systems in the classical mathematics.Now,many people are studying the fuzzy by using some theory and method in the classical mathematics. Their guiding idea is possible belong to this idea.Someone criticizes this method as "put on a dress and a cap ". But,the mathematics model of the fuzzy set is foundamentally different from the mathematics model of the classical set. Then,we must need to explore a new concept,operation method and an axioms systems,but not to take a road of improving the old systems. The mathematics model of the fuzziness has an immeasurable significance in our fuzzy mathematics research. It lead us foward match like the compass.

Reference

(1) Fang Jia-lin. On Set. Jilin People Publishing House. Changchun, 1982. (chinese)
Press