Fuzziness and Relevance Theory

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Abstract

This paper investigates how the phenomenon of fuzzy language, such as 'many' in 'Mary has many friends', can be explained by Relevance Theory (RT, Sperber and Wilson, 1986, 1995, 1998, 2002, Wilson and Sperber 2002). It is concluded that the use of fuzzy language conforms with optimal relevance in that it can achieve the greatest positive effect with the least processing effort. It is the communicators themselves who decide whether or not optimal relevance is achieved, rather than the language form (fuzzy or non-fuzzy) used. People can skillfully adjust the deployment of different language forms or choose appropriate interpretations to suit different situations and their communication needs. However, there are two challenges to RT: a. to extend its theory from individual relevance to group relevance; b. to embrace cultural considerations (because when relevance principles and cultural protocols are in conflict, the latter tends to prevail).

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How many is 'many'? How beautiful is 'beautiful'? 'Many' and 'beautiful' are two examples of what is called fuzzy language. Fuzziness in language is a pervasive phenomenon. We don't need to look far to see the use of fuzzy language, it is undoubtedly part of our daily life. However, fuzziness is a neglected area in linguistics and related disciplines, probably due to the misconception that mixes up fuzzy language with misuse or abuse of language. Questions like why and how we use fuzzy language have not been invested in depth. Over the years, there have been some works done on this area, like Channel (1983 & 1994) from semantic/pragmatic perspectives and Moxey and Sanford (1993) from a psychological perspective, but still a number of questions remain to be answered.

This paper aims to investigate the nature of fuzzy language and whether or not Relevance Theory (RT, Sperber and Wilson, 1986, 1995, 1998, 2002, Wilson and Sperber 2002) can be used to explain adequately the ways language users communicate in fuzzy language. It will explore in the discourse of fuzzy language, how the speaker expresses and hearer infers, as well as the negotiation between them.

1 Introduction

'Fuzziness' is defined in this paper as a linguistic unit (word, phrase, sentence, utterance etc) with no clear-cut meaning boundary. For example, words like 'beautiful', 'many'; sentences like 'Mary is a beautiful girl' and 'She has many friends'. If we push hard enough, there are hardly any words that are not fuzzy. For example, 'dead' or 'living' appear at first glance clear-cut. However, how would we classify a person who has been in a coma for say six months? Another pair is 'man' and 'woman', which side would a person who was born with both sex organs go? Fuzzy language is something we live by; we need it for communication as we need air to breath. In fact, we need fuzzy language for every aspect of our daily communication, as much as if not more as we need non-fuzzy language.

One point that should be made clear at the beginning is that 'fuzzy' in our discussion is a technical term, and fuzzy language is normal and useful rather than abnormal and undesired. It has nothing to do with misuse or ambiguity. Fuzziness differs from vagueness, generality and ambiguity. In my paper (Zhang, 1998), it states that fuzziness refers to an indeterminate referential boundary and is an inherent property of language. Because it is inherent, it is not resolvable even with resort to context, unlike vagueness, generality and ambiguity whose indeterminacy can be eliminated by their incompatibility with a given context. See my above paper for details.

Fuzzy language has a number of interesting features. For example, it tends to be clear-cut as far as the core meaning (sense) is concerned, but blurred around peripheral meaning (denotation/reference), see the next section for detail. Another important characteristic of fuzzy expressions, fuzzy quantifiers in particular such as 'about 200 students', is that they are compositional which has been demonstrated in my work (Zhang, 2001). It shows, via empirical data in Chinese and a comparison with English data (Channell 1983, 1994), that fuzzy quantifiers of the same type function in the same way to generate a constant semantic pattern. For example, the empirical date showed that all the fuzzy quantifiers of 'about n' type ('about 200', 'about 2000', 'about 20000' etc.) generate a similar bell shaped membership curve centred around the numerical 'n'. Likewise, all the fuzzy quantifiers of the 'nearly n' type ('nearly 200', 'nearly 2000', 'nearly 20000' etc.) generate a similar upward skewed membership curve. My work also demonstrated that although basic membership functions are subject to modification depending on context, they vary only within certain limits, which does not deny compositionality in any way. In other words, although some specific values for certain fuzzy expressions may have to be determined by pragmatic factors, semantic and inferential pattern are systematic and predictable. This is a crucial conclusion as far as semantics is concerned, i.e. compositionality is an important foundation of semantics. Of course, a purely semantic approach in the study of fuzziness is not enough; a pragmatic approach is also needed for achieving an adequate explanation of fuzzy language. That is exactly what is intended to be accomplished in this paper.

Previous works on fuzziness can be put into two major categories: numerical or non numerical. For the former, works like Channel (1983, 1994), Wallsten *et al* (e.g. Wallsten, Budescu, Rapoport, Zwick and Forsyth 1986; Rapoport, Wallsten and Cox 1987), Mosteller and Youtz (1990). The latter can be represented by Moxey and Sanford (1993). In addition, works done by a formal linguistic approach include Black (1937), Wachtel (1980, 1981) and Zhang (2001). Among the above, some adopt Zadel's (1965) Fuzzy Set Theory (FST, the idea is that instead of either being in a set or not, an individual is in the set to a certain degree), which deals with fuzziness using a membership function (see Section 4 for detail). FST explains fuzziness using a numerical approach (membership function). In order to have a more adequate and comprehensive account, we need to add psycholinguistic and cognitive points of view. A multi-dimensional approach, i.e. an integral combination of semantics, cognition, psychology and sociology, would certainly give us the edge to investigate fuzziness in language using. Little work has been done on a possible explanation that RT can offer to the study of fuzziness in language use. This paper attempts to fill this gap.

This paper aims to discuss the use of fuzzy language primarily from cognitive and psychological perspectives. The approach used here is RT, which argues that human cognitive processes are

geared up to achieve the greatest possible cognitive effect using the smallest possible processing effort. Wilson & Sperber (2002) claim that RT is based on a definition of relevance and two principles of relevance. The definition of relevance in their work is that the speaker's input connects with the background information the hearer has available to infer conclusions that matter to him. For example, the speaker's input is relevant if it could solve a puzzle the hearer had in mind or if it could provide the information the hearer sought after. In other words, the speaker's input is relevant to the hearer when the latter is able to, in the context of available assumptions, infer a positive cognitive effect[1]. The assessment of the relevance of an input to an individual is based on positive cognitive effects and processing effort: the more positive cognitive effects achieved and the less processing effort expended, the greater the relevance of the speaker's input to the hearer. The two principles are the Cognitive Principle and the Communicative Principle. The former claims that human cognition aims for the maximization of relevance and the later says that utterances create expectations of optimal relevance. In what follows we will test RT by applying it to the study of fuzzy language use in communication.

Before we move on to next section, it must be pointed out that RT emphases relevance of an input to an individual, but seems to overlook the difference between relevance to an individual and a group. For example, it is possible that other things being equal, some input is regarded as relevant to one individual, but not to another individual in a group, so what we should say about the relevance of the input? This kind of conflict occurs frequently in fuzzy language use. For example, a speaker utters this sentence: 'John has many girl friends', one hearer might infer 'many' as 'five girl friends' and considers that would be most relevant. On the contrary, another hearer might infer 'ten' instead of 'five' and insists that his inference is the most of relevant one. So at the level of the individual we may have a situation where everyone is satisfied INDIVIDUALLY. However, at the level of the group, we may have a messy situation to deal with where disagreement among individuals occurs. Accordingly, we have to find a way to reach unified agreement. 'Five girl friends' or 'ten girl friends', which is most relevant? Therefore, RT may have to extend its theory from individual relevance to group relevance. Otherwise, it may not be able to provide a comprehensive explanation to language phenomena like fuzzy language, which manifests at both the individual level and the group level and challenges us to consider matters at a higher level. It is not my intention to deal with these matters in this particular paper, but solving it is important and it is hoped that this matter will be dealt with in the near future.

2 Semantic fuzziness and pragmatic fuzziness

In this section, we look at fuzzy language from both semantic fuzziness and pragmatic fuzziness perspectives in order to provide a fuller profile of fuzzy language and further clarify what type of fuzziness we are going to discuss in the following sections.

In semantic terms, 'many' is fuzzy because its meaning boundary is not clear-cut. How many is 'many'? Its meaning boundary varies from individual to individual, from context to context. In sentence, 'John has many girl friends', one individual may think 'five girl friends' is 'many'; another individual may think 'ten girl friends' is 'many'. However, no matter whether it is five or ten they are denotative meanings. In fact, 'many' has a non-fuzzy sense, 'a significant number'; no one would dispute it. What we disagree on is the other part of meaning components, reference or denotation. People normally don't have problems agreeing on the senses of fuzzy expressions. Fuzziness occurs when we try to figure out their reference or denotation.

[1] Wilson & Sperber (2002, p251) define positive cognitive effect as a "worthwhile difference to the individual's representation of world – a true conclusion, for example". That is, it has to be from genuinely relevant inputs by the speaker to genuinely true conclusions inferred by the hearer. This distinguishes it from false beliefs and false conclusions. See Sperber & Wilson (1995, Ch3, 1-2) for a detailed discussion.

More precisely, in terms of denotational meaning we tend to agree more on the core member of a fuzzy expression's denotation. For example, if John has over 10 girl friends every one would say that indeed he has 'many' girl friends. Only when it comes to the peripheral part of denotation, would there be less agreement among individuals. For example, we don't know for sure that whether or not '3 girl friends' could be considered by everyone as 'many'. To sum up, fuzzy expressions have non-fuzzy sense, an agreeable core part of denotation, but fuzzy peripheral denotation. This claim has been empirically verified by my work (Zhang, 2001), for example, nearly all subjects agreed that 200 belongs to 'about 200', but their answers varied on the membership of 150 or 250 to 'about 200'. This was a general tendency in my test, and the conclusion backs up the claim that the manifestation of fuzziness is predominantly on the peripheral part of denotation.

Having stated that fuzziness tends to have invariant sense/core part of denotation and variant peripheral part of denotation, we can then assume that the fuzziness is closely associated with the real world. The reason is that the denotation or reference of an expression relates to the extralinguistic world, things like entities, states of affairs etc. When we try to define the denotation of an expression, we have to consider pragmatic factors that affect the meaning of the expression in one way or another, which leads to what we call pragmatic fuzziness.

Fuzzy meaning of expressions is very much a pragmatic matter, as its meaning depends heavily on context (linguistic or non-linguistic) or situation. The interpretation of a fuzzy expression would be influenced by all sorts of pragmatic factors, some of which are listed below (see Zhang 2001 for more detailed discussion on this matter).

2.1 Scale effects

The interpretation of a fuzzy expression can be affected by the scale onto which they are mapped. For example, 'about 5 people' and 'about 1000 people'. Because of floor effect (an effect that limits the expansion of a fuzzy expression's extension around the lower end of scale), the meaning of 'about 5 people' would be less fuzzy than 'about 1000 people'. The reason for this is that there is less space in the lower end of scale for 'about 5 people' to expand, while 'about 1000 people' has relatively more space to maneuver. In the other end of scale, ceiling effect would produce similar results. For example, the meaning of 'almost all' in 'Almost all of students came to Mary's lecture' would have a less fuzzy interpretation than 'many' in 'Many students came to Mary's lecture', because the former is higher on the scale than the latter. That is 'almost all' is close to the top of the scale and therefore has less space to vary, which means a less fuzzy meaning would be generated by the ceiling effect.

2.2 The item being modified

The meaning of fuzzy expressions may also depend on the size and nature of the objects being modified and on the spatial situations surrounding the objects. For example, for 'many', we would give a higher numerical value for the situations further down the list:

There are many people in the common room.
- the lecture theatre.
- the Tian'anmen Square.

Namely, 'many' students would be given a higher value in the situation of 'in the Tian'anmen Square' than 'in the common room'. Another example, 'There are many people in the forest' versus 'There are many elephants in the forest'. Due to the different sizes between 'people' and 'elephant', it is expected that the latter's numerical value would be lower than the former.

2.3 Expectation

The understanding and interpretation of meaning is associated with language users' expectation corresponding to different situations. Take fuzzy quantifiers as an example, the more people expect, the higher value a fuzzy quantifier would get assigned; and vice versa. For example, people usually expect a higher frequency of rainy days in Auckland than earthquakes. So when we say 'there are many rainy

days/earthquakes in Auckland', we would probably not assign the same value to both situations, the value of 'rainy days' would be much higher than 'earthquakes'.

The above assumption is supported by the empirical data in Pepper and Prytulak (1974). They found that when it was used to describe the frequency with which Miss Sweden was found attractive, the term 'frequently' was considered to mean approximately 70% of the time, due to a higher expected frequency. However, when it was used for the frequency of air crashes, the term was given only approximately 20% of the time, due to a lower expected frequency. Moxey and Sanford (1993) also conducted a series of tests on how expectation affects the understanding of fuzzy quantifiers, and concluded that it has a significant impact.

2.4 Cultural influence

Very often, cultural differences dominate how we understand and interpret meaning. For example, in China divorce has always been something disapproved of culturally. So, if we compare 'There are many divorce cases in China' with 'There are many divorce cases in the United States', one would give have a lower expectation and give a lower rate for the former but a higher expectation and rate for the latter. Another example, in Chinese culture it is not rare to see married children with their spouse and children, still living with their parents. Therefore, 'some' in 'Some married children still live with their parents' would be given a relatively higher expectation and therefore a higher rate if it refers to China. The above two examples demonstrate that cultural influence play a big role here and we have to be aware of it in order to fully understand/recognize meanings that tangle with cultural factors.

There are many more pragmatic factors which affect the interpretation of fuzzy expressions, such as sex, location, occupation etc. For example, how tall is a 'tall person', depends on all sorts of pragmatic factors. In general, men are taller than women; Europeans are taller than Asians; professional basketballers are taller than ordinary people.

In summary, fuzziness of a fuzzy expression tends to be around the peripheral area of its denotation. The inference meaning of fuzzy expressions cannot be done without consideration of pragmatic factors, which is indeed the reason that this paper explores fuzzy language using a pragmatic approach. Next section we are going to investigate how RT can explain the fuzzy language effectively and adequately, from a pragmatic perspective.

3 Explanations from Relevance Theory

In this section, we apply RT to the study of fuzziness. RT states that relevance may be assessed by optimal cognitive effect involving the least of processing effort. Wilson and Sperber (2002) further point out correctly that intuitively relevance is a matter of degree, rather than an all-or-none matter. That is to say that the criterion for picking out the most relevant one is on the principle of the greater positive cognitive effects and the lower processing efforts. Let us consider the examples below, which illustrate how the degree of relevance of alternative inputs could be determined in terms of the processing effort and positive cognitive effect. The scenario here is: John is a taxi driver and is asked pick-up passenger Mary at Auckland airport on Saturday, one of the busiest days. The information provided to John could be one of the following:

(1) She is non-European.
(2) She is Chinese, tall, slim, around 20 years old.
(3) She is a Chinese from the north of China, height is 1.67m, weight is 60.5 kilos, and 19 and a half years old. (3.1)

As we can see, to John all the above may be relevant to a certain degree. However, (2) would be more relevant because the description given would satisfy John the most in terms of achieving greater positive effects and requiring lower processing efforts. Here is a comparison:

(a) (2) describes that Mary is 'Chinese', comparing with 'non-European' (less informative) in (1) and 'Chinese from the north of China' (over informative and vague[2]) in (3).
(b) (2) describes Mary as 'tall', with no information given about height (less informative) in (1) and 'height is 1.67m (over informative) in (3).
(c) (2) describes Mary as 'slim', with no information given about weight (less informative) in (1) and 'weight is 60.5 kilos' (over informative) in (3).
(d) (2) describes Mary as 'around 20 years old', with no information given about age (less informative) in (1) and '19 and a half years old' (over informative) in (3).

Overall, (1) is less satisfactory or relevant in terms of lesser positive cognitive effects than (2). (3) is also less satisfactory or relevant but in terms of greater processing efforts than (2). In other words, (1) is too general to spot out Mary in a busy airport, on the other hand (3) is too precise, too much unnecessary numerical information given which would require additional processing efforts. (2) provides just the right level of information, not too little but not too much either. Therefore, under the principle of relevance, fuzzy language used in (2) is preferred over (1) and (3) for reasons of the greater positive cognitive effect and lesser processing effort.

Let us further analyze 'She is Chinese, tall, slim, around 20 years old' in (2). The reason it is chosen as the most preferred choice among the three in (3.1) is because of the fact that it uses fuzzy expressions that provide no more and no less information required by the situation. It would adequately meet John's need for the right amount of information and cost him the least processing effort. Regarding 'the least processing effort', (2) uses fuzzy expressions like 'tall', 'slim' and 'around 20 years old', which provide holistic information based on their non-fuzzy sense, agreeable core part of denotation, and fuzzy peripheral denotational meaning. The information provided in (2) is sufficient enough, but not too precise like (3). For an effective and efficient communication, John would prefer the information given in (2), rather that the tedious and unwanted numerical information, because the numerical values in (3) would cost John more processing effort. All John needs to do is to judge APPROXIMATELY that Mary fits in the description of 'Chinese, tall, slim, around 20 years old' given in (2), and he does not really care whether Mary is 1.67m or 1.69m, 57 or 60.5 kilos.

Fuzziness of language discussed in this paper is similar to what Wilson and Sperber (2002) called 'loose use of language', meaning that people use words in a loose sense. The examples they give are, 'square face' and 'silent room'. However, in a strict sense, faces are not square and rooms are generally not silent. While those loose uses are not strictly and literally true, they flow through day after day unattended and undetected. We take this type of language use for granted and use them by default without a second thought. Wilson and Sperber point out correctly that the expressions here exhibit some indeterminacy or fuzziness, so they are loose uses which convey an array of weak implicatuers. They further comment that utterance 'John has a square mind'[3] weakly implicates:

(1) He is somewhat rigid in his thinking.
(2) He does not easily change his mind.
(3) He is a man of principle. (3.2)

Barsalou's (1987) also suggests that a lexical item, e.g. 'bank' in the sentence of 'I went to the bank today', could be a related concept rather than an encoded concept, with a more restricted encyclopedic entry and a narrower denotation, constructed ad hoc for a particular situation. Similarly, RT also considers that words like 'square' and 'silent' in daily communication are not an encoded meaning but a loose one;

[2] For example, let us say that Mary is from Shanghai. People from Beijing would classify her as a southerner, but some Cantonese might see her as a northerner. That is because they consider that anyone who not from Guangdong Province (even narrower, Guangzhou city) are northerners.

[3] They seem to suggest that the loose meaning is similar to polysemy. It must be noted that in the case of fuzziness in my definition, fuzzy meaning differs from polysemy. See Zhang (1998) for a detailed discussion about the difference between fuzziness and polysemy.

they call it a related or ad hoc meaning. In other words, usually they are not used in their strict semantic meaning/dictionary entry meaning, they are pragmatic meanings interpreted in context.

Wilson and Sperber (2002, p280) ask this question: a stranger asks you for the time, time is 11:58 am. What would you answer? Would you say 11:58 or 12:00? According to RT, one of the two criteria for achieving optimal relevance is to reduce the hearer's processing effort (in this case 12:00 would be more preferable) unless some cognitive effect would be lost by speaking loosely. Either to round up or to give answer that is accurate to the minutes depends on subtle clues to what might make it relevant for the person making the request to know the time (van Der Henst, Charles & Sperber forthcoming). For example, if the stranger just wants to know roughly what time of the day it is now, you could well say 12:00. On the other hand, if you are in a train station's platform, the stranger probably wants to know the exact time. This is a case where the choice of giving exact information or loose/approximate information depends on whether or not the optimal relevance could be achieved.

If suitable to a particular situation, approximate information could be better than precise information. This is made feasible by our understanding of the existence of fuzziness in communication. For example, we know that often even exact numbers could be interpreted as a fuzzy one. For example, husband called his wife at home and said "I have to finish something here before I go home. I'll be home at 8 o'clock'. In this situation, the wife wouldn't think that her husband will be back 8 pm sharp; rather he will be back around 8 o'clock. Another example for using an exact number as a fuzzy number (a hedged version) is that John bought a jar of peanut butter which cost $3.96. However, when asked by Mary, he said that it cost $4[4]. Here, John uses $4 as a fuzzy number, and Mary would probably not mind at all. To what extend do we really care whether people say $3.96 or $4. This kind of language behavior can probably be justified by RT's optimal relevance as discussed above, in that $4 would be a better choice in terms of greater positive cognitive effect and lesser processing effort.

The discussion in this section demonstrates that RT indeed explains the use of fuzzy language well and fuzzy language indeed plays a unique and important role in achieving effective communication. In the next section, we are going to further discuss the best ways of analyzing the fuzzy language phenomenon.

4. FST vs. RT; Numerical vs. Non-numerical

FST (Zadeh 1965, 1971-1973, 1983) claims that instead of either being in a set or not, an item is in the set to a certain degree, represented by a number between zero (non-membership) and one (full membership), which is called a membership (characteristic) function. For example, we could give number 12 a membership of 0.8 to 'about 10', and number 6 a membership of 0.5. That means that the former belongs to 'about 10' more than the latter. What is appealing about FST is that it considers a range of choices for processing and orders them according to a membership function in a hierarchy fashion.

Although FST does shed new light on the study of fuzziness and has been successful in science like AI and other technology development areas, it is limited in its influence in linguistics and related humanities disciplines. Reasons for this may be its formal and seemingly numerical oriented approach[5]; also it is based on mathematical/logic type of arguments.

On the other hand, RT puts emphasis on a non-numerical approach. Wilson and Sperber (2002, p256) define optimal relevance as: 'An ostensive stimulus is optimally relevant to an audience iff: a. It is relevant enough to be worth the audience's processing effort; b. It is the most relevant one compatible

[4] Pragmatically speaking, in New Zealand saying $4 for the jar of peanut butter is more true than saying $3.96, because there is no 5 cent coin in New Zealand. Therefore, if buying the peanut butter alone, then you may have to pay $4, although it is labeled for $3.96.

[5] I argue in Zhang (1996) that precise numbers used in FST are not meant to be an absolute number, it is just for the convenience of argument. The adoption of numbers, as far as a formal approach is concerned, has significance only with respect to patterns and tendencies. In other words, the number is not significant via the number itself, but in terms of the way it is ordered. See Zhang (1996) for details.

with communicator's abilities and preferences.' This shows that RT looks at matters from different angle – cognitive and psychological perspectives with communicators' choices as its focus.

The similarity between FST and RT is that they employ the approach of optimality, i.e. prioritize preferences and order them according to whatever criteria are suitable in a particular situation. The difference between the two, as mentioned above, is that FST is numerical and more semantic orientated while RT sees the utterance interpretation as a cognitive process and therefore opts for a non-numerical approach.

Which approach to adopt is really a matter of what area one is interested. For example, in this paper, we are more interested in cognitive and psychological aspects, so RT would be a better theory to adopt. An application of RT to fuzzy language use would be a claim that language users interpret fuzzy language according to what is available and what is preferred. That is to say that we should consider both input and context together to render a more appropriate interpretation.

Wilson and Sperber (2002, p253) point out that the characterization of relevance is comparative rather than quantitative, in terms of providing the best starting point for constructing a psychologically plausible theory. One of the reasons given is that when assessing relevance 'from the inside', individuals don't have to compute numerical values even when they can (e.g. for weight or distance) due to the effort consuming nature. Also people prefer using comparative methods of assessment because they are more intuitive and basic than quantitative methods. There are also some other reasons that people use comparative methods rather than quantitative ones. Let us consider fuzzy expressions. While certain fuzzy expressions' meaning can be measured in numbers (e.g. 'many', 'about 20', 'a tall person' etc), the majority of them cannot be represented in numbers.
Also, sometimes we don't know or cannot agree on the exact numerical value for certain fuzzy expressions. Even if we know the exact numerical value, for some reason (safe guarding oneself, withholding information etc) we may still not disclose it, just as Wilson and Sperber (2002, p257) point out that speakers might be unwilling or unable to provide certain relevant information. That is, speakers might not be willing or able to provide precise information. Even in the cases where a quantitative approach is usable, we may still prefer the comparative approach.

A non-numerical approach tends to have far reaching significance. For example, sometimes two fuzzy quantifiers may not have much difference in terms of numerical values, but they could be very different in terms of attention and focus (Moxey and Sanford 1993). They explore fuzzy quantifiers, e.g. 'few, a few', from a non-numerical perspective. Their work shows empirically that these expressions serve to put focus into different subsets of the superset upon which they operate. For example,

(1) Few students attended Mary's class. They went to John's class instead.
(2) A few students attended Mary's class. They enjoyed it. (4.1)

'Few' puts emphasis on the set of students who didn't attend Mary's class; 'a few' on the other hand focuses on the set of students who did attend her class. Moxey and Sanford treat the quantifiers as having a major function in manipulating attentions and patterns of inference. They emphasize that other aspects of meaning differ between quantifiers, in addition to numerical meaning. For example, 'very' in 'very few' may not lower numerical value, but rather enhances the strength of claim. They argue that we don't have to compute a fine-grained scale for each fuzzy quantifier used.

Moxey and Sanford's above claim which is in line with RT is probably true because computing a fine-gained scale may be in conflict with achieving the least processing effort. People are able to communicate using the holistic meaning of fuzzy quantifiers rather than having to have a fine-grained scale. However, it has to be noted that while we emphasize the importance of cognitive and psychological approaches, we

cannot disregard totally the importance of numerals. Indeed, the non-numerical approach could complement the numerical approach by capturing far reaching properties of fuzzy expressions, such as attention manipulations, inference patterns, speakers' expectation etc. However, it doesn't mean that the numerical approach is totally dispensable. It is useful in some aspects and integration between the two approaches would be expected to make the study of fuzzy expressions more comprehensive. For example:

(1) a. Husband: I am thinking of inviting a few friends over for dinner. What do you think?
b. Wife: Fine. Tell me exactly how many will come, so I can prepare for the dinner.
(2) a. Husband: I am thinking of inviting a few friends over for dinner. Would you like to come?
b. Friend: Sure. I'd love to come. (4.2)

In (1), the wife has to know the exact numerical value of 'a few' in order to prepare for the dinner. On the other hand, in (2) the friend doesn't need to know the numerical information, so doesn't ask for it. (4.2) illustrates that sometimes we need to know the numerical values, other times we don't. Accordingly, when we study fuzzy language, we should realize that while the non-numerical approach is important and indeed far-reaching, the numerical approach does play a role at times.

In the next section, we look at the role of context and situation in the understanding and interpretation of fuzzy language. The matter being invested in the following section is how people skillfully adjust the deployment of different language forms to suit different situations and their communication needs.

5. Different deployments and interpretations correspond to different contexts

Wilson and Sperber (2002, p269) state that phrase 'put to sleep' in

(1) Peter: What do you think of Martin's latest novel?
(2) Mary: It puts me to sleep. (5.1)

is an ad hoc concept which denotes not only literal meaning of 'putting to sleep', but another loose meaning of being extremely boring and unengaging. Only if such a loose interpretation fails to satisfy his expectations of relevance would Peter be justified in spending the effort required to explore further contextual assumptions, and moving towards another more literal interpretation.

That means that people would deploy or choose appropriate interpretations with regard to contexts and situations. This applies to fuzzy language use too, people switch between fuzzy and non-fuzzy uses depending on communicational demand. For example:

Scenario 1: Switching between non-numerical (fuzzy) and numerical

Daughter: Some of my friends will come to my birthday party.
Mother: Exact how many?
Daughter: 10 (5.2)

In the case, the daughter initially used 'some' which is in line with RT for the least processing effort as far as she (the speaker) is concerned. However, it is obvious that the mother is not satisfied with the loose meaning of 'some', for reasons like she needs to know exact number of people who are coming in order to prepare for the party. Therefore, as far as the hearer is concerned, the use of 'some' is not an optimal relevance in terms of the positive cognitive effect. So, the mother asked again for a numerical value of 'some'. Then her daughter gave the number '10' which finally satisfied the mother, because it achieves both the greatest positive cognitive effect and the least processing effort, therefore an optimal relevance. This case illustrates that it is not necessarily the case that numerical information is less relevant than non-

numerical information. The deciding factor is not so much which language form we use, it is what the communicators think of as important. Any language form could be relevant and any language form could be irrelevant. It is the communicator who calls the shots.

Scenario 2: Using modifiers (e.g. 'very', 'sort of') when the quantitative method is not suitable

A: We are in a bad situation.
B: How bad?
A: Very bad. (5.3)

This case is the same in principle as (5.2) above, in that the speaker and the hearer have to negotiate to achieve an optimal relevance to satisfy both parties involved, regardless of which language form they use. The only difference is that the latter case deploys a modifier, 'very', because 'bad' is difficult to quantify in this case.

While in certain cases, using fuzzy expression a 'tall person' may be more relevant than using exact numbers 1.86m; in other cases using exact numbers would be more relevant like in (5.2) above. Moreover, sometimes we have to use fuzzy expressions for reasons like being unwilling or unable to provide precise information. Let us discuss the following scenario which is a case of unwillingness, i.e. the speaker deliberately provides less relevant information.

Scenario 3: a real estate agent leaves a note to the property owner after each open home.

(1) First week: '11 people through today'
(2) Second week: '7 people though today'
(3) Third week: 'A few people through today and a second viewing'
(4) Fourth week: 'Few people through today' (5.4)

Here, we can see the tendency from exact information to less exact information. The reason the real estate agent chooses to give the exact number in the first two weeks may be that the number looks encouraging. For the last two weeks, because the number is dropping and it does not look good, the agent then changes his language strategy from using exact numbers to fuzzy quantifiers to withhold the undesirable fact, e.g. using 'few' in (4). The owner may not care what exactly 'a few' or 'few' is, what he can sense is that the number of viewers is fewer than before and that is why the agent is reluctant to put the exact number. He wouldn't normally call the agent and ask exactly how many people through, unless he really wants to know the exact number.

In terms of whether or not (3) and (4) in (5.4) are relevant is entirely a matter of how the property owner feels about them. If he doesn't really care about knowing exactly how many is 'a few' and 'few' and all he wants to know is that the number of viewers going through his house is declining, then (3) and (4) qualify for relevance. However, they would not qualify for relevance if the owner prefers to know the exact number and feels frustrated by the use of 'a few' and 'few' by the real estate agent. Especially, the owner is unlikely to ask the agent for the exact number for the sake of being polite. Even if the owner does ask, the agent could still give him a run around (like answering with 'several' etc), which could be even more frustrating for the owner. Of course, (1) and (2) in (5.4) would have the same dilemma, depending on whether or not the owner prefers to know the exact number. Some of them would be perfectly happy with the use of 'many', 'a few' or 'few', while some would not.

Finally, there is a challenge from cultural consideration to RT. We all know that language is a social action; culture and language are two inseparable things. Cultural considerations may intervene with language rules. For example, people tend not to speak directly about something that may embarrass

someone. If they are asked to comment on someone who is not so bright academically, they tend to say the person is a very nice person and a great cook or something along these lines. This would be violating the relevance principle as far as the hearer is concerned, because the roundabout talk would not contribute to the greatest positive cognitive effect and the least processing effort. However, people would still automatically do it by default, which is something they know as a cultural protocol. Therefore, it appears that when there is conflict between the relevance principles and cultural protocols, the latter tends to preclude the former, especially in cultures like the Chinese. Further work needs to be done on how we deal with the conflict between language rules and cultural protocols.

6 Conclusions

In this paper, we have discussed the phenomenon of fuzzy language and its characteristics; how RT can be applicable to the use of fuzzy language. It is concluded that the use of fuzzy language can be explained by RT, i.e. it conforms with the optimal relevance in that people using fuzzy language can achieve the greatest positive cognitive effect and the least processing effort. In other words RT has been attested by the use of fuzzy language. However, RT may have to extend its theory from an individual relevance to group relevance to explain fully the interpretation of fuzzy language.

RT and this paper all adopt cognitive and psychological approaches to investigate language use; it can complement the semantic approach and has far reaching significance. However, we must emphases that in certain situations, semantic/numerical information is just as needed as non-numerical information; it all depends on the context and situation we are in. Therefore, to have a comprehensive study of fuzzy language, we have to deploy whatever approach is appropriate to the specific task.

It is also claimed that whether or not optimal relevance is achieved is not a matter of what language form (fuzzy or non-fuzzy) we deploy, rather a matter of how communicators themselves feel. The language form could be numerical or non-numerical, with or without modifiers, etc, but they are not deciding factor. The most important thing is language users' judgment, whether or not we think that certain utterance is satisfactory in terms of the relevance principles. People can skillfully adjust the deployment of different language forms or choose appropriate interpretations to suit different situations and their communication needs. Finally, it is noted that when the relevance principles and cultural protocols clash, the latter tend to prevail. This challenges us to further our study on the relations between language and culture, or even to wider areas like social behavior, political and economical effects etc. Only when we look at all the areas that have impacts on language, can we then possibly provide more convincing explanations about language.

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