



Article

# Fuzzification of Intelligence Quotient (IQ) for the Determination of Individual Temperament (Mizaj-e-Shakhsi)

Aisha Aijaz

Assistant Professor, Department of Tashreeh wa Munafeul aza, Ajmal Khan Tibbia College, AMU, Aligarh.

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## I N F O

**E-mail Id:**

aisha.tma@amu.ac.in

**Orcid Id:**

<https://orcid.org/0000-0001-6293-929X>

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## A B S T R A C T

**Introduction:** Temperament assessment is the key point on which whole of the Unani therapeutics depends. The various methods mentioned in classical Unani manuscripts are observation based liable to mistakes. Therefore, there is a need of searching some scientific methods of temperament assessment not the mere subjective parameters and that can be employed universally. Keeping this aim in mind this work was done in the department of Tashreeh wa Munafeul Aza, AKTC, AMU.

**Method:** The author has submitted a thesis in which the IQ was established as a tool for assessment of individual temperament using Boolean logic. Then taking those data, fuzzy logic was applied and fuzzification of IQ levels was done. The results thus obtained were compared.

**Result:** The assessment of individual temperament using Boolean Logic applied to IQ levels the individuals can be identified as Hot and Cold temperament persons. While applying fuzzy logic the subjects were identified as haar, baarid anf motadil temperament with specifications of degrees of temperaments.

**Conclusion:** Fuzzification is the better method of assessment of individual temperament.

**Keywords:** Mizaj, Temperament, Fuzzy Logic, Unani Medicine, Fuzzification

## Introduction

Unani medicine is an exquisite system of medicine providing holistic healthcare. Determination of individual temperament for the identification of prevailing health state (*Sehat wa Marz*) is the base of Unani therapeutics. *Ajnas-e-ahrash* questionnaire is the self-designed proforma most commonly used for individual temperament assessment. However, most of the parameters of this questionnaire

are subjective attributes that employ human reasoning for any conclusion. Due to this fact, the assessment of individual temperament (*Mizaj-e-Shakhsi*) lacks precision. Therefore, this work was done in the PG department of Munafeul Aza, Ajmal Khan Tibbiya College, Aligarh Muslim University, Aligarh, UP, India with the idea of fuzzification of Intelligence Quotient (IQ) for determination of individual temperament (*Mizaj-e-Shakhsi*).



## Literature Review

### Mizaj

According to Sina I, “the *Mizaj* is that quality which results from the mutual interaction and interpassion of the four contrary primary qualities residing within the imponderable elements. These elements are so minutely intermingled as each to lie in a very intimate relationship with the other. Their opposite powers alternately conquer and become conquered until a state of equilibrium is reached which is uniform throughout the whole; it is this outcome that is called as *mizaj*”.<sup>1</sup>

### Determination of Human Temperament

Ancient Unani physicians described the parameters for the determination of individual temperament (*Mizaj-e-Shakhsi*) in various manuscripts. Some parameters are related to structure and some to function while some are related to the psyche of the subject. Galen, Tabri, Majoosi, Razi, Jurjani and Masihi proposed the five parameters (*ajnas-e-khamsa*), and Arzani gave four parameters for the determination of temperament. Ibn Rushd described three parameters while Ibn Sina believed that there are ten parameters (*ajnas-e-ashrah*) of temperament determination.

Ibn Sina described the following ten parameters (*ajnas-e-ashrah*) in the book *Al Qanoon-fit-Tibb* for the determination of *Mizaj-e-shakhsi*:<sup>1</sup>

- *Malmas*
- *Leham wa Shaham*
- *Laun-ul-Badan*
- *Haiyat-ul-aza*
- *Kaifi'at-e-infe'al*
- *Ash'ar*
- *Naum wa Yaqza*
- *Af'al-ul-aza*
- *Fuzlaat-e-badan*
- *Inf'alat-e-nafsaniyah*

While discussing determinants of individual temperament, Sina I has said, “strong and active reaction to psychic influences and its excess is an evidence of hotness while its slowness that of coldness; its durability indicates dryness and transitoriness moistness. Cowardice, high degree of bashfulness and graciousness are indications of coldness while shamefacedness, loss of temper, boldness, hot temper, talkativeness, fest, persistent and coherent speech are evidence of hotness.”<sup>2</sup>

### Intelligence Quotient (IQ)

The ratio of mental age (MA) to chronological age (CA) multiplied by 100 yields the intelligence quotient (IQ).<sup>3</sup>

### Wechsler Adult Intelligence Scale (WAIS)

It is the most commonly used IQ test scale designed for

15-45 years of age. This was published in 1939 for the first time and it was called the Wechsler-Bellevue intelligence scale which was replaced by the Wechsler adult intelligence scale (WAIS) in 1955. Its revision (WAIS-R) was published in 1981.

Using this scale, the adult subjects can be classified into various categories according to their IQ levels as shown in Table 1.

**Table 1. Classification of IQ Range**

IQ Range	Class
≤ 69	Mentally defective subjects
70-79	Borderline subjects
80-89	Dull normal subjects
90-109	Average subjects
110-119	Bright normal subjects
120-129	Superior subjects
≥ 130	Very superior subjects

### Fuzzy Logic

The meaning of the word fuzzy is “unclear” or “vague”. Any event, process, or function that is changing continuously cannot always be defined as either true or false, which means that we need to define such activities in a fuzzy manner.<sup>4</sup>

Fuzzy logic (FL) is a method of reasoning that resembles human reasoning. It is a way of decision-making like human reasoning that involves all intermediate possibilities between digital values absolutely YES and absolutely NO (true and false). Lotfi Zadeh<sup>5</sup> stated that human decision-making, unlike computers, includes a range of possibilities between yes and no, such as:

- Certainly - Yes
- Possibly - Yes
- Cannot Say
- Possibly - No
- Certainly - No

Fuzzy logic deals with the degree of truth with a range of possibilities.<sup>5</sup>

### Fuzzification

The process in which a crisp set is transformed into a fuzzy set or a fuzzy set is converted into the fuzzier set is called fuzzification, thus, it is the process of conversion of precise data into imprecise data.

### Defuzzification

The process in which a fuzzy set is converted into a crisp (numerical) set or imprecise data is converted into precise data is called defuzzification.<sup>6</sup>

### Steps of Fuzzification<sup>7</sup>

- Specify the research problem
- Determine the fuzzy sets
- Construct the fuzzy rules
- Encode the members
- Evaluate the values

## Material and Method

### Selection of Subjects

In 2010, the author had submitted a thesis in Kulliyat-e-Tib department of Ajmal Khan Tibbia College, AMU, Aligarh. The title of the thesis was “Assessment of Intelligence Quotient (IQ) in Bilious and Phlegmatic temperaments”.<sup>8</sup> During that study, individual temperaments (*Mizaj-e-Shakhsi*) of 120 adult subjects of either gender were determined using a temperament assessment questionnaire designed on *Ajnas-e-Ashrah*. After that, an IQ assessment of each subject was done using the Indian adaptation of Weschler’s Adult Intelligence Scale (WAIS). Out of those 120 subjects, five persons (Table 2) with known *Mizaj-e-Shakhsi* and IQ levels were selected for this study.

It was seen that individuals having dominance of *Hararat* in their temperaments are intelligent and mentally sharper

**Table 2. IQ Assessment**

Subject	IQ by WAIS	Mizaj-e-Shakhsi by Ajnas-e-Ashrah
1.	80	Barid ratab
2.	90	Barid ratab
3.	100	Haar yabis
4.	110	Haar yabis
5.	120	Haar yabis

to have higher IQ levels in comparison to subjects having dominance of *Barudat* in their temperaments.

### Fuzzification

The IQ levels of the selected subjects were used for fuzzification and their *Mizaj-e-Shakhsi* was determined again using fuzzy logic.

### Steps Followed

**Specify the Research Problem:** The research problem was to determine the membership value of each subject in the group of “intelligent people”. Subjects having greater membership in the group of intelligent people will have dominance of *Hararat* in the *Mizaj* in comparison to the subjects having lower membership.

**Determination of Fuzzy Sets:** Using common sense, we made three overlapping fuzzy sets of subjects according to their IQ levels. For “unintelligent”, the membership value remained 1 for IQ less than or equal to 89, then it

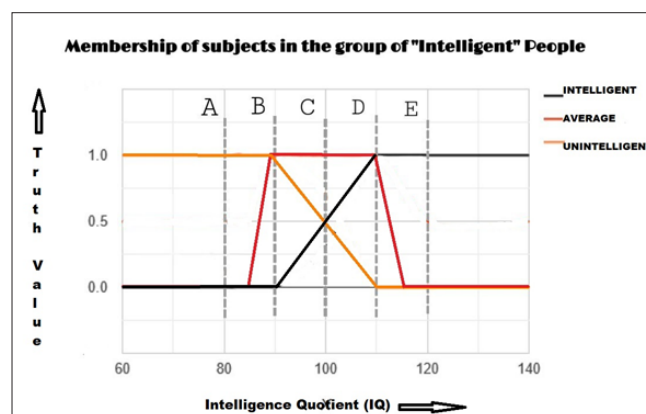
decreases to reach 0 at 110. The membership value for the “average” class remained 1 between 90 and 109 and then decreased at both ends until it reached zero at 85 and 115. The membership value for the “intelligent” class remained 1 for IQ  $\geq$  110. For lesser IQ levels, it decreased until it reached 0 at 90.

**Construct the fuzzy rules:** The following fuzzy rules were formulated based on the literature review:

- If a subject is unintelligent, then he has *mizaj-e-barida*
- If a subject has an average IQ, he belongs to *mizaj-e-Motadil*
- If a subject is intelligent, he falls in the *mizaj-e-Harrah* group

**Encode the Members:** For convenience, the selected subjects were coded. The subject having an IQ of 80 was coded as subject A, another having an IQ of 90 as B, the one having an IQ of 100 as C, the subject having an IQ of 110 as D, and the one having an IQ of 120 as subject E.

**Determination of Temperament:** According to fuzzy sets made in step b), Figure 1 has been plotted.



**Figure 1. Membership of Subjects in the Group of Intelligent People**

## Results and Discussion

By locating the IQ levels of all the five selected subjects, the membership value of each subject in the three fuzzy sets (step b) was evaluated and has been shown in Table 3.

Figure 1 can be interpreted for temperament assessment using fuzzy rules 1, 2, & 3 as follows.

**Table 3. Membership Value of Subjects**

Subject	Intelligence	Average	Unintelligence
A	0.0	-	1.0
B	0.09	1.0	0.9
C	0.5	1.0	0.5
D	1.0	0.9	0.09
E	1.0	0.0	0.0

**Table 4. Temperament Assessment of Subjects**

Subject	Hararat	Aetedal	Baroodat
A	0.0	-	1.0
B	0.09	1.0	0.9
C	0.5	1.0	0.5
D	1.0	0.9	0.09
E	1.0	0.0	0.0

Therefore, on applying Boolean logic, it was found that subjects A and B had *Barid* individual temperaments while C, D & E had dominance of *Hararat* in their temperaments (Table 2). On applying Fuzzy logic, it was found that subject A had *Haar mizaj-e-shakhsi*, subject B had *Mizaj-e-Barid ba mayil Baroodat*, subject C had *mota'dil mizaj*, subject D had *mizaj motadil ba mayil hararat* while subject E had *Haar mizaj* (Table 4). Hence this method of assessment is more specific and will be more useful for physicians in choosing preventive and therapeutic protocols.

### Conclusion

At the end of this study, it can be concluded that when individual temperament was assessed using a subjective parameter and the results were analysed using Boolean logic, the results were not that specific. On applying Fuzzy logic, the analysis became more precise and easier to use by physicians. This work also validates the concept of the presence of all *kaifiyat-e-arba* in the human body but the dominant one is called *Mizaj-e-shakhsi*.

### Ethical Approval

First half of the data belongs to thesis work of MD Unani submitted in 2010. The second method i.e. fuzzification of IQ levels for temperament assessment didn't require any interaction with the subjects. It was merely a desk job. So no ethical clearance or informed consent was required.

**Source of Funding:** None

**Conflict of Interest:** None

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