Mahavir Singh
Yasser Rafat *Editors*

Recent Developments in Acoustics

Select Proceedings of the 46th National Symposium on Acoustics

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Editors

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🕮 Springer

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Speech Hearing and Perception

Voice as a Parameter to Assess *Mizāj*

Huma Noor, Ferasat Ali, and Yasser Rafat

Abstract The need for this article is to strengthen the observational hypothesis and to find out the correlation between voice and Mizāj (Temperament). Voice is one of the most important physiological functions of the body which has some characteristic features for the differentiation of human body on the basis of Mizāj. Science needs continuous progression in every filed. Hence, many civilizations have been working to understand human body almost on every aspect of it, namely, anatomy, physiology, biochemistry, etc. to keep them alive and healthy. In search of the same, Unani scholars found out seven basic constituents of human body, where Mizāj comes on second number. There are some parameters to diagnose temperament; physiological function is one of them. Voice is a physiological function of the body and has various characteristics which are present in all the individuals according to their Mizāj. Mizāj could be either Ḥa*r* (hot) or Barid (cold) associated with passive properties Ruṭūbat and yubusāt (moistness and dryness). To see the history and course of Mizāj with respect to voice, ancient classical Unani literature was reviewed on this topic. Voice samples were collected, and time taken to speak a specific sentence in healthy female volunteers having different types of temperament was determined. With the help of the literature, it can be concluded that Ḥar Mizāj (Hot Temperament) has stronger characteristics than Barid Mizāj (Cold Temperament) as various previous works done on different parameters of temperament proved it. Here, with respect to voice, also results are in favour of the above conclusion. The results show significant difference between different temperaments with respect to time given to them to complete the sentence for the assessment purpose.

Keywords Unani · Voice · Temperament · Ajnās 'Ashara · Voice parameters

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Unani system of medicine has been one of the most accepted systems of medicine throughout the world until the introduction of allopath. The role of Unani medicine in the progress of medical sciences is well known. The government of India has been extending its support and funds for the multidirectional progress of Unani medicine along with other indigenous systems of medicine. India is the world leader in the Unani System of Medicine, having the widest network of educational, research, health care and pharmaceutical institutions of the system. The central council for research in Unani medicine (CCRUM), an autonomous system of government of India, under the ministry of health and family welfare is engaged in developing scientific research on various fundamental and applied aspects of Unani medicine. The growth of the council has attracted attention of the scientific community in both the country and abroad. It is heartening to note that WHO since the declaration of Alma Ata (1978) has been taking great interest in the revival of traditional medicine including Unani medicine.

1 Introduction

Unani medicine is based upon the theory of humours given by Hippocrates, which presupposes the existence of four humours in the body, namely, blood, phlegm, yellow bile and black bile. The temperament of an individual is expressed as sanguine, phlegmatic, choleric and melancholic according to predominance of the respective humours. The humours have their respective temperaments. Blood is hot and moist; phlegm is cold and moist; yellow bile is hot and dry; and black bile is cold and dry. Categorization of the subjects for any kind of study or research is the necessity of work for easiness. In various civilizations, human body and its functions were studied. The Greeks also studied the human body, with respect to its structure and functions. There are seven primary factors, viz., Arkān (Elements), Mizāj (Temperament), Akhlāt (Humours), A'ḍa (Organs), Arwāḥ (Life spirit, pneuma), Quwā (Faculty) and Afa'l (Action) which comes under Umūr Ṭabī'yya; no one can escape even a single from these seven fundamentals. Mizāj occupies second place among these factors. Human body is divided into four types of Mizāj (Temperament): Ḥar Raṭab (hot and wet), Ḥar Yabis (hot and dry), Barid Raṭab (cold and wet) and Barid Yabis (cold and dry). In these four qualities, two are active, Ḥararāt and Būrudāt (hotness, and coldness), while two are passive Ruṭūbat and yubusāt (moistness and dryness). Temperament is a vast term which encompasses all matchless traits of an individual. Every individual has a unique temperament that acquires distinctive characters. Specific temperament is inherited by every human being and encounters environmental assaults while interacting with transformed atmosphere in the second phase of life, i.e. post-natal. The significance of this predestined interaction results in acquired temperament. Every cell/tissue/organ possesses their own temperament and thus works distinctively. Functionally, organs of all human beings are comparable, yet their capacities are not identical. This functional variability results in physiological extent of variations [1].

2 The Human Temperament

About hundred trillion cells organised into different functional structures that work together as a single unit in a human body. Each cell, tissue, organ, and the whole body is governed by an innate power called Tabi'at which helps in Tadeel-e-Mizāj (homeostasis) through thousands of mechanisms for the preservation of the individual as well its species [2]. Every species has a specific temperament with the range that is confined in all the members of that species. So, human being also possesses Mizāj which is just equable to their required normal functions within a normal limit. Diseases are the result of alteration or derangement in the equable temperament. It is obvious if the temperament gets altered, and then the body functions get disturbed too.

3 Determination of Human Temperament

Ancient Unani physician described certain parameters in their manuscripts which are related to the morphological, physiological and psychological conditions of the human body. *Jalinoos* **(130–200 A.D)** mentioned five determinants of temperament, i.e. Head configuration, qualities of his sense of perception, how a person acts/reacts, reasoning power and function of the body [3]. **Rabban Tabri (770–850 A.D.)** had described the following five parameters: body colour, body hairs, muscles and fat, touch, and functions of five parameters: touch, complexion, hairs, physique and body function [5]. *Mohammad Bin Zakariya Razi* (**841–925 A.D.**) describes the following five parameters: complexion, physique, touch, functions and excreta [6]. *Jurjani* had described the following five determinants: touch, flesh and fat, state of organs, texture and colour and distribution of hairs, complexion [7]. According to *Arzani*, the determination of temperament was done through sense of touch, body muscles and fat, hairs and skin complexion [8]. *Ibn-e-Rushd* had described the following parameters: functions of organs, body or skin complexion and physique [9]. The most accepted one is that of *Ibn-e-Sina* (**980–1037 A.D.**), who had given ten parameters known as Ajnās 'Ashara. [10–12]. These are as follows: (**1**) *Malmas* (Touch): The hotness, coldness, softness and hardness of the body are to be checked by this parameter. The hotness of the skin is an indicator of hot temperament, whereas the colder skin is of cold temperament people. The quality of having soft and smooth skin indicates the moistness of temperament and vice versa. The combination of warm as well as soft skin is found in the hot andwet temperament. Those who are cold and moist in their temperament have cold and soft skin, while cold and rough skin points towards the cold and dry temperament [12]. (**2**) *Laḥm-wa-Shaḥm* (Muscles and Fat): The high amount of flesh in a person indicates heat while that of fat indicates cold. It is described in Unani literature that the excess of muscle is present in hot and moist temperament, while fat in excess amount is an indication of cold and moist temperament [13]. (**3**) *Sha'ar* (Hairs): Growth rate, i.e. rapid or slow,

hair colour, texture (smooth or rough), distribution and density are seen for assessing temperament [12]. (**4**) *Lawn-e-Badan* (Body Complexion): **Tabri** has mentioned the dominance of a particular humour (Khilṭ) being real cause of body colour and its diversion towards the skin at the time of embryo formation. If the Ṣafrā (yellow bile) is the dominating humour, then the body colour would be yellowish; blackish colour of skin is due to Sawdā (black bile), reddish colour is due to Dam (blood) and whitish colour is due to Balgham (phlegm) [4]. Climate and zones always have their impact on skin and hair colour. One should keep this factor also in mind while assessing their colour. That is why one should not expect a person of central Africa origin to have fair skin colour. (**5**) *Haiyat-e-A'ḍā* (Physique): Indicators of hot temperament are chest to be broad, veins and joints being prominent; muscles are well-developed pulse found rapid and strong, larger extremities and tall in height. Opposite qualities of it are found in cold temperament that is narrow and small chest, shorter extremities, slow and weak pulse, hidden joints and veins, shorter stature and excessive fat deposition [12, 14]. (**6**) *Kayfiyāt-e-Infi'al* (Responsiveness of organs): Reaction of organs as well as whole body is seen through this parameter. How the body reacts towards the states of hotness, coldness, moistness or dryness? Quickness of the body in reacting to a certain state tells about the preponderance of that particular quality in the body [15]. If an organ possesses hot temperament in itself, then considerable response will be given by that organ to the stimuli which is of hot quality. Similar reaction will not be given by the cold organ [16]. (**7**) *Nawm-o-yaqza* (Sleep and Wakefulness): Balanced sleep and wakefulness show equability of temperament, especially of the brain. Moisture and cold results in excessive sleep, while wakefulness is due to increased heat and dryness in the brain and body, and thus results in hot and dry temperament of a person. This is because the individuals of phlegmatic temperaments have excess of sleep and people with bilious temperament having less sleep [17]. (**8**) *Afa'l-ul-A'ḍā* (Functions of the body organs): Organs work with the pace as demanded by the physiology, and then they are considered to be normal. Similarly, assessment of perfection in somatic functions indicates balanced temperament. Acceleration of functions and actions of the body beyond physiological limits becomes indicative of hot temperament of the organ and vice-versa. [17]. (**9**) *Fuzlat-e-Badan* (Excreta of the body): The body excreta are one of the transparent windows in the diagnosis of temperament in both healthy and in diseased state. The body excreta are urine, stool, sweat, various body discharges, etc. The characteristics like colour, consistency, odour, taste, etc. help in assessing temperament as they are different in different individuals [1]. Preponderance of hot qualities in the body makes excreta acrid, strong or foul smelling and deep in colour and hence is an indication of hot temperament, while less smell and dull colour indicate coldness. Due to increased body metabolic rates, there is excess sweating which also signifies body hotness. (10) *Infi'ālāt-e-Nafsāniyya* (Psychic reactions): The nervous functions are taken into consideration through this determinant. This gives information about the psychological and mental setup of an individual. The intensity of anger, depth as well as persistence of sadness and sorrow, retentive power or memory status, decision-making power, over trust, confidence, insensitivity, attention/alertness, kindness and active habits all indicates the hot temperament. A cold temperament is characterised by the qualities opposite to

those mentioned before. If there is persistence of happiness, anger and good memory, dryness of temperament is the cause, while forgetfulness is due to excessive moisture [17, 18].

4 Voice as One of the Body Functions *(Afa'l-e-Badan)* and Temperament *(Mizāj)*

Afa'l-ul-A'ḍā' are important determinants of temperament. Unani physicians have always been trying to extract clues about the individual temperament by observing the functional state of the body. It is believed that the individuals having hot temperament have more rapid physiological functions because of the dominance of hotness which symbolises the active property in comparison to the body functions of the individuals of cold temperament. Classical Unani literature includes many quotes and philosophical facts about the voice in different temperaments, which shows that voice is an important body function and it had been used as a determinant of temperament in previous time. In this regard, while describing the qualities of hot temperament *Majoosi* mentioned that the signs of hot temperament with respect to voice are that they *talk rapidly* and *do not pause during conversation.* Similarly, regarding the cold temperament, it was mentioned that the individuals having cold temperament *owns a heavy tongue and pauses during conversation* [5, 9–11]. Unani Philosophers have mentioned that voice is one of the strong aspects among the functions which can be used for characterisation of the temperament. *Strong and loud voice (within normal range), frequent speaking pattern, can speak for long*, short-tempered, rapid body movements, rapid blinking of eyes are all in support of hot temperament [5, 9, 19].

5 Voice in Unani System of Medicine

The following quotations are mentioned in Unani literature, showing voice characteristics with respect to temperament as mentioned above.

(1) "….one whose temperament is hot, the voice of that person will be loud or high and clear….." *(Kamil-us-Sana)* [5]. In addition, it is also mentioned in the literature that in wet temperament *(Raṭab Mizāj)* the person will be unable to make his/her speech louder. In dry temperament *(Yabis ul Mizāj)*, voice would have harshness; if this kind of a person is asked to make his/her speech loud, its resemblance will be with a bird whose name is *tehu* [5, 9–11].

(2) *RAZI* "……loud voice indicates hot temperament while soft and low voice is the indication of clod temperament….." At another place, Razi has mentioned that "….fluent speech shows the hotness of the temperament…." *(Kitab-ul-Mansoori)* [6].

(3) **GHULAM HUSAIN KANTOORI** "……when a human body has cold temperament then the walking style of such a person is lazy, poor intelligence, he will own a heavy tongue which will make him to take pauses while conversation, his activities will be slow and he will feel a burden to do any work……" [10].

(4) **HKM.AZAM KHAN** "……hotness makes voice loud while coldness makes it dull or low. Dryness makes voice clear or in other words harsh, while wetness makes it quite unclear and soft….." *(Akseer-e-A*A'ḍā*m)* [20].

(5) **IBN RUSHD—"…**if the temperament of lungs is equable/moderate (moatadil), then the respiration is neither too fast nor too slow but it is normal and the voice of such a person is also moderate, neither too high (loud) nor too low (dull)……" *(Kitab-ul- Kullīyat)* [5, 6, 9].

The elaboration in support of the above quotes is given in literatures with some detail: Soft and low voice indicates wet temperament, while loud, clear and sharp voice indicates dry temperament. Person having wet temperament of lungs; if they start speaking with little efforts, then their voice would not be clear due to wetness of the lungs which disrupts the movement and action of trachea because of the phlegmatic secretions. Dry temperament of lungs helps to produce clear voice. Only hotness and coldness are not responsible to make voice high and low. The anatomy of trachea is also responsible for this, so if lumen of trachea is wide then it will help to produce high pitch, and the narrow lumen is responsible for low pitch quality. Coldness and hotness of trachea are temporary and come under the influence of lungs; hot temperament of lung which is given by *Ṭabī'at* widens the trachea, because hotness dilates and widens the lumen. Cold temperament of lungs contracts the lumen of trachea because *Burūda*t has the property to contract the lumen. Soft voice is due to wetness of trachea, and rough voice is a result of dryness of trachea [5]**.**

According to *Ali Ibne Abbas Majoosi,* there are five parameters to diagnose the individual's temperament. One of them is body function: Under this parameter, he stated that *Ḥar Mizāj* person's speech will be fluent with lesser pause, and speech would be loud and clear. *Barid Mizāj* person's speech will be less fluent with more number of pauses [5]. If the functions of the body are slower than normal, it indicates coldness. Rapidity in functions of the body indicates hotness. There is a strong relationship between movement and hotness (Ḥarārat) [12].

6 View of Voice in Ayurvedic System of Medicine

Unani as well as Ayurvedic system of medicines is based on ancient principles. So, there is similarity between Ayurvedic and Unani medicine as they share similar ideas based on the basic principles. As in Unani System of medicine there are four humours in the body which are responsible for assigning the unique temperament to the person, similarly in the Ayurvedic System of medicine there are three kinds of humours, these are Vata, Pitta and Kapha which are responsible for different body

types [15]. They have described the voice features according to the type of humours which are as follows:

i. **Vata**—Voice of people having vata as the prominent humour among all the tridoshas have a dry, hoarse and high-pitched or loud voice. They are fast talker, jumps from topic to topic with erratic rhythm and focus. Vata is very sensitive to excess noise.

ii. **Pitta**—People having pitta as the major humour have a loud and sharp voice. They are well focused, persuasive, dominates conversation, argumentative, challenging and due to their impatience they tend to finish other people's sentences.

iii. **Kapha**—Those who have kapha as the dominating humour in their body, they have a moist, soft, deep and calm voice. Their voice is sweet and melodious which is pleasant to listen.

Ayurveda shares the Vedic concepts like Prana, Panchakoshas, Chakras, Pancha Mahabhootas, Mind and nadis. They have described four types of Voice from gross to subtle—Vaikhari, Madhyama, Pashyanti and Para. Sound occurs in four levels and dimensions. These four levels of sound relate to frequency, fine quality, perceiving level and power as follows:

1. **Vaikhari**—The coarse voice which is the ordinary, audible and material sound. It is this level of Nada that is used in singing.
2. **Madhyama**—The mental sound with even little practice of music or Yoga. A common man can hear, understand and feel this level of Nada. To understand the concept of shruti, one should practice inner awareness to reach this level.
3. **Pashyanti**—The visualised sound.
4. **Para**—The magnificent sound [21].

On the basis of octaves and registers for voice, Ayruveda has defined six limbs or qualities of good voice. A balanced voice in all the three octaves and registers is one which is well heard (loud enough), well tuned and richly textured and smooth and that which is not harsh is sweet and harmonious. These six limbs are as follows:

i. *Shravaka*—Voice which is loud enough, well heard by the audience even at a long distance when necessary is called *shravaka.* Even today the importance of such voice is not less, but the advanced sound projection technologies are available nowadays which has minimised its use.

ii. *Ghana*—Voice which is very pleasing and tuned. This voice has a rich texture (especially which has a 'bass' effect).

iii. *Snigdha*—The voice which sounds smooth, soft and sweet that which is not harsh is *snigdha.*

iv. *Madhura*—Musical and pleasant voice is called as *madhura.*

v. *Avadhanavan*—A voice that is sweet and harmonious, a voice which knows how to tune itself perfectly is termed as *avadhanavan.*

vi. *Tristhanashobhi*—This voice is properly balanced in all the octaves and registers. The quality of this voice has stability in all three registers.

Sangeet Ratnakar: Sharangadeo in his text 'Sangeet Ratnakar' gives more than 30 qualities of the voice. He says that basically voice is of three types, which bear the qualities of *kapha*, *pitta* and *vata.* Further, he says, they can be combined into infinite qualities of *mishraka* (combination) like ***Khahula***—derived from *kapha*—having qualities of *snigdha*, *madhura* and *komala,* i.e. soft, sweet and tender. This type of voice in lower (*mandra*) and middle (*madhya*) octave is called as *adilla.* ***Narata***—derived from pitta—has qualities of g*hana*, *gambhira* and *Lina* (*asphuta*), i.e. rich textured, having good bass effect and humble. ***Bombaka***—derived from *vata*—has qualities of *nihssara*, *kathora* and *tara,* i.e. dry, harsh and high-pitched. ***Mishraka*** is any combination of the above three qualities [22].

The various concepts about the voice and its qualities in different traditional sciences, i.e. Unani, Ayurveda and other sciences, have been reviewed in the previous sections. The whole literature was compared and deeply analysed to look at the base for an experiment. After going through theories and concepts of the different traditional sciences, it was observed that the uniqueness of Unani system of medicine is its theory of temperament which is based on four qualities Ḥar, Barid, Raṭab and Yabis. From the above-compiled literature, it can be easily understood that the voice is an important parameter to assess temperament of a person. It has a lot of characteristics on which experimental and scientific researches should be done for the benefit of human being and such an attempt is being done by this study.

7   Methodology

A meeting was held by Institutional Ethics Committee (IEC), Ajmal Khan Tibbiya College, Faculty of Unani Medicine, Aligarh Muslim University, Aligarh on 21 June 2016, with the reference to dispatch number 215/FUM. Prof. Qayyum Husain was the chairman along with other members of the committee. The committee did not find anything objectionable/unethical as the study was totally noninvasive and did not harm any kind of ethical issue. The proposal is therefore awarded ethical clearance. Voice parameters were analysed scientifically and experimentally. In the study presented here time taken to read a sample sentence chosen as one of the parameters to assess the quality of voice among different temperaments. For this purpose, a study is carried out on healthy volunteers. Firstly, all the volunteers were categorised into four groups by assessing their temperament through a well-designed pro-forma which includes all the ten determinants essential for temperament differentiation. The criteria to assign volunteer, a specific temperament, were based on scores. The pro-forma and consent form shown in Table 4. Then, the study was done by cross-checking their temperament on the basis of their voice qualities as mentioned in literature. A sample of 69 females with no history of any voice disorders was taken. A self-made sentence was recorded (two-time repetition) in an acoustically treated room by condenser microphone and then analysed for different voice parameters by PRAAT software. The sentence was made according to the points of articulation for getting all the possible physiological human sounds during conversational speech.

After obtaining data, it was statistically interpreted by applying unpaired t-test, and significance was noticed among different groups of temperaments.

8 Statistical Analysis of Time as One of the Parameters of Voice to Assess Temperament

The data regarding time taken by female volunteers of different temperaments to speak a sentence is given below:

Among 69 females, there were 19 bilious, 23 sanguine, 22 phlegmatic and 5 melancholic, respectively, as shown in Table 1.

Table 2 shows mean and standard deviation of the time variation among different groups. Significance between groups is shown in Fig. 1.

Mean and S.D. of time in bilious, sanguine, phlegmatic and melancholic volunteers were 4.54 ± 0.43, 4.30 ± 0.52, 5.19 ± 0.74 and 4.80 ± 0.48, respectively.

The above table shows the significance of time in different temperaments. The result shows that there is statistically no significant difference between bilious to sanguine, bilious to melancholic, sanguine to melancholic and phlegmatic to melancholic, as time (which shows the rate of speech of the volunteers) taken by volunteers when compared was very much close to each other. But the difference is highly significant in case of bilious to phlegmatic and sanguine to phlegmatic because as mentioned in the literatures the people of phlegmatic temperament speaks slowly, so

Table 1 Number of females in different groups of temperaments

Sex	Bilious	Sanguine	Phlegmatic	Melancholic	Total
Female	19	23	22	05	69

Table 2 Mean and standard deviation of time in females of different temperaments

TIME	Bilious	Sanguine	Phlegmatic	Melancholic
Mean ± S.D	4.54 ± 0.43	4.30 ± 0.52	5.19 ± 0.74	4.80 ± 0.48

Fig. 1 Significance of time in different groups of temperament

Significance of Time In Females of Different Temperaments

■ Bilious ■ Sanguine ■ Phlegmatic ■ Melancholic

4.54 4.3 5.19 4.8

Time (Sec)
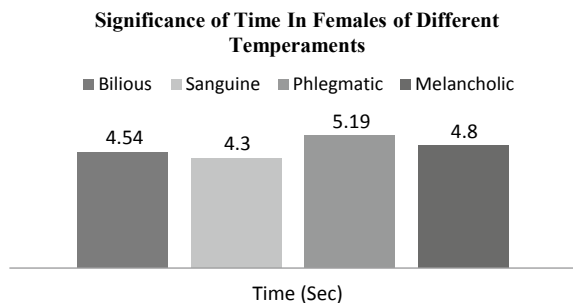
Table 3 Comparison of time to check the significance between different groups of temperament

Comparison between	t-value	p-value	Significance
Bilious to Sanguine	1.533	0.1332	Insignificant
Bilious to Phlegmatic	3.396	0.0016	Highly significant
Bilious to Melancholic	1.188	0.2475	Insignificant
Sanguine to Phlegmatic	4.676	0.0001	Highly significant
Sanguine to Melancholic	1.957	0.0612	Insignificant
Phlegmatic to Melancholic	1.125	0.2711	Insignificant

the time taken by them was longer in comparison to others. The result is in accordance with the logic-based theory (Table 3).

Consent of The Volunteer *(The participant should complete the whole of this sheet himself/herself)*

Title of experiment: **A study to assess Different Temperaments Through Voice Analysis**

Name of the Experimenter: **Huma Noor**

Please tick boxes

1. I confirm that I have read and understood the information sheet for the above experiment.
2. I have had opportunities to ask questions and my questions have fully been answered.
3. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason.
4. I have received enough information about the experiment.
5. I agree to take part in the above experiment.

This experiment has been explained to me to my satisfaction, and I agree to take part. I understand that I am free to withdraw at any time.

_____   _____   _____

Name of the Participant   Date   Signature

I have explained the experiment to the above participant and he/she has agreed to take part.

Table 4 Mizāj assessment pro-forma

Parameter (Evidence)	Damwi (Sanguineous)	Balghami (Phlegmatic)	Ṣafrawi (Bilious)	Saudāwi (Melancholic)
MORPHOLOGICAL				
Skin texture/temperature Score:01	Warm & Smooth ☐	Soft & Moist ☐	Hard & Hot ☐	Rough & Cold ☐
Complexion Score:05	Reddish ☐	Whitish ☐	Pale ☐	Blackish ☐
Body built Score:5	Muscular ☐	Fatty ☐	Moderate ☐	Lean & Thin ☐
Texture of hairs Score:0.5	Thick & Lusty ☐	Thin & Smooth ☐	Curly ☐	Straight ☐
Growth and distribution of hairs score:0.5	Rapid, Average ☐	Slow, Scanty ☐	Moderate/profuse ☐	Excessive ☐
Colour of hairs Score:0.5	Blackish ☐	Brownish ☐	Yellow-Black (Golden) ☐	Black & White (Mixed) ☐
PHYSIOLOGICAL				
Urine Score:01	Moderate in Quantity ☐	White, More in Quantity ☐	Yellow, Less in Quantity ☐	Turbid, Less in Quantity ☐
Tolerate well Score:01	Dryness ☐	Summer ☐	Cold ☐	Dampness ☐
Remains well in Score:03	Spring ☐	Summer ☐	Winter ☐	Autumn ☐
Appetite Score:01	Strong Appetite (Can Skip a meal) ☐	Less Appetite (feel heaviness after eating) ☐	Strong Appetite (Can't Skip A Meal) ☐	Irregular Appetite ☐
Thirst Score:01	Average (++) ☐	Poor (+) ☐	Increased (++++) ☐	Low (+++) ☐
Digestion Score:01	Average ☐	Slow ☐	Strong ☐	Irregular ☐
Movements and activities Score:03	Average in Physical Activity ☐	Dull Laziness ☐	Brisk, Hyperactive ☐	Less ☐
Sleep Score:01	Average ☐	Excess ☐	Disturbed Sleep ☐	Insomnia ☐
PSYCHOLOGICAL				
Dream Score:01	Blood, Red Objects ☐	Water, Snow ☐	Fire, Yellow Objects ☐	Black, Fearful Dreams ☐
Anger /joy Score:01	Comes On Easily & Easily Lost ☐	Comes On Hardly ☐	Frequent, Severe & Persists For Long ☐	Infrequent But Persist ☐
Response to external stimuli in adverse condition Score:01	Aggressively Respond ☐	Weekly Respond ☐	Bravely Respond ☐	Cowardly Respond ☐
Decision taking power Score:01	Take Boldly ☐	Hesitate in Taking Decisions ☐	Take Quickly ☐	Afraid in Taking Decisions ☐
Memory Score:01	Good, Retention Also Good ☐	Not Good ☐	Good, But Can't Retain For Long ☐	Can't Learn Easily But Excellent Retention ☐

Huma Noor

——————   —————   —————

Name of the Experimenter   Date   Signature

Name of the volunteer ………..Father's name …….. Age….. Gender………. Height …..

Weight ……….. Pulse …… B. P ……. Occupation……. Mobile no :…… Address ………..

Total Collection:——— Damwi:——— Safrawi:——— Balghami:——— —— Sawdāwi:———

Diagnosed Temperament:——— Signature of the Investigator:———

9 Conclusion

This study is done to ascertain some updated parameters to diagnose the human temperament with respect to voice. Those parameters of voice were taken into consideration which are measurable and can be obtained digitally with maximum ease. At the same time, it was also an objective that these all parameters must be very precise and easily applicable; also they must be free of bias and errors. Human temperament is a very unique aspect of Unani system of medicine. A false diagnosis of temperament will be misleading or may be of no use as it is not helpful in curing diseases or bringing back the misbalanced temperament to the equable temperament. For this, above result of the digital examination of voice is giving direction to go to quantitative aspect of voice instead of qualitative which is more correct and validated.

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Neuro-Physiological Correlates of Voice Onset Time in Kannada and Tamil Speaking

T. Jayakumar and Vijay Kumar Narne

Abstract Voice Onset Time (VOT) refers to the time difference between two events—one articulatory and the other laryngeal. VOT is measured as the time difference between the onset of the burst (articulatory event) and the onset of vocal fold vibration (laryngeal event) Lisker [14]. The cross-linguistic variation with respect to voicing perception is more in multilingual countries like India. For example, in Tamil language, there is no good distinction between voiced and unvoiced stops; however, in Kannada, Telugu, and Hindi, there exists a difference. To verify the cross-linguistic difference, the behavioral response for VOT continuum in native Kannada and Tamil speakers, and the neuro-physiological changes for VOT continuum in native Kannada and Tamil speakers were taken as objective of the study. Two groups of subjects were participated in the study. Group I consisted of ten male Kannada speakers in the age range of 20–35 years. All the subjects were native speakers of Kannada language, and they belong to Mysore dialect and they are fluent speakers in Kannada only. All though they were exposed to English, they were not fluent speakers of English or Hindi. Group II consisted of ten male Tamil speakers in the age range of 20–35. All the subjects were native speakers of Tamil language, and they belong to Coimbatore/Chennai dialect and they are fluent speakers in Tamil only. Although they were exposed to English, they were not fluent speakers of English or Kannada or Hindi. From the naturally recorded speech sounds, /da-ta/ continuum was created using copy past synthesis method. This continuum had 10 tokens. Using this stimulus, behavioral identification curve was generated. Also electrophysiological, N100 potential was recorded using Neuro-Scan instrument (Compumedies, AUS) with five tokens, which covers the entire dynamic range of the /da-ta/ continuum. The recording was done with 16 channels. The behavioral result showed there was difference between Tamil and Kannada languages; however, electrophysiological results showed that there was a change with N100 latency with changing VOT but there was no language

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difference found. The author concluded that N100 may not be an effective measure to indicate to represent the voice /voiceless categorical perception. May be higher potential might give better information.

1 Introduction

The term voice onset time was coined and described by Abramson and Lisker [2]. Voice Onset Time (VOT) refers to the time difference between two events—one articulatory and the other laryngeal. VOT is measured as the time difference between the onset of the burst (articulatory event) and the onset of vocal fold vibration (laryngeal event) Lisker and Abramson [1]. In case of voiced stop consonants, voicing starts before the onset of the burst, and hence VOT is negative or leads VOT. In case of unvoiced stop consonants, voicing starts after the burst, and hence VOT is positive or lags VOT. It is known that VOT is one of the cues in the perception of voicing in stop consonants Liberman et al. (1982), [3], Shankweiler (1961), Williams [4, 5], Savithri et al. [6], Satya [7]. However, the change in the percept from voiced to unvoiced stop consonant depends upon the classification of stop consonants in a language. For example, in English, the percept changes at +20 ms VOT, whereas in Kannada and Telugu, the percept change at lead VOT and in Tamil the voicing contrast is negligible in spoken language.

Kannada language is one of the important Dravidian languages of India, spoken majorly in the state of Karnataka. Kannada language is native language of people who live in the State of Karnataka, India. Their population is roughly 38 million, making it the 27th most spoken language in the world. It is one of the scheduled languages of India and the official and administrative language of the state of Karnataka (http://www.en.wikipedia.org/wiki/Kannada_language), and Tamil is a major Dravidian language spoken by Tamil people of the Indian subcontinent. It has official language status in the Indian state of Tamil Nadu and in the union territory of Puducherry. Their population is roughly around 66 millions of people. (http://www.en.wikipedia.org/wiki/Tamil_language).

Few researchers investigated the neural encoding of VOT in the brain through auditory evoked potentials. Sharma and Dorman [8] measured cortical auditory evoked potential (CAEP) in conjunction with behavioral perception of /da- ta/ continuum. Neuro-physiological correlates of VOT encoding were investigated using the N1 CAEP which reflects sensory encoding of stimulus features, and they found distinct changes in N1 morphology which was related to VOT encoding. For the stimuli that were behaviorally identified as /da/, a single negativity (N1) was apparent; however, for stimuli identified as /ta/, two distinct negativities (N1 and N1') were apparent. This difference in N1 morphology seen in the region of the /da-ta/ phonetic boundary appears to provide neuro-physiological correlates of categorical perception for VOT.

Since speech perception abilities are altered by experience with a particular language and the lack of experience with a particular phonetic contrast has the effect