IS IT POSSIBLE TO QUANTIFY THE ARABIC LANGUAGE? A FUTURE VIEW OF COMPUTERIZING LANGUAGE WRITING AND PRONOUNCING

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Abstract

This paper explores the foundations of quantifying the Arabic language laid by Al-Khalil ibn Ahmad Al-Farahidi (d. 175 AH) through his seminal works on the dictionary Al-Ayn and establishing the science of Arabic prosody. Using an inductive, comparative methodology, the paper analyzes Al-Farahidi's techniques to uncover his principles of quantification focused on achieving stability, objectivity, generalization, analogy, and accurate measurability. Al-Farahidi pioneered the systematic classification of Arabic lexicon based on the number of root letters and mathematical permutations. His dictionary covered all possible Arabic words systematically derived from two to five root letters. He also devised a formal prosodic system rooted in the basic units of vowel motion and stillness to quantify Arabic poetry. Al-Farahidi set clear objectives, defined the subjects of quantification, categorized lexical and prosodic types, formed quantitative relational equations, and highlighted exceptions. He also employed logic, objectivity, and experiential evidence. The principles extracted from Al-Farahidi's quantitative methods can enrich Arabic language studies today and align them with modern scientific techniques. Investing in Al-Farahidi's methodology can enable progress in linguistics through computational techniques. The paper concludes that Al-Farahidi's founding techniques contain the blueprint for quantifying the qualitative dimensions of the Arabic language and transforming linguistic research.

Keywords: Quantification, Arabic, Al-Farahidi, Dictionary, Prosody

INTRODUCTION

Languages and humanities are facing some challenges that hinder its progress, on top of these challenges is comparing it with natural sciences, then it is accused of complication, individuality, non-objectivity and being not subject to repetition, generalization, analogy and logic, (Kandilgy 1999: 51, 55) which is greatly opposing the basics of scientific research as all its definitions (Aldamin 2007: 17) confirm stability, objectivity, accuracy, generalization and analogy (Dewidry 2000: 32). Here comes the judgement clear that humanities sciences don't reach the level of natural sciences (Aldamen 2007: 21), because "generalizations in humanities sciences aren't equal to generalizations in natural sciences'', because the research is a process of customize the things, concepts and symbols for generalization (Badr 1994, 22). The human phenomenon differs from the natural in the "difficulty of quantification, using words of manner then the difficulty of forming accurate rules and the researcher is an integral part of the phenomenon that he searches for'' (Alkhouly 2014: 59). It has "various features, dimensions and characteristics that lead to great incapability of its description trials'' (Alkhouly 2014: 59). It opposes the modern scientific thinking that goes to quantification. The modern scientific progress moved the focus of interest from concrete observation to converting the qualities into quantities and expressing of sensory facts in numerical numbers and viewing has become translated into graphs and statistical tables (Dewadry 2000: 31, 32).

The crisis of humanities sciences is not in itself, it is sciences that had characteristics and features as natural sciences. But its problem is with the tools and methods used to study it that don't consistent with its properties then comes the judgement of its non-objectivity and non-stability.

The methods of research in the humanities sciences are too much (Alrabey 2012: 171,181). It all depends on top, on the language (Zakareya 1978: 5). The descriptive method that comes on top of methods of research in humanities sciences (Obaidat 1984: 187,188) can't be without the language. As there are several linguistic levels, usage levels (Omar 2009: 155) for a lot of dictionary vocabulary and different levels of language proficiency of researchers, there is a difference in describing the humanities phenomena which leads to individuality, non-objectivity, non-repetition, generalization and mensuration that humanities sciences are accused of (Kandilgy 1999: 51,55).

Research is a human instinct since birth. His search and exploration (Abd Elkerim, 1983, 4, 5) journey starts by touch. In each stage of research, he wants to express. There is no other way but language to express the abstract which is the domain of humanities sciences, while the natural sciences domain is the concrete that gives it stability and generalization (Abdel-Karim 1983: 12) The concrete doesn't change in itself nor Infront of the eye except by external stable effects also Infront of the eye, it can be easily isolated in natural sciences (Abdelkerim,1983,15) and no one can deny, it is clear -to a great extent- to the experimental method that doesn't suit all humanities sciences (Kandilgy 1999: 52).

The difference is not in the human phenomenon itself, if it was concrete, it would be stable but the difference comes from different descriptions, each using his dictionary which differs from one to the other. The phenomenon differs with different vocabulary which led to the appearance of formularization method. It interprets the phenomenon using the knowledge related to it, using forms, equations and symbols. It depends on numbers, signs and mathematical reactions (Diab, 2010, 668) this simplifies the terms, definitions and big texts. It is transferred to numbers and symbols that are logical, small and accurate in relating to trace repetition, similarly and mixing. There is also generalization, abstraction, stability, logic and objectivity (Diab 2010: 668). So comes the quantitative dimension that the modern technology is based on. It helps in "expressing scientific facts accurately as the difference is great in accuracy between saying iron is hot and the temperature of iron is 350 degrees for example" (Zakareya 1978: 43). So, on that base, the researcher finds that the progress of humanities sciences is based not on it but on its research tools, language on top which is used by researchers to carry their human discoveries to others. Their language and expressions should be stable and stubborn away from individuality, exaggeration and lack of accuracy in description.

The Arabic library is full of lots of linguistic dictionaries. Each one differs in its objectives though they all have the same objective on top which is protecting God's book and it's language (Al-Farāhidī: 1, 8). On top of these documents was كتاب العين *Al-ʿīn* (eng. eye) book   for Al-ḫalīl Ibn Aḥmad Al-Farāhidī (175h). Before him, Arabs didn't know the Arabic dictionary, but before him was only simple trials to collect language but it didn't reach the level of dictionary as it is known now (Alkhatib 1994, 1, 28). Al-ḫalīl Ibn Aḥmad Al-Farāhidī (175 h) though being the first to be categorised as linguistic Arabic dictionary, the research tools that are called for today by specialists were there in his method. He achieved limitation, preserved quantity, was away of individuality and put basics for mensuration, logic as well as accepting other opinions which are the focus of scientific way today (Al-Farāhidī 2001: 24).

These basics might have come to Al-ḫalīl by accident if it was only in one research case but This is what the research aims to achieve by studying the approach of Al-ḫalīl (d. 175 AH) in his classification of the dictionary of *Al-ʿīn*, and his development of the science of prosody.

The multiplicity and abundance of phenomena is no longer a problem today with the multiplicity of modern preservation methods and the various technical capabilities. The problem became latent in limiting these phenomena and in the possibility of quantification them (Al-Farāhidī 2001: 24) and describing it by a word that differs in meaning from one to the other, so the objectivity, mensuration, generalisation and abstraction are achieved. Then the door for modern technology is opened as it doesn't work except by these things, therefore sciences develop.

The researcher believes that quantification is the base of solving the problem of humanities sciences, there won't be quantification except by quantificated language which Al-Farāhidī (d. 175h) started in *Al-ʿīn* and prosody that he made.

Proceeding from that was the idea of research to study Al-ḫalīl method of research in *Al-ʿīn* (eng. eye) and prosody as well as his bases of quantification to enrich sciences. This will be through two chapters preceded by an introduction clarifying the idea of the research and followed by a conclusion showing the complete bases of quantification methodology for Al-Farāhidī (d. 175h):

1. Dictionary quantification for Arabic vocabulary

2. Vocal quantification in poetry prosody

There are several reasons for choosing this topic, one of them is that it was never discussed before except for concern with dictionary industry. (Moajam 1985: 46, 50), the mathematical dimension of prosody, (Mostagir 1980) which is completely different from this research, as the objective is research methodology and its vocabulary to achieve quantification.

The inductive and comparative research methodology were when the researcher notes how did Al-ḫalīl (175h) achieve his settled objectives in *Al-ʿīn* and prosody, putting rules and giving evidence, comparing the results from both sciences to reach one base for quantification methodology by Al-ḫalīl (175h) writing and speaking.

## 1. Dictionary quantification for Arabic Vocabulary

(1)

Al-ḫalīl Ibn Aḥmad categorised his dictionary Al-ʿīn to collect in its Arabs words and vocabulary. But the collection wasn't random or relative, it was quantified. That is clear from the first word in the introduction of his dictionary "This is what Al-ḫalīl Ibn Aḥmad wrote -God rest his soul- from letters a, b, c, d " (Al-Farāhidī, 1, 47) he put his hands on numbering that ends and added " these are the letters that composed Arabic successively, it is 29 letters " (Alfarahidi, 158) to achieve his objective by it, which is to collect Arabs language without missing anything. The alphabet is a quantity that ends. hat comes out of it is a quantity that ends, this is a clear picture in Al-ḫalīl mind and his book was "the orbit of the Arabs' speech and expressions, and nothing departs from it. He wanted Arabs to know from it poetry, dioms, speeches and nothing go out of it" (Al-Farāhidī, 1, 47) Al-ḫalīl (175 h) objective wasn't collection only as the trials before him (Al-Farāhidī, 2016: 26), but the finite combination which is what modern technology working on.

(2)

After putting his hands first on the letters as a first stage, he starts categorization as a second stage, he says "Arab words are based on four categories: on the bilateral, triple, quadruple, quintet.' (Al-Farāhid, 1,48) And he does not leave the matter until after his quantification, he says: "Arabs don't have structure in nouns or verbs more than 5 letters, any letter more than the 5 letters is an excess structure, not from the root of the word" (Al-Farāhidī, 1, 49). Here he closes the equation of forming the words on 5 main letters as maximum, achieving repetition and generalization as a characteristic

of scientific research that cares about investigation and "common behavior models between things and events that are observed thematically" (Dawidry 2000: 70). The structure of verbs or nouns is not more than 5 main letters regardless of the type of these letters. The theory can be generalized and repeated with all alphabetic letters, nouns and verbs, the following figure shows that
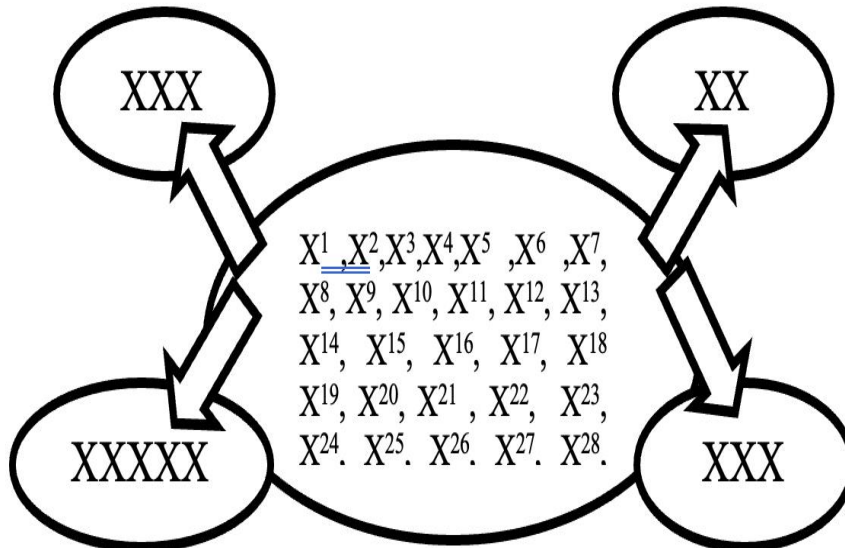
The quantization here is verified by the following equation:

- (W) = (XX) /(XXX)/(XXXX)/(XXXXX)

- $(X)=(X^1:X^{29})$

(W) Means the word generally and (X) means the alphabetical letter from X1 to X 29.

(3)

Al-ḫalīl (d. 175h) creates a mathematical equation, through which he ensures that no word is deviated from this sum. He confirmed this saying "nothing go out of it, … nothing is irregular of it". (Al-Farāhidī, 1, 47) This equation is based on his 4 categories that he mentioned, bilateral, triple, quadruple, quintet. He says, I know that "the bilateral word has two faces, such as: qad, daq, shada, … and the triple word is conjugated on six faces: ḍaraba, baraḍa, ḍabara, baḍara, raḍaba, brabaḍa, and the quarterly word has twenty four faces, we write what is used and ignore the rest, as: ʿaqrab, ʿabqar, ʿabqar, ʿabraq, ʿarqab, ʿarbaq, qaʿrab, qab ʿar, qabraʿ, qarb aʿ, raʿqab, raʿbaq, raq ʿab, raqba ʿ, ranqa ʿ, rab ʿaq, ba ʿqar, ba ʿraq, baq ʿar, baqraʿ, bar ʿaq, barqaʿ, Abkr, and the quinary word has 120 faces, a few are used and a lot are cancelled (Al-Farāhidī, 1,59).

From the previous text, the highest level of quantification is clear by Al-ḫalīl Ibn Aḥmad (d. 175h). He doesn't want to be origin in language, that's why he made a symbolic mathematical equation that can be applied on all Arabic alphabet with no irregulars. This guarantees the existence of all linguistic origins in his categorization which is his final step in his book first stage, the limits of plurals which is a main stage in making his dictionary.

He achieved quantification then generalization, on logic, stability and mensuration, he gave examples that can be followed (qad, šadda, ḍaraba, ʿabqara, safargal) as follows:

- **XY**=2×1=**X**+(y)+**Y**+(x)=2

- **XYZ**=3×2= **X**+(yz+zy)+**Y**+(xz+zx)+**Z**+(xy+yx)=6

- **XYZA**=4×6=**X**+(yza+zay+ayz+yaz+zya+azy)+**Y**+(xza+zax+axz+xaz+zxa+azx)+**Z**+(xya+yaz+ayx+xay+yza+axy)+**A**+(xyz+yzx+zxy+xzy+yxz+xyx)=24.

- **XYZAB=**5×24=**X**+(yzab+zaby+abyz+byza+yzba+zayb+abzy+byaz+yabz+zbya+ayza+bzay+yazb+zbzy+ayaz+bzya+ybza+zyab+azby+bayz+ybaz+zyba+azyb+bazy)+**Y**+(xzab+azbx+zabx+bxza+xzba+azxb+zaxb+bxaz+xabz+axbz+zxba+bzax+xAzb+axzb+zxab+bzxa+xbza+abxz+zbxa+bazx+xbaz+abzx+zbax+baxz)+**Z**+(xyab+yabx+abxy+bxya+xyba+yaxb+abyx+bxay+xaby+yxba+ayxb+bayx+xayb+yxab+aybx+baxy+xbya+ybxa+axyb+byaz+xbay+ybax+axby+byza)+**A**+(bxyz+xyzb+yzax+zbxy+bxzy+xybz+yzxa+zbyx+bzyx+xbzy+yxaz+zyxb+bzxy+xbyz+yxza+zybx+byzx+xzby+yaxz+zxyb+byxz+xzyb+yazx+zxby)+**B**+(xyza+yzax+zaxy+axyz+xyaz+yzxa+zayx+axzy+xazy+yxaz+zyxa+azyx+xayz+yxza+zyax+azxy+xzya+yxza+zxya+ayxz+xzay+yxaz+zxay+ayzx)=120.

Isn't that what some scientists say today, that this science didn't start except with mathematics (Zakareya 1978: 46) and that "the accuracy in natural sciences laws goes back to its mathematical picture because it can be easily measured by quantity (Saghir 2013: 37).

(4)

Al-ḫalīl (175h) collected with these equations all what is represented in Arabic without missing anything, it's logical and can't be changed by time or people. Then he will clarify the meaning of each user resulting from these mathematical equations. He says at the beginning of each unit (the bilateral unit: ʿin with *qāf* and what before is denied (ʿaqa, qʿ) (Al-Farāhidī, 1, 62)*, (the unit of ʿin and ẓāʾ).* That means that what is used according to him has a meaning while what is ignored equals zero, the following equation clarifies this:

Unused= 0   Used = 1: ... ≠ 0

It means, that if the word has a value other than zero, it means it is used. While if its value is zero, it means that it is not used and ignored. So his dictionary included the "clear and strange Arabic words" (Al-Farāhidī 1, 60).

(5)

Al-ḫalīl Ibn Aḥmad (175h) was careful about an important issue relates to the validity of imposing all hypotheses on its equations, in what is related to what is used and not used. He says: "the ع ʿin doesn't harmony with the ح ḥāʾ in one word because of its pronounciation except if we made a verb from two words such as حي على ḥai ʿala (Al-Farāhidī, 60)1), which means that this construction in one word is not from the words of the Arabs. They can only be gathered in a word of two words, it can have the symbols as following:

One word # ʿin + ḥāʾ

One word = two words = ʿin + ḥāʾ

(6)

As he cared about the maximum of words, he cared also about its minimum, he says: "the noun is not less than 3 letters" (Alfarahidi, 1, 49). But there can be a noun of 2 letters. Al-ḫalīl (175h) finds two reasons: at-Tašdīd and to be "names", its pronunciation is on two letters, and its completion and its meaning are on three letters (Alfarahidi, 1, 50). The quantification is clear in what he says, (doesn't) and directing what opposes to three (Al-Farāhidī 1, 52) to at-Tašdīd or deletion.

(7)

Al-ḫalīl (175h) put a general rule to differentiate between the Arab and foreigner, that mixes between pronunciation and the number that he put in his theory of collecting language. He says: if a word of 4 or 5 that is not oral and, in this word, there is no letter or 2 or more you should know that it is brand new and not from *Arab words because you won't find a 4 or 5 word of Arabic except with one or two or more letters that are oral" (Al-Farāhidī, 1, 52).

He also refers that ق *qaf* and ف *fāʾ* don't mix in one word except that the word is arabized from the words of non-Arabs. The same case with ج *ǧīm* and ق *qaf* (Al-Farāhidī, 5, 6).

This proves Al-ḫalīl (175h) disinterestedness and objectivity as it is a condition of scientific research " self-alienation, the researcher show put himself away of his interests and desires" (Dewidry, 2000, 32). The researcher must follow, "objectivity in any research, he should follow reality as it is" (Dewidry, 2000, 32)

(8)

Al-ḫalīl (d. 175h) leaned back to the experience in the development of his dictionary العين Al- ʿīn, because "correctness in scientific research is the experience that resolves any disagreement that may arise between researchers" (Saghir, 2013, 29). That was in some issues: First, the beginning of his dictionary as he clarifies the reason for that in its introduction, "he couldn't start by أ *ʾalif* , ب *bāʾ* because أ *ʾalif* is a vowel, and when he left the first letter, he hated to beginn with the second, except after thinking and reasoning. Of all letters, he tasted it and found that all words come from the throat, he put a letter at the beginning in the throat" (Dewidry 2000,32,33), Al-ḫalīl (d. 175h) may be here accused of subjectivity in words as (hate, plan, look, taste, find, persevere) but he defeated all his experiments by evidence, he used logic to be objective, no difference that (أ *ʾalif* is a vowel) ¡ put (letters in the throat)

Second: arranging the letters from the furthest to the nearer, in the introduction, he opened his mouth with أ *ʾalif* such as: *ʾaف̣, ʾaḥ, ʾaʿ* … because he found the *ʿīn* the deeper letter in throat, he put it at the beginning of the book then what near it is the thinner than the thinner then he reached the last م *mīm* " (Al-Farāhidī,1,47). He clarified his practical experience that he arranged letters in, from the father to the nearer, this experiment is objective, and anyone will have the same results. The same is generalization, the rule of pronouncingأ *ʾalif* before the letter you want to know it's sequence and where it comes from throat is not related to one letter or a group of letters but with all Arabic letters with no exception then he concludes with a rule that the researcher is built upon in his dictionary, no word is irregular" if you were asked about a word and you want to know its place , look at the letters of the word , whatever letter is there in this book" (Al-Farāhidī 1,47)

Third: categorization of letters as he says "I know that the slipping and oral letters are 6: ر rāʾ, ل lām, ن nūn, ف fāʾ, ب bāʾ and م mīm. These letters was called like this because the slipping in pronunciation by tip of the tongue and lips, 3 of them are slipping letters: ر rāʾ , ل lām , ن nūn, and 3 oralف . fāʾ, ب bāʾ and م mīm, they come specially out of the lips" (Al-Farāhidī,1,51). He was keen on experience,

general rules, and clear numerical statistics in which there is no exception. With the passage of time, the exits of letters did not change, and the experiment still gives the same results as Al-Farāhidī.

Fourth: His accurate differentiation between letters, the accurate differentiation shows accurate experiment, he said "the extreme of all letters is ع *ʿīn* then ح *ḥāʾ* . If there was no ech in ح *ḥāʾ* it would have been similat tot he ع *ʿīn.* (Al-Farāhidī 1, 51) here he makes accurate differentiation between 3 letters in the same domain.

To conclude, we can clarify principles of quantification for Al-ḫalīl Ibn Aḥmad (d. 175h) in his dictionary in the following points:

- Al-ḫalīl (175h) objective has collected language without missing anything, he started by a number that had beginning and end to achieve quantification. He started by Arabic alphabet, the smallest unit language is composed of as Ibn Jinī referred to the language in his definition, "sounds each group of people express themselves by"(Ibn Jinī, 1,33).

- He made four categories for Arabs words, twice, thrice, quaternary, quinary and Arabs don't have more than 5 letters in their main structure.

- He cared for the maximum of a word as he cared for its minimum, it was 3 and if less, it goes back to tashdid one of the letters or noun 2 syllables of 2 letters and his meaning on three.

- The twice changes on 2 faces, the thrice changes on 6 faces, the quarterly changes on 24 faces and the quinary on 120 faces, no face was out of his dictionary.

- Al-ḫalīl Ibn Aḥmad (d. 175h) cared on the numerical language in the categorization of Arab words, the number of transformations of each category which is what is called for in scientific research today, as numerical language," is based on organized accurate measurement that leads to accurate understanding for phenomena* (Dewidry,2000,72). So, his theory coming clear, complete and limited is not a wonder.

- He clarified the use of everything which represented mathematically in its value and what is ignored equals zero. This can be achieved by the formulization method to avoid the "diversity of meaning for expressions and terms." (Deyab 2010, 669).

- He excluded from his hypothetical equations what reality prevents as the gathering of ع *Al-ʿīn* and خ *Al-ḫāʾ*, ض *alḍād* and ص *al-ṣād …etc.* Their gathering in the hypothetical equation has nothing in it, but in the reality of the Arabic language is confused.

- Distinguish between Arabic and non-Arabic words by investing the number and the result, he said that the quaternary or quinary words in order to be Arabic, it has to have one or more oral letters, he referred also that the gathering of *al-qāf* ق and *al-kāf* ك in one word or *alqāf* ق *and al-gīm* ج shows that the word is arabised, not Arabic.

- He deposited on experiment in setting his collective curriculum, he determined the pronunciation of letters and arranged it from the further to the nearer, categorised them and in complete accuracy differentiated between the voice of each category letters, he was objective.

By these rules quantification is determined in *Al-ʿīn* (eng. eye) book in terms of quantity, constancy, abstraction, generalization, analogy, and objectivity. The following figure represents this symbolically:

- Number of letters = 1: 29 ($X^1 : X^{29}$)

- Distributing of letters in a sequential, iterative manner into four classes:

- (2X ,3X,4X,5X)

- X2, the twice gives 2 words

- X3, the thrice gives 6 words

- X4, the quaternary gives 24 words

- X5, the quinary gives 124 words

- The maximum number of main letters = 5. The minimum number of main letters = 3. It means that the main word is (3X:5X)

- Not used = 0, used =1: .... ≠ 0

- ع *Al-ʿīn* and ح *Al- ḥāʾ* = 0

- ع *Al-ʿīn* + خ *Al-ḫāʾ* = 0

- ض *Alḍād* and ص *Al-ṣād* = 0

- The quaternary word, (4x) quinary (5x) with a slipping letter =Arabic

- The quinary word, (4x) quinary (5x) with no slipping letter # Arabic

- *al-qāf* ق and *al-kāf* ك = arabised

Isn't that what the researcher calls for dividing the studied material into independent phenomena through which he can extract "the general features that characterize it, and he ends with an objective and accurate interpretation of its content (Teams 2004, 95) Isn't that what he is calling for, the quantitative analysis treating, " information numerically by applying statistical methods, by its two types, the descriptive and the deductible, the qualitative analyzer deals with ideas and opinions directly without changing it to numbers while the quantitative analyzer deals with numbers repressing ideas and opinions"(Alassaf 1995,117)

2. Vocal quantification in poetry prosody

Al-ḫalīl Ibn Aḥmad (175h) set the bases of prosody to be the balance for Arabic poetry (Altabrizy 1994, 17)." He locked himself at home days and nights reading poetry that has various music then he came to people with right based and rules called prosody" (Aniss 1952, 47) Prosody is the artistic measurement for setting the poetic balance and its music.

The first look at balance and poetry case shows that vocal quantification in Arabic can't be or maybe impossible". The talented poet can say poetry without knowing prosody or studying its rules and terms because poetry is highly sensitive and creative"(Yamout 1992, 14)

They are all terms that contradict "the nature of science, which refuses to interfere with the loose and elusive element of value, which is difficult to eradicate from human research." (Alkhouly 2014, 59)

These issues, before Prosody can hardly be imagined to have rule other than talent. How can voice be measured and it has different ways of pronunciation from one person to the other. How is it measured

what results from twenty-eight voices. Each image is adjacent to another image from another sum to give finally the poetry verse.

Part of a verse			
Verse words	W^1	W^2	W^3
Number of letters of each word	2X	4X	5X
Possible alternatives for each word according to changes	2W	24W	120W

The following figure shows that:

- (W) words of poetry line that can increase or decrease

- (2,4,5) the number of letters of each word in the poetic line, as an example and can change in its number of voices, according to Al-halil(175 h) model that the word is not less than 2 letters nor more than 5 letters, this is in main letters ,what is the case of the extra letters.

- (2, 24, 120) the number of alternatives possible of the letters of each word when changed, extra letters must be put in concern.

- Each picture of (W^1) will be changed with each picture of (W^2) and (w3). So each picture of (w^2) that will be changed to (W^1) and (W^3) etc.

- All this is done with all Arabic voices.

- The Verse consists of two parts as a standard image (Yamout, 1992, 24), and this means that the alternatives are increasing.

Quantification view was clear in Al-ḫalīl Ibn Aḥmad's (175 h) mind, while setting prosody. He wanted to set a science to set the balance of poetry without excluding one Arabic poetic line. That's what Ibn Jinnī confirmed saying "the objective is the limitation of the balance that the Arabs used in their poems" (Elzamakhshary 1989, 24)

(1)

The beginn of Al-ḫalīl (175) was from the pronounced not the written (Altevrizy, 1994, 19), from the vocal not the silent (Alzamajhshary, 1989, 53) and making it a focus to build his artistic tool strongly confirms that Al-ḫalīl (175 h) view for quantification. In addition to being "the clearest voice is clear while talking and rarely hidden from the listeners ears while the distance is far between talkers " (Aniss,1952,144) The alternatives concluding from varying silence in Arabic is a lot while what's related to vocals are limited and ending. He could reach what he can balance with "endless poetry". (Aniss 1952, 49) The researcher finds Al-ḫalīl Ibn Aḥmad (175 h) was successful here, how can he put the endless as a measure to set a similar endless. The measure must be endless quantificated to be correct and accurate in setting the endless. Ibn Jinnī described it as "The roots that Arabs set poetry balance on without irregularity" (Alzamajhshary 1988, 30, 31) this is the goal of scientific methods specially formulaization method. "Formula represents simplifying the realistic state and clarifying a spaceport of its various characteristics and sequence substitution for characteristics and relations that was clarified by symbols and logical mathematical marks (Deyab 2010, 668).

In what is called quantitative determination, which "allows comparison between phenomena, as colors, for example, are transformed from qualitative characteristics into numbers representing certain vocal waves, the comparison becomes easy, while the quantitative view makes between each colour and other barriers that can't be crossed, at the end, the quantitative expression allows us to cross the limits of Human senses or our ability in general." (Zakareya, 1978, 43)

(2)

Al-ḫalīl set his curriculum totally on الحركة Al-*ḥarakāt* (/) an السكون al-Sukūn (5) without differentiation between what is Maḍmūm or Maksūr or Maftūh (Aniss 1952,54).

The researcher finds that is itself what the modern technology is built on, specially the computational, as computer is built on what is called (0,1) (Alhady, 1988,49) zero symbolizes the low electric pulse and one for the high electric pulse. He made it his measure that has an end to measure what is endless of Arab poetry.

Prosody	Modern Technik
(/ + 5)	Zero and one (0+1)

If computer technology was built on (0, 1) and through it all endless data input happens. This is Al-ḫalīl 175h) model in prosody. He made it a measure for endless Arabic poetry.

(3)

The ladder of measuring data technically is similar to the ladder of measuring vocal syllables for Al-ḫalīl Ibn Aḥmad (175h) .If technology represented what is equal to eight different or similar pulses Bit ,what is equal to 1024 Bit by Byte(Alhady,1988,50,52) Al-ḫalīl (175h) called what consists of movement and Sokoun (/0)light reason (Eltebrezy,1994,18) and what consists of two movements (//) heavy reason (Eltebrezy,1994,18) what consists of two movements and followed by Saken collected stick (Eltebrezy,1994,18) what's imposed of two movements with Saken in between diverse stick (Eltebrezy,1994,18) This is a clear evidence of Al-ḫalīl Ibn Aḥmad accuracy in setting a poetic measure and his awareness and carfulnes for quantification, then stability, mensuration and abstraction isn't that the objective of the formulaization method today " from studying topics and operations by representing (picturising) its content, figures , structures and using it as symbols and formulas in a certain atmosphere (mathematics and logic) (Deyab 2010,668)

(4)

If scientists believe that the reason of natural sciences development is its objectivity and its being away of subjectivity, Al-ḫalīl (d. 175h) in setting his Prosody science achieved that without any exaggeration, his poetry measure manages Arabic poetry and measures it objectively, there is no difference by difference of people, that's the highest level of objectivity away from any subjectivity, isn't that what the scientific model calls for "necessity of objectivity in dealing with data and information and being away of subjectivity"(Badr 1994,238).

(5)

Prosody circles prove that Al-ḫalīl (175 h) was aware of quantification and that it was clear in his mind. A clear proof is prosody circle as a term, quantification is one of the meanings of the term, the circle is quantificated, you start from a point that you will return to, for sure once again, (Fares 1999: 310,311) which Al-ḫalīl (175h) did in his circles, as he made a special circle for each similar group of verses. (Yamout 1992, 221). A circle for الطويل tawīl, المديد Madīd and البسيط al-basīṭ called المختلف al-muḫtalif, while the circle of الرجز Ar-rigz, الهزج Al-hazg and الرمل Ar-raml is called المجتلب Al-moǧtalab. And a circle for السريع as-sarīʿ, الخفيف al-ḫafīf, المضارع al-muḍariʿ, المقتضب *al-muqtaḍib and* المجتث *almuǧtaṯ* is called المشتبه almutašabih. A circle for المتقارب al-mutaqarib and المتدارك al-mutadarak is called المتفق al-mutafaq (Alzamakhshary 1989,50,52). So he is caring about all possible alternatives from movement and Sukūn (/5). What follows this way in poetry, he made it a measure, to measure poetry on, what doesn't follow, he ignores and goes to the following alternative. All of that in objectivity away of subjectivity, because he moves the reason or the stick (Yamout, 1992, 222) from the beginning of the البحر B*aḥr* to its end to make a new one. There is no difference in conclusion with

the differing people or time which is achieved by formulaization method "which is a suitable good base for forming the studied objective symbolic models that have high levels of generalisation and abstraction" (Deyab 2010, 669).

The idea of quantification in prosody circles based on limiting alternatives of certain total of reasons and sticks confirm an issue irrelevant to prosody but to its owner, which *Al-ʿīn* (eng. eye) rate in it (Terbish 2016, 17, 18). As the idea of *Al-ʿīn* (eng. eye) dictionary us based on limitation of possible alternatives in Arabic letters. Quantification is achieved clearly in both, prosody and dictionary with the same tools.

(6)

Looking at الزحاف Az-zaḥāf clarifies quantification and abstraction, each type of it is set quantitatively the letters that enters on it. الخبن Al- ḫaban and الإضمار al-iḍmār enters the second, and al-ṭai enters the fourth (Alhashemy,1991,126). While setting off الزحاف Az-zaḥāf by reasons (Alhashemy ,1991,126) comes from an objective view based on logic and concerned with quantification, abstraction, mensuration and generalization. الزحاف Az-zaḥāf doesn't differ in that from the reasons which is available in formulaization method " from avoiding diversity of terms meanings that characterizes normal language, each symbol form is moved by certain accurate meaning"(Deyab,2010,669).

(7)

The logic through which Al-Khalil (d. 175 AH) established his poetry science achieved quantification by the possibility of الزحاف Az-zaḥāf statistics that enter each prosody in a way that achieves abstraction, generalisation, objectivity, بحر الطويل baḥrel-ṭṭawīl as an example doesn't enter its prosody except deletion (Altabrizy,1994,22) by the following alternatives:

- Al-ʿarūḍ maqbūḍah wal-ḍarb ṣaḥīḥ

- Al-ʿarūḍ maqbūḍah wal-ḍarb maqbūḍ

- Al-ʿarūḍ maqbūḍah wal-ḍarb maḥzūf

This sets another principal of scientific research, the belief in determinism. "Every phenomenon has a cause that necessitates its occurrence, and every cause has an effect that arises from it, so phenomena must occur when their causes are available, and it is impossible for them to occur in the absence of these causes " (Dewadry,2000,33).

Therefore it is clear the quantification rules in prosody, there is no one irregular Arabic poetry verse and it doesn't stop at any limit or group. The quantity, stability, abstraction, mensuration, objectivity are achieved by the following rules:

- Al-ḫalīl (175h) put prosody to be a balance for Arabic poetry and an artistic measure for it but counting the balances that the Arab used in their poetry. So was his objective limited and accepts quantification.

- He set the beginning point accurately, he started by the pronounced not the written but not all the pronounced, he made his measure from the vocal not the silent, what comes out of it is an ending quantity that can abide with generalisation, abstraction and mensuration.

- He set his balances on on الحركة Al-ḥarakāt (/) an السكون al-Sukūn without differentiation between what is مضموم Maḍmūm or مفتوح Maftūh or مكسور Maksūr. By that he set the balance for prosody. He could reach an ending limited quantity through what he can measure Arab poetry that's the endless quantity.

- He determined the terms accurately; the researcher see that this is a main reason for his science success and its continuity quantificated. What consists of الحركة Al-ḥarakāt and السكون al-Sukūn (light reason) what consists of two (heavy reason) like that, there is no argument in this.

- His criteria were objective, no existence for the subjective view of balance or judgment, the matters return to setting the الحركةAl-ḥarakāt and السكون al-Sukūn.

- Phenomena produce itself; this is another form of quantification appeared through prosody circles, each circle produces a group of balances, each one has a clear relationship with the others that are produced from it. In addition, the base of all circles is the ending quantity that Al-ḫalīl (175 h) has chosen as a base to build on his science (الحركة Al-ḥarakāt and السكون al-Sukūn).

- He depended on defining the phenomenon numerically by selling الزحاف Az-zaḥāf, Al-ʿilal, the letters and balances that enter it, the prosodic statistics abstractly and objectively.

CONCLUSION

Therefore, from what preceded, we can find quantification model in Al-ḫalīl (175 h) *Al-ʿīn* (eng. eye) and prosody as a part that should be invested in the future in studying humanities sciences and its quantification as well as preparing it for modern techniques and technology, this can be clarified in the following:

The Beginn	**Objective.** It is determined from the beginning with the targeted goal and product, in his dictionary *Al-ʿīn* (eng. eye), his goal was (collecting Arabs language) and in prosody (limiting the balances of Arabs poetry) while putting in mind the clarity of goals and objectivity.
	quantification **subject** is a main istin reaching the targeted goal successfully, in AlAyn, he defined quantification (Arabic alphabet) in prosody (pronounced /vocals) he observes the material of building the criteria while quantification it clearly in addition to being out of what's interested to quantify, but has a great clear relation to it. He didn't choose a group of words or sentences but the bases of the material interested to quantify is abstract, it was the alphabet for the dictionary and the vocals for prosody.
Borders	**Types of Study Material** This means dividing the material (phenomenon) to a group of quantificated types, each type collects a group of phenomena that share characteristics and features. The success of the test with the types shows success with all phenomena which leads to abstraction, generalisation, mensuration that is what Al-ḫalīl 175 h) made in classifying Arabs words (twice, thrice,4 ,5) and putting the maximum and minimum for words in *Al-ʿīn* (eng. eye) dictionary and limiting the poetic balance by prosody circles.
Formation Equations	**Relation of types** after defining the material of quantification and setting the types of studied phenomena and its quantification, equations are made to produce the endless phenomena from quantification that is ending. It clarifies the relation of phenomena with each type of the types by a quantificated equation which is what Al-ḫalīl (175 h) made in *Al-ʿīn* (eng. eye). He defined the changes of the twice, thrice, Quadruple and pentagonal regardless of the letters forming each type, in prosody, the production of البحور al-buḥūr from one circle by moving reason or stick regardless of words or letters, his equations are completely abstract and can be measured.
Exceptions	pointing exceptions; quantification shadows exceptions in each equation so it should be pointed, agreed or not, to quantification criteria which Al-ḫalīl (175 h) made in *Al-ʿīn* (eng. eye) by pointing some worde made of changing letters according to his criteria that it is not Arabic or made of two mixed words and in prosody in limiting Alzehaf and Alelal, with its mixing with his criteria.

Experiment	**Logic of Mensuration** Not all experiments are made in Labs from the researcher s point of view, each criteria has a positive or negative conclusion which Al-ḫalīl (175 h) followed closely in *Al-ʿīn* (eng. eye) through the following points: 1- His explanation of how he chose *Al-ʿīn* (eng. eye) as beginning of his dictionary. 2- The arrangement of sounds from the far to the X, near and how to reach that. 3- Categorizing sounds from (slipping, oral….) and accrediting that to know the authenticity of the Arabic word. 4-Differentiating between sounds as ع *Al-ʿīn,* ح *Al- ḫāʾ,* ع *Al-ʿīn* and ﻫ *Al-hāʾ*

Symbols in the Research

Symbol	Meaning
X, Y,Z,A,B	Genera examples for Arabic letters
W	General Arabic word
X, Y	Two letters word
X, Y, Z	Three letters word
X, Y, Z, A	Four letters word
X, Y, Z, A, B	Five letters word
Writing the letter Capital	Stability of the beginning letter in the changes
Writing the letter Small	The letters that change with the first capital letter
1:.....#0	Used
0	Unused
X2	Twice word
X3	Thrice word
X4	word quad
X5	quintet word
W2	two words
W6	Six words
W24	24 words
W120	120 words

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