

## The Psycholinguistics Thought of Ibn Sīnā (Avicenna)

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### Introduction

Extensive studies have been conducted on the history of the Medieval period which is typically stated to have lasted from the 5th to 15th Century. During this period a number of outstanding thinkers emerged and, interestingly, their theories still remain relevant to this day. In recent years, a lot of energy has been devoted to the study of Medieval thought.<sup>1</sup> This historical era has been presented as the basis of modern development. In other words, much research today is conducted on a revival of Medieval thinking and what we might learn from it,<sup>2</sup> as well as how it reflects on the foundations of modern science. Accordingly, modern studies must recognize a large number of great medieval thinkers.

While discussing the topics addressed by Medieval thinkers or outlining the lines of influence which are always a vitally important component,<sup>3</sup> the focus here is on contextualizing the thought of one of the Medieval thinkers, Ibn Sīnā, and how his work on psychology relates nowadays to the modern field of psycholinguistics.

Ibn Sīnā dealt with a large number of issues, which are today among the most prominent theses in modern psychology and psycholinguistics. The paper will focus on the psycholinguistic issues which Ibn Sīnā dealt with. However, due to the overlap between psychology and psycholinguistics and the fact that Ibn Sīnā dealt with such issues holistically, it is not possible to restrict the discussion to issues related to psycholinguistics alone.

The study applies a comparative approach and compares Ibn Sīnā's psychological issues with modern psycholinguistic concepts to highlight the extent of the similarity between Ibn Sīnā's approach in psychological theory and the topics of modern psycholinguistics. This comparison shows Ibn Sīnā pioneered a number of psychological issues relevant to modern psycholinguistics.

The paper is organized as follows: Section I presents a brief overview of Ibn Sīnā's life and work, Section II provides short flashes on the meaning of psycholinguistics, and Section III discusses Ibn Sīnā's psycholinguistic thought and how his work on psychology predates modern views of psycholinguistics through a discussion of some aspects covered by Ibn Sīnā and modern psycholinguistics. These aspects include:

- Ibn Sīnā and the human mind (or soul)
- Ibn Sīnā and intelligence in relation to learning in general and language acquisition
- Ibn Sīnā and perception (flashes on senses)
- Ibn Sīnā and speech pathology.

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<sup>1</sup>Adamson (2007: v).

<sup>2</sup>McGinnis (2010).

<sup>3</sup>Koterski (2009).

## I. Ibn Sīnā's life and work

Ibn Sīnā, Abū Alī Al-Husayn Ibn Abd Allāh, commonly known as Ibn Sīnā or by his latinized name Avicenna,<sup>4</sup> was a Persian. He was born c. 980 in Qishlak Afshona (in present-day Uzbekistan) and died in 1037 in Hamadan, in Iran.<sup>5</sup> Ibn Sīnā is one of the greatest Islamic medieval thinkers and the most famous intellectual of his time. He wrote many books and papers in the fields of Philosophy, Physics, Psychology, Astronomy, Mathematics and Medicine. In Medicine, he wrote his most renowned work the book *al-qānūn fī 'aṭ-ṭibb* "The Canon of Medicine". Another significant book of Ibn Sīnā, is *kitāb 'aṣ-ṣifā'* "The book of Healing", which includes work on earth sciences such as Geology. It also discusses the philosophy of science and described an early scientific method of inquiry, and various topics in physics. In addition, Ibn Sīnā worked on Astronomy and Astrology, Chemistry and Jurisprudence. These subjects are dealt with in various parts of his books such as, *'al-iṣārāt wa-t-tanbīhāt* "Remarks and Admonitions", *risālah fī siyar al-qadar* "Essay on the Secret of Destiny", *kitāb 'an-najāh* "The Book of Deliverance" and others.<sup>6</sup>

Ibn Sīnā was a philosopher of vast knowledge<sup>7</sup>. This genius with "an encyclopaedic knowledge has dealt with almost all scientific branches or praxis with great success".<sup>8</sup> In relation to psychology, Ibn Sīnā dealt with many aspects that today are being investigated in psycholinguistics.<sup>9</sup>

## II. Psycholinguistics: Flashes on the meaning of psycholinguistics

Psycholinguistics, as one branch of linguistics, has as its purpose the understanding of the psychology of language as it relates to learning, mind, and brain, as well as various aspects of society and culture.<sup>10</sup>

Psycholinguistics studies the psychological and neurobiological factors that enable humans to use, acquire, comprehend, and produce language.<sup>11</sup> It also covers the cognitive processes that create grammatical and meaningful sentences, as well as the processes that make it possible to understand concepts, words, sentences and speech.<sup>12</sup> It further investigates the relationship between language and mind,<sup>13</sup> understanding and intelligence, language and memory, perception and imagination (as a mental process), as well as the relationship between mind and dreams.<sup>14</sup>

Psycholinguistics, accordingly, draws on various disciplines: linguistics, psychology, and even philosophy and physics. It is "Cross-disciplinary in nature with an overlapping domain that includes phonetics, discourse analysis, language pathology, neuroscience, computer modelling, and language teaching pedagogy".<sup>15</sup> Psycholinguistic research is a mosaic of specializations, focused on different aspects of highly complex phenomena.<sup>16</sup>

<sup>4</sup>Goodman (2006).

<sup>5</sup>Renard (2011).

<sup>6</sup>Rizvi (2006).

<sup>7</sup>Leaman (1998-2014); Sarrafzadeh (2001).

<sup>8</sup>Cerić and Mehić-Basara (1997: 6).

<sup>9</sup>Gutas (1987: 67-70).

<sup>10</sup>Steinberg (2006); Kess (1992: 2).

<sup>11</sup>Treiman (2003: 3).

<sup>12</sup>Traxler (2012).

<sup>13</sup>Kess (1992); Wood et al. (2002).

<sup>14</sup>Field (2003); (Garnham 1994); Slobin (1974).

<sup>15</sup>Field (2003: ix).

<sup>16</sup>Garman (2000).

### III. Ibn Sīnā's psycholinguistic thought

Ibn Sīnā is one of the most influential pioneers in the history of psychology. As a Medieval philosophical writer,<sup>17</sup> Ibn Sīnā wrote on psychology in many of his books and articles, although psychology was not addressed at that time as an independent subject. Certainly, psychology is one of the earliest things he ever wrote about and may quite possibly be the very earliest.<sup>18</sup>

#### III.i. Ibn Sīnā and the human mind (or Soul)

Ibn Sīnā's general approach to psychology is to identify different activities that characterise various kinds of living things and then to consider the nature of the cause of these activities, namely, the *soul*. Thus, it includes whatever turns around human thought, the mind, and how people acquire knowledge.

The central topic in Ibn Sīnā's psychological thought is the principle of the *soul*. In terms of faculties, Ibn Sīnā tried in several of his books to identify the meaning of *soul*. He divided it into three species: the vegetable soul, the animal soul, and the rational soul. The *vegetable soul* is the first creation of the natural body possessing organ, which reproduces, grows, and nourishes. The *animal soul* is the first actuality of a natural body possessing organ which receives individual conditions and moves by volition. The *rational/human soul* is the *human* component, which is the natural body possessing organs, which commits acts of rational choice and deduction through opinion and therefore perceives universal matters.<sup>19</sup>

Ibn Sīnā divided the human rational soul into a practical and theoretical faculty, both of which are equivocally called 'intelligence'. The practical faculty is the principle of movement of the human body which controls individual actions characterized by deliberation in accordance with purposive considerations.<sup>20</sup> The theoretical faculty is the principle of the abstract view which is related to the soul. This is discussed further below in this paper.

In his explanation of the human soul, Ibn Sīnā argued that the soul has two simple mixed faculties: animal and human. He considered the human soul to be in a position between the soul of animal and the soul of God. He realized that the human faculty has a certain similarity which corresponds to the animal faculties of appetite, imagination, and estimation. He states:

"Its relationship to the animal faculty of appetite is that certain states arise that are peculiar to man, to which he responds with quick actions and passion, such as shame, laughter and weeping. Its link to the animal faculty of imagination and estimation is that it uses that faculty to deduce plans concerning transitory things and to deduce human arts"<sup>21</sup>

فاعتبارها بحسب القياس إلى القوة الحيوانية النزوعية هو القبيل الذي تحدث منه فيها هيئات تخص الإنسان يتهيأ بها لسرعة فعل وانفعال مثل الخجل والحياء والضحك والبكاء وما أشبه ذلك. واعتبارها الذي بحسب القياس إلى القوة الحيوانية المتخيلة والمتوهمة هو القبيل الذي تنحاز إليه إذا اشتغلت باستنباط التدابير في الأمور الكائنة الفاسدة، واستنباط الصناعات الانسانية.<sup>22</sup>

<sup>17</sup>Marenbon (1998: xxxiii, 510).

<sup>18</sup>Afnan (1958: 123).

<sup>19</sup>Ibn Sīnā: *Kitāb 'aš-šifā' (The Book of Healing), Book 6: Almaqāla 1: The Soul*, p.349 & *Kitāb tisa' ras'ā'il (Book of Nine Letters), The Third Letter: The Soul*; Afnan (1958:164).

<sup>20</sup>*Kitāb 'aš-šifā'*, p. 351; Rahman (1952: 32).

<sup>21</sup>Ibid., p. 32.

<sup>22</sup>*Kitāb 'aš-šifā'*, p. 351.

Ibn Sīnā explained the dual characters of the human soul, such that “its analogy to itself and theoretical intelligence, it forms the ordinary and commonly accepted opinion concerning actions such as lies and tyranny considered evil and other similar premises”.<sup>23</sup>

وقياسها إلي نفسها أن فيما بينها وبين العقل النظري تتولد الآراء الذائعة المشهورة مثل: أن الكذب قبيح، والظلم قبيح وما أشبه ذلك.<sup>24</sup>

Ibn Sīnā clarified that it is this part which makes the human soul more related to the soul of God, which he called ‘The Soul of Sanctity’ ‘Divine Spirit’.<sup>25</sup>

In his explanation of the two characteristics of the human soul, Ibn Sīnā developed a view of the relationship and the differences between the soul and body. He related the animal side of the human with a practical faculty that acts through the body. In contrast, he connected the human side of man with a theoretical faculty, which is produced by the soul or mind.<sup>26</sup>

In current psychology, the relationship between the mind and body is a topic of central interest.<sup>27</sup> In attempting to understand how human beings acquire language knowledge, psycholinguists adopt various approaches such as the theory of intellectualism or behaviourism. Before they begin to inquire about how language is learned, they begin with fundamentals of human beings by drawing on the differences between Mentalism and Materialism that shape the characteristics of the mind or soul and the body. Although there is general agreement that the body and mind are interactive with one another, such that one may cause or control events in the other, some psycholinguists have highlighted the centrality of the mind, arguing that “the understanding of mind is essential to the understanding of the intellectuality of human beings, particularly language”.<sup>28</sup>

The investigation of the relationship between body and mind is a philosophical matter which goes back to the ancient Greeks such as Aristotle. It was further discussed by philosophers such as Locke and Descartes and has become a material topic in the present day, drawing the attention of theorists such as Chomsky and Searle.<sup>29</sup> Psycholinguists typically believe that the initial forays into psycholinguistics were broadly philosophical ventures, due mainly to a lack of cohesive data on how the human brain functions.<sup>30</sup>

In an interview (at Massachusetts Institute of Technology on March 23<sup>rd</sup> of 2004), Chomsky discussed the importance of the thought of Juan Huarte de San Juan (1529–1588) in relation to modern linguistics and cognitive science. Chomsky highlighted many points in linguistics and cognitive science which were inspired by Huarte’s work. He also considered the relation between Huarte’s ideas in psychology and the topics discussed today in psycholinguistics. Huarte’s ideas of relevance to modern psycholinguistics include:<sup>31</sup> (a) the brain as the material site for what are called cognitive functions, (b) the innateness of cognitive functions, (c) the generative quality of human understanding, (d) qualitative differences between human and animal capacity, (e) universal language structure, (f) creation of words by human convention (not by divine intervention as was frequently believed), and (g) the defence of vernacular language used in science.

<sup>23</sup> Rahman (1952: 32).

<sup>24</sup> *Kitāb ‘aš-šifā’*, p. 424.

<sup>25</sup> *Ibid.*, p. 351; *Kitāb ‘an-najāt (The Book of Deliverance), Treatise on the Soul, Almaqāla 6*, p.139.

<sup>26</sup> *Kitāb ‘aš-šifā’*, p. 350.

<sup>27</sup> Leudar and Costall (2004).

<sup>28</sup> Steinberg et al. (2013: 278).

<sup>29</sup> *Ibid.*, p. 278.

<sup>30</sup> Thompson (2007: 77-109).

<sup>31</sup> Ortega (2005: n. 3).

According to Chomsky, Huarte's likely influence on Cartesian thinking includes the idea that the mind is a "cognitive power" with a creative character, and the view that man has two generative powers, one common to the animals, the other common to the spiritual substance and God. Chomsky concludes: "Huarte's framework is useful for discussing psychological theories in the seventeenth and eighteenth centuries' linguistics, especially his reference to the use of language as an index of human intelligence, of what distinguishes a man from animals, and specifically, his emphasis on the creative capacity of normal intelligence. These concerns dominate rationalist psychology and linguistics".<sup>32</sup> Huarte thus provides a good example of how pre-modern thinkers have influenced modern psycholinguistics.

### III.ii. Ibn Sīnā and intelligence in relation to learning in general and language acquisition

The second psycholinguistic aspect in Ibn Sīnā's thought is *intelligence*. He addressed the identity of intelligence through the second aspect of the faculty of the human soul, which is the theoretical power. He also related his explanation of the intelligence faculty to learning in general or knowledge acquisition, arguing that the soul (through its various faculties) is the path to knowledge, for it distinguishes between sensory and intellectual perceptions.

Ibn Sīnā attempted to identify the substance of the human intellect, nature, origination and in some sense, destiny. More specifically, he addressed how human material intellect emerges from a state of potentially knowing certain objects to a state of actual knowing.<sup>33</sup> He clarified the stages of intellect-potentiality of knowledge by giving an example of the capacity of an infant writing. The first stage, he pointed out, is the stage of the child who primarily has full potentiality. However, nothing has yet become actual, nor has the instrument of its actualization even been achieved. Secondly, an older child who has learnt the use of the pen and the inkpot, and knows the value or meaning of the letters, is said to have the capacity of writing. At this stage the child has relative potentiality when nothing more than the instrument of the acquisition of the actuality has been achieved. The third stage takes place when the child is able to think and acknowledge. The fourth stage occurs when the instrument has been perfected and the child's capacity has been made complete.<sup>34</sup> Ibn Sīnā gave a name to each stage of the human potentially of knowing, calling the first instance *absolute* or *material* potentiality; the second, *possible* potentiality; and the third, *habitus*. Sometimes, however, he called the second *habitus*, and the third the *perfection of potentiality*.<sup>35</sup>

Well before the appearance of the science of psychology, with its terminology, Ibn Sīnā established, throughout his initial theory of intelligence, the terms that identify intelligence as well as describing its processes or stages. He tried to characterise theoretical intelligence in terms of several stages. First, the stage of absolute or material potentiality

<sup>32</sup>Chomsky (1968: 9).

<sup>33</sup>*Kitāb 'an-najāt, Treatise on the Soul, Almaqāla 6.*

<sup>34</sup>*Ibid.*, p.137; Rahman (1952: 34).

<sup>35</sup>*Kitāb 'an-najāt*, p.137; Rahman (1952: 34):

قال ابن سينا: "والقوة تقال على ثلاث معان بالتقديم والتأخير فيقال قوة للاستعداد المطلق الذي لا يكون خرج منه الى الفعل شيء ولا ايضا حصل ما به يخرج وهذه كقوة الطفل على الكتابة ويقال قوة لهذا الاستعداد اذا كان لم يحصل للشئ الا ما يمكنه به ان يتوصل الى اكتساب الفعل بلا واسطة كقوة الصبي الذي ترعرع وعرف القلم والدواة وبسائط الحروف على الكتابة، ويقال قوة لهذا الاستعداد اذا تم بالآلة وحدث مع الآلة ايضا كمال الاستعداد بأن يكون له ان يفعل متى شاء بلا حاجة الى الاكتساب بل بكيفية ان يقصد فقط كقوة الكاتب المستكمل للصناعة اذا كان لا يكتب. والقوة الاولى تسمى قوة مطلقة وهيولانية، والقوة الثانية تسمى قوة ممكنة، والقوة الثالثة تسمى ملكة، وربما سميت الثانية ملكة والثالثة كمال قوة"

such as when an infant describes the relationship of the theoretical faculty to abstract immaterial forms, which belong to the soul and has not yet realized any portion of perfection due to its lack of potentiality. Ibn Sīnā called this '*material intelligence*' (*'al-'aql al-hayulānī*), which is found in every individual of the human species. Second, the stage of relative potentiality occurs when the instrument for the reception of actuality has been achieved. Ibn Sīnā called this *intellectus in habitu* (*'al-'aql bi-l-malaka*). Third, the actuality stage makes human beings able to actually think. Ibn Sīnā called this *intellectus in actu*, or *actual intelligence* (*'al-'aql bi-l-fi'l*). Finally, the stage of the perfection of the original potentiality, or *habitus*. The forms of absolute actuality are when these forms are present and humans actually and knowingly contemplate them. He called this '*intellectus acquistus*' (*'al-'aql al-mustafād*).<sup>36</sup>

In a long discussion, Ibn Sīnā investigated how all stages of intelligence, which are mentioned above, govern others and serve each other to create the understanding of how the human mind works to obtain knowledge. He argued:

“Consider now how these capacities govern others and how they serve each other. You will find that the acquired intellect is the governor and the ultimate goal that all the rest serve, and then the *intellectus in habitu* (*'al-'aql bi-l-malaka*) serves the *intellectus in actu* (*'al-'aql bi-l-fi'l*), and is in turn served by the material intellect with all its capacities. The practical intellect serves them all”.<sup>37</sup>

فاعتبر الآن وانظر إلى حال هذه القوى كيف يرأس بعضها بعضا وكيف يخدم بعضها بعضا، فإنك تجد العقل المستفاد رئيسا ويخدمه الكل وهو الغاية القصوى، ثم العقل بالفعل يخدمه العقل بالملكة، والعقل الهيولاني بما فيه من الاستعداد يخدم بالملكة، ثم العقل يخدم جميع هذه.<sup>38</sup>

In addition to his ideas of the stages of knowledge acquisition, Ibn Sīnā showed the variety amongst humans in their degree of competence in acquiring knowledge. He pointed out that acquisition of knowledge, whether from someone else or from within oneself, is of various degrees. Some people get near to immediate perception, which acts as the most powerful source. He called the strong capacity of the person who can acquire knowledge and knows everything innately and does not need great effort to engage with active intelligence 'intuition' (*'al-ḥads*). This is the highest degree of this capacity. In this state he called the material intelligence '*Divine Spirit*' which he realized that not all people share.<sup>39</sup>

Ibn Sīnā also declared the basis of knowledge that people generally acquire. He emphasized the fact that intelligible truths are acquired only when the middle term of an analogy is obtained. He realized that this is done in two ways. First, through intuition, which is an act of mind by which the mind itself immediately perceives the middle term. This power of intuition is quickness of apprehension. Second, the middle term is ordinarily acquired through instruction. He stated:

“It is possible that a person may find the truth within himself, and that the analogy may be affected in his mind without any teacher. This varies both quantitatively and qualitatively; quantitatively, because some people possess a greater number of middle terms which they have discovered themselves; and qualitatively, because some people find the term more quickly than others”.<sup>40</sup>

<sup>36</sup>Kitāb 'an-najāt, *The Natural Science: Soul*, p.139; Rahman (1952: 37).

<sup>37</sup>Kitāb 'aš-šifā', *The Natural Science, Book 6: The Soul*, p. 353; Rahman (1952: 37).

<sup>38</sup>Kitāb 'aš-šifā', *The Natural Science, Book 6: The Soul*, p. 353.

<sup>39</sup>Kitāb 'an-najāt, p.138; Rahman (1952: 35); Afnan (1958).

<sup>40</sup>Kitāb 'an-najāt, p.138; Rahman (1958: 35).

فجانز أن يقع للإنسان بنفسه الحدس وأن ينعقد في ذهنه القياس بلا معلم وهذا مما يتفاوت بالكم والكيف أما في الكم فلأن بعض الناس يكون أكثر عدد حدس للحدود الوسطى، وأما في الكيف فلأن بعض الناس أسرع زمان حدس.<sup>41</sup>

In relation to language knowledge and language acquisition, linguists and psycholinguists are interested in documenting and understanding the steps and mechanisms that account for children's linguistic developmental paths.<sup>42</sup> This area has become important since the 1960s after Chomsky challenged Skinner's idea that language is just a form of behavior. Chomsky argued that humans are born with innate linguistic knowledge as "Universal Grammar". This guides acquisition of language.<sup>43</sup>

Nowadays, many psycholinguists base their understanding of how human beings comprehend knowledge and produce language on theories of language acquisition, identifying the process of acquiring language starting from a child's early age, using a psychological and linguistic approach.<sup>44</sup> Their study involves two areas of investigation: one focused on non-linguistic cognitive development and the other on the development of language.<sup>45</sup> This approach takes advantage of different theories, such as innate, behavioral and cognitive theories.<sup>46</sup>

Brown and Steinberg in their study on the early stages of a first language acquisition have argued that the children exhibit different degrees of language competence, emphasizing that a strong ability of comprehension depends mainly on a high level of one's competence capacity.<sup>47</sup> This echoes Ibn Sīnā's notion of 'intuition' (*'al-ḥads*).

Pinker, who works on child language development generally, adopts one of two theories, and there is still much debate as to which theory is correct. The first theory states that language must be taught, echoing the view of Ibn Sīnā, who stated that knowledge is acquired by instruction. The second theory is that language cannot be learned, but that humans possess an innate language faculty.<sup>48</sup> This echoes the idea of acquisition through intuition, which Ibn Sīnā developed in his explanation of the two intelligible ways of obtaining knowledge.<sup>49</sup>

Pertaining to knowledge acquisition, Ibn Sīnā, in his book on *Politics* (*'as-siyāsah*), develops a view of approaches to education as a part of knowledge acquisition, in what could be an initial method of issues discussed in contemporary studies in psycholinguistics. First of all, Ibn Sīnā respected the physical as well as the intellectual development of knowledge. He devoted his attention to moral aspects, and likewise he aimed at the formation of a personality complete in body, mind, and character.<sup>50</sup>

Ibn Sīnā established methods of education, starting from his concerns for the formative age for child education. He determined the stage of primary education should start from 6 years of age and end at approximately 14 years. He indicated that children at this age must begin gradually moving away from play to receiving education in serious circumstances. He considered that at this level "the child's joints strengthen, his tongue is apt, his hearing is attentive, and he is ready for instruction".<sup>51</sup>

<sup>41</sup> *Kitāb 'an-najāt*, p.138.

<sup>42</sup> Traxler and Gernsbacher (2006).

<sup>43</sup> Chomsky (1966, 1993, 2000).

<sup>44</sup> Neisser (1967).

<sup>45</sup> Traxler (2012).

<sup>46</sup> Bowerman and Levinson (2001: 19).

<sup>47</sup> Brown (1973); Steinberg (1993: 16).

<sup>48</sup> Pinker (1989).

<sup>49</sup> Pinker (1995).

<sup>50</sup> Ibn Sīnā, *Kitāb 'as-siyāsah* (*The Book of Policy*); Naqib (1993/2000).

<sup>51</sup> *Kitāb 'as-siyāsah*, p. 102.

Accordingly, Ibn Sīnā established methods of education which developed the structure of good education whilst considering the group, not the individual's instruction. He advised that children should be brought up with others. He argues that "one child will teach another, learning from him and becoming his friend. If one child is left alone with the teacher, that is most likely to be unsatisfactory for them both; when the educator moves from one pupil to another, the risk of boredom is less, the pace of activities is more rapid and the child is eager to learn and succeed".<sup>52</sup>

The specialized stage of education, in Ibn Sīnā's view, is the age of 14 and onwards. At this stage the young person specifies for himself the type of study or vocational work suited to him during the higher or specialized stage. Ibn Sīnā also emphasized that pupils at this stage should not have any kind of study or work forced on them that does not correspond to their abilities and tendencies.<sup>53</sup>

Ibn Sīnā observed that pupils differ in their capabilities. He was aware of the 'mentally retarded' and the 'simple-minded', who are incapable of benefiting from any kind of theoretical or practical education. He assumed that they must be educated as special cases under the supervision of a warden.<sup>54</sup>

Ibn Sīnā's curriculum was informed by two approaches; a theoretical/moral substance and a practical substance. On the one hand, the practical trend is acquired by practice in the activity of the craft. Ibn Sīnā advised pupils to set down their learning in the form of practice in medicine, literature, calligraphy, and composition in order to respond to their studies and to become accustomed to earning their own livelihood. On the other hand, the theoretical substance is acquired from speech, hearing, and understanding which expresses an attitude and an opinion. This theory of education is built on philosophical and psychological bases, and addresses the issue of moral educational methods which presents a valuable example of education by building a healthy environment, involving encouragement and kindness, and preventing admonition with anger and punishment.<sup>55</sup>

Ibn Sīnā believes that successful education is dependent on a perfect teacher. He observed that the teacher's role not only depends on imparting knowledge to his students, but also imbues them with great habits, ideas, and values. Ibn Sīnā thus required an excellent person who could be a good advisor and model for students. He stated:

"The educator must be intelligent, a man of religion, skillful at instructing children, dignified, calm, far removed from foolishness or pleasantries, not given to levity or slackness in the youth's presence; neither rigid nor dull; on the contrary, he should be kind and understanding, virtuous, clean and correct. He is one who has served the leaders of the nation, knows the kingly virtues in which they take pride and the correct manners used in society".<sup>56</sup>

وينبغي أن يكون مؤدب الصبي عاقلاً ذا دين، بصيراً برياضة الأخلاق، حاذقاً بتخريج الصبيان، وقوراً رزيناً بعيداً من الخفة والسخف، قليل التبدل والاسترسال بحضرة الصبي، غير كز ولا جامد بل حلواً لبيباً ذا مروءة ونظافة ونزاهة قد خدم سراة الناس وعرف ما يتباهون به.<sup>57</sup>

In modern psycholinguistics, the relationship between age and language development is an important issue. This view has been discussed widely in language acquisition. Among others, current language acquisition research investigates the assumptions underlying notions

<sup>52</sup>Ibid., p. 103.

<sup>53</sup>Ibid., p.104.

<sup>54</sup>Ibid.; Naqip (2000).

<sup>55</sup>*Kitāb 'as-siyāsah (The Book of Policy)*; Naqip (1993/2000).

<sup>56</sup>Ibid.

<sup>57</sup>*Kitāb 'as-siyāsah*, p.102.



about the age of starting to learn, such as: (a) the idea that there are age ranges within which certain things should happen in normal language acquisition development and (b) the idea that one's age is a major factor in how efficient one is as a language learner whether in first language acquisition (L1) or second language acquisition (L2).<sup>58</sup>

Such areas of investigation echo Ibn Sīnā's theory of language learning and education in general. Aaronson and Rieber in their studies in educational psycholinguistics have considered the usefulness of educational applications and psychological components in explaining the ability of children to acquire language, understanding the learner's mind, and a successful method of teaching,<sup>59</sup> such as teaching children in groups, methods of correcting their speech, and the impact of encouragement on improving their abilities in speech, reading, and writing.<sup>60</sup>

It is clear in the vision of learning or knowledge acquisition that Ibn Sīnā brought together a number of issues: the identification of the sources of acquisition of knowledge, the differences between people in their abilities to obtain knowledge, reflecting different human capacities, as well as establishing the formative period of proper learning or education for pupils, and the acquisition of mechanisms of knowledge.

### III.iii. Ibn Sīnā and perception (flashes on senses)

In the context of Ibn Sīnā's consideration of the processes of intelligence, *perception* took a prominent place in his theoretical approach to psychology. He emphasized its relationship with the senses, focusing on the differences between its faculties in terms of its role and functions.

Ibn Sīnā uses his theory of perception to formulate the concept of learning or knowledge acquisition. Subsequently, he classified aspects of knowledge acquisition according to different sources. The first material is *sensation* which perceives forms ingrained in matter. "It arrives at the knowledge of an object by perceiving its form which happens only when the form is present in the matter of the object".<sup>61</sup> Another source is *imagination* which can act "without the presence of the physical object itself. Clearly, the images that it forms are not material images although they can be formed after the pattern of material objects".<sup>62</sup> Another source is taken up by the *estimative* faculty which perceives knowledge, such as pleasure and pain, which sees fairness and evil in the individual objects which have been first sensed and then imagined. In the final source, reason comes to acquire things that have either been abstracted into pure form or have abstracted themselves completely and takes in their ultimate universality.<sup>63</sup>

Ibn Sīnā explained the nature of these sources, arguing that there are differences between perception by sense, by imagination, or by estimation. To illustrate this, he divided perception into two types: perception by external sensation and perception by internal sensation. He assumed both types of perception to be "but the abstraction by the percipient subject of the form of the perceived object in some manner".<sup>64</sup>

Ibn Sīnā's theory of the five external and five internal senses and his descriptions of these had a strong impact on early Medieval thought.<sup>65</sup> In different areas in his books, he explained the two aspects of the perception faculty. He also presented its location in the

<sup>58</sup> Singleton and Ryan (2004).

<sup>59</sup> Aaronson and Rieber (2014: 497).

<sup>60</sup> Sterinberg et al. (2001: 41).

<sup>61</sup> *Kitāb 'an-najāt, The Natural Science; The Soul*, p.151; Afnan (1958: 164).

<sup>62</sup> Ibid.

<sup>63</sup> Ibid.

<sup>64</sup> *Kitāb 'aš-šifā'*, p.349.

<sup>65</sup> Knuuttila and Kärkkäinen, (2014: 131-145).

brain, which is discussed further in this paper.

Ibn Sīnā assumed that the *external sense* is the preliminary action in the perception process. He explained in detail the five external senses:<sup>66</sup> seeing, hearing, smelling, tasting and touching. Ibn Sīnā explains in detail that the forms of all the senses reach the organs of sense and are imprinted on them to be perceived by the faculty of sensation.<sup>67</sup>

Ibn Sīnā in his explanation of the external senses, such as hearing, is concerned with their psychological and physical form and their role in perception. With regard to hearing, he states:

“One of the senses is *hearing*, which is a faculty located in the nerves distributed over the surface of the ear-hole; it perceives the form of what is transmitted to it by the vibration of the air which is compressed between two objects, one striking and the other being struck, the latter offering it resistance so as to set up vibration in the air which produces the sound. This vibration of the air outside reaches the air which lies motionless and compressed in the cavity of the ear, moving it in a way similar to that in which it is itself moved. Its waves touch that nerve, and so it is heard”.<sup>68</sup>

ومنها السمع وهي قوة مرتبة في العصب المفروق في سطح الصماخ تدرك صورة ما يتأدى إليه بتموج الهواء المنضغط بين قارع ومقروع مقاوم له انضغاط العنف يحدث منه تموج فاعل للصوت يتأدى إلى الهواء المحصور الراكد في تجويف الصماخ ويموجه بشكل نفسه ويماس أمواجه بتلك الحركة تلك العصبه فيسمع.<sup>69</sup>

Although Ibn Sīnā's explanation of the hearing sense in its role in perception took a physical and psychological form, it was cited within his overall account of the comprehension and perception of language and knowledge in general. In contemporary psycholinguistic studies, hearing has an essential role in the process of producing language, since speech perception and comprehension precedes language production. Modern views in general have been strongly influenced by theoretical advances in linguistics and more especially by the development of generative grammar. Speech perception is a production process which reflects human hearing: “we speak in order to be heard, in order to be understood”.<sup>70</sup> Raphael, Borden and Harris, in their studies on speech, language, and thought in child language learning, argue that a successful way of speaking depends on a suitable environment for hearing. “Although some children eventually encounter problems learning to read or write, all normal children learn to speak and to understand speech. They do this with virtually no formal instruction, acquiring speech simply by hearing those around them speak. And of course, at the same time they acquire language”.<sup>71</sup>

The other aspect of perception in Ibn Sīnā's theory is internal senses. His ideas about internal senses were justified thoroughly in *Kitāb 'an-Najāt* and *Kitāb 'aš-šifā'*, which characterized the differences between some faculties of internal perception that perceived the form of the sensed things and others that perceived the ‘intention’ thereof. Ibn Sīnā states:

“The distinction between the perception of the form and that of the intention is that the form is what is perceived both by the inner soul and the external sense; but the external sense perceives it first and then transmits it to the soul ... As for the intention, it is a

<sup>66</sup> *Kitāb 'aš-šifā'*, p. 349, 350, 366; Rahman (1952: 26).

<sup>67</sup> *Kitāb 'aš-šifā'*, *The Natural Science, Book 6*.

<sup>68</sup> *Kitāb 'an-najāt*, p.132; Rahman (1952: 26).

<sup>69</sup> *Kitāb 'an-najāt*, p.132.

<sup>70</sup> Jakobson et al. (1952).

<sup>71</sup> Raphael et al. (2006: 4).

thing which the soul perceives from the sensed object without its previously having been perceived by the external sense”<sup>72</sup>.

والفرق بين إدراك الصورة وإدراك المعنى أن إدراك الصورة هو الشيء الذي يدركه الباطن والحس الظاهر معا لكن الحس الظاهر يدركه أولا ويؤديه إلى الحس الباطن... وأما المعنى فهو الذي تدركه النفس من المحسوس من غير أن يدركه الحس الظاهر أولا.<sup>73</sup>

Ibn Sīnā also analyzed other distinctions between the faculties, some of which can both perceive and act, while others can only perceive and do not act. He states:

“The difference between perception accompanied by action and perception unaccompanied by action is that it is the function of certain internal faculties to combine certain perceived forms and intentions with others and to separate some of them from others so that they perceive and also act on what they have perceived. Perception unaccompanied by action takes place when the forms or the intention is merely imprinted on the sensed object without the percipient having any power to act upon it at all”<sup>74</sup>.

والفرق بين الإدراك مع الفعل والإدراك لا مع الفعل، أن أفعال بعض القوى الباطنة أن يركب بعض الصور والمعاني المدركة مع بعض ويفصله عن بعض، فيكون قد أدرك وفعل أيضا فيما أدرك. وأما الإدراك لا مع الفعل فهو أن تكون الصورة أو المعنى يرتسم في الشيء فقط من غير أن يكون له أن يفعل فيه تصرفا البتة.<sup>75</sup>

In addition, Ibn Sīnā pointed out that some faculties act to produce a primary form of perception, others a secondary form of perception. The distinction between primary and secondary perception is that:

“In the former, the perception faculty somehow directly acquires the form, while in the latter the form is acquired through another agent which transmits it to the acquired through another agent which transmits it to the percipient faculty”<sup>76</sup>.

والفرق بين الإدراك الأول والثاني أن الإدراك الأول هو أن يكون حصول الصورة على نحو ما من الحصول قد وقع للشيء من نفسه، والإدراك الثاني هو أن يكون حصولها للشيء من جهة شيء آخر أدى إليها.<sup>77</sup>

Moreover, Ibn Sīnā treats in a systematic way the inner senses, identifying different features through physical, psychical, and spiritual approaches. Firstly, Ibn Sīnā started with *collative sense / common sense* ('*al-ḥiss 'al-muṣṭarak*). He determined its location to be in the forepart of the front ventricle of the brain. He assumed it branched out from the center of the senses and is a power towards which all sensible entities converge, receiving all the forms which are imprinted on the five senses.<sup>78</sup> The collative sense, however, in Ibn Sīnā's view cannot operate in the external sense. Rather, it occurs in the brain throughout mental processes.

<sup>72</sup>Kenny (2009); Rahman (1952: 30).

<sup>73</sup> *Kitāb 'aš-šifā'*, p.350.

<sup>74</sup>Rahman (1952: 30).

<sup>75</sup> *Kitāb 'aš-šifā'*, *The Natural Science*, p.350.

<sup>76</sup> *Kitāb 'aš-šifā'*, *The Natural Science, Book 6*, p.350; Rahman (1952: 30).

<sup>77</sup> *Kitāb 'aš-šifā'*, *The Natural Science, Book 6: Almaqāla 1*, p.350.

<sup>78</sup> *Kitāb 'aš-šifā'*, *The Natural Science, Book 6: Almaqāla 4: The Soul*, p.350; *Kitāb an-najāt*, p.400; Rahman (1952: 31).

The next notion in Ibn Sīnā's account of perception by inner sense is the faculty of *representation or imagination* ('*al-muṣawwirah*, '*al-xayāl*'). He determined its location in the brain in the rear part of the front ventricle of the brain.<sup>79</sup> Moreover, he identified the imaginative role in the mind, pointing out that it observes what the collative sense has received from the individual five senses even in the absence of sensed objects.<sup>80</sup> However, he supposed that this and the collative sense are like one power, but they are different in form:

“The collative sense and imagination seem as if they were one power, as though they do not differ in theme, but in their form. The collative sense cannot retain its object, but the sensible form is retained by the recording power or imagination. This makes no judgment, but simply retains the form. The collative sense and the external senses do judge, in a certain way or with a certain kind of judgment, so it is said this moving thing is black or this red thing is sour. But the retaining power makes no judgment about a thing existentially, but only about its essence, that it has such a form”.<sup>81</sup>

والحس المشترك والخيال كأنهما قوة واحدة، وكأنهما لا يختلفان في الموضوع، بل في الصورة. وذلك أنه (الحس المشترك) ليس أن يقبل أن يحفظ، فصورة المحسوس تحفظها القوة التي تسمى المصورة والخيال، وليس لها حكم البتة، بل حفظه. وأما الحس المشترك والحواس الظاهرة فأنها تحكم بجهة ما أو بحكم ما، فيقال أن هذا المتحرك أسود وأن هذا الأحمر حامض، وهذا الحافظ لا يحكم به علي شيء من الموجود إلا على ما في ذاته بأن فيه صورته كذا.<sup>82</sup>

Ibn Sīnā goes on to deduce other faculties of internal sense denoting its power. One of the other faculties is called *sensitive imagination* ('*al-mutaxayyilah*) related to the animal soul and *rational imagination/ cogitative sense* ('*al-mufakkirah*) related to the human soul. He also identified its location; it is in the middle ventricle of the brain near the vermiform process. Its role is to combine certain things with others in the faculty of representation and in separating some things from others as it chooses.<sup>83</sup>

Recent empirical research in cognitive psychology and neuropsychology on the importance of motor processes in mental imagery activities has emphasized insights from cognitive linguistics and psycholinguistics on the role of embodiment in thought and language have direct applications in understanding various kinds of mental imagery data. It also suggest that recognizing the embodied nature of mental imagery is a major step in understanding the fundamental importance of the imagination in human cognition.<sup>84</sup>

Similarly, recent neurological research has taken advantage of psycholinguistic analyses of how the mind works to acquire language and the role of imagination in the mind-process of language development. One study examines imagination, and specifically self-imagining, as a method for improving memory in individuals with neurological brain damage. It shows the important of psycholinguistic insights and the need for additional research to investigate the benefits of self-imagining in providing a particularly effective method for memory rehabilitation.<sup>85</sup>

Another approach to the internal senses in Ibn Sīnā's psychology view is *estimative*

<sup>79</sup>Kitāb 'aṣ-ṣifā', *The natural science, Book 6: The Soul*, p.350; Kitāb 'an-najāt, p.400; Rahman (1952: 31).

<sup>80</sup>Kitāb 'aṣ-ṣifā', *The natural science, Book 6: The Soul*, p.350; Kitāb 'an-najāt, p.400; Rahman (1952: 31).

<sup>81</sup>Kenny (2009); Rahman (1952: 31).

<sup>82</sup>Kitāb 'aṣ-ṣifā', p. 400; Kitāb tisa' rasā'il, *Letter 1: Physics from the Eyes of Wisdom*, p.28.

<sup>83</sup>'al-Iṣārāt wa-t-tanbīhāt (Remarks and Admonitions), Part 3: *The Soul*, p.381; Kitāb 'aṣ-ṣifā', p. 400; Rahman (1952: 31); Kenny (2009).

<sup>84</sup>Gibbs and Berg (2002).

<sup>85</sup>Grilli and Glisky (2011: 1–5, 17).

power (*'al-waham*) which has today become the focus of many psychological studies. One study of Medieval methods of internal sense analysis shows that Ibn Sīnā's theory of internal senses was among the leading paradigms until the mid-thirteenth century, and his conception of estimative power was discussed right through to the seventeenth century.<sup>86</sup>

Ibn Sīnā determined the location of estimative power; it is in the far end of the middle ventricle of the brain.<sup>87</sup> He also clarified its role in terms of perceiving the non-sensible intention that exists in individual sensible objects.<sup>88</sup> He gave examples of it in both the animal and human soul, "like the faculty which judges that the wolf is to be avoided and the child is to be loved":

كالقوة الحاكمة بأن الذئب مهروب عنه، وأن الولد هو المعطوف عليه.<sup>89</sup>

In Ibn Sīnā's method, estimation played an important role in accounting for features of both animal and human cognition.<sup>90</sup> According to Black, his study shows the importance of the human aspects of estimation in Ibn Sīnā's view as he posited a human estimative faculty in addition to the intellect in order to account for a variety of complex human judgments that are pre-intellectual, more than being merely sensible. This perspective on estimation, as he shows, was largely ignored in the West.<sup>91</sup>

Estimation, in Ibn Sīnā's view, is important in many respects. First, Ibn Sīnā's claim of meanings or 'intentions', which are distinct in kind from sensible forms and images, is the most important aspect of his account of the estimative faculty.<sup>92</sup> He wanted to posit a rational power to the faculty of estimation by making an association between intentions and external senses to make its processes concrete. Due to this view, Ibn Sīnā gave his examples of estimation from animals; sheep and wolves, which can perceive material things by the five proper senses and perceive the non-material, such as "smelling danger" and "seeing hostility" by "intentions".<sup>93</sup> In this regard, Black states: "It seems obvious that one of the main reasons why Ibn Sīnā often provides examples of estimative intention drawn from the animal kingdom is that if even non-rational animals can be shown to perceive aspects of their environment that exceed the perceptual capacities of the senses and imagination, the objection that such perceptions are really intellectual ones can be forestalled from the outset".<sup>94</sup>

A second important aspect of estimation in Ibn Sīnā's theory is that it does not only come from filling the gap between perceiving by external senses and by non-sensible character that explains the matter of seeing some things as sweet, since the eye itself only perceives color. However, memory also plays an explicit part in Ibn Sīnā's theory of estimation, acting as a second type of estimation 'on account of something like experience' as when a dog comes to fear a stick after he has been repeatedly beaten by it.<sup>95</sup> "Ibn Sīnā explains this estimative phenomenon as involving a complex process in which the estimative sense, with the aid of memory, sensation, and the formative sense (*al-muṣawwirah*), reunites the forms and intention perceived from a given object into the perception of a concrete

<sup>86</sup>Knuutil and Kärkkäinen (2014).

<sup>87</sup>*Kitāb 'aṣ-ṣifā'*, *The Natural Science, Book 6: The Soul*, p.351.

<sup>88</sup>*Ibid.*, p.357; *Kitāb 'an-najāt*, p.141; *'al-'Isārāt wa-t-tanbīhāt*, *The Soul*, p.367. *Kitāb tisa'rasā'il*, *Letter 1: Physics from the Eyes of Wisdom*, p.26.

<sup>89</sup>*Kitāb 'aṣ-ṣifā'*, *The Natural Science, Book 6*, p.351

<sup>90</sup>*Ibid.*, p. 352.

<sup>91</sup>Black (2000).

<sup>92</sup>*Kitāb 'aṣ-ṣifā'*, *The Natural Science, Book 6, Almaqāla 2: The Soul*, p.357; *Kitāb 'an-najāt*, *The Natural Science*, p.141.

<sup>93</sup>*Kitāb 'aṣ-ṣifā'*, *The Natural Science, Book 6*, p. 351.

<sup>94</sup>Black (2000).

<sup>95</sup>*Kitāb 'aṣ-ṣifā'*, *The Natural Science, Book 6*, p. 357.

whole”.<sup>96</sup> In this role, the estimative faculty can perceive the complexity of these things together and judge the objects as an individual whole.

A third additional important aspect of Ibn Sīnā’s view of estimation is that it identifies estimation as a judgmental faculty (*’al-hākīm*). Ibn Sīnā frequently uses the language of control, conduct, employment, and so on to describe the estimative sense’s relation to the other internal sense powers, particularly *common sense/ collative sense* (*’al-ḥiss al-muštarak*), *formative or retentive imagination* (*’al-muṣawwirah /’al-xayāl*), and *compositive imagination/imaginative sense* (*’al-mutaxayyilah*). He states:

“This power, which combines form and form, or form and significance, or significance and significance, is like the estimative sense in location, not in judging, but in working to link with judgment. Its location is the middle of the brain so that it can communicate with the repositories of both significances and forms. It might seem that the estimative sense is itself the cogitative, imaginative and recollective powers. But it is accurately the judgmental power: by its essence judging, by its movements and actions imagining and recalling. It is imagining by how it acts upon the forms and significances, and remembering in the way its action terminates”.<sup>97</sup>

وهذه القوة المركبة بين الصورة والصورة، وبين الصورة والمعنى، وبين المعنى والمعنى، هي كأنها القوة الوهمية بالموضوع، لا من حيث تحكم، بل من حيث تعمل لتصل إلى الحكم. وقد جعل مكانه وسط الدماغ ليكون لها اتصال بخزائني المعنى والصورة. وشبهه أن تكون القوة الوهمية هي بعينها المفكرة والمتخيلة والمتذكرة، وهي بعينها الحاكمة فتكون بذاتها وبحركاتها وأفعالها متخيلة ومتذكرة، فتكون متخيلة بما تعمل في الصور والمعاني، ومتذكرة بما ينتهي إليها عمله.<sup>98</sup>

In his study of estimation, Black focused on the concept of judgment in Ibn Sīnā’s writing on estimation. He states: “In some texts, Ibn Sīnā even attributes to estimation, as the soul’s chief judgmental power, responsibility for all acts of sensible perception. In others, he attributes to estimation a kind of opinion or assent on the level of sense cognition”.<sup>99</sup>

Elsewhere in his psychological writings, Ibn Sīnā gives estimation a high rank in the internal senses; and in ascribing the chief role to estimation in the judgmental function, it appears implicitly that Ibn Sīnā considered incidental perception as an estimative function that is common to animals and humans. In animals, Ibn Sīnā identified the estimative power as the apperceptive faculty. In human beings, he presumed that estimation possesses special judgment (*’aḥkām xāṣṣah*).<sup>100</sup> Although Ibn Sīnā pointed out that the judgment of estimation is not decisive or intellectual, he tends to view it as a cognitive force, believing that it is “sufficiently unique, and sufficiently important, to warrant an entirely separate consideration in epistemological terms, as the source of a distinctive class of logical propositions which may serve syllogistic premises”.<sup>101</sup>

Returning to the inner senses, Ibn Sīnā identified other perspective powers. He explained the meaning, role, and location of the *retentive* (*’al-hāfiḍah*) and *recollective* (*’al-mudakkirah*) faculty, which are located in the rear ventricle of the brain.<sup>102</sup> Ibn Sīnā claimed in his psychological writing:

<sup>96</sup>Black (1993).

<sup>97</sup>Kenny (2009).

<sup>98</sup>*Kitāb ’aš-šifā’, The Natural Science, Book 6, p. 401.*

<sup>99</sup>Black (1993).

<sup>100</sup>*Kitāb ’aš-šifā’, The Natural Science, Book 6, p. 401.*

<sup>101</sup>Black (1993).

<sup>102</sup>*Kitāb ’aš-šifā’, The Natural Science, p.402.*

“The object of sense is called ‘form’ and the object of the estimative sense is known as ‘significance’ (*ma‘nā*). Each of these has its own repository (*xizānah*). The repository of sense data is the imagination. By contrast, the repository of the estimative data is called the retentive power because of what it produces there. It is also called recollective because of its speedy readiness to ascertain a thing, to represent it, and to retrieve it if it is lost”.

يسمى مدرك الحس صورة ومدرك الوهم معنى، ولكل منهما خزانة. فخزانة مدرك الحس هي القوة الخيالية، وخزانة مدرك الوهم هي القوة التي تسمى الحافظة وهذه تسمى أيضا متذكرة فتكون حافظة لصيانتها ما فيها، ومتذكرة لسرعة استعدادها لاستثباته، والتصور به مستعدة إياه إذا فقد.<sup>103</sup>

In a manner which is partly comparable to Ibn Sīnā’s approach to the internal senses, and their role in comprehension and understanding through processes in the human brain, modern research in psycholinguistics makes use of biology, neuroscience, cognitive science, and information theory to study how the brain works in acquiring and understanding meanings.<sup>104</sup> Modern approaches emphasize that “theories of sentence comprehension and production are not based, in any simple way, only on linguistic theories. Rather, psycholinguistic theories must consider the properties of the human mind as well as the structure of language”.<sup>105</sup> In one applied psycholinguistic study, Rosenberg provides a discussion of the component system theoretically involved in word recognition and the brain process in this system. The study presents the three-stages of memory that involves recognizing and identifying a word, from initial pickup of its physical features, to the production of an identifying response. In this context we will mainly consider the first stage that explains the brain processes in comprehending meaning. This involves three components: The first stage - *sensory register*- is a physical visual process that records the features of letters and words. The second component is the *short-term* store which is believed to be a limited capacity system depending on one’s ability to store and recollect. The final component is *long-term* memory which is an unlimited capacity system that retains information indefinitely.<sup>106</sup> The study of these stages were considered a mental process explaining human comprehension, production, and acquiring knowledge, realizing the role of external senses such as, seeing and hearing, as well as identifying a human being’s brain mechanism, such as representation, retentive, and recollective skills. They can be usefully compared to Ibn Sīnā’s consideration of internal sense.

Another area of psychological application in Ibn Sīnā’s thought is the faculty of *dreaming*. He linked its function with the perception faculties, especially the faculty of representation. Ibn Sīnā supposes that the faculty of representation plays an organizing role in dreaming. He also considers recollective faculty functions in the process of dreaming. In his study of dreams, Ibn Sīnā presented a mental process of a dream and how it appears through eye movements or verbal speech.<sup>107</sup>

In studying the cognitive psychology of speech processes, psycholinguists have proposed a relationship between dreams and speech, finding sharing points between them in common production routines. Although many studies have indicated that there are major differences between speech and dream production at both input and the output levels, at least one study proposes that mid-range stages of speech and dream production might be largely identical. Foulkes in his study of dream presents much new data in attempting to provide an

<sup>103</sup>Ibid., p.400.

<sup>104</sup>Levelt (2013).

<sup>105</sup>Treiman (2003: 3).

<sup>106</sup>Rosenberg (2014: 37).

<sup>107</sup>*Kitāb ‘an-najāt, The Natural Science*, p.400.

answer to the question of how mental functions are organized during rapid eye movement sleep in dreams.<sup>108</sup>

Additionally, one psycholinguistic investigation of dreams argues that certain commonly reported phenomena may be taken as evidence that the linguistic system is active during dreaming. It also describes different categories of dream phenomena that support the claim that verbal thought is an important component of dream formation and content.<sup>109</sup> The discussion of these facts shows the relationship between dream, thought, and language.

### III.iv. Ibn Sīnā and speech pathology

Ibn Sīnā additionally referred to other psycholinguistic approaches, in what he wrote in the third book of the *Canon*,<sup>110</sup> more specifically: speech pathology. Although the medicine part is not stressed here, it will be assumed as a part of Ibn Sīnā's view in relation to psycholinguistic approaches.

Ibn Sīnā, in the sixth 'art' of the third part of *Canon*, devoted more than fourteen chapters to the tongue. He explained the tongue's anatomy, musculature, and nerve innervations as well as tongue diseases. Ibn Sīnā also analyzed taste disturbance, tumors and tongue-ties, as well as the disturbance of speech and painful tongue disorders. His study was concerned mainly with the causes of tongue diseases and various forms of treatment. Ibn Sīnā clarified the function of the tongue thus:

“The tongue is an organ from the oral cavity which plays a major part in the mechanism of chewing food, phonation, pronouncing letters, and differentiation of taste. Its ventral surface has attachment with the esophagus and the stomach, while the dorsum of the tongue is divided into two parts in a V-shape with a considerable sharing between them through the communication tendons. The tongue has a large network of subdividing nerve branches from four protruding nerves. It also contains a large network of blood supply and nerve innervations. Under the tongue, there are two orifices of the submandibular salivary gland ducts, that open and release their secretions into the oral cavity to keep both tongue and oral mucosa wet”.

الفم عضو ضروري ... وهو من آلات تقليب الممضوغ، وتقطيع الصوت وإخراج الحروف، وإليه تمييز الذوق. وجلدة سطحه الأسفل متصلة بجلدة المرئ. وباطن المعدة. وجلدة النطع مقسومة منصفة بحذاء الدرز السهمي وبينهما مشاركة في أربطة واتصال... وجوهر اللسان لحم رخو أبيض، قد اكتنفه عروق صغار مداخلة دموية إحمر لونه بها، ومنها أوردة، ومنها شريانات، وفيه أعصاب كثيرة متشعبة من أعصاب أربعة ناتئة... ومن تحته فوهتان يدخلهما الميل هما منبع اللعاب... يحفظان نداوة اللسان.<sup>111</sup>

Following this, Ibn Sīnā interprets the anatomy of the tongue muscles. He indicates that the tongue contains several pairs of muscles; upper, middle and lower tongue muscle, in all a total of seventeen muscles.<sup>112</sup> Ibn Sīnā describes the neuroanatomy of the tongue, identifying the trigeminal nerve, which is the fifth cranial nerve. He called it the third pair of the seven pairs.<sup>113</sup> His description of nerve branches and the investigation of its functions

<sup>108</sup>Foulkes (1982).

<sup>109</sup>Kilroe (2001); Blechner (2013).

<sup>110</sup>See for more information about the *Canon Book*, Moosavi (2009); Afnan (1958: 205); Nasser et al. (2009); and Rahimi et al. (2007).

<sup>111</sup>*al-Qānūn fī at-ṭibb*, Vol.2, p.1061

<sup>112</sup>*al-Qānūn fī at-ṭibb*, Vol.1, p.66

<sup>113</sup>*Ibid.*, p.77.



have been extensively discussed and are still used in contemporary approaches to Anatomy.<sup>114</sup>

Ibn Sīnā describes in detail tongue diseases which can restrict the tongue's movability, sensibility, or taste, or perhaps inactivate one of its senses more than the other. He assumed that tongue disorders could be combined diseases, local or due to communication with the brain, or the stomach, or any other organ such as the lungs or chest.<sup>115</sup>

In relation to tongue pathology, Ibn Sīnā brought together a number of speech problems which are caused by tongue relaxation, which could lead to hardship, altered speech, or perhaps loss of speech. He elucidated various terms relating to speech pathology, such as *'al-fa'fa'ah*, *'at-ta'ta'ah*, and *'at-tamtamah*, which describe speech difficulties in terms of pronouncing the letters incorrectly due to psychological, rational, neurological or clinical reasons.

Relating to this, Ibn Sīnā determined the causes of disturbance in human speech. He states that this occurs because of something in the brain, or due to an issue in motor enervation, or its ascending branches to the tongue.<sup>116</sup> Specifically, he points out that the tongue's redness or high temperature may indicate that the disease is caused by bloody material on the tongue. On the other hand, he mentions that a proliferation of flowing saliva might be due to water inflation diseases on the tongue. He states:

“Laxness of the tongue may be due to watery, bloody moistures. It may be due to a cause in the brain, or in the nerve, which causes brain motion, or the branch which comes from the nerve to the brain. You know what is linked to the brain and what is not, accordingly to the state of the other organs linked by sense or movement to the brain. The redness and heat of the tongue may indicate that the substance is bloody. But a large amount of soft, flowing saliva may also indicate that the substance is soft and watery”.

قد يكون استرخاء اللسان من رطوبة دموية مائية، وقد يكون لسبب في الدماغ، وقد يكون لسبب في العصبية المحركة له، أو الشعبة الجائية منها إليه. وأنت تعلم ما يكون بشركة من الدماغ، وما يكون من غير شركة، بما تجد عليه الحال في سائر الأعضاء المستقيمة من الدماغ حسا وحركة، وقد يدل على أن المادة دموية، حمرة اللسان وحرارته، وقد يدل على أن المادة رقيقة مائية، كثرة سيلان اللعاب الرقيق.<sup>117</sup>

For more explanation, Ibn Sīnā clearly delineates the causes of speech disturbances causes. These include:

- **Central or peripheral nervous system causes:** Ibn Sīnā clarifies this symptom saying:

“Aphasia and other speech disorders can be due to disorders in the brain and from the exits of the nerves leading to the tongue causing it to move, or they could be in the same nerve branch or the muscle itself”.<sup>118</sup>

إن الخرس وغيره من آفات الكلام، قد يكون من آفة في الدماغ، وفي مخرج العصب الجائي إلى اللسان المحرك له وقد يكون في نفس الشعبة وقد يكون في العضل أنفسها

<sup>114</sup>Kaadán and Hanoón (2003: 41-46).

<sup>115</sup>*'al-Qānūn fī at-ṭibb*, Vol.2, p. 1062.

<sup>116</sup>Shah (1996: 200).

<sup>117</sup>*'al-Qānūn fī at-ṭibb*, Vol.2, p.1063.

<sup>118</sup>*Ibid.*, p.1068.

- **Anatomical and pathological causes related to the tongue:** Ibn Sīnā attempted to identify various causes of dysphasia. He states:

“It could be within the muscle itself either due to convulsion, expansion, stiffness or relaxation, or tongue, or surgical complications that have ended up with scaring or a solid tumor”.

وقد يكون في العضل أنفسها. وذلك الخلل إما تشنج، وإما تمدد، أو تصلب، أو استرخاء أو قصر رباط، أو تعقد عن جراحة اندملت، أو ورم صلب.<sup>119</sup>

Ibn Sīnā also indicates that dysphasia might occur due to the tongue becoming enlarged, making the tongue extrude out of the mouth, in which case the mouth cannot hold it. He mentions that this could be due to heavy soft, simulative mucous secretion.<sup>120</sup> Contrastingly, Ibn Sīnā assumes that dysphasia can also occur due to shortness of the tongue (ankyloglossia). He believes that tongue-tie or shortness occurs as a result of anatomical factors related to the lingual frenum, or due to convulsions of the tongue that would prevent its normal movement.<sup>121</sup>

Gagging reflexes are another anatomical reason for speech disturbance. Ibn Sīnā explains that:

“This could be due to large tumors, or in cases of diphtheroids so the tongue will extrude outside to open the respiratory airway”.

قد يكون لأورامه العظيمة، وقد يكون من الخوانيق، فتدلع الطبيعة أو الإرادة، اللسان ليتسع مجرى التنفس.<sup>122</sup>

- **Causes of paroxysm on the surface of the tongue that spoil speech due to the resulting pain:** Ibn Sīnā argues that tongue disorders may be caused by ulcers or tumors such as inflammatory tumors, mucous tumors, or solid and malignant tumors.<sup>123</sup> Ibn Sīnā also accepts that aphthous stomatitis, which are ulcers of the tongue and mouth, are caused by inflammation of the stomach and head, or are due to fevers.<sup>124</sup> Ibn Sīnā also considers the effects of ranula diseases in causing speech disturbance. He explains the nature of ranula in the same basic way as described in a recent study of tongue pathology of ranulas.<sup>125</sup> He states:

“The ranula is a semi solid gland situated below the tongue, a similar color to the surface of the tongue and its vein where the ranula is located. It is caused by heavy viscous mucous secretion”.

مرض الضفدع هو شبه غدة صلبة تكون تحت اللسان شبيهة اللون المؤتلف من لون سطح اللسان والعروق التي فيه بالضفدع، وسببه رطوبة غليظة لزجة.<sup>126</sup>

<sup>119</sup>Ibid., p.1068.

<sup>120</sup>Ibid., p.1065; Kaadan and Hanoon (2003).

<sup>121</sup>*al-Qānūn fī at-ṭibb*, Vol.2, p.1066.

<sup>122</sup>Ibid., p.1069.

<sup>123</sup>Ibid., p.1068.

<sup>124</sup>Ibid., p.1069.

<sup>125</sup>Kaadan and Dabao (2006: 57-59).

<sup>126</sup>*al-Qānūn fī at-ṭibb*, Vol.2, p.1068.

All these types of tongue surface diseases in Ibn Sīnā's theory affect the tongue and its different aspects, causing speech disorders.

- **Casual fundamental causes:** Ibn Sīnā explained that dysphasia could appear after a cerebral accident, "when the embolus ascends from the brain to block the tongue supply, or in severe fever cases due to dehydration so the tongue will shrink and become convulsed".

وقد يعرض السرسام لاندفاع العضل من الدماغ إلى الأعصاب وفي الحميات الحارة لشدة تجفيفها ويكون اللسان مع ذلك ضامرا متشنجا وهو قليلا ما يكون.<sup>127</sup>

Ibn Sīnā also considered what is today called glossodynia. He states:

"This could be due to mouth or stomach ulcers, or the brain, without this reaching fever, or the intake of spicy, salted, sour and sweet foods, polydipsia, or due to other greater causes such as severe internal tumors".

قد يكون ذلك بسبب حرارة في فم المعدة، أو الدماغ، لا يبلغ أن يكون حمى، أو بسبب تناول أشياء حريفة، ومالحة، ومرة، وحلوة، والعطش الشديد. ويكون لأسباب أعظم من ذلك مثل الحميات الحارة، والأورام الباطنة.<sup>128</sup>

- **Laryngeal causes:** Ibn Sīnā believes that speech disturbance can be related not only to the tongue, but also to the muscles of the larynx. These can be either extended or relaxed. He states:

"The speech disturbance can be due to muscles of the larynx in which they can be either extended or relaxed so that the person will not be able to phonate easily if he attempts to move his chest and larynx muscles with great force that won't be tolerated by these muscles. He may get stuck with the first word but after that he can continue. Such a person must not start speech by inhaling deeply and moving his chest greatly, but he should start with ease, because if he gets used to that, speech will be easier for him".

وقد تكون الأفة في الكلام لسبب في عضل الحنجرة اذا كان فيها تمدد او استرخاء. فربما كان الإنسان يتعذر عليه التصويت في أول الأمر إلا أنه يعنف في تحريك عضل صدره وحنجرته تعنيفا لا تحتمله تلك العضلة فتعصى فإذا يبس في أول كلمة ولفظة استرسل بعد ذلك. ومثل هذا الإنسان يجب أن لا يستعد للكلام بنفس عظيم وتحريك للصدر عظيم بل يشرع فيه بالهوينى فإذا اعتاد ذلك سهل عليه الكلام واعتاد السهولة فيه.<sup>129</sup>

Ibn Sīnā seems well aware of the anatomy and neuroanatomy of the tongue as well as the diseases that cause tongue or speech disturbance and the relevant treatments. All these considerations in Ibn Sīnā's theory are presented in a logical sequence, which seems to reflect a highly specific scientific classification similar to what is used nowadays in clinical studies as well as in the study of speech pathology in some aspects of psycholinguistics.

<sup>127</sup>Ibid., p.1068.

<sup>128</sup>Ibid., p.1069.

<sup>129</sup>Ibid., p.1068.

Ibn Sīnā's consideration of language disorders is interdisciplinary in nature, covering – from a modern perspective – clinical, physical, and psychological aspects. Recent theories in the area of speech development have endeavored to bring clinical theories into the field. Studies of children's speech difficulties do not focus only on the importance of linguistic approaches, since these do not provide sufficient explanations for these difficulties. They also recognize the importance of the medical perspective, in explaining the underlying causes of speech impairments, since "linguistic and medical perspectives on speech development and impairment clearly complement one another"<sup>130</sup>.

Psycholinguistic studies of speech production, such as aphasia or loss of the ability to express or produce speech, tackle the causes of these disorders.<sup>131</sup> The study of speech disorders has attempted to identify and analyze different types of speech difficulties and sound production problems, such as: Dysarthria, Aphasia, Apraxia, Alalia, Aphemia, Aphonia, Articulation, Autism, Cleft Lip and Palate, and Dysphagia.<sup>132</sup> It focuses on describing the symptoms of speech diseases and provides a theoretical structure for speech therapy, attempting to make speech therapy consistent with modern conceptions of science. Travis in his study on the difficulties of treating Dysarthria argues that one stage of training is to make the patient aware of his errors and to use a phonetical approach to training. The patient should be encouraged to express himself when he is required to talk.<sup>133</sup> This is an approach Ibn Sīnā also advocated. He states:

"If the child is slow to speak, his tongue must be constantly made to move, exercised, and its saliva made to flow. This is particularly effective if honey is used with the exercises, as well as Darani salt. It collects the moistures of the tongue as discussed. Forcing the child to speak also frees up the tongue's movement".

وإن أبطأ الصبي بالكلام وجب أن يدام تحريك لسانه وذلكه وتسييل اللعابات منه، وينفع في ذلك خصوصا إذا استعمل في ذلكه العسل، والملح الداراني، ويجمع ما قيل في رطوبة اللسان، ومما يحرك لسانهم ويطلقه إجبارهم على الكلام.<sup>134</sup>

## Conclusion

This paper attempted to give an overview of Ibn Sīnā's contribution psycholinguistics (though it comes inter-twined with his overall view of psychology), considering issues relating to linguistics, education, and speech pathology.<sup>135</sup> The paper has considered Ibn Sīnā's approach to the human mind, perception, intelligence, learning or knowledge acquisition and speech pathology. It compares some recent views in the field of psycholinguistics. The findings indicate that Ibn Sīnā helped lay the foundation for numerous areas within psycholinguistics. This illustrates the significance of the thinking of one Medieval scholar, Ibn Sīnā, and suggests how studies in the future may further investigate Ibn Sīnā's knowledge. The paper has shown that the methodology of Ibn Sīnā was encyclopaedic in nature. In the modern era the encyclopaedic method has once again become important, giving rise to notions such as 'interdisciplinary co-operation' and 'cross-disciplinary research'.

<sup>130</sup> Baker (2001).

<sup>131</sup> Crystal (1983).

<sup>132</sup> Travis (1975: 48); Muma (1998).

<sup>133</sup> Travis (1957: 501).

<sup>134</sup> *al-Qānūn fī at-ṭibb*, Vol.2, p.1065.

<sup>135</sup> Steinberg (2006).

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