The Ventricle System and the Internal Senses
In Medieval Cognitive Theories

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Introduction

Often research activities in the history of philosophy are distinct and separated from research activities undertaken by historians of psychology, even though both are considering the same areas of inquiry and often are dealing with similar subject matter. One discovers this when considering the internal sense theories of medieval philosophers like Aquinas and the physiological ventricle system of the brain developed by other medieval philosophers like Avicenna. The thrust of this paper is directed towards assisting historians of medieval philosophy understand what historians of psychology have discovered when reading and considering the faculty psychology of the internal senses articulated in medieval theories of mind. This paper considers the writings of two historians of psychology, Thomas Hardy Leahey and Simon Kemp, with Kemp's work providing the main thrust of this analysis. In addition, this paper pays special attention to the intentionality of inner sense found in the writings of Thomas Aquinas.

Leahey's discussion of Thomas Aquinas offers a straightforward but what I take to be an incomplete and mildly inaccurate analysis of Aquinas on inner sense. Kemp provides a fascinating account of the ventricle system of the brain, which he suggests influenced the Arabian philosophers, especially Avicenna and Averroes, and through them, Thomas Aquinas. His *Medieval Psychology* and *Cognitive Psychology in the Middle Ages* defend what Kemp takes to be this conjunction of the ventricle system with medieval theories of inner sense. The first part of this paper
discusses Kemp’s analysis of the ventricle system and its appropriation by several medieval Aristotelians; the second part is a philosophical analysis of Kemp’s and Leahey’s positions.

The Ventricle System of the Brain

We begin with Kemp’s work in the history of psychology on the internal senses and his take on the importance of the ventricle system of the brain in medieval accounts of the internal sense faculties. Of course, the shadow of Aristotle’s *De Anima* hovers over these discussions of internal sense faculties and their functioning in what late twentieth century psychologists call cognitive psychology. With Avicenna, the cognitive functions of the Aristotelian *phantasia* were localized in the ventricle system of the brain. While critical of aspects of Kemp’s work, nonetheless, Historians of medieval philosophy, Robert Pasnau and Jeffrey Brower, both claim that Kemp’s work on the inner senses is noteworthy.

Kemp writes that the ventricle system began with the early anatomical and physiological work of Galen. Following empirical observations resulting from his dissection of cadavers, Galen first discussed the ventricle system and its importance. Kemp suggests that Galen got the biological location of the ventricles more or less right. However, Galen did not assign cognitive functions to any particular part of this system. This cognitive assignment developed later with the work of Avicenna and then Thomas Aquinas. Physiologically, there are three ventricles in the brain, which were seen as “fluid-filled cavities.” Galen was, however, incorrect on one important
aspect of the ventricle system, which would cause chaos for late medieval and early renaissance commentators. Galen thought that the sensory nerves that carried “information” from the external sense faculties were routed directly to the front ventricle. This “routing,” however, was found lacking experimentally.

This development of the cognitive dimension required the analysis and experimentation of Avicenna, who offered what became the more or less authoritative and canonical account of the ventricle system and its relation to the internal sense faculties. A well-trained physician of his time, Avicenna wrote widely on medical as well as philosophical issues. Kemp further notes that Avicenna’s “ Canon of Medicine was a standard medical text in Europe from the 13th to the 17th centuries.” Avicenna argued that the three ventricles of the brain—what some translations call “concavities”—were the physiological places of five distinct and different cognitive faculties that served as the organic foundation for the cognitive functions of perception. These five faculties were: the sensus communis, the retentive imagination, the compositive imagination or vis cogitativa, the vis aestimativa (which for Aquinas functions in humans as the vis cogitativa) and the sense memory. Kemp, as far as I can tell, does not distinguish the two faculties of the imagination, but Avicenna did assert this distinction regarding the faculties of inner sense. Of course, these internal sense faculties are common to psychological treatises based on Aristotle’s account in the De Anima. What is interesting and important is Avicenna’s placing the cognitive functioning faculties in different parts of the three ventricles discussed by Galen. This squares with Aquinas’s distinction
between “organ” and “faculty,” although George Klubertanz suggests that Aquinas’s “attitude toward localization is hesitant.”

The Front Ventricle

The *sensus communis* was found in the front part of the forward ventricle. Following Aristotle, the *sensus communis* is where the discrete impressions from the external sense faculties are combined. At this level, Avicenna, much like Berkeley and Hume, adopts what I call a “bundle view of sensations,” with the physical object being reducible to a combination of discrete sensations—Aristotle’s proper and common sensibles—coming from the different external sense faculties. This is the classic “heap theory” of a physical object.

Avicenna placed both the *sensus communis* and the *imaginatio* in the foremost ventricle in the human head. Kemp writes: “all the sensory nerves were believed to be connected to the front ventricle, in the front of which the common sense [the *sensus communis*] was located.” Kemp also notes that, according to Avicenna, “...the consistency of the front ventricle was more liquid and slippery than the back, so that sensation was rapidly received by the common sense but also quickly lost if the stimulus were removed.” The state of the liquid character of the front most part of the ventricle is contrasted with the state of the rear part of this ventricle: “the imagination at the back could retain images because it was drier.” Reading Kemp helped clear up several puzzles I found in reading Aquinas’s texts on internal sense, where Thomas uses the “moist” description. In *De Veritate*, for instance,
Aquinas writes: "the organs of the power of imagination, of memory, and of the *vis cogitativa*, are in the brain itself, which is the place of greatest moistness in the human body." Until reading Kemp’s analysis, I was unclear on what role the degree of "moistness" played in all of this.

The Middle Ventricle

According to Avicenna, the sensory information from the front ventricle is passed through to the middle ventricle by means of a narrow passage, which had—as a gate-like mechanism, according to Avicenna—a small “worm-like organ known as the vermis.” Once in the middle ventricle, there were, according to Kemp’s reading of Avicenna, two cognitive processes, what Aquinas later would call the *vis aestimativa* and the *vis cogitativa*. According to Kemp, the function of the *vis cogitativa* was to form images like “the golden mountain,” composed from discrete images or phantasms of a mountain and of gold. The workings of the *vis aestimativa*, according to Kemp’s reading of Avicenna, are like “implications,” which are either instinctively or are the results of what Kemp calls “associative learning.” Kemp writes:

So, to use two more of Avicenna’s examples, a sheep will instinctively fear a wolf even if it has never encountered one before, since it can recognize the threat to it that is one of the implications of the appearance of the wolf. Also a dog will cringe in terror from a stick with which it has been previously beaten.
The Rear Ventricle

Finally, the inner sense faculty of memory—memoria or vis memorativa—is found in the rear ventricle of the brain. Kemp's reading of Avicenna suggests that the memory—what some translators of Aquinas call the “sense memory” in order to distinguish it from the imagination—stores the phantasms from the vis aestimativa. Aquinas here would have the phantasms from the vis cogitativa stored in the vis memorativa. Humans do not have a vis aestimativa; Aquinas writes: “Therefore, the power which in other animals is called the natural aestimativa in humans is called the cogitativa....”

The Ventricle System and Aquinas's Cognitive Theory

Leahey suggests that Aquinas “makes no original contribution to Aristotelian psychology...” Here I submit that the division of the internal sense faculties from what Aristotle claims in the De Anima is extensive. Aquinas offers a distinction between the physiological place of the internal sense organs and the cognitive function of the faculties. Inner sense refers to the faculties that require a phantasm. Kemp and Leahey blur this distinction. Furthermore, Aristotle gives several cognitive functions to the imagination—the phantasia. Aquinas divides inner sense in human knowers into the imagination, the vis cogitativa and the vis memorativa, as the following passage illustrates:
So there is no need to assign more than four internal powers of the sensitive part—namely, sensus communis, imagination, (vis) aestimativa [or vis cogitativa in human beings] and memorative powers.

Aquinas also refers to the inner sense faculties: "The powers in which the phantasms reside, namely, the imagination, the memory and the vis cogitativa." In his Commentary on Aristotle's On the Soul, Aquinas uses "phantasia" as an umbrella concept for the three faculties of inner sense. In the Summa Theologiae, however, he identifies the vis imaginativa with the phantasia.

Textual evidence suggests that Avicenna held for five internal sense faculties where Aquinas only postulated four. Avicenna divided the imaginatio into the retentive imagination and the compositive imagination or cogitativa. The former was the "storehouse"—the "thesaurus" in Aquinas's Summa Theologiae account—while the later was the faculty that produced images like "the golden mountain." Aquinas sees no need to divide these two aspects of the imaginatio and hence postulates only one inner sense faculty that is capable of two functions. Also the vis cogitativa has a different function. Leahey does affirm this combination of the two functions into one faculty of inner sense for Aquinas.

In addition to the exposition of the ventricle account of inner sense, this paper attempts to clear up several representational muddles found in Leahey and Kemp.
Kemp falters, I suggest, in his analysis of Aquinas on the internal sense faculties. His consideration of the sensus communis and his claim that Aquinas postulates the vis aestimativa as a human faculty of inner sense are not four square with the texts. At this juncture, Kemp, like many historians of both philosophy and psychology, adopts a paradigm from modern philosophy. Kemp appears to assume that Aquinas—and several other Aristotelians—defend a representational view of perception. Following structurally the sense datum approach that D.W. Hamlyn once proposed regarding Aquinas’s philosophy of mind, historians of psychology like Leahey and Kemp go awry in their structural accounts of Aquinas on the internal senses. Aquinas adopts, to the contrary, a form of direct realism that is disparate structurally from what Locke, Berkeley and Hume, among others, accepted. This depends on two propositions:

a. Denying that the sensus communis has for its object an image or phantasm.

b. Interpreting the vis cogitativa as a structured faculty of inner sense.

Where Kemp goes astray in his account, I submit, is that he suggests that the resultant combination of discrete external sensibles produces an “image” known by the sensus communis. Kemp writes: “The images produced in the common sense are stored in the imagination [Latin: imaginatio or formans] located at the back of the front ventricle.” He also writes "in normal waking life the images that are presented to the common sense . . . arise from perceiving the world..." Kemp refers several times to "images in the common sense." Of course, if the sensus communis has an image for its direct object, this renders Aristotelian philosophers
representationalists, thus subverting the epistemological realist and externalist thrust of much Aristotelian perception theory. Kemp is not the only one who holds this position. Several commentators on Aquinas’s theory of perception argue that a phantasm, what they take to be an image, is an intermediary intentional entity that serves as a necessary condition for perceiving things in the external world. For Example, Pasnau, in his extensive commentary on Aquinas’s theory of human nature, appears to adopt this position. In an illustration of the internal senses, Pasnau holds that phantasms belong to the *sensus communis*. This entails that Aquinas is a representationalist in his theory of perception. Hamlyn holds much the same position. In a review of Kemp’s *Cognitive Psychology in the Middle Ages*, Pasnau wrote:

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\text{According to Kemp, it was the standard medieval view that the common sense is responsible for imagining images (as opposed to storing them). This is an important issue, and I think Kemp gets it right.}\
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Pasnau and I disagree on this account of the *sensus communis*. This is, in my view, a serious mis-reading of the Aquinas texts. There is, as far as I can determine, no textual reference in Aquinas’s writings that associates the phantasm with the intentional act of the *sensus communis*. On the other hand, there are multiple references where Aquinas asserts that the phantasms are found only in the other three internal sense faculties, conspicuously omitting any reference to the *sensus communis*. 9
There is another textual muddle in Kemp’s analysis of Aquinas. Kemp has the *vis cogitativa* as the cognitive faculty in animals responsible for the performance of complex functions, like the spider weaving its web or the birds building nests. Aquinas gives these cognitive functions to the *vis aestimativa*, which he characterizes as instinct in animals; however, this faculty is not found in human knowers. In his *Cognitive Psychology in the Middle Ages*, Kemp suggests that Aquinas and Avicenna differ in that Aquinas denied the existence of the *vis cogitativa*. Even a cursory glance at almost any Aquinas texts on inner sense demonstrates that Kemp’s claim is incorrect. Leahey, moreover, also ascribes “estimation” to the human perceiver. Yet he also refers to “human estimation” as the “*cogitativa*.” Furthermore, in the *Summa Theologiae*, Aquinas argues that it is the *imaginatio* where the composite image of the “gold mountain” is formed, not, as Kemp suggests, in the *vis cogitativa*.

Nonetheless, Leahey claims this inner sense faculty to have an awareness of particular actions to be undertaken or things to be appreciated: “It intuits harm or benefit of object.” Klubertanz, in his massive study of the *vis cogitativa*, also limited its intentional function to actions about to be undertaken. Richard Sorabji also interprets the *vis cogitativa* in this restrictive way. This limited reading of the texts neglects the important account Thomas develops in his *Commentary on Aristotle’s On the Soul*, where the *vis cogitativa* is that faculty of inner sense that
is aware of individual primary substances. Leahey also suggests that this view of human estimation removes the need for the practical intellect in Aquinas. This too, of course, is a claim inconsistent with many of Aquinas's texts.

On the other hand, Kemp suggests, rightly I think, that the vis aestimativa is, according to Avicenna—and also Aquinas—the cognitive faculty “...which perceives the non-sensible intentions that exist in the individual sensible objects, like the faculty which judges that the wolf is to be avoided.” These are Avicenna writes, “intentions which we do not sense.” Aquinas argues in his Commentary on Aristotle's On the Soul that the vis cogitativa (and the vis aestimativa in animals) provides the cognitive ability to be aware of non-sensible forms—the so-called intentiones non-sensatae. The intentional object of the vis cogitativa is what Aquinas refers to as the Aristotelian “incidental object of sense.” This renders possible Aquinas’s awareness of the individual as a primary substance and not merely as the "bundle of sensations" so common to British Empiricism. In several texts, Aquinas quotes various Arabian physicians who suggested that the vis cogitativa is located “... in the middle cell of the head.” For Aquinas, part of the function of the vis aestimativa in animals is absorbed in humans, as it were, in the inner sense faculty of the vis cogitativa. Hence, the human perceiver does not have a vis aestimativa but an enriched vis cogitativa. Recently, Dorothea Frede wrote that she considered Aquinas’s account of the vis cogitativa an “embarrassment.” Frede’s position does not square with the important analysis that Aquinas provided in his Commentary. Kemp notes, interestingly enough, that Roger Bacon called the vis cogitativa “the
mistress of the sensitive faculties.”

The Inner Sense Theory and Contemporary Scientific Explanation

Before closing this journey into medieval cognitive theory and despite the objections I have raised, I suggest that we historians of philosophy might learn from Kemp’s analysis. Kemp offers several significant suggestions in his evaluation of the medieval theory of inner sense. First of all, this is, Kemp suggests, an “information-processing model.” Secondly, the theory is consistent with “discrete stage-processing models,” which, Kemp notes, have been important in twentieth century cognitive psychology. These models argue that cognitive information is transformed in discrete stages. Thirdly, contemporary psychologists distinguish between “episodic memory” and “semantic memory.” For Aquinas, the former would be located in the inner sense faculties and the latter in the mind; this “semantic memory” would be, I submit, an example Peter Geach’s account of the concept in Aquinas as a cognitive ability.

Kemp suggests that when considering the value of medieval theories of inner sense, one needs to consider meta-scientific theory articulated by recent philosophers of science. The necessary conditions for an adequate scientific theory include: [a] explanatory depth; [b] unifying power; [c] consistency and coherence; and [d] application. The theory of inner sense as developed in medieval cognitive theory, Kemp argues, met these conditions. This theory did attempt to explain perception theory; moreover, it was a unified position covering the developing stages of
phantasm formation; and it appeared to be consistent internally. Lastly, Kemp writes that the theory helped account for certain mental aberrations—nightmares, delusions, et al—that were explained through the mal-functioning of the *vis cogitativa* or the *phantasia*.

In closing, I recommend that we historians of medieval philosophy reflect on Kemp's rejoinder to psychologists—and also, I might add, contemporary philosophers of mind—who too readily dismiss medieval cognitive theories as trivial:

However, we would claim that the theory of the inner senses was an elaborate and innovative exposition that, even in retrospect, can be regarded as a considerable scientific achievement.