

ARISTOTLE ON REFLECTIVE AWARENESS  
(*DE ANIMA* III.2, *DE SOMNO* 2)\*

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*Abstract*

We present a logical reconstruction of Aristotle's views on reflective awareness (*De Anima* III.2, 425b12-25, and *De Somno* 2, 455a12-22).

1. *Introduction*

1.1. *The Texts.* When we are seeing or hearing, we may realize that this is what we are doing: seeing or hearing. Aristotle's psychological works contain two intriguing passages concerning this ability on our part to "perceive" (as he called it) that we see or hear.

The first passage is to be found at *De Anima* III.2, 425b12-25. It reads as follows.<sup>1</sup>

- (a) Since we perceive that we see and hear it must either be by sight that one perceives that one sees or by another [sense].
- (b) But in that case there will be the same [sense] for sight and the colour which is the subject for sight.
- (c) So that either there will be two [senses] for the same thing or [the sense] itself will be the one for itself.
- (d) Again, if the sense concerned with sight were indeed different from sight, either there will be an infinite regress or there will be some [sense] which is concerned with itself; so that we had best admit this of the first in the series.
- (e) But this presents a difficulty: for if to perceive by sight is to see, and if one sees colour or that which possesses colour, then, if one is to see that which sees, that which sees primarily will have colour.
- (f) It is clear then that to perceive by sight is not a single thing; for even when we do not see, it is by sight that we judge both darkness and light, though not in the same way.

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<sup>1</sup> Translation from Hamlyn (1968a), pp. 47-48.

- (g) Moreover, even that which sees is in a way coloured; for each sense-organ is receptive of the object of perception without its matter.
- (h) That is why perceptions and imaginings remain in the sense-organs even when the objects of perception are gone.

The other passage is to be found at *De Somno* 2, 455a12-22. It reads as follows.<sup>2</sup>

- (i) Each sense possesses something which is special and something which is common. Special to vision, for example, is seeing, special to the auditory sense is hearing, and similarly for each of the others; but there is also a common power [faculty] which accompanies them all, in virtue of which one perceives that he is seeing and hearing.
- (j) For it is not by vision, after all, that one sees he is seeing; nor is it by taste or by sight or by both that one judges, and is capable of judging, that sweet things are different from white ones; but it is by some part which is common to all the sense-organs.
- (k) For there is one faculty of sense, and one master sense-organ, although the being of sense is different for each genus, e.g., for sound and colour.

1.2. *Importance of the Texts.* The *De Anima* and *De Somno* passages are of considerable historical importance and have had a great influence. The *De Anima* passage is "one of the earliest discussions, in any author, of the difficulties involved in self-consciousness."<sup>3</sup> Brentano used it as late as 1874.<sup>4</sup> The *De Somno* passage is "the classical statement of the doctrine of *sensus communis*."<sup>5</sup> This doctrine is still being taken seriously today.<sup>6</sup>

1.3. *Problems Raised by the Texts.* The *De Anima* and *De Somno* passages raise two major problems.

- The *De Anima* arguments are hard to understand. The commentators have called them "very difficult," "obscure," "puzzling," and "neither straightforward nor clear."<sup>7</sup> Hamlyn has even concluded that Aristotle

<sup>2</sup> Translation from Kahn (1966), p. 59.

<sup>3</sup> Ross (1961), p. 35.

<sup>4</sup> Brentano (1924), vol. 1, bk. 2, ch. 2.

<sup>5</sup> Kahn (1966), p. 59.

<sup>6</sup> Marks (1978).

<sup>7</sup> Schiller (1975), p. 294, Hamlyn (1968b), p. 201, Kosman (1975), p. 501 and p. 500.

was considering “impossible circumstances,” that “the solution to the problem which Aristotle is attacking is impossible,” and that “there seems no way of making the argument coherent.”<sup>8</sup>

- The *De Anima* and *De Somno* passages seem to conflict with one another. The former claims that we perceive by sight that we see, whereas the latter asserts that it is not by sight that we see that we see. Most commentators deny that there is a genuine conflict.<sup>9</sup> It is, however, hard to devise an interpretation which is in accord with both passages.

1.4. *Goals of the Present Paper.* The interpretation of the *De Anima* and *De Somno* passages which we shall give has the following features.

- It shows that the *De Anima* arguments can be made sense of after all: they can be reconstructed as sound derivations from principles which are not too implausible in themselves.
- It is in accord with both passages and does not imply that they conflict with each other.

We shall give a formal analysis of the passages because this will enable us to be as precise and concise as possible.<sup>10</sup>

## 2. A Formal Language

The formal language which we shall use is the same as the usual language of first-order predicate logic without identity, except that there are several additional sentential operators  $A$ ,  $P$ ,  $S_1$ , ...,  $S_6$  and  $S_1^*$ , ...,  $S_5^*$ . The formation rules are extended as follows: if  $\varphi$  is a formula and  $t$  a singular term, then  $A\varphi$ ,  $tP\varphi$ ,  $S_1\varphi$ , ...,  $S_6\varphi$  and  $S_1^*\varphi$ , ...,  $S_5^*\varphi$  are formulas. These formulas are read as follows.

$A\varphi$	...	the agent is aware that (perceives that) $\varphi$
$tP\varphi$	...	$t$ perceives that $\varphi$
$S_1\varphi$	...	the agent sees that $\varphi$
$S_2\varphi$	...	the agent hears that $\varphi$

<sup>8</sup> Hamlyn (1968a), pp. 121-123.

<sup>9</sup> See, e.g., Brentano (1924), vol. 1, bk. 2, ch. 2, §10, Hamlyn (1968b), pp. 202-203 and p. 208, Kahn (1966), pp. 56-57, Kosman (1975), pp. 517-518, Osborne (1983), pp. 406-407, and Sorabji (1974), p. 72 n. 24. Block (1964), p. 63, is an exception.

<sup>10</sup> There are no other formal analyses of Aristotle's views on reflective awareness, as far as we know. Berger (1989) has given a formalization of Brentano's related but different views on this topic.

$S_3 \varphi$	...	the agent smells that $\varphi$
$S_4 \varphi$	...	the agent tastes that $\varphi$
$S_5 \varphi$	...	the agent feels that $\varphi$
$S_6 \varphi$	...	the agent perceives by the common faculty that $\varphi$
$S_1^* \varphi$	...	the agent perceives by sight that $\varphi$
$S_2^* \varphi$	...	the agent perceives by hearing that $\varphi$
$S_3^* \varphi$	...	the agent perceives by smell that $\varphi$
$S_4^* \varphi$	...	the agent perceives by taste that $\varphi$
$S_5^* \varphi$	...	the agent perceives by touch that $\varphi$

$S_1 \varphi$  is also read as "the agent perceives by the *special* faculty of sight that  $\varphi$ " and as "the agent perceives by sight *quâ sight* that  $\varphi$ ." Similar remarks apply to  $S_2 \varphi$ , ...,  $S_5 \varphi$ .  $S_6 \varphi$  is also read as "the agent perceives by sight *quâ sense* (hearing *quâ sense*, smell *quâ sense*, taste *quâ sense*, touch *quâ sense*) that  $\varphi$ ." Note that we make a distinction between "to see that  $\varphi$ " and "to perceive by sight that  $\varphi$ ."

The monadic predicate symbols  $O_1, \dots, O_6$  and  $O_1^*, \dots, O_5^*$  are used to represent the direct object constructions corresponding to the propositional attitude constructions  $S_1 \varphi, \dots, S_6 \varphi$  and  $S_1^* \varphi, \dots, S_5^* \varphi$ , respectively.

$O_1 t$	...	the agent sees $t$
$O_2 t$	...	the agent hears $t$
$\vdots$		$\vdots$
$O_1^* t$	...	the agent perceives $t$ by sight
$O_2^* t$	...	the agent perceives $t$ by hearing
$\vdots$		$\vdots$

Note that we make a distinction between "to see  $t$ " and "to perceive  $t$  by sight."

The following individual constants represent the basic parts of the sensory system.

$s_1$	...	the special part of the organ of sight
$s_2$	...	the special part of the organ of hearing
$s_3$	...	the special part of the organ of smell
$s_4$	...	the special part of the organ of taste
$s_5$	...	the special part of the organ of touch
$s_6$	...	the part which is common to all the sense-organs <sup>11</sup>

<sup>11</sup> Aristotle identified the *sensorium commune* with the heart (*De Somno* 2, 456a1; *De Iuventute* 3, 469a10). He should have identified it with certain areas in the brain. See Marks (1978), ch. 5, for some modern ideas about its physiological basis.

The following monadic predicate symbols represent certain "special qualities" (cf. *De Anima* II.7-11).

$C_1$	...	is coloured, bright or dark
$C_2$	...	makes sound or is silent
$C_3$	...	is odourous or odourless
$C_4$	...	is tasteful or tasteless
$C_5$	...	is hot or cold or dry or fluid

### 3. The *De Anima* Passage

3.1. *Claim.* We claim that the *De Anima* arguments can be reconstructed by means of the following axioms and rules of inference in addition to those of the first-order predicate calculus.  $\bigwedge_{i=1}^k \varphi_i$  is an abbreviation of  $\varphi_1 \wedge \varphi_2 \wedge \dots \wedge \varphi_k$ .  $\bigvee_{i=1}^k \varphi_i$  is an abbreviation of  $\varphi_1 \vee \varphi_2 \vee \dots \vee \varphi_k$ .

$$(A) \quad A\varphi \leftrightarrow \bigvee_{i=1}^6 S_i\varphi.$$

In other words, to perceive is to see, hear, smell, taste, feel or perceive by the common faculty. There is no "extrasensory perception."

$$(S^*) \quad \bigwedge_{i=1}^5 (S_i^*\varphi \leftrightarrow (S_i\varphi \vee S_6\varphi)).$$

Example: To perceive by sight that  $\varphi$  is to perceive by sight *quâ* sight that  $\varphi$  or to perceive by sight *quâ* sense that  $\varphi$ .

$$(O^*) \quad \bigwedge_{i=1}^5 (O_i^*x \leftrightarrow (O_i x \vee O_6 x)).$$

Example: To perceive  $x$  by sight is to perceive  $x$  by sight *quâ* sight or to perceive  $x$  by sight *quâ* sense.

$$(SsP) \quad \bigwedge_{i=1}^6 (S_i\varphi \leftrightarrow s_i P\varphi).$$

Example: The agent sees that  $\varphi$  if and only if the special part of his organ of sight perceives that  $\varphi$ .

$$(SFO) \quad \bigwedge_{i=1}^6 (S_i Fx \rightarrow O_i x).$$

Example: If the agent sees that  $x$  is  $F$ , then the agent sees  $x$ .

$$(OSC) \quad \bigwedge_{i=1}^5 (O_i x \rightarrow S_i C_i x).$$

Example: If the agent sees  $x$ , then he sees that  $x$  is coloured, bright or dark.

$$(\text{Spec}) \quad \bigwedge_{i=1}^5 \bigwedge_{j \neq i}^5 \neg S_i C_j x.$$

Example: The agent does not hear, smell, taste or feel that something is coloured, bright or dark.

All these axioms seem unproblematical. They are in accord with both the *De Anima* and our present-day ideas about perception. Note that we have:

$$(1) \quad \bigwedge_{i=1}^5 (AC_i x \rightarrow S_i^* C_i x) \quad \text{by (A), (Spec) and (S*)}.$$

So if the agent perceives that something is coloured, bright or dark, then he does so by sight. This is related to the remarks about the "proper objects of the senses" in *De Anima* II.6.

The following principles are more controversial than those we have given thus far.

$$(\text{Refl}) \quad \bigwedge_{i=1}^5 (S_i \varphi \rightarrow AS_i \varphi).$$

Example: If the agent sees that  $\varphi$ , then the agent is aware that he sees that  $\varphi$ . This axiom represents the claim made in the first part of (a). The infinite regress argument in (d) would make no sense without it.

$$(\text{Ver}) \quad \bigwedge_{i=1}^5 (S_i \varphi \rightarrow \varphi).$$

In other words, seeing, hearing, smelling, tasting and feeling are veridical. This is an oversimplification (*De Anima* II.6), but it works remarkably well in the present context.

$$(R) \quad \vdash \varphi \rightarrow \psi \Rightarrow \vdash \bigwedge_{i=1}^6 (S_i \varphi \rightarrow S_i \psi).^{12}$$

In other words, one sees the logical consequences of what one sees.

3.2. *Alternatives to Rule (R)*. Rule (R) is often found in modern systems of perceptual logic<sup>13</sup> but highly controversial. We need it in order to derive the following theorems:

<sup>12</sup>  $\vdash \varphi$  means that  $\varphi$  is a theorem.

<sup>13</sup> See, e.g., Bacon (1979).

- (Th.SsP)  $\bigwedge_{i=1}^6 \bigwedge_{j=1}^6 (S_i S_j \phi \leftrightarrow S_i S_j P \phi)$  by (R) and (SsP).  
 (Th.SFO)  $\bigwedge_{i=1}^6 \bigwedge_{j=1}^6 (S_i S_j Fx \rightarrow S_i O_j x)$  by (R) and (SFO).  
 (Th.OSC)  $\bigwedge_{i=1}^6 \bigwedge_{j=1}^5 (S_i O_j x \rightarrow S_i S_j C_j x)$  by (R) and (OSC).  
 (Th.Ver)  $\bigwedge_{i=1}^6 \bigwedge_{j=1}^5 (S_i S_j \phi \rightarrow S_i \phi)$  by (R) and (Ver).  
 (Th.  $\wedge$ )  $\bigwedge_{i=1}^6 (S_i (\phi \wedge \psi) \rightarrow (S_i \phi \wedge S_i \psi))$  by (R).

Rule (R) could be removed if these theorems were accepted as axioms. This would, however, have an extremely unpleasant consequence: (Th.SsP), (Th.SFO), (Th.OSC), (Th.Ver) and (Th.  $\wedge$ ) would become totally *ad hoc* and unjustifiable. It is therefore preferable to retain (R).

Note that (Th.Ver) is similar to the *Qui facit per alium facit per se* axiom from the logic of action.<sup>14</sup> We may call it the *Qui percipit per alium percipit per se* theorem.

3.3. *The Objective of the Arguments.* The *De Anima* arguments are reductions *ad absurdum* of

$$(*) \quad \bigwedge_{i=1}^5 \neg S_i^* S_i \phi.$$

(It is not by sight that one perceives that one sees, it is not by the auditory sense that one perceives that one hears, and so on.) They show that

$$(\dagger) \quad \bigwedge_{i=1}^5 \neg O_i x$$

(one does not see, hear, smell, taste or feel anything at all) becomes a theorem as soon as (\*) is accepted. ( $\dagger$ ) is absurd, so (\*) must be rejected. Note that (\*) is equivalent with the conjunction of the following two theorems:

- (\*1)  $\bigwedge_{i=1}^5 \neg S_6 S_i \phi$  by (\*) and (S\*).  
 (\*2)  $\bigwedge_{i=1}^5 \neg S_i S_i \phi$  by (\*) and (S\*).

3.4. *The First Argument.* The argument in (b)-(c) proceeds as follows. Suppose that (\*) were accepted. One may then argue as follows.

- (2)  $O_i x \rightarrow S_i C_i x$  ( $1 \leq i \leq 5$ ) by (OSC)  
 (3)  $\rightarrow A S_i C_i x$  by (Refl)

<sup>14</sup> Chellas (1992), §3.

- (4)  $\rightarrow \bigvee_{j=1}^6 S_j S_i C_i x$  by (A)  
 (5)  $\rightarrow \bigvee_{j=1}^5 S_j S_i C_i x$  by (\*1)  
 (6)  $\rightarrow \bigvee_{\substack{j=1 \\ j \neq i}}^5 S_j S_i C_i x$  by (\*2)  
 (7)  $\rightarrow \bigvee_{\substack{j=1 \\ j \neq i}}^5 S_j C_i x$  by (Th.Ver)  
 (8)  $\rightarrow \perp^{15}$  by (Spec)  
 (9) (†) by (2)-(8).

(†) is unacceptable, so (\*) must be rejected. Note that the following theorem is available at (7):

- (10)  $\bigwedge_{i=1}^5 \left( O_i x \rightarrow \bigvee_{\substack{j=1 \\ j \neq i}}^5 (S_j O_i x \wedge S_j C_i x) \right)$  by (6), (7) and (Th.SFO).

In other words, one and the same special perceptual faculty, different from the special faculty of sight, is concerned with both the fact that  $x$  is seen and the fact that  $x$  is coloured. This corresponds to (b).

*Comparison with Hamlyn.* Hamlyn used the following "principle of transparency" in his analysis of (b)-(c):<sup>16</sup>

If I perceive by sense  $Y$  that I see  $X$ , I must therefore perceive  $X$  by  $Y$ .

He did not understand why anyone would want to accept this principle, but it is derivable in our system:

- (11)  $S_i^* O_j x \rightarrow (S_i O_j x \vee S_6 O_j x)$  ( $1 \leq i, j \leq 5$ ) by (S\*)  
 (12)  $\rightarrow (S_i S_j C_j x \vee S_6 S_j C_j x)$  by (Th.OSC)  
 (13)  $\rightarrow (S_i C_j x \vee S_6 C_j x)$  by (Th.Ver)  
 (14)  $\rightarrow (O_i x \vee O_6 x)$  by (SFO)

<sup>15</sup>  $\perp$  is the contradiction.

<sup>16</sup> Hamlyn (1968a), pp. 121-122. The transparency of perception in Hamlyn's sense has also been discussed by Kosman (1975) and Osborne (1983).



$$(15) \quad \rightarrow O_i^* x \quad \text{by (O*)}.$$

3.5. *The Second Argument.* The infinite regress argument in (d) can be reconstructed as follows. Several applications of (Refl), (A) and (\*1) yield

$$(16) \quad S_{i_0} \varphi \rightarrow \bigvee_{i_1=1}^5 \bigvee_{i_2=1}^5 \bigvee_{i_3=1}^5 \bigvee_{i_4=1}^5 \bigvee_{i_5=1}^5 \left( \bigwedge_{j=1}^5 S_{i_j} \dots S_{i_0} \varphi \right) \quad (1 \leq i_0 \leq 5),$$

where

$$(17) \quad S_{i_1} \dots S_{i_0} \varphi \stackrel{df}{=} S_{i_1} S_{i_0} \varphi, \quad S_{i_{j+1}} \dots S_{i_0} \varphi \stackrel{df}{=} S_{i_{j+1}} S_{i_j} \dots S_{i_0} \varphi.$$

Now consider any formula of the form

$$(18) \quad \bigwedge_{j=1}^5 S_{i_j} \dots S_{i_0} \varphi \quad (1 \leq i_0, \dots, i_5 \leq 5),$$

The six indices have at most five different values, so there are at least two indices which have the same value. Suppose that  $j < k$  and  $i_j = i_k$ . This implies that the  $k$ -th conjunct is of the form  $S_{i_j} S_{i_{k-1}} \dots S_{i_j} \dots S_{i_0} \varphi$ .  $(k-j)-1$  applications of (Th.Ver) on this conjunct yield

$$(19) \quad S_{i_j} S_{i_j} \varphi$$

(the special faculty of some sense is concerned with itself: cf. (d)), which yields  $\perp$  by (\*2). Thus, any formula of the form of (18) implies  $\perp$ . As a result, we have

$$(20) \quad S_{i_0} \varphi \rightarrow \perp,$$

and hence (†) by (OSC). (†) is unacceptable, so (\*) has again been reduced *ad absurdum*.

It is clear that a similar argument could be given if there were more senses (i.e., more operators  $S_i$  or  $S_i^*$ ); the formulas used in the argument would merely become longer. The situation would only become different if there were infinitely many senses (operators  $S_i$  or  $S_i^*$ ). This is the "infinite regress" Aristotle alluded to.

*Comparison with Hamlyn and Kosman.* Hamlyn called the infinite regress argument "better" than the first argument.<sup>17</sup> This is nonsense because the arguments are based on the same principles, apart from the perfectly uncontroversial (Spec). They stand or fall together. Kosman did not understand

<sup>17</sup> Hamlyn (1968a), p. 122.

where the regress past the second sense comes from.<sup>18</sup> This should now be clear: from (Refl), (A), (\*), (Th.Ver) and (OSC).

3.6. *The Conclusion.* Having shown that (\*) is unacceptable, Aristotle adopted

$$(DA) \quad \bigwedge_{i=1}^5 \bigwedge_{\substack{j=1 \\ j \neq i}}^5 \neg S_i S_j \varphi.$$

Example: We do not hear, smell, taste or feel that we see that  $\varphi$ . Axiom (DA) implies:

$$(21) \quad \bigwedge_{i=1}^5 (S_i \varphi \rightarrow S_i^* S_i \varphi) \quad \text{by (Refl), (A), (DA) and (S*)}.$$

Example: If you see that  $\varphi$ , then you perceive by sight that you see that  $\varphi$ .

Note that (DA) does not follow from the axioms and rules put forward in §3.1. It may be seen as a generalization of the following subtly different theorem, which *does* follow from those axioms and rules:

$$(22) \quad \bigwedge_{i=1}^5 \bigwedge_{\substack{j=1 \\ j \neq i}}^5 \neg S_i O_j x \quad \text{by (Th.OSC), (Th.Ver) and (Spec)}.$$

Example: We do not hear, smell, taste or feel that we see  $x$ .

3.7. *Refutation of an Objection.* In (e)-(g), Aristotle considered an objection to his theory. Suppose one adopts:

$$(**) \quad \bigwedge_{i=1}^5 (S_i^* \varphi \rightarrow S_i \varphi)$$

("to perceive by sight is to see"). One may then argue as follows:

(23)	$S_i \varphi \rightarrow S_i^* S_i \varphi \quad (1 \leq i \leq 5)$	by (21)
(24)	$\rightarrow S_i S_i \varphi$	by (**)
(25)	$\rightarrow S_i S_i P \varphi$	by (Th.SsP)
(26)	$\rightarrow O_i S_i$	by (SFO)
(27)	$\rightarrow S_i C_i S_i$	by (OSC)
(28)	$\rightarrow C_i S_i$	by (Ver).

<sup>18</sup> Kosman (1975), p. 501.

So if you see something, then "that which sees" (the special part of the organ of vision) is coloured, bright or dark. Is this not absurd?<sup>19</sup> Aristotle gave two answers:

- (1) He rejected (\*\*). As he said in (f), "to perceive by sight is not a single thing." Not all perception by sight is seeing. You perceive by sight that it is dark, but do not see that it is dark, for you do not see anything when it is dark. Perceiving that you see is analogous to perceiving that it is dark: it is perception by sight which does not involve seeing.
- (2) He accepted the conclusion. As he said in (g), "that which sees" —the transparent substance in the eye<sup>20</sup>— is indeed coloured, bright or dark when it sees. It assumes the "form" of what it sees in the process of perception. Similarly, the air within the ear assumes the auditory form of what it hears by moving along with it, and so on.

Note that we have:

$$(29) \quad \bigwedge_{i=1}^5 (S_i \phi \rightarrow O_i S_i) \quad \text{by (23)-(26).}$$

Example: One "sees that which sees" (as (e) puts it) whenever one is seeing. It is strange that Aristotle did not object to this thesis, for it conflicts with his own answer to the question at *De Anima* 417a3: "Why do we not perceive the senses themselves?"

*Comparison with Hamlyn.* Hamlyn could not make head or tail of the argument in (e)-(g). He called it "irrelevant in any case, since [Aristotle's] concern should be with seeing that one sees, and he should show that this involves seeing the thing which sees; this he fails to do."<sup>21</sup> Theorem (Th.SsP) provides the required link between the propositional attitude construction and the direct object construction.

<sup>19</sup> Or perhaps better: "[This] would seem to be false in view of the principle already laid down [§ 427], that sight receives colour precisely in so far as it is colourless." Aquinas, *In Aristotelis Librum De Anima Commentarium*, § 587, as translated in Foster & Humphries (1951), p. 361.

<sup>20</sup> *De Sensu* 2; Sorabji (1974), p. 72 n. 22.

<sup>21</sup> Hamlyn (1968a), p. 122.

#### 4. The *De Somno* Passage

4.1. *Completing the Picture.* The *De Anima* theory is inconclusive, for even though we know that awareness of seeing is provided by the sense of sight (theorem (21)), we do not yet know whether it is due to its special or common faculty. In other words, either (\*1) or (\*2) can still be added to the theory. The *De Somno* passage provides the final solution.<sup>22</sup>

The passage starts with a reaffirmation of the claim that the sense of sight is "not a single thing." It has two distinct powers or faculties: one which is unique to it (seeing; this is perception by *sight quâ sight*) and one which is common to all the senses (perception by *sight quâ sense*). The passage goes on to state that awareness of seeing is due to the latter faculty. So it is (\*2) which is to be added as an axiom.

$$(DS) \quad \bigwedge_{i=1}^5 \neg S_i S_i \varphi \quad (= (*2))$$

Aristotle did not motivate this axiom, but it may be seen as a generalization of the following theorem:

$$(30) \quad \bigwedge_{i=1}^5 \bigwedge_{j=1}^5 \bigwedge_{\substack{k=1 \\ k \neq j}}^5 \neg S_i (S_j \varphi \wedge S_k \psi) \quad \text{by (Th. } \wedge \text{) and (DA).}$$

Example: You neither see nor hear that you see and hear.

#### 4.2. Theorems.

$$(31) \quad \bigwedge_{i=1}^5 \bigwedge_{j=1}^5 \neg S_i S_j \varphi. \quad \text{by (DA) and (DS).}$$

$$(32) \quad \bigwedge_{i=1}^5 (S_i \varphi \rightarrow S_6 S_i \varphi): \quad \text{by (21), (S*) and (DS).}$$

It is not by the special faculty of sight, nor by the special faculty of any other sense, that one perceives that one is seeing (i.e., one does not see, hear, smell, taste or feel that one is seeing): awareness of seeing is due to the common faculty. We perceive by *sight quâ sense*, not by *sight quâ sight*, that we see. These theorems are in accord with (i)-(j). Or as Rodier put it: *Ce n'est pas, en effet, en tant que sens spécial et différencié que le*

<sup>22</sup> Hamlyn (1968b), p. 203, Kahn (1966), pp. 56-57, Osborne (1983), p. 402 and pp. 406-407, and Sorabji (1974), p. 72 n. 24, have likewise pointed out that the *De Anima* passage is inconclusive and that the final solution is only to be found in the *De Somno*.

*sens de la vue nous donne la conscience de la vision; c'est en tant qu'il participe aux caractères communs de toute sensibilité.*<sup>23</sup>

$$(33) \quad \bigwedge_{i=1}^5 \bigwedge_{j=1}^5 \bigwedge_{\substack{k=1 \\ k \neq j}}^5 \neg S_i (C_j x \wedge C_k y) \quad \text{by (Th. } \wedge \text{) and (Spec).}$$

It is not by sight *quâ sight* or by taste *quâ taste* or by both that one perceives that salt is white but not sweet (i.e., one does not see or taste or see-and-taste that salt is white but not sweet): awareness of the fact that salt is white but not sweet is due to the common faculty. This is in accord with (j).

$$(34) \quad \bigwedge_{i=1}^6 (S_i \phi \rightarrow S_6 \phi) \quad \text{by (32) and (Th.Ver).}$$

$$(35) \quad \bigwedge_{i=1}^6 (O_i x \rightarrow O_6 x) \quad \text{by (34), (OSC) and (SFO).}$$

"There is one part of the soul with which it perceives everything" (*De Sensu* 7, 449a8).

$$(36) \quad \neg S_6 P \phi \rightarrow \bigwedge_{i=1}^6 \neg S_i P \phi \quad \text{by (34) and (SsP).}$$

"When the primary organ, by which one perceives all things, is incapacitated, all the sense-organs lose their capacity for sensation" (*De Somno* 2, 455b11).

$$(37) \quad \bigwedge_{i=1}^5 \bigwedge_{j=1}^5 (S_i^* \phi \leftrightarrow S_j^* \phi) \quad \text{by (34) and (S* ).}$$

$$(38) \quad \bigwedge_{i=1}^5 \bigwedge_{j=1}^5 (O_i^* x \leftrightarrow O_j^* x) \quad \text{by (35) and (O* ).}$$

When one perceives by sight one perceives by sight *quâ* sense and hence by taste *quâ* sense.

$$(39) \quad \bigwedge_{i=1}^5 (S_i \phi \rightarrow O_6 S_i) \quad \text{by (32), (Th.SsP) and (SFO).}$$

We perceive "that which sees" whenever we are seeing. This theorem is similar to (29). Aristotle did not explicitly draw this conclusion. Aquinas, who adopted the *De Somno* account of reflective awareness in the *Summa Theologica*, came closer.<sup>24</sup>

Theorems (29) and (39) are, of course, unacceptable to the modern reader. What went wrong? Theorem (Th.SsP) seems to be the chief culprit.

<sup>23</sup> Rodier (1900), vol. 2, p. 266, as quoted in Kahn (1966), pp. 56-57 n. 27.

<sup>24</sup> Aquinas (1894), pars I, q. 78, art. 4 ad 2 (p. 599), and pars I, q. 87, art. 3 ad 3 (p. 678).

One may be aware that one sees without perceiving any part of one's organ of sight. Since (Th.SsP) is a consequence of (R) and (SsP), at least one of these principles has to be rejected as well.

### 5. Conclusion

We have been able to reproduce most of Aristotle's arguments and assertions in our formal system and did not detect any glaring mismatch. With this, the goals announced in §1.4 have been reached. After centuries of fruitless exegetical activity, it has finally proved possible to reconstruct the Aristotelian passages on reflective awareness as logically impeccable arguments. We defy any future commentator to come up with a more adequate analysis.

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### REFERENCES

- Aquinas (1894), *Summa Theologica*, Vol. 1, second edition, Forzani et S., Rome.
- Bacon, J. (1979), 'The logical form of perception sentences', *Synthese* 41, 271-308.
- Berger, G. (1989), On self-awareness, in S. Lindström & W. Rabinowicz, editors, 'In So Many Words: Philosophical Essays Dedicated to Sven Danielsson on the Occasion of His Fiftieth Birthday', University of Uppsala, Uppsala, pp. 215-224.
- Block, I. (1964), 'Three German commentators on the individual senses and the common sense in Aristotle's psychology', *Phronêsis* 9, 58-63.
- Brentano, F. (1924), *Psychologie vom empirischen Standpunkt*, Vol. 1, Felix Meiner, Hamburg.
- Chellas, B. F. (1992), 'Time and modality in the logic of agency', *Studia Logica* 51, 485-517.
- Foster, K. & Humphries, S. (1951), *Aristotle's De Anima in the Version of William of Moerbeke and the Commentary of St. Thomas Aquinas*, Routledge and Kegan Paul, London.
- Hamlyn, D. W. (1968a), *Aristotle's De Anima, Books II and III*, Clarendon Press, Oxford.
- Hamlyn, D. W. (1968b), 'Koinê aisthêsis', *The Monist* 52, 195-209.
- Kahn, C. H. (1966), 'Sensation and consciousness in Aristotle's psychology', *Archiv für Geschichte der Philosophie* 48, 43-81.

- Kosman, L. A. (1975), 'Perceiving that we perceive: On the Soul, III.2', *Philosophical Review* 84, 499-519.
- Lokhorst, G. J. C. (1992), Logical Explorations in the Philosophy of Mind, PhD thesis, Erasmus University, Rotterdam.
- Marks, L. E. (1978), *The Unity of the Senses: Interrelations among the Modalities*, Academic Press, New York.
- Osborne, C. (1983), 'Aristotle, De Anima 3.2: How do we perceive that we see and hear?', *Classical Quarterly* 33, 401-411.
- Rodier, G. (1900), *Aristote, Traité de l'âme*, Vol. 2, Leroux, Paris.
- Ross, W. D. (1961), *Aristotle: De Anima*, Clarendon Press, Oxford.
- Schiller, J. (1975), 'Aristotle and the concept of awareness in sense perception', *Journal of the History of Philosophy* 13, 283-296.
- Sorabji, R. (1974), 'Body and soul in Aristotle', *Philosophy* 49, 63-89.