Descartes on the Cognitive Structure of Sensory Experience

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Descartes is routinely thought to have driven a wedge between the sensory perception of primary qualities (size, shape, position, distance, etc.) and the sensory perception of secondary qualities (color, odor, flavor, warmth, etc.). Accounts vary as to just what the difference is, but one widely accepted proposal is that the sensory perception of primary qualities is (partly) intellectual in a way that sensory perception of secondary qualities is not. According to Nancy Maull, Descartes maintains that the former involves an “intellectual reckoning” or “reasoning” that plays no part in the latter. Margaret Wilson writes:

Descartes...construe[s] the perception of position, distance, size, and shape as involving strong intellectual elements...and he holds that they differ in this fundamental respect from ordinary perceptions of color, sound, heat and cold, taste, and the like, which are said to consist just in having “sensations” that “arise from the mind-body union.”

I call this reading the bifurcation reading. It is underwritten by Descartes’ suggestions that (a) sensory perception involves the joint efforts of sense and intellect, (b) the sensory perception of primary qualities involves a kind of natural geometry that is not involved the sensory perception of secondary qualities, and (c) the human mind is capable of a purely intellectual perception of primary but not secondary qualities (at least when they are considered as modes of body). The alleged intellectual character of spatial perception is taken to imply further that it occupies an epistemically privileged place in the Cartesian mind. I argue that this reading is misguided: on Descartes’ considered view, the sensory
perception of primary qualities is no more intellectual than that of secondary qualities. To the contrary, Descartes develops a unified account of the cognitive structure of sensory experience according to which the senses and intellect together construct an imagistic and therefore non-intellectual representation of the world in both its primary and secondary quality aspects.

At stake here is not merely a reading of Descartes’ account of sensory experience, but also our understanding of the relation between the senses and intellect more generally in the Cartesian mind. Their relation is puzzling. On the one hand, Descartes portrays the senses and intellect as different cognitive faculties that regularly interfere with one another. One professed aim of the Meditations is to lead readers’ minds away from the senses and in so doing to “prepare [them] for the study of intellectual things” (AT VII 171-72). The senses impede the intellect’s operation (AT VII 163, 358, 375) and sustained use of the intellect can impede the functioning of the senses (Dioptrics, AT VI 109; letter to Elizabeth, AT III 695). On the other hand, when Descartes turns to sensory perception itself, he insists that it involves both the senses and (somehow, in some respect) the intellect (Meditations, AT VII 32; Sixth Replies, AT VII 438). Just how are we to understand this claim? Advocates of the bifurcation reading answer that Descartes divides sensory perception into two distinct components: the sensing of secondary qualities and the intellectual perception of primary qualities. This misconstrues the role of the intellect, which, I argue, operates in roughly the same way in our sensory experience of both primary and secondary qualities: it alters the sensory image without in any way intellectualizing it. More generally, the bifurcation reading obscures the cognitive architecture of the Cartesian mind: the deep bifurcation is between sensory and purely intellectual perception. The sensory perception of primary qualities falls squarely on the sensory side. Although there are important connections between the two,
sensory and purely intellectual perception of primary qualities are two fundamentally different ways of perceiving primary qualities that play very different roles in human cognition.

I. Preliminaries

Some preliminaries are in order, starting with a word about Descartes’ sensory terminology. Descartes uses the terms ‘sensory idea,’ ‘sensory perception,’ and ‘sensation’ more or less interchangeably. The terms ‘idea’ and ‘perception’ generally refer to different aspects of the same mental state: ‘idea’ refers to the representational aspect of a mental state (its content or intramantal object), while ‘perception’ refers to the conscious aspect of the mental state that has that content or object. Thus ‘sensory idea’ refers to whatever is represented to the mind when it engages in sensory perception. As for the term ‘sensation,’ Descartes explicitly treats it as a synonym for ‘sensory perception’ (Principles I.66 and IV.189, AT VIII-A 32 and 316); there is therefore no significant difference in reference when Descartes talks about a color sensation on the one hand and a sensory perception of color on the other. This point must be stressed, for the terms do not have the connotations they currently do, whereby a sensation is a non-representational mental state (a mere sensation or quale) and a sensory perception is a representational mental state (or propositional attitude or factive mental state). Variations in Descartes’ sensory terminology indicate no such distinction. In developing my interpretation, I introduce terminological conventions to fit his theory rather than risk confusion by attempting to fit his theory to current terminological conventions.

Second, although Descartes does not draw a terminological distinction between representational and non-representational mental states, it remains an open (and much disputed) question whether he nevertheless draws one. Even if he does implicitly draw such
a distinction, it lends no direct support to the bifurcation reading. There is nothing to suggest that non-representational states are distinctively sensory or that representational states are distinctively intellectual. In any event, the evidence that the sensory perception of secondary qualities is non-representational seems to me slight. More often than not, when Descartes denies the representationality of secondary-quality sensations (and internal sensations), he is denying that they represent their corporeal causes by way of resemblance. That leaves open the possibility that they represent their causes in some other way, or even that they misrepresent them (but a mental state surely cannot misrepresent something without being representational). In what follows, I presume that the sensory perception of secondary qualities is representational in some way, but nothing turns on any particular account of the nature of its representationality.

Finally, I focus on visual perception to the exclusion of other sensory modalities. There are two reasons for this. First, vision is the sensory modality that Descartes treats in the most detail, and so it provides the richest resource for investigating his views about sensory perception. Second, vision is the most salient modality for perceiving both primary and secondary qualities, and thus it is well suited to the present study.

II. The Three Grades of Sensory Perception

Descartes most thoroughly treats sensory perception in general, and visual perception in particular, in his early scientific works, the *Dioptrics* and *Treatise on Man*. It is in the *Sixth Replies*, however, that Descartes most explicitly distinguishes the roles of sense and intellect in sensory perception, and so I begin here. Descartes analyzes the sense perceptual process into three grades. The first grade is physiological; it begins with the mechanical stimulation of the sense organs by external objects and terminates in the mechanical stimulation of the
pineal gland. The second grade occurs in the mind: it includes "all the immediate effects in the mind that result from its being united to a corporeal organ that is affected in this way" (AT VII 437). I call these second-grade effects ‘sensations’ to acknowledge that they are the only mental states that Descartes is willing to attribute to the senses proper (Sixth Replies, AT VII 437). The third grade belongs to the mind as well, but, by contrast with the second grade, it is the result of what we might call purely psychological processes: it involves a host of habitual judgments that, on Descartes’ view, alter or enrich the content of our sense perceptual experience. Descartes is by no means systematic in his treatment of these judgments, but as I interpret him there are two main sorts, which I call ‘projective’ and ‘constructive.’ Projective judgments are those by which Descartes maintains that we “refer” our sensations to the world or judge that there is something in the world that “resembles” or “conforms to” our sensations. Descartes routinely suggests that these projective judgments involve a (false) assumption about the causal mechanism underlying sensory perception, viz., that it operates by resemblance. Constructive judgments, by contrast, help to construct of the phenomenological representation of particular qualities in the first place. When I look at a bagel from an oblique angle, I judge that it is round (or perhaps toric) despite the elliptical patch of brown it produces in my visual field at the second grade of sensory perception; the result is a sensory experience in which the bagel looks round (or toric). Descartes attributes third-grade judgments to the intellect, with the consequence that our overall sensory experience involves the joint efforts of sense and intellect. I call the product of this joint effort ‘sensory experience’ to contrast it with pre-judgmental sensation and I generally reserve the term ‘sensory perception’ for use when I want to remain ambiguous between sensation and sensory experience.
So what do the grades of sensory perception have to do with the bifurcation reading? It is tempting to align the distinction between the second and third grades inversely with the distinction between primary and secondary qualities, so that secondary qualities are represented to the mind at the purely sensory second grade while primary qualities are represented to the mind at the intellectual third grade. Some commentators argue for a strict bifurcation along these lines. Others argue for the moderate position that although there may be (some) second grade sensation of (some) primary qualities, our third-grade judgments about them include an intellectual component that is absent from the perception of secondary qualities. Opinions vary about just how the third grade of sensory perception is supposed to be intellectual: some maintain that it is inferential, so that the representation of primary qualities is strictly the result of reasoning; some maintain that it involves \textit{a priori} reasoning; one commentator suggests that at the third grade, the intellect brings the sensory array under purely intellectual spatial concepts; another argues that the third grade consists in rationally supported belief about spatial qualities; one cautiously admits that it is unclear just what makes the third grade intellectual. Despite the vast disagreement, there is general agreement that Descartes’ analysis of sensory perception into sensory and intellectual components produces a cognitive asymmetry between the sensory perception of primary and secondary qualities. This point of agreement is my target.

Contrary to these commentators, I argue that Descartes’ distinction between the second and third grades of sensory perception cuts almost squarely across the primary-secondary quality distinction. Both qualities are represented to the mind at the second, purely sensory, grade of sensory perception. And both are subject to third-grade judgments of the intellect that affect the way they ultimately appear to us in sensory experience. On my way to this conclusion, I consider just what the intellect does and does not contribute to
sensory experience. If I am right, then Descartes’ division of the sensory process into purely sensory and more intellectual components does not create any cognitive asymmetry between the sensory perception of primary and secondary qualities.

III. The Second Grade of Sensory Perception: Cartesian Sensations

I begin with the second grade of sensory perception, which includes all the immediate sensational effects in the mind of motions in the pineal gland. Commentators are quick to point out that Descartes focuses in the *Sixth Replies* on the production of secondary-quality sensations. When one looks at a stick, one’s sensations “extend to the mere perception of color and light reflected from the stick” (AT VII 437). There is no mention of primary qualities here, and this neglect is one thing that leads commentators to suppose that primary qualities are simply not represented at the second grade of sensory perception. The case appears to be won by the fact that Descartes does explicitly introduce primary qualities into the sensory process only at the third grade: “I calculate the size, shape, and distance of the stick: although this is usually attributed to the senses [which is why I here refer it to the third grade of sensing] it is clear that it depends solely on the intellect” (AT VII 437-38). I think that the text is misleading, and that there is good textual and philosophical evidence that Descartes’ considered view is that primary qualities are, indeed *must* be, represented at the second grade of sensory perception.

Descartes twice refers the authors of the *Sixth Objections* to his earlier *Dioptrics* for his more complete account of visual processing (AT VII 437 and 438), and so it is worth consulting this text for clues to his considered view. In the *Dioptrics*, Descartes maintains that an institution of Nature pairs types of pineal motions (and the images they inscribe on gland) with types of sensations in the mind. This institution of Nature seems to be the
psycho-physiological mechanism at work between the first and second grades of sensory perception. Descartes invokes it to explain our sensory perception of *all* the visible qualities, including “color, light, position, distance, size, and shape” (AT VI 130), that is *both* primary and secondary qualities. Descartes presents the institution of Nature as a wholesale explanatory replacement for resemblance in the theory of sensory perception: the problem for the natural philosopher is “only to know how [images formed in the brain] can enable the soul to sense all the different qualities of objects to which they correspond, and not at all to know how they resemble them” (*Dioptrics*, AT VI 113). Even though there *are* images in the brain that resemble visible objects in their macroscopic primary qualities, it is the institution of Nature that is responsible for our seeing them:

we must not think that it is by means of this resemblance that [the images in the brain] make us sense the objects…but rather that there are motions composing the images that, *acting immediately on our soul, insofar as it is united to our body, are instituted by Nature to make it have such sensations.*

(*Dioptrics*, AT VI 130; italics mine)

In the *Treatise on Man*, Descartes makes a similarly inclusive remark about the institution of Nature. He writes that stimulation of the pineal gland “can give occasion to the soul to sense the motion, size, distance, colors, sounds, odors, and other such qualities” (AT XI 176; see also 191). In neither of these texts does Descartes invoke the institution of Nature to account for the sensory perception of secondary qualities alone.

Returning to the *Sixth Replies*, I note that Descartes does not assert that the second grade of sensory perception is *devoid* of size, shape, and position. It is, of course, devoid of *formal* size, shape and position; being immaterial, sensations cannot be literally sized, shaped, or positioned. But there is no reason in principle that second-grade sensations could not
have *objective* size, shape, and position; that is, they can surely *represent* size, shape, and position. Indeed there is good reason to think that they must. Second-grade sensations of color, as Descartes describes them, are sensations of color patches, not sensations of color points. In the 18th and 19th centuries, perceptual theorists distinguish the production of punctiform color sensations that vary only in intensity and degree from processes that arrange them into spatial representations, but there is no evidence to suggest that Descartes anticipates this development. To the contrary, when he later introduces third-grade judgments into the picture he writes: "I calculate the size, shape, and distance of the stick from the extension of that color, the boundaries of that color, and the position of that color" (AT VII 437; italics mine). In the *Dioptrics*, Descartes similarly speaks of judging the relative distance of two ships on the basis of “their shapes, their colors and the light that they transmit to us,” all of which are presumably represented together at the second grade of sensory perception (see AT VI 140). The second grade of sensory perception may not have the fully developed spatial articulation of our third-grade sensory experience, but insofar as colors are represented to us as finite expanses of color, it certainly has *some* spatial articulation.

Finally, if we take seriously Descartes’ claim that the second grade of sensory perception includes all the immediate effects in the mind of motions in the brain, in contrast to the effects of judgment, then there is further evidence from the details of his theory of vision that it includes the representation of various spatial qualities. Consider the direction of an object relative to one’s own body. Descartes proposes that the position of the nerves running from eye and head to brain has been instituted by Nature to make us perceive the direction of bodies that lie in our visual path (*Dioptrics*, AT VI 134-36;142-43; *Treatise*, AT XI 159). When I look straight ahead at my computer, the position of the nerves running from my eyes and head to my brain is hard-wired to give rise to a perception of the computer as in
front of me; when I turn my head to look out the window to my left, the change in muscular
and neural position automatically gives rise to a perception of the tree out the window as to
my left and not in front of me, despite its appearing in the center of my visual field. All this
occurs, Descartes writes, “without my having any cognition [connaître] or thought [penser]” of
the position of my eyes or head (Dioptrics, AT VI 135). The perception of direction is the
immediate result of the arrangement of nerves in the brain with no intervening judgments,
and so must occur at the second grade of sensory perception.

Although a second-grade sensory image is typically thought to be a two-dimensional
mosaic of color patches from which distance is inferred at the third grade of sensory
perception, Descartes actually offers purely psycho-physiological, and so second-grade,
explanations for the perception of distance as well. When one fixes one’s visual attention on
objects at different distances, he proposes, the muscles surrounding the lens (or ‘crystalline
humor’) change the lens’ shape to get the objects in focus (Dioptrics, AT VI 108 and 117;
Treatise, AT XI 153-56 and 159-60). This accommodation of the lens in turn effects
mechanical changes in “certain parts of our brain” (Dioptrics, AT VI 137) which are
“instituted by Nature” to make us see distance:

Vision of distance depends…first of all on the shape of the body of the
eye; for, as we have said, to make us see things that are close to our eyes,
this shape must be somewhat different from the shape that makes us see
things that are farther away from our eyes; and as we adjust the eye
according to the distance of the objects, we also adjust certain parts of
our brain in a way that is instituted by Nature to make our soul perceive
this distance. (Dioptrics, AT VI 137)
Distance perception by accommodation involves no judgment, no calculation, no reasoning. It is a hard-wired response in the mind to changes in the eye and brain, and so it is a second-grade sense perceptual phenomenon.

Barring evidence that Descartes changed his mind about the scope of the institution of Nature in general, and about these psycho-physiological mechanisms of spatial perception in particular, these texts present strong evidence that the second grade of sensory perception includes some representation of primary qualities. Why do so many commentators think otherwise? The answer, I think, is that these texts have been eclipsed by Descartes’ more famous account of spatial perception as involving some sort of natural geometry, an account that has traditionally been interpreted to be a third-grade, judgmental operation. But I argue that even the involvement of natural geometry does not tell against the second-grade representation of primary qualities.

IV. The Sensory Base of the Natural Geometry

In the Sixth Replies, Descartes describes spatial perception as follows: “I calculate [ratioiner] the size, shape, and distance of the stick” (AT VII 438). For details, he refers the reader to the Dioptrics where he suggests that when our eyes triangulate on an object (or when an object is viewed monocularly from two vantage points), we perceive its distance “as if by natural geometry”; that is, knowing the distance between our eyes (or between the two vantage points) and the angles formed by the eyes’ convergence on the object, we judge the distance of the object as if we were calculating the apex of the a triangle by angle-side-angle (Dioptrics, AT VI 137-38). Descartes offers corresponding accounts for the perception of size and shape (Dioptrics, AT VI 140). As portrayed in this pair of texts, spatial perception involving natural geometry is a third-grade mental operation in which primary qualities are
judged rather than sensed. And that has suggested to commentators that primary qualities are not represented to the mind until the third grade of sensory perception. This seems to me a mistake.

First, the account that Descartes gives of spatial perception involving natural geometry in the *Dioptrics* is at odds with the account he gives of it elsewhere. Gary Hatfield points out, for example, that in the *Treatise on Man* Descartes casts the process in purely physiological terms: ocular convergence produces “as if by natural geometry” a corporeal representation of distance in the form of a lean or tilt in the pineal gland, which in turn gives rise in the soul to a perception of distance (AT XI 183). Any geometrical “calculating” here is incorporated into the first grade of sensory perception in the production of inclinations of the pineal gland, so that distance perception requires no judgmental mediation.

Second, although the more famous version spatial perception involving natural geometry in the *Dioptrics* is cast in undeniably psychological or judgmental terms, there is good reason to think that these judgments require some antecedent representation of primary qualities at the second grade. Descartes says that these spatial judgments require us to calculate one spatial quality from another (AT VII 438). We calculate size, for example, from shape and distance. In order for size to be calculated from shape and distance, however, shape and distance must already be represented to the mind. If in perceiving a fire truck, I received only a second-grade sensation of unextended red, there would be no way to judge the truck’s size.

One might retort that spatial judgments need not be based not on any mental representation of spatial qualities, but only on the corporeal representation of them in the brain or pineal gland at the first grade of sensory perception. The second grade is simply
bypassed in spatial perception. Descartes’ language does sometimes suggest as much. The Sixth Replies passage continues as follows:

I calculate the size, shape, and distance of the stick from the extension of that color, the boundaries of that color, and the position of that color relative to the parts of the brain. (AT VII 437, italics mine)

In the Dioptrics he writes:

One calculates [s’estime] the size of objects by the knowledge or opinion that one has of their distance compared with the size of the images that they impress on the back of the eye. (AT VI 140, italics mine; see also AT VI 138-39 and 145; Treatise, AT XI 161 and 163)

These are mysterious passages inasmuch as the calculations seem to be made on the basis of some strange mix of second-grade color sensations, previously held beliefs, and first-grade images in the eye and brain. The pressing question is whether or not Descartes means to suggest that the intellect can access, or be informed by, the primary qualities represented by retinal and pineal images without any intervening second-grade sensory representation of them. It seems to me that the answer is no.

Descartes makes it absolutely clear in the Dioptrics that, despite his suggestive language to the contrary, the mind has no access to any corporeal images in the eye and brain apart from the immediate effects that they have on the mind by the institution of Nature. In other words, the relation between brain and mind in sensory perception is first and foremost causal not cognitive: the mind does not directly “inspect” any corporeal image in the brain “as if there were yet other eyes in our brain with which we could perceive it” (AT VI 130; see also AT VI 114); rather, goings-on in the brain cause certain sensory states to occur in the mind. Throughout his career, Descartes makes this point most emphatically
for secondary quality sensations and internal sensations for which there are no corporeal images resembling them in the brain to be directly inspected in the first place:

Such is the nature of our mind that, simply from certain motions occurring in the body, it can be stimulated to have all sorts of thoughts that bear no semblance of those motions...[W]e clearly see that the sensation of pain is excited in us simply from certain parts of our body being moved by some other body. We can therefore conclude that our mind is of such a nature that from some other local motions it can be made to suffer all the other sensory affections. (Principles IV.197, AT VIII-A 320-21; see also IV.189-90, AT VIII-A 316; Dioptrics, AT VI 131; World, AT XI, 4-5)²⁸

In the Dioptrics, Descartes makes the further point that even macroscopic primary qualities, which are represented imagistically on the retina and pineal gland, are not represented to the mind by means of any mental inspection of those corporeal images. Rather, “the motions [of the nerves] comprising the [corporeal] image, acting directly on [my] soul, insofar as it is united to [my] body, are instituted by Nature to make us have these sensations” (AT VI 130; see also Comments, AT VIII-B 359). In other words, corporeal images in the brain give content to our sensory perceptions only by means of their immediate effects on the mind. Any judgments I make about the shapes and sizes of things in the world must be made on the basis of sensations that correspond to corporeal images, but not directly on the basis of corporeal images themselves.

Why, then, do so many passages misleadingly suggest that spatial judgments are based directly on corporeal images? It is not that Descartes is sloppy. In these passages he is typically making the very different point that the information we get about the spatial
qualities of objects from these corporeal images is insufficient to explain the way things actually look: “those [corporeal] images ordinarily contain only ovals and rhombuses, while they make us see circles and squares” (*Dioptrics*, AT VI 140-41). Our sensory experience of spatial qualities must therefore be based on something more than what we get from those images. Consider the passage from the *Dioptrics* concerning size perception again, this time in full and with a different emphasis:

One calculates the size of objects by the knowledge or opinion that one has of their distance compared with the size of the images that they impress on the back of the eye and not by the size of these images alone. This is obvious enough from the fact that the [retinal] images of objects close to us are a hundred times bigger than the images of objects ten feet further away, and yet they do not make us see the object as a hundred times bigger, but as almost the same size, unless we are fooled about their distance. (*AT VI 140*, italics mine; see also *Treatise*, AT XI 160)

Shape and distance perception also depend on more than what is represented in retinal images and pineal inclinations (see *Dioptrics*, AT VI 138, 141 and 147; *Treatise*, AT XI 160 and 163). Judging "as if by natural geometry" is one way in which Descartes proposes that ancillary information is worked into our sensory experience of those spatial qualities. The point remains that the spatial information represented in the retinal images and pineal inclinations has to get into the mind in the form of a second-grade sensations for it to play any role in our sensory experience at all. But since corporeal images and their corresponding sensations represent spatial qualities isomorphically, it is convenient for Descartes to collapse them to contrast the information they bring to sensory experience with that provided by ancillary sources. The presence of third-grade constructive judgments in
Descartes’ theory of the natural geometry, then, does not testify to the absence of spatial representation at the second grade of sensory perception; it testifies rather to the lack of complete spatial representation at this stage.

In sum, both primary and secondary qualities are represented to some extent at the purely sensory second grade of sensory perception. The question now is whether or the intellect introduces a significant cognitive asymmetry between their representation at the third grade of sensory perception.

V. The Third Grade of Sensory Perception: Judgments of the Intellect

Before examining the specifics, I examine Descartes’ general claim that sensory experience involves judgments of the intellect, for this claim raises a number of difficult interpretive questions on its own. Why does Descartes attribute judgments to the intellect? Does judgment here imply belief? What conception of the intellect (and the intellectual) is meant? The pure intellect? If so, does that mean that the perception of clear and distinct ideas plays a role at the third grade of sensory perception? Or is Descartes referring to some other capacity of the intellect? Without answers to these and related questions, it is hard to know how to interpret Descartes’ claim that the third grade of sensory perception is a matter of intellectual judgment. And without that, it is impossible to know how to evaluate the effects of these judgments on the way primary and secondary qualities are represented to the mind in sensory experience.

First, a brief review of Descartes’ mental taxonomy. The Cartesian mind has two chief faculties of thought: the intellect, or faculty of perception, and the will, or faculty of volition. Judgment requires both: “to judge, the intellect is certainly required, for we can make no judgment about something we in no way perceive; but the will is required also to
give assent to the what is perceived” (*Principles* I.34, AT VIII-A 18; see also *Meditations*, AT VII 56-57). It is to the will, however, that judgment is attributed:

It seemed to me that over and above perception, which is a pre-requisite for judging, affirmation or denial is required to constitute the form of judgment, and we are often free to withhold assent even when we perceive something. I therefore assigned the act of judging itself, which consists in nothing but assent (that is, in affirmation or denial), not to the perception of the intellect but to the determination of the will. (*Comments*, AT VIII-B 363)

The perceiving intellect thus represents things to the mind and the will affirms or denies what is represented.

The intellect has three basic “modes of perceiving” or ways of representing things: sensory perception, imagination, and pure intellection or understanding. Descartes stresses the difference between the first two and the third throughout his career. Sensory perception and imagination are special modes of perception that belong only to embodied minds and depend on the presence of corporeal images in the brain. Pure intellection or understanding, by contrast, is essential to all minds and it does not depend on corporeal images in the brain. The difference is not merely etiological. The involvement of the body affects the way things are represented to the mind in sensory perception and imagination. At the opening of Meditation 6, Descartes compares imagining geometrical figures with understanding them. Imagining involves an image that is “intuited by the mind’s eye as if it were present” (AT VII 72). This image can, with some noticeable effort, be mentally scanned. Understanding involves no such mental imagery or effort but only mere
comprehension of the nature of a figure. That the crucial difference concerns the presence or lack of an image is confirmed by a letter to Mersenne:

I must tell you that your friend did not understand me at all when, to mark the difference between ideas in the imagination and ideas in the mind, he said that ideas in the imagination are expressed by names and ideas in the mind by propositions…The difference is in the manner of conceiving them, so that everything that we conceive without an image is an idea of the pure mind and everything we conceive with an image is one of the imagination.  

These passages explicitly contrast imagination and understanding, but Descartes elsewhere maintains that both imagination and sensory perception are distinctively imagistic modes of representation. This difference in mode of representation yields a difference in range of objects: sensory perception and imagination are restricted to representing (i.e., forming images of) corporeal things, while the intellect can represent (i.e., understand) both corporeal and incorporeal things. Finally, there is an epistemological difference. Sensory perception is alleged to be “obscure and confused” and so to be conducive to errors in judgment; it is uncertain and unreliable. Purely intellectual perception, free of the sensory images that “disrupt and obscure it as much as possible” (Second Replies, AT VII 163), amounts to "clear and distinct" perception that gives rise with certainty and reliability to true judgments.

Descartes’ analysis of sensory perception in the Sixth Replies does not conform with this mental taxonomy. First, Descartes’ attribution of judgments to the intellect conflicts with his official line that judgment is an act of the will in response to something perceived or represented by the intellect. Things only get more perplexing when we consider the context of this discussion. Descartes is responding to his objectors’ claim that sense perceptual error is corrected by the senses themselves and not by the intellect; when vision erroneously
represents a stick submerged in water as bent, touch corrects the mistake. Descartes responds, curiously enough, by insisting that the intellect is implicated in both the original visual error and the tactile correction; the error, he submits, is due to a judgment made habitually by the intellect on the basis of visual sensations. That error is corrected when the intellect reflectively favors the evidence of touch over vision (AT VII 438-39). I say this makes matters more perplexing because Descartes’ official line on error is that it, like judgment, is attributed to the will: “all I can do through the intellect by itself is perceive the ideas about which I can make a judgment; and there is no error, properly so-called, in that” (Meditations, AT VII 56; see also Principles I.33, AT VIII-A 17). Error occurs when the will affirms something that the intellect does not clearly and distinctly perceive (Meditations, AT VII 58-60; Principles I. 32-35, AT VIII-A 17-18). Yet in the Sixth Replies, Descartes not only has the intellect judging, but judging erroneously! What is going on here?

Descartes is describing a mental operation (or set of operations) that falls somewhere between the mere perception of ideas and the affirmation or denial by the will of whatever those ideas represent to the mind, an operation that affects what is represented to the mind. The intellect performs this operation more or less reliably depending on whether it operates habitually or reflectively. That Descartes calls this operation ‘judgment’ is confusing, but he may be loosely invoking a more traditional conception of judgment, one that would have been familiar to his objectors. Scholastic Aristotelians (and even later Cartesians such as Arnauld and Nicole) maintain that judgment is one of three basic operations of the intellect. Situated between simple apprehension and reasoning, judgment consists in the “combination” or “division” of apprehended ideas. One judges that a bagel is round, for example, by “combining” the idea of a bagel with the idea of roundness (or round thing) in such a way that roundness is predicated of the bagel. Judgment thus has to do with the
structuring of ideas. Descartes would no doubt dismiss the details of Aristotelian accounts of judgment as unnecessarily preoccupied with a formal analysis of propositions and with baroque rules for their proper formation, but there is no reason to think that he rejects the general idea that the mind combines-and-divides or structures its ideas. In the Rules, having said that the only objects of cognition are “simple natures and a certain mixture or compounding of them” (AT X 422), he spends considerable time discussing the various ways in which ideas are combined (through impulse, conjecture, or deduction), the various ways in which these combinations lead to error, and the ways to avoid or overcome those errors (AT X 422-30). Since “we can go wrong only when the things that we believe are in some way composed by us” (AT X 423), as for example when “deceptive judgments of the imagination conjoin things improperly” (AT X 368), we can avoid error by “never conjoining one [idea] with another unless we intuit a wholly necessary connection of one with the other” (AT X 425) or at least by making an effort to “distinguish one from another and to intuit each one separately with steadfast mental gaze” (AT X 425). Descartes’ philosophy of mind changes in some ways after the Rules, but I see no convincing reason to think that he dismisses the idea that the intellect affects the content of its thoughts through some such process. In the Principles, he remains committed to there being “simple notions from which our thoughts are composed” (I.47, AT VIII-A 22). The confusion with which he routinely charges our thoughts can be understood to be the result of some faulty combination of ideas, or at least the failure to distinguish their components.

In its capacity for judging, the Cartesian intellect ought to be able to make use of either purely intellectual ideas or sensory ideas (or ideas traceable to sensory ideas, like memories and imaginings). With this in mind, I distinguish the intellect’s purely intellectual judgments from its sensory judgments. Purely intellectual judgments make use of purely
intellectual ideas and have no sensory content; they include such metaphysical judgments as that God is infinite, that the essence of body is extension, and that mind and body are really distinct. Sensory judgments, by contrast, have sensory contents. They may not have \textit{exclusively} sensory contents, but their having some sensory content is sufficient for their being sensory judgments. The third grade of sensory perception obviously involves sensory judgments in this sense, since third-grade judgments are made in conjunction with second-grade sensations.

There is a second reason for casting these judgments as sensory: they affect the way the world \textit{appears} to us. They do not immediately result in any \textit{beliefs} about the world but rather in a sensory \textit{experience} of it. Constructive judgments of shape do not make me \textit{believe} that bagels are round; they make bagels \textit{look} round. Without these constructive judgments of shape, bagels would look elliptical or toric. In and of themselves, third-grade sensory judgments do not make me believe anything at all. Cartesian belief requires the affirmation of the will. Third-grade sensory judgments typically \textit{lead to} our having certain beliefs about the world, since the will typically affirms the contents of the sensory experience to which sensory judgments give rise. But Descartes clearly thinks that those beliefs are revisable in a way that sensory experience itself is not. This, after all, is one of the lessons of the \textit{Sixth Replies}: when I learn in school that water refracts light in such a way that it makes straight things appear bent, I may start deliberately or reflectively to judge, and so to believe, that sticks submerged in water are generally straight. But this reflective judgment does not replace the habitual third-grade sensory judgment, for sticks in water still \textit{look} bent. Thus Descartes bemoans the plight of astronomers who “after having established through reason that the sun is many time larger than the earth, nevertheless cannot prevent themselves from
judging that it is smaller when they look at it with their eyes” (Sixth Replies, AT VII 440; see also Principles I.72, AT VIII-A 36).^39

All this raises an obvious problem concerning the notion of intellect at work in the Sixth Replies. It is tempting to presume that Descartes is attributing third-grade judgments to the pure intellect, since the contrast in this passage is between the senses and the intellect. If that is right, then it would stand to reason that they somehow involve the introduction of purely intellectual or clear and distinct ideas into our sensory experience (and so, perhaps, a certain epistemic pedigree). The sense-intellect distinction at work in the Sixth Replies, however, does not map cleanly onto Descartes’ distinction between the sensory and purely intellectual modes of perception. After all, he is giving an analysis here of sensory perception itself. One might propose that, on Descartes’ view, sensory perception is really a curious combination of purely sensory perception (constituted by second-grade sensations) and purely intellectual judgment (that is, judgment based on purely intellectual, clear and distinct ideas). But this seems to me untenable. First, it is difficult to determine what it would mean for sensory perception to combine purely sensory images with purely intellectual judgments into a single phenomenologically seamless experience. Second, to the extent that the two are mixed together it would seem that the judgments are not, after all, purely intellectual. Third, elsewhere than in the Sixth Replies these judgments are sometimes referred to the imagination rather than to the intellect, which suggests that the notion of intellect at play is weaker than the that of the pure intellect (see, for example, Dioptrics, AT VI 138 and Principles I.71-72, AT VIII-A 36-37). Finally, and to my mind decisively, I point out above that the intellect is used at the third grade of sensory perception to explain perceptual error and the possibility of correcting it through reflective judgments; it is the intellect that introduces pre-conceived false opinions and bad epistemic habits into our sensory lives. Insofar as the pure intellect is
the faculty of clear and distinct perception, it is free of error and is not a source of bad habits. It could not possibly do the explanatory work that Descartes here invokes the intellect to do.

As I interpret it, when Descartes writes that third-grade judgments “depend on the intellect alone” (AT VII 438), he does not mean that they depend on the pure intellect rather than the senses. He means that they depend on the mind rather than the mind-body union. By contrast with second-grade sensations that depend causally on physiological events in the brain, third-grade sensory judgments depend only on the mind’s ability to perceive or represent things to itself. That is quite different from saying that they depend on the mind’s ability to perceive purely or to represent things clearly and distinctly, i.e., to understand things.

Simple introspection is a similar example:

when an adult feels something [like pleasure or pain] and simultaneously perceives that he has not felt it before, I call this second perception a reflection, and I attribute it to the intellect alone despite the fact that it is so linked to sensation that they happen simultaneously and appear to be indistinguishable. (letter for Arnauld, AT V 221; see also Fifth Replies, AT VII 358-59)

Introspection of one’s own pleasures and pains are operations of the intellect alone in the sense that they depend on the mind alone, but insofar as they concern sensations, they too fall outside the domain of purely intellectual perceptual.

My proposal, then, is this. Starting with what is given to the mind at the second grade of sensory perception (for example, a visual pattern of colors and shapes), the intellect, conceived quite generally as a faculty of perception or representation, develops sensory experience by adding to its representational content in various ways (explained below).
Insofar as these judgments occur at the third-grade of sensory perception, they are the result of habits originating in early childhood. They are not, in other words, judgments grounded in carefully thought out reasons or in consultation with the deliverances of the pure intellect. The pressing questions now are (a) in what ways, exactly, do these judgments develop the content of sensory experience and (b) do they drive a cognitive wedge between the representation of primary qualities and the representation of secondary qualities?

VI. The Third Grade of Sensory Perception: Sensory Judgments

Descartes recognizes two basic sorts of third-grade judgment in the Sixth Replies, projective and constructive. Projective judgments are those by which the mind refers its sensations to the world. The mind does this by presuming not only that its sensations are caused by external objects but also that its sensations resemble their external objects in the sense that they exhibit the properties the external objects actually have. When Descartes talks about these judgments, he focuses on secondary qualities: “from the fact that a sensation of color affects me, I judge that a stick located outside me is colored” (AT VII 437). He cannot, however, restrict projective judgments to secondary qualities. We do not simply judge that sticks are colored, but also that they have sizes and shapes. In the body of the Meditations and in the Principles, Descartes explicitly includes both primary and secondary qualities in the list of things about which we habitually make projective judgments:

Cases in point are the belief that all space in which nothing occurs to stimulate my senses is empty; or that in a hot body there is something exactly similar to the idea of heat that is in me, in a white or green body there is the same whiteness or greenness that I sense, in a bitter or sweet body there is the same flavor, and so on; or, finally that stars and towers and
other distant bodies have the same size and shape that they present to my senses.

(Meditations, AT VII 82, italics mine; see also AT VII 39-40, 76, 82-83;
Principles I.71-72, AT VIII-A 35-37)

Descartes has a special reason for lingering over the projective judgments that we make about secondary qualities: stars may not have the size they appear to have, but they have some size or other; by contrast, stars have no color of the sort that is sensed. Projective judgments about secondary qualities therefore lead us into error not only about the particular properties of bodies, but also about the very nature of body in general. These judgments are obviously made, however, for both sorts of qualities.

One might argue that projective judgments about primary qualities are more intellectual, or at least more rational, than projective judgments about secondary qualities insofar as they project onto the world properties that we are in a position to know really can exist in bodies as they are sensorily represented. But knowledge of this fact plays no role in our projective judgments, which are based on little more than our having sensations and on our presuming that our sensations represent the corporeal world as it really is. We make these projective judgments, he writes, “from childhood onwards without any rational basis” (Meditations, AT VII 83; see also Principles I.71, AT VIII-A 36). That these judgments are sometimes true when they are made about primary qualities is beside the point. Truth here is a matter of epistemic luck, not a matter of reasoned belief. Sensory perceptions, Descartes maintains, “do not, except occasionally and by accident, show us what bodies are like in themselves” (Principles II.3, AT VIII-A 41-42, italics mine; see also Second Replies, AT VII 164). Insofar as they figure in the third grade of sensory perception, projective judgments about primary qualities are no more intellectual or rational than projective judgments about
secondary qualities. If there is a cognitive asymmetry, it is more likely to turn up in constructive judgments.

The only constructive judgments Descartes explicitly discusses in the Sixth Replies are those involved in perceiving spatial properties by some sort of natural geometry, whereby “I calculate the size, shape, and distance of the stick” (AT VII 437). Here is Dioptrics passage to which Descartes refers the reader for details:

this is accomplished by an act of thought which, while only a very simple act of imagination, nevertheless conceals in itself a kind of reasoning entirely similar to that used by surveyors when they measure the [distance to] an inaccessible place by means of two different stations. (AT VI 138)

The fact that the process of natural geometry involves some calculation (ratiocinatio) or reasoning (raisonnement) suggests to some commentators that it is, in some robust sense, intellectual. It is, the thought goes, a matter of applying an a priori science to second-grade sensations. Nancy Maull writes:

we find ourselves in possession of rules…for the projection of three-dimensional figures onto a two-dimensional plane. We need only “reverse” these rules to apply a natural geometry and to form perceptual judgments about three-dimensional objects.40

Since projective geometry is restricted to spatial qualities, and since there is no equivalent a priori science for establishing necessary connections among secondary qualities, it is perhaps natural to infer that there is something peculiarly intellectual about the sensory perception of primary qualities. This inference, however, is not correct.

Although it plays the crucial role in the Sixth Replies and in the secondary literature, application of natural geometry is only one among many judgmental processes in Descartes’
account of visual perception. What is notable about the other judgmental processes is that they are better described as involving the habitual association of sensory or pictorial cues than as involving any sort of rational, geometrical calculation. Here is an example:

when we already imagine, from some other source, the size of an object, or its position, or the distinctness of its shape and colors, or only the force of the light that comes from it, this can enable us not properly to see but to imagine its distance; for example, when we observe from afar some body we are used to seeing close at hand, we judge its distance much better than we would if its size were less well known to us.

(*Dioptrics*, AT VI 138-40)

In this case, we are associating a sensation of an object with an imagistic memory of its size, position, shape, color, or brightness to represent its current distance. Although we do not strictly speaking see the object’s distance by this means, the judgment works distance into our overall sensory representation of the object so that we imagine it. Other judgments are formed entirely on the basis of cues internal to the second-grade sensory image:

Looking at two ships on the sea, one is smaller than the other but so much nearer that they appear equal [in the sensory image], we can judge which is further away by the difference in their shapes and their colors and the light that they reflect toward us. (*Dioptrics*, AT VI 138-40)

These judgments associate such things as brightness with proximity, and dimness with distance, so that the brighter ship looks to be closer in the resulting sensory experience. Sensations of color patches caused by the ships occupy the same amount of space in visual field at the second grade of sensory perception, but sensory experience ultimately represents the ships as having different sizes, for once the brighter ship is represented as closer, it will
also be judged (and so look) smaller. Occlusion provides another sensory cue to distance: “when we look at a mountain exposed to the sun beyond a forest covered in shadow, it is only the position of this forest that makes us judge it the nearer” (Dioptrics, AT VI 140).

Brightness sometimes combines with the relative indistinctness of an image (which results from the over-convergence or under-convergence of rays of coming from places other than the focal point) to form yet another sensory cue to distance: fuzzy bright images are judged to represent nearby objects; fuzzy dim images are judged to represent more distant objects (Dioptrics, AT VI 138; Treatise on Man, AT XI 160 and 163).

What is notable about these constructive judgments is that they do not seem to involve any geometrical calculations based on a clear and distinct intellectual idea of res extensa and the geometrical laws that govern it. To the extent that these judgments are based on such things as brightness and color, they could not be: brightness and color cannot be conceived as modifications of res extensa, and so geometrical judgments about them make no sense. To the extent that these constructive judgments are based on spatial qualities, rather than such properties as color and brightness, they are based on sensory images of those qualities (either images stored in memory or images present at the second grade of sensory perception) and not on any clear and distinct intellectual idea of them. Moreover, these judgments do not involve the perception of any necessary geometrical connections among spatial qualities; they consist in habitual associations (for example, of occlusion with distance). Finally, the result of these judgments is clearly an imagistic representation of these qualities in our sensory experience: distance and size are not so much understood as they are “imagined” (AT VI 139; see also Principles I.71-72, AT VIII-A 36-37).

My reason for emphasizing the associative character of these third-grade judgments and the fundamentally imagistic character of their results is twofold. First, they are quite
different from the presumed intellectual judgments involved in the application of geometry to our sensations. Second, unlike the judgments involved in the application of geometry, the constructive judgments under consideration might just as well be made about secondary qualities. One of the chief effects of Descartes’ third-grade judgments is perceptual constancy: the size of a receding object looks constant despite the fact that the amount of the visual field it fills shrinks; similarly, the shape of a rotating object looks constant despite the fact that the shape it projects into the visual field changes. On Descartes’ view, third-grade judgments explain the perceived constancy of these properties. But color is something that is subject to perceptual constancy as well: the color of an object under changing lighting conditions (usually) looks constant despite changes in the makeup of the light that reaches the eye and induces second-grade sensations. There is nothing to prevent Descartes from saying that color constancy is the result of associating unconsciously an occurrent sensation with some sense-based memory of the color of the object: my second-grade sensations of the leaves on a tree at dusk represent them as bluish; I have a wealth of sense-based memories of those leaves as appearing green for most of the day; I may therefore judge, at the third grade of sensory perception, that those leaves are green with the result that the leaves look like green leaves in changing light. Descartes comes close to offering such an account in the passage about the two ships (Dioptrics, AT VI 140): the difference in the sensed color of the ships serves as a cue for their different distances, not as a cue for their different colors. Whether or not Descartes was actually on the verge of offering an account of color constancy here, he clearly has the conceptual resources to do so. If I am right, then even Descartes’ constructive judgments do not so far distinguish in any principled way the sensory perception of primary and secondary qualities.
But what about spatial perception involving natural geometry? Does it not have a purely intellectual component? In a word: no. First, there is some reason to suspect that even in the *Dioptrics* passage, it is really the imagination that is at work and not the pure intellect (or understanding). Descartes claims that the calculation is performed by “a very simple act of the imagination” (AT VI 138). If that is right, then Descartes’ talk of spatial perception “concealing a kind of [geometrical] reasoning” is only talk; it is not that we actually engage in any such reasoning, but rather that the imagination produces a representation that we could rationally reconstruct through genuine geometrical reasoning. I do not, however, want to rest my case on a controversial reading of this passage.

Suppose that in the *Dioptrics* Descartes really does mean to suggest that in spatial perception involving natural geometry the pure intellect engages in genuine geometrical reasoning. What would the consequence be? There is nothing in the text to suggest that it would result in a purely intellectual representation of the spatial properties being perceived. Suppose that in its geometrical reasoning the pure intellect consults a host of clear and distinct, purely intellectual ideas—ideas of the nature of extension in general, of the natures of shapes, of the laws of geometry, and so on. Using these clear and distinct, purely intellectual ideas and its knowledge of the distance between the eyes and the angles of ocular convergence, the intellect calculates the distance of an object. What then? The sensory image is spatially articulated: a bagel in on the table in front of me is now represented fully in three dimensions as round-but-viewed-obliquely rather than as elliptical. This articulation may well be based on clear and distinct ideas, but the representation of the world is still in the form of a sensory image. The result is a representation through which the world looks to have a certain spatial structure, not one through which it is merely understood to have this structure. In short, even if Descartes thinks that the pure intellect helps to articulate the spatial
representation of the world by engaging in genuine geometrical reasoning, he gives no indication that this process intellectualizes the sensory representation.

Nor does the intellect's constructive judgments make spatial perception epistemically reliable at the third grade of sensory perception. I mention above that Descartes routinely insists that projective judgments of both primary and secondary qualities lead to false beliefs. He similarly points out that constructive judgments involved in spatial perception are “very uncertain” and often lead to misperception (Dioptrics, AT VI 144; see also 147). The same sort of judgments that enable us to perceive two ships on the water veridically as different in size and distance lead us to perceive the sun and moon as smaller than they really are, and even to perceive the sun at the zenith and the sun at the horizon as different in size and distance. Slight changes in our visual musculature or in the path of the light reaching our eyes leads us to make inaccurate constructive judgments about the location of objects (Treatise, AT XI 160-62). In a particularly pessimistic moment, Descartes writes: “all means that the soul has for knowing the distance of the objects are uncertain” (Treatise, AT XI 162). Third-grade constructive judgments often introduce misperception into our sensory experience even of the world’s spatial qualities.

In sum, the intellect plays essentially the same role in the sensory perception of primary qualities and of secondary qualities: through third-grade judgments, the intellect adds detail to our imagistic, sensory representation of these qualities. As a result of the intellect’s projective judgments, colors and shapes are represented as real properties of bodies existing outside the mind. As a result of the intellect’s constructive judgments, bodies are represented (a) fully in three dimensions, (b) as viewed from a particular vantage point, and (c) as having constant colors and shapes that are viewed under changing conditions. In
none of these cases does the intellect produce a properly intellectual representation of the corporeal world, or even a reliably accurate representation of it.

VII. Sensory and Intellectual Perception in the Life of the Cartesian Mind

Descartes does not divide the cognitive structure of sensory experience into distinct primary quality and secondary quality components. To the contrary, he offers a unified account of it according to which the senses and intellect are engaged in the joint construction of our imagistic, sensory representation of the world. Sensory representation does not reliably lead us to true beliefs either the primary qualities or the secondary qualities in the world. But, then again, that is not its job. As Descartes depicts it, we “pervert the order of nature” by using sensory perception as a guide to what the world is really like; sensory perception is “given to us by nature only to signify to the mind what is beneficial or harmful to the composite of which it is a part” (AT VII 83). This claim has to hold for the sensory perception of both primary qualities and secondary qualities. Although this is not the place to pursue the connection between sensory representation and self-preservation in detail, some of Descartes’ own observations about visual experience might secure the point: visual experience represents colors as qualitative differences in the surfaces of bodies, which facilitates our discrimination and re-identification of them (Dioptrics, AT VI 133); it represents only macroscopic sizes and shapes (Principles IV.201 and 203, AT VIII-A 324 and 325-26); it represents bodies as they are spatially related to us, for example as near to or far from us (Dioptrics, AT VI 138) and as lying in a certain direction from us (Dioptrics, AT VI 134-35 and 142); it represents only one thing clearly at time, namely, whatever is at the center of the visual field (Treatise, AT XI 157); and it represents with most precision bodies that are nearby, sacrificing precision in more distant objects that are less likely to be of
immediate practical consequence (*Dioptrics*, AT VI 134, 144 and 146; *Treatise*, AT XI 162). In short, sensory experience represents both the primary qualities and the secondary qualities of the world in a way that enables the embodied mind to direct its body safely and expediently through it.  

I do not suggest that there are no important differences between the sensory perception of primary qualities and of secondary qualities. There are, but those differences are not intrinsic to sensory experience. From a Cartesian point of view, the most salient difference is that the sensory perception of primary qualities is *intelligible* in a way that the sensory perception of secondary qualities is not. That is because primary qualities are intelligible as properties of bodies in a way that secondary qualities are not. We can *understand* what it is for bodies to have the shapes they are sensorily represented as having but we cannot understand what it is for bodies to have the colors they are sensorily represented as having. Descartes is clear about this: “we recognize [agnosciumus] much more clearly what it is for that [sensorily perceived] body to have shape than what it is for body to have color” (*Principles* I.69, AT VIII-A 34). And again:

> When we say that we perceive colors in objects, this is the same as if we were to say that we perceive something in objects whose nature we are ignorant about…we do not know what it is that we are calling by the name ‘color,’ nor can we understand [intelligere] any similarity between the color that we are supposing to be in objects and the color that we are experiencing in sensation…[T]here are many other things, like size, shape, number, etc., that we clearly perceive to be in objects, or at least to be capable of being in objects, in just the way that we sense or understand them. (*Principles* I.70, AT VIII-A 34)
But Descartes is *not* saying that primary qualities are understood *through sensory perception*. They are understood through *purely intellectual perception*. In order to understand the nature of body, we must

*make use of the intellect alone, by attending carefully to the ideas implanted in it by nature...* If we do that, we shall perceive that the nature of matter, or body regarded in general, does not consist in its being a thing that is hard or heavy or colored or anything that affects the senses in any way, but only in its being a thing that is extended in length, width, and depth.  (*Principles* II.3-4, AT VII-A 42, italics mine; see also *Principles* I.75, AT VIII-A 38 and *Sixth Replies*, AT VII 440)

Similarly, we understand what it is for a body to have shape because we can conceive shape as a modification of extension—as the boundary or limit of some portion of extension (see *Principles* I.53 and II.23, AT VIII-A 25 and 52; see also *Meditations*, AT VII 43). Colors are “less clearly understood [*minus clare intellecta*]” as properties of body (*Meditations*, AT VII 80) because colors cannot be conceived as modifications of extension (see *Meditations*, AT VII 43; *Principles* I.68, I.70, IV.198 and IV.200, AT VIII-A 33, 34, 322 and 324). Armed with a purely intellectual understanding of the nature of body and its possible modifications, I can judge that the bodies I sensorily perceive are capable of having the shapes they sensorily appear to have. Of course, I can also judge (a) that the bodies I perceive are positively incapable of having the colors they appear to have (*Principles* I.70, AT VIII-A 34; *Sixth Replies*, AT VII 440), (b) that colors can and do exist, as sensed, as modes of mind (*Principles* I.68 and I.75, AT VIII-A 33 and 38), (c) that there is something in bodies that corresponds to and causes my sensations of color (*Principles* I.68 and I.70, AT VIII-A 33 and 34; see also *Meditations*, AT VII 81), and (d) that the cause must be a proper modification of extension
Our sensory experience of secondary qualities is therefore not wholly opaque to intellectual scrutiny. The important point here is that none of these judgments about primary qualities or secondary qualities is a third-grade habitual judgment of the intellect that Descartes supposes to be partly constitutive of sensory experience. They are intellectual responses to or reflections on sensory experience. The deep difference, then, between the sensory perception of primary qualities and the sensory perception of secondary qualities lies not in their intrinsic cognitive natures but in the different relations they bear to our purely intellectual understanding of body.

The last point suggests that the relation between sense and intellect in the Cartesian mind is complex: the intellect plays one role within sensory experience and another when it reflects on sensory experience. Descartes minimizes the difference in the Sixth Replies when he claims that the intellect’s habitual judgments are “made in the same way” as its more reflective judgments (AT VII 438). They are similar in that each goes beyond the deliverances of the senses proper. But there are deep differences too. These differences reflect the fact that the embodied mind has two jobs: (a) direct its body safely through the world, and (b) secure true beliefs. Descartes often makes it sound as though the senses direct the body through the world while the intellect seeks truth (Meditations, AT VII 82-83; Principles II.3, AT VIII-A 41-42). In fact, both jobs are executed through the cooperation of sense and intellect, albeit in slightly different working relations.

The habitual judgments that figure in sensory experience are fixed in infancy when the intellect judges physical things “insofar as they contribute to the preservation of life” (Sixth Replies, AT VII 440-41) and “in terms of their utility to the body in which [the mind] was immersed” (Principles I.71, AT VIII-A 36). In this capacity, the intellect draws no special distinction between the primary and secondary qualities brought to its attention through the
senses. Descartes recognizes that we cannot exorcise these judgments from our sensory lives: just as we are always going see bagels more or less correctly as round rather than as elliptical, so we are always going see stars incorrectly as very small rather than as large, and grass incorrectly as having a green surface rather than as having a certain geometrically articulated microstructure that puts a certain rotational spin on light particles (Sixth Replies, AT VII 438-49 and 440; Principles I.72, AT VIII-A 36). These judgments are part and parcel of sensory experience. And this is surely a good thing insofar as they develop sensory experience in ways that, by and large, have practical benefit.

The intellect’s more reflective judgments, by contrast, require a “power of reason we did not have in our infancy” (Sixth Replies, AT VII 439); more accurately, they require a power of reason we had but could not exercise because we were attending to the needs of the body (letter to Hyperaspistes, August 1641, AT III 423-24). These reflective judgments require that the intellect be liberated from needs of the body enough to investigate the “truth about things considered in themselves” (Principles I.72, AT VIII-A 36) rather than truths about their potential impact on us. The liberation of the Cartesian intellect amounts chiefly to the discovery of the pure intellect and its stock of clear and distinct ideas. In our search for truth about the corporeal world, however, clear and distinct ideas get us only so far. They reveal the essence and possible modifications of body. With some analytical work and a few added premises about God, they lead us a priori to the foundational principles of natural philosophy: there is no void; body is infinitely divisible; all motion is in some sense circular; and so on. At some point, however, Descartes admits that natural philosophers are going to have to turn to experience:

we cannot by reason alone determine what size these parts of matter are,
or how fast they are moved, or what circles they describe. Since there are
countless different ways in which God could have regulated them,

experience alone must teach us which of these ways he chose. (Principles III.46, AT VIII-A 100-101; see also Discourse VI, AT VI 63-64; letter to Mersenne, 5 April 1632, AT I 243)

It is just here that the intellect’s reflective judgments on sensory experience come into play. Descartes proposes that under the strict guidance of the intellect, the embodied mind can employ sensory experience in its search after truth.47 In this capacity, the intellect must interpret the contents of sensory experience. From this reflective stance, the intellect is in position to distinguish primary and secondary qualities and to correct the habitual judgments that it makes within sensory experience. That is why “now when we are advanced in years those judgments we make from certain new observations [animadversiones] are more certain than those judgments we formed in early childhood without any examination” (Sixth Replies, AT VII 438). In conclusion, it is not so much that sensory perceptions of primary qualities and of secondary qualities play different cognitive roles in the Cartesian mind, as that the intellect plays different roles depending on whether it is helping to constitute sensory experience in its quest for bodily survival, or reflecting on sensory experience in its search for truth.48
Endnotes

1 Descartes does not use the terms ‘primary qualities’ and ‘secondary qualities’ for the two sets of qualities; he simply gives lists. I use ‘primary qualities’ to designate those spatial or geometrical qualities that Descartes takes to be conceivable as modifications of res extensa and ‘secondary qualities’ to designate those qualities that he takes to be (a) inconceivable as modifications of res extensa and (b) referred in some way to the senses.


4 Maull in particular argues that the role of the intellect in spatial perception grounds Descartes’ distinction between primary and secondary qualities (“Cartesian Dioptrics,” 26) and even underwrites his commitment to a mathematical science of nature (“Cartesian Dioptrics,” 23). Atherton argues that in at least one text Descartes takes the role of the intellect in spatial perception to account for our having rationally supported beliefs about the geometrical qualities of the world (Berkeley’s Revolution in Vision, 30). Secada argues that the
intellect plays a special role in spatial perception by giving it an intellectual content not available for the sensory perception of secondary qualities (*Cartesian Metaphysics*, 132).

5 See also AT VII 12, 34, 52-53, 157-58 and 163. References to Descartes’ works are cited in the text and notes according to the following format. All references are to Charles Adam and Paul Tannéry, eds., *Œuvres de Descartes*, 12 vols. (Paris: Vrin, 1964-76) as ‘AT’ followed by volume and page numbers. Translations are my own, but they have benefited from consulting those found in John Cottingham, Robert Stoothoff, Dugald Murdoch and Anthony Kenny, trans. and eds., *The Philosophical Writings of Descartes*, 3 vols. (Cambridge: Cambridge University Press, 1985-91) and Thomas Hall, trans., *Treatise on Man* (Cambridge, MA: Harvard University Press, 1972). The titles of Descartes’ works are abbreviated as follows: *Comments* for *Comments on a Certain Broadsheet*, *Discourse* for *The Discourse on Method*, *Meditations* for *Meditations on First Philosophy*, *Passions* for *Passions of the Soul*, *Principles* for *Principles of Philosophy*, *Rules* for *Rules for the Direction of the Mind*, and *Treatise* for *Treatise on Man*.

6 Two caveats. First, this is not true for Descartes’ early works, where he sometimes uses the term ‘idea’ to refer to corporeal images traced in the brain (see, for example, *Rules*, AT X 415-19 passim; *Treatise*, AT XI 174, 176-77). Second, Descartes sometimes distinguishes the representational and conscious aspects of thought by two senses of the term ‘idea’ itself: idea considered objectively vs. materially (Preface to the *Meditations*, AT VII 8); idea considered formally vs. materially (*Fourth Replies*, AT VII 232); and idea insofar as it has objective vs. formal being (*Meditations*, AT VII 40-42). For present purposes, I set aside the vexing questions concerning (a) the precise ontological relationship between these aspects of thought and (b) whether the fact that Descartes makes this distinction implies that Cartesian thought is epistemologically mediated by a “veil of ideas.”

If there are non-representational states in the Cartesian mind, then volitions would seem to be likely candidates (insofar as they can be isolated from the perceptual states that provide them a target [AT VII 377]); but volitions are surely not sensory states. As for the identification of representational and intellectual states, if the latter are conceived narrowly to include only purely intellectual states, then intellectual states comprise only a subset of representational states, for imagining triangles is a form of mental, but not purely intellectual, representation. If, on the other hand, the intellectual is conceived of broadly to include all the different modes of perceiving attributable to the intellect (as opposed to the will), then sensory perception (even of secondary qualities) must be included among them, since it is a mode of perception.

"Are Cartesian Sensations Representational?" I fail to include Hoffman's view among the representationalist readings of Descartes. His view that sensations are misrepresentational, however, he clearly supposes that sensations represent (if only in a misleading way).

10 It is a notoriously vexed question whether mind-body interaction is a matter of transeunt efficient causation (according to which motions in the brain are the proximate causes of ideas in the mind) or a matter of some sort of occasional causation (according to which motions in the brain simply provide the occasion for something else—God or the mind itself—to produce ideas in the mind). What I say is consistent with either interpretation.


12 My distinction between projective and constructive judgments is similar to one that Margaret Wilson makes between “mere inferences to external causes of an idea, and the reasoning or judgment involved in the actual construction of a specific quality perception—say, of the distance of a thing” in a footnote to “Descartes on the Perception of Primary Qualities,” 175, n. 17. There are arguably other kinds of third-grade judgments that do not explicitly turn up in the Sixth Replies, such as judgments that import content concerning the identity and natures of things to sensory experience. Descartes’ claim in Meditation 2 that seeing a single piece of wax undergo sensible changes involves a judgment about the nature of wax or “what the wax is” (AT VII 31-34) and his claim that seeing men outside his window involves a judgment about what lies underneath the visible hats and coats (AT VII 32) are cases in point. Although these latter judgments are surely important to a complete account of sensory experience, I put them aside insofar as they are not directly relevant to the representation of particular primary and secondary qualities.
Descartes’ distinction between the second and third grades of sensory perception is clearly not intended to characterize the introspective phenomenology of sensory experience: we are not aware of second-grade sensations or third-grade judgments as distinct mental phenomena; we are aware only of the product of the two. This obviously threatens Descartes’ claim that all mental activity is conscious (Second Replies, AT VII 160; Fourth Replies, AT VII 246; Principles I.9, AT VIII-A 7). There seem to me two ways available to Descartes to resolve the problem. First, he may argue that some mental phenomena occur consciously but so quickly and habitually that they are almost immediately forgotten (see his letter for Arnauld, 29 July 1648, AT V 221; Fourth Replies, AT VII 246). Since he persistently maintains that third-grade judgments happen quickly and habitually, he may argue that they are immediately forgotten, with only their effects remaining available to consciousness. Second, Descartes may say that since sensations and judgments jointly constitute sensory experience, both are present to consciousness. They are not distinctly present to consciousness, but only confusedly present to consciousness. Descartes’ discussion of perceptual confusion in Principles I.46 supports this reading (AT VIII-A 22). He there considers the case of projective judgments, but the case is even more plausible for constructive judgments: although bagels viewed obliquely look round (or toric), there is a sense in which the elliptical patches they produce in the visual field are available to consciousness (and with training can be easily brought to consciousness, as perceptual psychologists and artists testify).

See Arbini, “Did Descartes Have a Philosophical Theory of Sense Perception?” 331-33. Jolley and Wilson are tempted by such a reading, although they express some reservations about whether the second grade of sensory perception is really restricted to secondary qualities (see Light of the Soul, 91 and “Descartes on the Perception of Primary Qualities,”
Atherton subscribes to a version of this view, but as she understands it, the bifurcation reading fits only the Sixth Replies (see Berkeley’s Revolution in Vision, 19-22 and 30-33).

15 See Maull, “Cartesian Dioptrics,” 30-33. Celia Wolf-Devine subscribes to a version of this view, but like Atherton she understands the bifurcation reading to fit only the Sixth Replies. See Descartes on Seeing (Carbondale IL: Southern Illinois University Press, 1993), 84-88.

16 See Arbini, “Did Descartes Have a Philosophical Theory of Sense Perception?” 333 and Jolley, Light of the Soul, 91.


18 Secada, Cartesian Metaphysics, 132 and 137.


20 Wilson, “Descartes on the Perception of Primary Qualities,” 169. Wilson is very careful to point out (to my mind rightly) that whatever sort of intellectual activity is involved in the sensory perception of primary qualities, it must be quite different from the sort of intellectual activity that is involved in the clear and distinct or purely intellectual perception of primary qualities.

21 There has been some question in the literature whether the Dioptrics and the Sixth Replies advance the same theory (or even consistent theories) of sensory perception (see Atherton, Berkeley’s Revolution in Vision, ch. 2 and Wolf-Devine, Descartes on Seeing, ch. 4). There are certainly differences of detail and emphasis. In the Dioptrics (as in the even earlier Treatise), Descartes focusses largely on the physiology and psycho-physiology of sensory perception; the psychological distinction between sensation and judgment is not drawn sharply. In the Sixth Replies, Descartes is forced by his objectors to develop his psychology of sensory perception by distinguishing the contributions of sense and intellect; there is therefore a
sharper distinction between sensation and judgment here. The accounts of the sensory process seem to me consistent and even complementary. That Descartes did not change his mind about his views in the *Dioptrics* while he wrote the *Sixth Replies* is supported by the fact that he continues to treat the *Dioptrics* as authoritative even in his latest works, the *Principles* (IV.189 and 195, AT VIII-A 316 and 319), *Comments on a Certain Broadsheet* (AT VIII-B 359) and *Passions* (I.12-13, AT XI 337-38).


23 In *Cartesian Metaphysics*, 286, n. 48, Secada makes a similar case for presence of spatial qualities at the second grade of sensory perception.

24 The quotation is actually taken from a parallel discussion of a blind man’s ability to perceive direction through hand-held sticks “without any thought or knowledge” of the position of his hands. It is clear from the passage, however, that the same is supposed to be true for direction perceived through the eyes.

25 There is some inconsistency in Descartes’ discussions of accommodation in the *Dioptrics* and *Treatise*. In the *Dioptrics*, he speaks rather vaguely about the shape of the *eye* changing in response to focal distance, while in the *Treatise* he speaks more specifically of the shape of the *crystalline humor* (or lens) changing. This might be explained by the fact that the *Treatise* has a more extensive discussion of the physiological details of sensory perception than the *Dioptrics*.


27 There are some competing passages in which Descartes suggests that the mind inspects images in the brain, the most famous of which occurs in his reflections on imagination in Meditation 6 (AT VII 73). This particular passage does little to confirm that Descartes’ considered view is that the mind can literally inspect images in the brain, for not only does he qualify the claim by saying the mind “as it were” (*veluti*) inspects the brain, but also he offers this account of imagination only as a possible explanation for how it works, not as the account he endorses. The fact that he does not think it is a strong enough proposal to secure the existence of body suggests that he has some reservations about it. I am tempted to read most passages in which Descartes makes use of inspection language metaphorically: the point has less to do with the *means by which* information is transferred from brain to mind than with the simple *fact that* information does (somehow) get transferred from brain to mind in the cases of sensory perception and imagination (see *Second Replies*, AT VII 161; *Fifth Replies*, AT VII 385-87; and *Treatise*, AT XI 177). Thanks to Marleen Rozemond for a helpful discussion of this point.

28 Andrew Chignell makes the unusual suggestion that even secondary quality sensations are to be explained by the mind’s inspection and interpretation of motions in the brain (“*Descartes on Body-Mind Relations: The Semantic-Causation Model,*” paper presented at the Eastern Division Meeting of the American Philosophical Association, New York, 30 December 2000). While it is intriguing, I think this reading is implausible. Although Descartes routinely describes motions in the brain as signs, he clearly distinguishes conventional signs such as words, which require an interpretive act of the mind, from natural signs, which do not—the interpretation is, as it were, built into the very nature of the mind-
body union, i.e., by the institution of Nature. In the passage quoted here, for example, Descartes notes that although words may need to be interpreted to produce thought of the things they signify, local motions in the brain *immediately* excite sensations in the mind. Again, thanks to Marleen Rozemond, who made roughly the same point in her commentary on Chignell’s paper at the APA.

29 By the term ‘faculty’, one need understand nothing more mysterious than the mind’s capacity to engage in a particular kind of thought. For passages in which Descartes distinguishes these two chief faculties, see *Meditations*, AT VII 56ff.; *Principles* I.32, AT VIII-A 17; *Comments*, AT VIII-B 363; *Passions* I.17, AT XI 342; letter to Elizabeth, 21 May 1643, AT III 665.

30 See *Meditations*, AT VII 30-34 and 78-79; *Second Replies*, AT VII 160; *Principles* I.32, AT VIII-A 17; *Rules*, AT X 395-96 and 415-16; letter to Elizabeth, AT III 691-92. This tripartite division is also present in the *Passions of the Soul* but is overshadowed by Descartes’ more pressing interest in the distinction between perceptions that have the body as their source and those that have the soul as their source. It must be noted that other modes of perception that are discussed in Descartes’ texts do not fit precisely into this tripartite taxonomy, such as memory, the passions, and reflection.

31 For discussions of the comparative etiologies of these faculties, see *Meditations*, AT VII 73; *Second Replies*, AT VII 163; *Fifth Replies*, AT VII 358 and 385-87; *Comments*, AT VIII-B 363-64; *Rules*, AT X 415-16 and 419.

32 AT III 395; italics mine. See also *Third Replies*, AT VII 178; *Fifth Replies*, AT VII 385-87; *Comments*, AT VIII-B 363-64. It is difficult to say more positively just what purely intellectual perception (or understanding) is supposed to be. Although today it might be natural to contrast imagistic representation with *propositional* representation, this does not
seem to be the contrast Descartes has in mind. He makes it clear in this passage that he thinks the contents of both imagistic sensory perception and non-imagistic intellectual perception can be expressed either by terms or by propositions; what is propositional, on his view, is language, not perception or its immediate contents. Descartes’ purely intellectual perception is sometimes thought to be distinctively conceptual. That does not seem quite right either. Descartes says little about what he thinks concepts are, but it seems likely that he would allow that we have concepts of properties that we have no purely intellectual perception of. We surely have color concepts, even if we do not have purely intellectual perception or understanding of them. Nor can purely intellectual perception be identified with the perception of universals, for he allows that we have purely intellectual perception of particulars (God, my mind). Whatever else it is, purely intellectual perception is clearly supposed to involve the direct apprehension of essences or true and immutable natures. For a recent exploration of the topic, see Secada’s *Cartesian Metaphysics*, esp. ch. 5.

33 See his letter to Mersenne, July 1641, AT III 394; *Fifth Replies*, AT VII 358; *Treatise*, AT XI 177; and *Rules*, AT X 416 and 419.

34 See *Rules*, AT X 416-17; *Discourse*, AT VI 37; *Fifth Replies*, AT VII 387; *Comments*, AT VIII-B 363.


36 Some caution is needed here, for Descartes sometimes says that images of simple shapes depicted in the imagination are distinct: the mental image of a pentagon is distinct by comparison with the mental image of a chiliagon (*Meditations*, AT VII 72). He also says that some sensory perceptions are clearer than others. When someone with jaundice sees snow as yellow, “he sees [the snow as yellow] just as clearly and distinctively as we do when we see it as white” (*Second Replies*, AT VII 145). By contrast, the colors of distant bodies are “seen less
distinctly” (*Dioptrics*, AT VI 134) and if I look at things without my glasses on, nothing is clear at all. But one can accept that images are more or less clear and distinct and still maintain that there is a categorical difference between the clarity and/or distinctness of these images and that of a purely intellectual perception. There is a *phenomenal* clarity and distinctness about certain images that is contrasted with a phenomenal obscurity and confusion in others. The clarity and distinctness characteristic of purely intellectual perception, by contrast, has nothing to do with phenomenal presence. It has to do rather with our understanding certain things to be true of its object.

37 Descartes demonstrates his familiarity with this tradition in a passing remark in the *Second Replies* wherein he argues that “an idea is that which we perceive through the intellect when it apprehends or judges or reasons” (AT VII 139). For examples of this treatment of judgment, see Thomas Aquinas, *Summa Theologica* Ia, qu. 85, art. 6 and Arnauld and Nicole, *Logic of the Art of Thinking*, translated by Jill Buroker (New York: Cambridge University Press, 1996), 23 and 81-82.

38 See *Rules*, AT X 372-73 and *Discourse*, AT VI 17.

39 Gary Hatfield suggests that we recognize a fourth grade of sensory perception consisting in “the considered judgments of the mature understanding” (“The Senses and the Fleshless Eye,” in *Essays on Descartes*’ Meditations, edited by Amélie Rorty (Berkeley: University of California Press, 1986), 59). Insofar as Descartes thinks that we are not inclined to confuse these reflective judgments with the deliverances of the senses proper, I am not inclined to assign them to a special grade of sensory perception, but I do think Hatfield is right to call attention to the difference between these reflective judgments and the judgments that Descartes attributes to the third grade of sensory perception.

40 “Cartesian Dioptrics,” 36.
To my mind, then, Margaret Wilson is wrong to say that Descartes overlooks color constancy because he wants to restrict our processing of secondary qualities such as color to the senses alone (see “Descartes on the Perception of Primary Qualities,” 172). See also Wolf-Devine, *Descartes on Seeing*, 64.


The angles subtended by the sun, the moon, and the stars in the visual field are consistent with each being either a large body at a great distance or small body close by. On Descartes’ account, because we judge that they are closer than they really are, we sensorily perceive them as smaller than they actually are: “not being able to conceive them any further than about one or two hundred away, it follows that their diameters appear to us to be only about one or two feet” (*Dioptrics*, AT VI 144). As for the apparent difference in the size of the sun at its zenith and at the horizon, Descartes explains this much as he explains our perception of the two ships: the zenith sun is judged to be closer than the horizon sun because for the zenith sun there are few other cues, such as occlusion, with which to judge its distance; consequently, the zenith sun looks to be smaller than the horizon sun (see AT VI 145).

For a more detailed discussion of the connection between sensory representation and the role of the senses in self-preservation, see my “Are Cartesian Sensations Representational?”

There remains a problem to solve: how is it that I recognize what is imagistically represented in sensory experience to be an instance of some intellectually understood shape? How, in other words, do I match images with clear and distinct ideas? Descartes has little to say about this, but he does occasionally suggest that images prompt corresponding clear and distinct ideas. At *Principles* II.1 he writes: “we sense, or rather prompted by the senses we clearly and distinctly perceive some kind of matter that is extended in length, width, and
depth” (AT VIII-A 40). Similarly: “when earlier in our childhood we looked at a triangular figure drawn on paper, it could not have been that figure that taught us how to conceive the true triangle as studied by Geometers…But because the idea of the true triangle was already in us and more readily conceived by our mind than the more composite figure in the picture of the triangle, when that composite figure was seen we apprehended not that triangle itself but rather the true triangle” (Fifth Replies, AT VII 381-82; see also his letter to Mersenne, AT III 395).


47 Descartes explicitly claims that sensory experience must be used to (a) isolate corporeal phenomena for investigation (Principles III.4, AT VIII-A 82-83), (b) provide macroscopic models for hypotheses about microscopic phenomena (Principles IV.203-204, AT VIII-A 326-37; letter to Morin, 12 September 1638, AT II 368), and (c) identify which among the many possible corporeal phenomena are actual (Principles III.46, AT VIII-A 100-101; Discourse VI, AT VI 63-64; letter to Mersenne, 5 April 1632, AT I 243). For sample discussions of the role of experience in Cartesian science, see Desmond Clark, Descartes’ Philosophy of Science (University Park, PA: The Pennsylvania State University Press, 1982), esp. ch. 2; Daniel Garber, “Science and Certainty in Descartes,” in Descartes: Critical and Interpretive Essays, edited by Michael Hooker (Baltimore: The Johns Hopkins Press, 1978), 114-51, and “Descartes and Experiment in the Discourse and Essays,” in Essays on the Philosophy and Science of René Descartes, edited by Stephen Voss (New York: Oxford University Press, 1993), 288-310;

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