

Thought and Image

Preamble: Use of terms

"Imagination", says Aristotle, "is the process by which we say that an image is presented to us."¹ While the OED accepts at least five other entries for the word -- including, for instance, poetic genius -- its first entry refers to the production of mental images. So in this paper, the one and only way I will use the term imagination is in reference to mental images.

What then is an image? A picture of a clock tower, for example, is an image.² It may be made of ink and paper rather than bricks and mortar; it may be made of bytes; it may be smaller than the tower; it may be of somewhat different colour than the tower; but it qualifies as an image in so far as it has the same shape. An image is isomorphic to the original (iso = same; morphe = shape.) It may occasionally be useful to go beyond shape to other qualities: the aural image of a tune, for instance, can be said to have the same temporal shape as the tune. The central characteristic of an image is that it resembles the original by having the same relevant qualities. Plato seems to use the term this way: in his allegory of the cave, he contrasts the shadows cast on the wall with the real things.³ Presumably the shadows are images because they have the same shape (and maybe same movements) as the realities. In contemporary usage, the OED offers eight equally legitimate uses of the term "image", but its first use is, "an imitation or representation of the external form of an object ..." Once again, in this paper I will restrict myself exclusively to this, simple-minded and unequivocal meaning of "image:" An image is an object isomorphic to the original. It is these images that imagination -- as I use the term -- is concerned with.

Introduction

Thoughts and words are about things. How, in general, can we account for this aboutness (aka "intentionality")? A particular word is about a particular thing, but how does it succeed in being about this thing rather than any other? Some claim that the aboutness of language ("secondary intentionality") derives from the aboutness of thought ("primary intentionality"); this, of course, is only helpful if we already have an account of the aboutness of thought.

This paper will discuss two philosophical approaches to aboutness. The first, based on images, on isomorphism, is pre-Modern; the second approach involves a third factor, factor "X," and comes in a number of varieties from the 17th century to the present.

It is Plato, in the first place, that bequeaths to us the dichotomy of thought and image. He is also among the first to insist that it is not in images that truth is to be found: that is the point of his allegory of the cave. His project for philosophical enlightenment involves escaping from the cave and leaving the images behind. But this is no easy task: my paper is organized historically and will track the path of Western philosophy as it has tried to extricate itself from the imagistic

analysis of thinking. I will discuss, in order, Aristotle, as a representative of isomorphic theory, and then Descartes, Frege, Wittgenstein and Brandom, as representatives of the third factor approach.

Aristotle

Aristotle's metaphysics, "hylomorphism," claims that things in themselves are composed of matter (*hyle*) and form (*morphe*).⁴ [Don't confuse "form" as a translation of Plato's *eidos*, with "form" as a translation of Aristotle's *morphe*.] The particular object is the kind of object it is because the *morphe* enforms the *hyle* in a particular way. An object is a tower because the stuff it is made of, the bricks and mortar, has the form of towerness. His theory of knowledge is based on this metaphysics. To know the tower is for the same form that makes the bricks be a tower to "inform" the mind, that is, for it to be in the mind in the way appropriate to the mind – that is, without the matter, the *hyle*. The mind's state is *about* the tower because the form in the mind is the *same* form as that in the matter.

Given the way I'm using the term "image," it should be clear that Aristotle's theory of aboutness is imagistic. What makes the mind's state be a thought about the tower is that it has the same form (shape, *morphe*) as the tower in itself. The mind's state is a likeness of the tower; it resembles the tower. Aristotle says, "During the process of being acted upon it [the mind] is unlike, but at the end of the process it has become like that object, and shares its qualities."⁵

The Aristotelian theory of forms is, of course, more sophisticated than this, especially in its scholastic elaboration. Intelligible forms need to be distinguished from sensible forms; the active intellect has a role in abstracting the form from the matter; knowledge of matterless forms needs to be accounted for; etc.⁶ But one of the beauties of the isomorphic theory is that, with respect to aboutness, the strategy is simple and clear: a state of the mind is about its object in so far as it shares the same form. In imagistic analysis, it is the form's own intrinsic properties that, because of its resemblance to the object, guarantees the aboutness. The thought of a tower is about a tower because it has the form of a tower; the thought of an elephant is about an elephant because it has itself the form of an elephant. The imagistic theory of aboutness is bipartite; it needs only two components: the thought and the thing. The thought has, in itself, its own intrinsic form; it is in the nature of this particular thought that it must be about its particular object. Non-imagistic theories of aboutness, as we shall see, all require some third factor to account for the relationship.

Descartes

Descartes is my first example of an attempt at a non-imagistic account of aboutness.

Descartes' sets out to establish Modern, Galilean, mechanistic science in opposition to the pre-modern reliance on the metaphysical forms of scholastic Aristotelianism. In physics, Galileo

had already taken the first steps towards abandoning hylomorphism when he claimed that the world is like a book written by God in a foreign language, and that that language is numbers, mathematics.⁷ Descartes continues this project of replacing Aristotelian qualitative forms by mathematical quantities; A good example is his invention of Cartesian coordinates to analyze space, "extension." The successful result, with a little later help from Newton and Leibniz, is mechanistic, that is, "Modern," physics.

An essential step for Descartes, following in the footsteps of Plato, is to distinguish ideas from images. Images are extended, spatial. The mind is non-extended. So mental ideas cannot be images. The idea of a triangle cannot itself be triangular. In his experimental work, Descartes showed that an ox's eye has an image on its retina, an image that is isomorphic to whatever is in front of the eye, but upside down. Such images may well be transmitted by nerves from the eye to the brain, perhaps to the pineal gland, he thinks. So he grants that there are images. But they are bodily entities, for they are laid out spatially and only the body is extended. Since the mind is not extended, such images cannot be mental entities; they cannot be elements of thought. He suggests that the mind might observe the images in the brain, but in so far as it *thinks* about them, that thought is itself an unextended idea, and so cannot be an image.

Descartes defends this position by discussing the idea of a chiliagon, a regular, thousand-sided geometric figure. The *idea* of a chiliagon is distinct from that of a myriagon, a 10,000-sided figure. Any *image* we might have of a chiliagon, however, would be indistinguishable from that of a myriagon. Hence the ideas involved are not images.⁸

It follows that, whatever accounts for an idea being about its object, it cannot be based on the two having the same shape. In general, his point is that ideas do not relate to their objects by resembling them, by having qualities in common. Mind and body have no properties in common. Properties of the entities doing the representing, the ideas, must not be confused with properties of things represented. This is true not only of Cartesian ideas, but of any kind of representation. For example, the pictorial representation of the tower in my Endnote #2 is about 10 mm high while the tower it represents is 50 m high. What is even more obvious is that the linguistic representation "Tower" has five letters; the tower itself is 50 metres high and has no letters. As a general principle, we must distinguish between the attributes of any representation and the attributes of what is represented. Since according to Descartes the mind and its ideas are immaterial and not extended or spatial, mental ideas about physical things in space must be about their objects in some way other than isomorphism. The ideas used in thinking must then be radically different than images.⁹

Hence, the Aristotelian theory of forms is wrong. It is wrong not only with respect to physics; it is also wrong as an account of aboutness. There may be isomorphic forms in the body – on the retina, for instance -- but the representational capacity of thought must be explained by some other principles than forms.

While the victory of Descartes' mechanism over Aristotelian physical science is clearly a success, his theory of thought, I argue, is a more limited victory. If ideas are to be different than images, Descartes must account for the relationship between ideas and their objects without reliance on resemblance. For example, if the new physics is to be possible, the idea of extension, though not itself extended, must successfully represent the mechanistic, quantified spatial world that mechanics is about. Descartes attributes this success to the goodness of God: having planted the innate idea of extension in our minds, God guarantees that external space itself, which we cannot access independently, is truly grasped by the idea of quantified Cartesian coordinates.

There are, however, two different problems here, and God can only solve one. God can guarantee that my idea of a tower is true to the tower; but how do I know which of my ideas is the idea of the tower? What if I mis-take the idea of a tower for that of an elephant? Say idea #1 refers to a tower and idea #2 refers to an elephant. How do I know which one is idea #1? How can I tell, glancing around my mind, which idea is which? If I take idea #2 to be idea #1, then even God can't help me. Consider an analogy: What if I have an experience of pleasure, but mistakenly interpret it as a pain? (Maybe masochists make this kind of mistake.) Am I not then in pain? Even if God assures me that it is an idea of pleasure, if it seems to me to be a pain, then it is a pain. Just as God cannot make it be that I think I exist when I don't, God cannot make it be that what I experience as a pain is really a pleasure; He cannot make it be that what I experience as an elephant is really the idea of a tower. I have a freedom, in this respect, equal to that of God's, as Descartes might put it. That idea #1 is really about a tower is an objective issue that God can guarantee. That I nevertheless experience idea #1 as of an elephant is up to me; it is purely subjective. How I "take" it is what counts, even if my taking is a mis-taking. This is not some incidental quirk of subjectivity: such "taking" is the very essence of subjectivity. That mental objects, ideas, have a significance for me is what it is for me to be a subject.

This distinction between how a thing is *in-itself* and how it is *for-me* -- using later labels -- is sometimes referred to as Descartes' discovery ("invention") of subjectivity. Images and other Aristotelian forms resemble their object "in-themselves." That is, they have intrinsic properties that refer them to their objects, no matter how they are "taken" or mis-taken. Indeed, they don't have to be "taken" at all; their aboutness is built into what they are in themselves. Because they are isomorphic they can manage by themselves without me. Images don't need subjectivity to be about their object. The image on an ox's retina is isomorphic to the tower even if the ox is dead and Descartes is experimenting with its excised eye in his laboratory.

Thought, in contrast, is something I *do*; not something that impersonally happens to me. Thoughts are in this respect more like words than images. Unlike the image, the word "tower" does not resemble a tower and so it cannot succeed in referring to the tower all by itself. It is about the tower only in so far as I mean it that way. If I take the word "tower" to be about an elephant, then that's what it means *for me*; that's what the word is about when I speak it. An image of a tower, on the other hand, is *in-itself* isomorphic to the tower. Descartes' distinction between image and idea is the first step towards a subjectivist theory of aboutness for thoughts.

This active role of a subject in taking an idea in a specific way is implied by Descartes' philosophy, but he himself is reluctant to take this step. It is at this point that I believe Descartes' overthrow of imagistic thinking is limited: he offers us no satisfactory analysis of the "taking" that determines which idea is which. He seems to assume that the subject can just tell by "looking" at an idea which one it is, as if the idea were transparent and we could see its object within it. When push comes to shove, he slips back into the Aristotelian claim that thoughts are intelligible forms that have an intrinsic, isomorphic relationship to their objects.¹⁰

Descartes, according to my retrospective interpretation, is on the way to inaugurating Modern, subject-based philosophy of thinking by overcoming the imagistic, bipartite, isomorphic notion of aboutness offered by the Aristotelian world-view. He half-succeeds, for he discriminates between imagination, which represents by means of resemblance, and thought, which involves ideas whose referential capacity depends on something other than isomorphism. Unlike resemblance, for which there are only two factors – images and their objects -- the aboutness of thoughts involves a third factor, factor X. For Descartes, this third factor, is subjectivity, that is, what a thought means for the ego – how the ego takes it.

Frege

Frege (c. 1895) also offers a tripartite theory, but he rejects the assimilation of factor X to subjectivity. To see why, we must note that Descartes' Way of Ideas underwent an important shift in the two centuries after him. During this period, science developed beyond mechanics, and came to be applied to human minds. The result was "psychology," the study of how the mind in fact works. Thoughts came to be seen by some as natural objects or events governed by naturalistic, empirical laws. By the second half of the 19th century empiricists and neo-Kantians were offering psychological accounts of mental processes.

Labeling such approaches "Psychologism," Husserl and Frege offered numerous arguments attacking such approaches for undermining science.¹¹ Frege and Husserl were mathematicians, so their primary concern was to insist that the validity of mathematics -- and so of all other sciences -- could not depend on how mental ideas are "taken" by individual human subject. Frege claimed that if mathematical (or any scientific) thought is just a psychological process, then it is subjective in the dangerous sense that it is relative. Even if it were not relative to individual human beings, it is relative to the contingencies of an empirical human nature. But the truth that $2+2=1+3$ is absolute in a way that does not depend on the accidental genetic or psychological nature of human animals.

Frege therefore distinguishes "thought" -- as in "mathematical thought" -- from imagination, or from any other psychological process for that matter. When *I* think of 3, an image of a clock face springs to mind, with the hour-hand pointing to 3 o'clock. One of my professors had images

of "crystal solids": when he thought of 3, an image of a bluish globe came to his mind. Others may have yet different images. Frege's claim is that the nature of such images is irrelevant to mathematical validity. $2+2=1+3$ no matter what image one has, and even if one has none. Thinking is not imagining. In fact, with respect to the mathematical validity of the thought, it doesn't matter what psychological processes are going on in my mind. What is important is their "sense (Sinn)."¹²

Sense is what relates signs to their objects -- factor X. The written words "morning star" refer to Venus because they have the sense "brightest star in the morning." "L'étoile matinale" refers to the same object not because the letters or words -- the sign -- are the same, but because they have the same sense. A sign does not refer to its object by its own right, in function of the structure of the sign, but only by means of the sense that the sign has. $II + II = I + III$ in Roman numerals expresses the same thing as $2+2=1+3$ in Arabic numerals because they have the same *sense*, not because the *signs* are the same. It follows that even an image does not refer directly: The picture of a clock-tower can refer to a clock, to Memorial University, to time, or even to hubris, depending on its sense. "Chair" (of philosophy) has a different sense than "chair" (wooden) and so refers to a different object. The sign "elephant" -- whether written, spoken or mental refers to an elephant rather than a tower because of its sense. The sign "Gajah" in Indonesian, although it is an entirely different word, refers to the same object as "elephant" because it has the same sense. With respect to its capacity to be about its object, it is the sense of a sign that counts, not its material structure, its carrier, as it were.

It follows that, for Frege, the carrier of the sign is secondary. A sign may be written or spoken; but it may also be a mental event or a psychological process. Hence his analysis is neutral with respect to the distinction between speaking and thinking. Ideas are seen as mental signs and are therefore given exactly the same treatment as verbal ones. Descartes had already hinted that ideas are more like words than images. From Frege on, thought and language essentially merge; aboutness is accounted for in the same way. The intentionality of thought is no more primary than that of language.

Sense, then, is the third factor, factor X, that accounts for the relationship of words and thoughts to their objects. As such, it plays the same role for Frege as "taking" does in the subjective approach: it determines the intentionality of the mental state, what it is "about." "Taking" is explained in terms of sense.

But what exactly is sense? The concept is elusive. It is certainly not an image. Nor, given Frege's attack on psychologism, is it anything subjective. It is not dependent on the referent: If Venus disintegrated, there would be no referent for "morning star." The sense, however, would still be there. But nor is it dependent on the signs: if we no longer used the term in English, or in any other language, and no one ever even thought of the morning star again, that is, if all the signs disappeared, the sense itself would not vanish. $2+2=1+3$ would still be true even if no such signs (or others with the same sense) ever entered anyone's mental processes.

The weirdness of Frege's sense as some kind of timeless, immaterial, entity led others to criticize him as a Platonist. These criticisms led to two alternative routes in 20th century philosophy. Husserl defended a subjectivist approach and held that all sense had to be *for a subject*, but to avoid psychologism, he claims that sense is constituted by transcendental subjects, not empirical ones. Sense then becomes what-is-experienced, which he labels the "phenomenon", and so phenomenology is the description of senses. In the end, for Husserl, there is nothing but sense. Much of "Continental" philosophy derives from this approach. But this analysis of aboutness is not my focus in this paper.

Wittgenstein

The alternative, non-subjectivist route after Frege in the early 20th century is "extensionalism:" the attempt to see if we can get along without this weird notion of sense altogether. Russell and the early Wittgenstein return to a bipartite approach and try to work out a theory of thought/language in which signs relate directly to things. Words are purely referential: they name objects directly without the mediation of sense, like labels. Unlike "morning star," names like "Mary" have no sense. Their meaning is pure designation: it is exhausted by their reference. In extensionalism a word has no meaning other than its extension, that is, the object(s) to which it refers. Referential terms that appear to have sense (e.g., the King of France, the morning star) need to be reinterpreted so that, when decoded, all referring terms are without sense. In the extensionalism of Wittgenstein's *Tractatus* (1913, 1921),¹³ absolutely simple names directly relate to absolutely simple objects by arbitrary designation without the mediation of sense, and all other thought/language is constructed from these simples by logical compounding. Propositions are structured arrangements of names that are true if their arrangement corresponds to the arrangement of the simple objects. In other words, a proposition is an image -- in the isomorphic sense that I have defined the term -- of the world. Wittgenstein has eliminated sense, and any other form of factor X, only by reverting to an imagistic analysis of language/thought.

This apparent victory of imagistic thinking is short-lived. By the end of the *Tractatus*, Wittgenstein realizes that, for logical reasons, the isomorphic relationship of propositions to facts, of names to objects, cannot itself be stated in language. We cannot say what is a name of what, for saying requires that we already have the naming structure we are trying to describe. (We cannot, for instance, say "the word 'tower' refers to the tower," for the second instance of the term assumes we already know this.) The project of stepping outside of signs in order to describe how signs relate to objects is an incoherent project; it is "non-sense". We can *show* in practice how the relationship works, but we cannot *say* it in language or think it in thought. The relationship is, for logical reasons, ineffable ("mystical," Wittgenstein sometimes says, a bit misleadingly.) This relationship, of course, is the mysterious element that Frege called sense. Despite its extensionalist aim, the *Tractatus* fails to eliminate it; the book simply proves that we can neither do without it, nor say what it is. The concluding message of the *Tractatus* is that sense can never be spoken about; hence it is that about which we must be silent.¹⁴

But philosophers didn't stay silent for long! Wittgenstein worried at this problem for the next few decades and, in the *Philosophical Investigations* (1951),¹⁵ proposed that the relationship between words and objects is to be explained by social practices: language games. The slogan "meaning is use" is the return of factor X. Frege's sense has now become the rules of social practice, of what we do. This leads us to my third example of the factor X approach

Wittgenstein's theory that meaning is use is a two pronged attack. On the one hand, it is a rejection of Frege's Platonic tendency to treat sense as ideal, as outside of history and culture. The patterns of use to which Wittgenstein appeals are constructions by real, historical societies. Even that archetype of absolute knowledge, mathematics, is ultimately to be explained by what we do.¹⁶ On the other hand, Wittgenstein also rejects appeal to the individual subject as the origin of sense. In a famous passage on private language, he argues that words cannot get their meaning from the subjective, interior, private experiences -- such as images or thoughts-- of individuals. The source of meaning is public.¹⁷

Nevertheless, in the *Investigations*, Wittgenstein clings to the *Tractarian* position that we cannot say exactly how these meaning-giving practices work. We cannot give any overarching account of the source of sense, for to do so we would have to place ourselves outside of practice and language and so deprive ourselves of the foundations needed to say or think anything. Philosophy can provide a kind of therapy for those (frequent) occasions when language goes on a holiday and philosophers mystify themselves by neglecting the boundaries of the language games within which words have meaning. But he still insists that we cannot, within language and thought, give any overview of how language works, that is, of aboutness.

Brandom

Brandom, writing 40 years after the *Investigations*, has no such qualms. His *Making It Explicit* (1994)¹⁸ is a detailed examination of the way social practices account for the meaning of language and thought. Following Kant and Frege, he claims the basic move in a language game is not an individual word, but an assertion (judgment, proposition). A behaviour qualifies as an assertion if other people, the listeners, treat the speaker as thereby making certain commitments: commitments to other linguistic behaviours ("implications") and, often, to non-linguistic behaviours ("actions"). The sense ("propositional content") of an assertion is the set of implications to which the speaker is thereby committed. More correctly, the sense is the set of implications to which the speaker *should* be committed -- Brandom's account is normative through and through.

For instance, if a parrot makes the sounds, "it is minus 20 degrees outside," these sounds are meaningless, for we hold the parrot committed to nothing thereby. If, as a participant in a linguistic community, I make these sounds, an "assertion" is attributed to me and others hold me committed to also asserting that "you'd better wear a coat if you go out," that "it's colder than yesterday's minus 5," and so on ("implications"). You also expect me to actually wear a jacket

when I head outside ("action"). If instead you find me making other sounds, "Leave your jacket behind," and "It's warmer than yesterday's minus 5," and so on, then you may come to change the assertion you are attributing to me. You may then decide that, when I make the sounds "minus 20," you will attribute to me the same commitments that you would attribute to anyone else when they say "plus 20." That is, you may come to realize that I am using the sounds "minus 20" with the sense "plus 20". (Alternatively, you might decide I'm a parrot and not a member of our linguistic community!) What constitutes the sense of words is the implications that others hold I should be committed to. A community that holds others responsible in this way is a "linguistic" community, that is, one for which words have a sense, for which language has aboutness. And the specific sense an assertion has is the set of implications that community considers I should have when I utter it.

I phone Environment Canada's weather line and the voice says, "It's minus 20." Is it the voice of a meteorologist who knows and means what she says? Or are the sounds generated by a computer and so uttered without meaning? I can find out by asking questions to discover if the speaker is committed to the implications the assertion implies: Should I therefore wear a jacket? and similar questions. If I find it is not committed to such further assertions and actions – it just repeats "It's minus 20" monotonously – then I can assume it is a computer parroting words that are not really about things.

How, in the future, could we enrich Environment Canada's computer so that it really meant what it said? Descartes would say we'd have to endow it with an inner life and ideas, and with an ego who could "take" them the right way. This is a task for God. Frege would say the computer's words would have to have the Platonic sense "minus 20." I've no idea how that could be done (but then Frege fails to tell us how humans do it either!) Brandom would say that if the computer could be programmed so that we could reliably count on it to assert the right implications (and, if it is mobile, to put on a jacket or turn on its heaters if it goes outside), then its words could have propositional content, could be counted as meaningful. This is not magic: it is not that the sounds themselves would suddenly take on some intrinsic property of aboutness. Aboutness is an attributed status: assertions have meaning in so far as their speaker gets treated in a certain way by the community. The computer would then be accepted as a member of our linguistic community: it would be speaking and communicating *meaningfully*, and we could correctly attribute beliefs to it -- at least with respect to the weather.

Brandom does not rely on the bipartite isomorphism of images: his account of aboutness is tripartite. How words refer to things is explaining by appealing to a third factor, the normative practices of the community of speakers. It is the context -- one particular context -- that is factor X. Descartes' subjective "taking" and Frege's mysterious sense are replaced by the context within which words are uttered. Factor X is neither the pure interior activity of a private subject, nor the eternal, Platonic entities that Frege postulates, but the norm-governed attributions of society.

Brandom has therefore also reversed the priority of thinking and speaking. Far from the Cartesian principle that thought donates its meaningfulness to language as an external expression of it, for Brandom, speaking is where aboutness is first generated. It is possible for individuals to speak to themselves silently, but only because public discourse has generated meaningful speech in the first place. Private thought is derivative from public discourse. The meaning of words is not an image or any other interior process in the speaker's head; it is the commitments she is held to by others.

Conclusion

Plato contrasted a life of images with the philosophical project of pure thought, of seeing how things really are. Following Plato, I understand "image" as a double that represents an object. I have argued that, in the history of Western philosophy, we have only with difficulty extricated our theory of aboutness from reliance on images. Initially we conceived of each thought as having an intrinsic property that makes it be about its object: its own form is the same as the form of the object. Abandoning this isomorphism, philosophers searched for some third principle that accounts for thoughts being about things. Subjectivity is a first attempt: an inner ego takes a mental states as representing some thing in the world. But how such taking works is problematic, and finding a notion of subject that is not simply "subjective" -- in the relative, non-objective way -- but "Transcendental" proves to be difficult. Frege's alternative to subjectivity, the "sense" of a thought, jettisons subjects in favour of a third factor that is even more mysterious, yet attempts by Russell and Co. to get along without this, or any other, third factor led to a dead end. In the last half-century many philosophers have rejected both meaning-giving subjectivity and Fregean ideal sense and turned to the activity of society as factor X. In Brandom's version, the aboutness of thoughts derives from the aboutness of words, and both depend on an evolved linguistic community that attributes commitments and therefore aboutness to the language behaviour of speakers.

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Endnotes

- 1 Aristotle *De Anima* III 3, 428a1 <http://classics.mit.edu/Aristotle/soul.3.iii.html>
- 2  <http://en.wikipedia.org/wiki/File:MemorialUniversity.jpg>
- 3 Plato, *The Republic*, Book VII (514a–520a). <http://webspace.ship.edu/cgboer/platoscave.html> For an interesting interpretation, see <http://faculty.washington.edu/smcohen/320/cave.html>
- 4 Don't confuse "form" as the translation of Plato's *eidos*, with "form" as the translation of Aristotle's *morphe*.
- 5 Aristotle *De Anima* II 418a5 <http://classics.mit.edu/Aristotle/soul.2.ii.html>
- 6 <http://en.wikipedia.org/wiki/Hylomorphism>
- 7 “Philosophy is written in this grand book — I mean the universe — which stands continually open to our gaze, but it cannot be understood unless one first learns to comprehend the language in which it is written. It is written in the language of mathematics, and its characters are triangles, circles, and other geometric figures, without which it is humanly impossible to understand a single word of it; without these, one is wandering about in a dark labyrinth.” (As translated in *The Philosophy of the Sixteenth and Seventeenth Centuries* (1966) by Richard Henry Popkin, p. 65.) For other translations see http://en.wikiquote.org/wiki/Galileo_Galilei
- 8 Descartes, *Meditations on First Philosophy*, Meditation VI, Second paragraph. In *Descartes: Selected Philosophical Writings*, Trans. John Cottingham et al. Cambridge University Press 1988. 111
- 9 “I now know that even bodies are not strictly perceived by the senses or the faculty of imagination but by the intellect alone.” Descartes, Meditation II. In *Descartes: Selected Philosophical Writings*, Trans. John Cottingham et al. Cambridge University Press 1988. 86
- 10 This isomorphic account of the aboutness of ideas, however, passes through images in the mind of God. For a careful, scholarly discussion of Descartes' handling of this problem, see Sepper, Dennis L. *Descartes's Imagination: Proportion, Images, and the Activity of Thinking*. Berkeley: University of California Press, 1996.
- 11 J.N. Mohanty “The Concept of ‘Psychologism’ in Frege and Husserl” in D. Jacquette, *Philosophy, Psychology and Psychologism*, Springer, 2003.
- 12 G. Frege, “On Sense and Reference,” in A.W. Moore, *Meaning and Reference*, Oxford University Press, 1993. 23-27.
- 13 L. Wittgenstein, *Tractatus logico-philosophicus*, Routledge & Paul, 1961.
- 14 Wittgenstein, *Tractatus*, 7.
- 15 L. Wittgenstein, *Philosophical Investigations*, Blackwell, 1976.
- 16 L. Wittgenstein, *Remarks on the Foundations of Mathematics*, MIT, 1978.
- 17 Wittgenstein, *Philosophical Investigations*. The core of the argument is generally thought to be presented in §256 and onward, though the idea is first introduced in §243.
- 18 R. Brandom, *Making It Explicit: Reasoning, Representing and Discursive Commitment*, Harvard University Press, 1994.