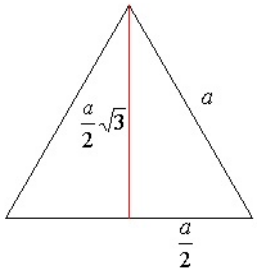
**Philosophy 203: History of Modern Western Philosophy** Hamilton College
Spring 2012 Russell Marcus

Class 19 - Mathematics, Science, Skepticism and Atheism
Berkeley's *De Motu* (AW 504-508)
*Principles*, §101 - §156 (handout)

I. Empiricism and Mathematics

Berkeley claims that the root of Locke's materialist error is his doctrine of abstract ideas.
The importance of that doctrine is easiest to see in Locke's account of mathematics.
resembLet's take a moment to see how the problem of accounting for mathematical knowledge leads Locke to his doctrine of abstraction.

Mathematics appears to be among the most certain of disciplines.
The certainty of mathematics entails that mathematical theorems are true.
For example, consider the claim that the height of an equilateral triangle is the length of one of its sides multiplied by the square root of three, and divided by two.
It is natural to take a proof of this theorem as sufficient for its truth.




True statements require truth makers.
For 'snow is white' to be true, there must be snow, and it must be white.
Snow and its whiteness are the truthmakers for 'snow is white'.
For our mathematical theorem to be true, we need its truth makers: a triangle, numbers like three, and functions like 'the positive square root of x'.
Thus, the certainty of mathematical theorems standardly entails the existence of mathematical objects.

The rationalists all accounted for the certainty of mathematics on the basis of innate ideas.
We know the truths of mathematics because those theorems are built in to the structures of our minds.
Even if all of mathematics is not innate, the fundamental axioms may be taken as innate, along with our abilities to derive the more complicated theorems from those axioms.
Our substantial capacity for pure thought accounts for our knowledge of mathematical theorems, and gives us insight into the nature of mathematics.

The rationalists' account of our knowledge of the physical world may seem implausible, since it impugns the role of the senses.
For example, Leibniz's opposition to transeunt causation and his denial of the reality of bodies entail that our knowledge of physical laws is neither acquired from experience nor robust.
The rationalists' accounts of our knowledge of mathematics, though, is more plausible.
Descartes and Leibniz put these accounts in terms of innate ideas.
In contemporary philosophy, we refer instead to pure reason or *a priori* methods.
Both terms are supposed to indicate a capacity for acquiring and justifying beliefs which is more substantial and robust than mere psychological associations, which vary with the person.
Locke rejects innate ideas and pure reason, and produces a more intuitively-satisfying sensory account of our knowledge of the physical world.
But Locke's account of mathematics, which relies on the doctrine of abstraction, is less plausible.
For Locke, mathematics is certain, but does not concern real things.
He denies the claim that the truthmakers of mathematical theorems are mathematical objects.
Instead, Locke says that mathematical theorems are about our ideas and their relations.
Thus, Locke defends the certainty of mathematics by making mathematical objects individual, personal,

and psychological rather than universal.
Strictly speaking, for Locke, everyone's mathematical theorems are about their own mathematical ideas.

Here is another way to put the problem for Locke.
Recall that Descartes parses our ideas into three types: A. Innate; B. Acquired; or C. Produced by me.
Locke rejects anything of type A.
Mathematical theorems can not be of type B, for the same reasons that Descartes gives.
Locke agrees that we do not see triangles.
So, our knowledge of mathematics must be of type C, produced by me.
In particular, it is produced by abstraction.
We sense particulars, like doughnuts and frisbees.
Then, we generalize, forming an abstract idea, like that of a circle.

## II. Berkeley, Mathematics, and the *Minimum Sensibilia*

You might think that Berkeley could, like Locke, take mathematical terms to refer to our mental states.
He could understand mathematical terms as he does terms like 'apple', as referring to a collection of particular experiences.
But instead of trying to provide an empiricist account of mathematics, Berkeley denies that there is any mathematical knowledge.
He does not deny that mathematical proofs are valid.
He denies that they have any real content.

> That the principles laid down by mathematicians are true, and their way of deduction from those principles clear and incontestible, we do not deny; but, we hold there may be certain erroneous maxims of greater extent than the object of mathematics, and for that reason not expressly mentioned, though tacitly supposed throughout the whole progress of that science; and that the ill effects of those secret unexamined errors are diffused through all the branches thereof. To be plain, we suspect the mathematicians are as well as other men concerned in the errors arising from the doctrine of abstract general ideas, and the existence of objects without the mind (*Principles*, §118).

The posits of mathematical objects, Berkeley argues, rely on the same process of abstraction which led us to the error of positing physical objects.
Thus Berkeley sees mathematics as useful, but mathematical terms as empty names, just like 'physical object', 'redness', and 'table'.
In both kinds of cases, standard beliefs are infected with the doctrine of abstract ideas.
In mathematics, the problems of abstraction are multiplied.
To take an important example, Berkeley thinks infinite divisibility is paradoxical.

> The *infinite* divisibility of *finite* extension, though it is not expressly laid down either as an axiom or theorem in the elements of that science, yet is throughout the same everywhere supposed and thought to have so inseparable and essential a connexion with the principles and demonstrations in geometry, that mathematicians never admit it into doubt, or make the least question of it. And, as this notion is the source from whence do spring all those amusing geometrical paradoxes which have such a direct repugnancy to the plain common sense of mankind, and are admitted with so much reluctance into a mind not yet debauched by learning; so it is the principal occasion of all that nice and extreme subtlety which renders the study of *mathematics* so difficult and

> tedious. Hence, if we can make it appear that no finite extension contains innumerable parts, or is infinitely divisible, it follows that we shall at once clear the science of geometry from a great number of difficulties and contradictions which have ever been esteemed a reproach to human reason, and withal make the attainment thereof a business of much less time and pains than it hitherto has been (*Principles* §123).

This example is important both because of Descartes's claim that matter is infinitely divisible and because the calculus of Newton and Leibniz depends on extensions of infinitely small length.

The basic problem that the calculus solves is to calculate, precisely, the area under a curve.
To do so, we divide a finite area into infinitely many infinitesimally-small segments, and add them up.
Thus, the calculus involves infinite divisibility.
The application of calculus to problems in the real world, to science, seems to carry with it support for Descartes's view that extension is infinitely divisible.

In contrast, from Berkeley's idealism and his claims that things are just objects of our perception, it is a short step to the claim that there is a smallest perceivable extension.
Despite the fact that the real world is just a world of ideas, it is not, for Berkeley, infinitely divisible.
Berkeley calls the smallest possible extension the *minimum sensibilia*; see his *Essay Toward a New Theory of Vision*.
To get a feel for its size, Berkeley estimated that the size of a full moon is about thirty *minima sensibilia*.
The *minimum sensibilia* functions as an atom in Berkeley's metaphysics.

According to Berkeley's account, then, there are limits to the divisibility of objects and their extensions.

> There is no such thing as the ten-thousandth part of an *inch*; but there is of a *mile* or *diameter of the earth*, which may be signified by that inch (*Principles* §127).

We might believe that we can divide an inch into ten thousand parts, because we can use it to represent a much larger segment, as on a map.
We can divide the 10,000 kilometers from here to Southern Chile into 10,000 kilometer-length segments.
But, on a small map, the inch or two between Clinton and Tierra del Fuego is not divisible into 10,000 parts.
To think that we can divide a finite segment into arbitrarily many segments violates the constraints of the *minimum sensibilia*.
If Berkeley is correct about infinite divisibility, the calculus, and all its benefits for empirical science, is based on a fundamental error.

## III. Berkeley on Science

The process of abstraction that Berkeley rejects serves not only to support our beliefs in mathematical claims, but also our knowledge of the laws of motion.
If we were convinced that these laws were universally valid, then we might infer that they are true.
If we think that we have knowledge of the laws of motion, and believe that our knowledge is justified by appeal to a process of abstraction, then we can argue for the legitimacy of that process.
Thus, it is important for Berkeley to block the inference by denying that laws of motion are veridical.

> Those who treat of mechanics employ certain abstract and general words, and imagine in bodies force, action, attraction, solicitation, etc., which are exceedingly useful for theories, enunciations, and computations concerning motion, although in actual truth and in bodies actually existing, they are sought in vain, as much as are those things imagined by mathematical abstraction (*On Motion*, §39, AW 506b).

Berkeley construes laws of nature as the regularities, or set rules, which guide our perceptions.

> We learn [laws of nature] by experience, which teaches us that such and such ideas are attended with such and such other ideas in the ordinary course of things (*Principles* §30, AW 453a).

These rules are useful, but they do not reveal the fundamental causal structure of the universe.
The only true causal ascriptions apply to God.
Thus, Berkeley separates two different aspects of scientific practice, which we have so far run together: laws of nature and laws of efficient causation.
Scientists seek to describe uniformities in nature.
When we find uniformities, we call them laws.
But, not all uniformities are laws.
If we discovered that every person in the room were an eldest child in a family of five, we would not think that we had discovered a law about people in the room.
A law has a predictive aspect.
We would not predict, on the basis of this uniformity, that the next person to enter the room is the eldest child in a family of five.
In contrast, we would predict that the next person to enter the room has a heart, and a brain, since those features of human beings are lawlike.
Ordinarily, we take the difference between lawlike and non-lawlike uniformities to be the presence of causal connections underlying those uniformities.
Berkeley denies that an understanding of the uniformities in nature leads to ascribing causal powers to any objects other than God.
Indeed, he calls gravity an occult phenomenon.

> Reason proves that there is some cause or principle of these phenomena, and this is generally called *gravity*. Since, however, the cause of the fall of heavy bodies is dark and unknown, gravity in that sense cannot be called a sensible quality; consequently, it is an occult quality. But we can scarcely conceive - and indeed not even scarcely - what an occult quality is, and how any quality can act or effect anything. It would be better then, if men would attend only to the sensible effects, putting the occult quality out of view. Abstract words - however useful they are in discussion - should be discarded in meditation, and the mind should be fixed on particular and concrete things, that is, on the things themselves (*On Motion*, §4, AW 504b-505a).

Thus Berkeley separates laws of nature, on the one hand, from laws of efficient causation, on the other.
We can know the laws of nature, insofar as we understand them to be uniformities in our perceptions.
But we can not know the causal connections, since they are not the objects of any perceptions.
We will return to skepticism about our knowledge of causation when we read Hume, who argues that causal connections are beyond our reach.
Berkeley anticipates Hume's concern, but believes that we can have knowledge of laws of nature, construed as regularities in our perceptions arising from God's goodness.

Taking the laws of nature to be mere regularities in our perceptions, and ascribing causation only to God, allows Berkeley to avoid committing to the universality of laws.
Nature is in many ways uniform, and this uniformity allows us to predict and control nature.
But Berkeley also leaves room for miracles, exceptions to the laws of nature.
He argues that both uniformity in nature and these miraculous blemishes support our belief in God's existence.

> If we attentively consider the constant regularity, order, and concatenation of natural things, the surprising magnificence, beauty, and perfection of the larger, and the exquisite contrivance of the smaller parts of creation, together with the exact harmony and correspondence of the whole, but above all the never-enough-admired laws of pain and pleasure, and the instincts or natural inclinations, appetites, and passions of animals; I say if we consider all these things, and at the same time attend to the meaning and import of the attributes One, Eternal, Infinitely Wise, Good, and Perfect, we shall clearly perceive that they belong to the aforesaid spirit, *who works all in all*, and *by whom all things consist* (*Principles*, §146).

> We should further consider that the very blemishes and defects of nature are not without their use, in that they make an agreeable sort of variety, and augment the beauty of the rest of the creation, as shades in a picture serve to set off the brighter and more enlightened parts... It is plain that the splendid profusion of natural things should not be interpreted weakness or prodigality in the agent who produces them, but rather be looked on as an argument of the riches of His power (*Principles*, §152).

The claim that both uniformity and irregularity each testify to the goodness of God is philosophically troubling.
If an hypothesis is supported by any evidence whatsoever, it seems like an empty hypothesis.

## IV. God, Me, and the Resemblance Hypothesis

To this point in our discussion of Berkeley's work, God has played a very small role.
The arguments against the primary/secondary distinction and abstract ideas do not depend on the existence of God.
Our appeals to God in interpreting Berkeley's work have mainly been limited to invoking an ultimate cause of our perceptions.
Insofar as we have circumscribed the role of God in Berkeley's work, we have taken Berkeley's writings to be philosophical rather than theological.
But, Berkeley was an Anglican bishop, and God does play a significant role in his world view.

Given Berkeley's strict empiricism, one might wonder how Berkeley could defend any knowledge of God.
We have no idea (or image or impression) of God.
Similarly, we have no ideas of our selves or of other persons.
Still, Berkeley allows for beliefs in the existence of our selves, other persons, and God, despite having no ideas of any of them.
Despite his opposition to Lockean abstraction and other psychological processes which would ground belief in the material world, Berkeley allows for some kinds of inferences beyond the evidence of our sense perception.
Let's start with our beliefs in the existence of other persons.

There is no universally accepted argument for the existence of other minds.
Berkeley claims that we can infer the existence of other minds from their effects on us.

> From what has been said, it is plain that we cannot know the existence of other spirits otherwise than by their operations, or the ideas by them excited in us. I perceive several motions, changes, and combinations of ideas, that inform me there are certain particular agents, like myself, which accompany them and concur in their production. Hence, the knowledge I have of other spirits is not immediate, as is the knowledge of my ideas; but depending on the intervention of ideas, by me referred to agents or spirits distinct from myself, as effects or concomitant signs (*Principles* §145).

The problem of other minds is perennially troubling, and nothing Berkeley says here resolves it.
How do we know that the things we call other people are not craftily constructed robots?
How do we know that the effects Berkeley mentions are really originating in a thinking thing?

Some philosophers say that every one's problem is no one's problem.
But the problem of other minds seems even worse for Berkeley than for most other philosophers because even our own existence appears to be a contentious inference.
Berkeley agrees that we have no idea of ourselves.

> A spirit is one simple, undivided, active being; as it perceives ideas it is called the *understanding*, and as it produces or otherwise operates about them it is called the *will*. Hence there can be no idea formed of a soul or spirit; for all ideas whatever, being passive and inert (see §25), they cannot represent unto us, by way of image or likeness, that which acts... The words *will*, *soul*, *spirit* do not stand for different ideas or, in truth, for any idea at all, but for something which is very different from ideas, and which, being an agent, cannot be like or represented by any idea whatsoever - though it must be admitted at the same time that we have some notion of soul, spirit, and the operations of the mind, such as willing, loving, hating, inasmuch as we know or understand the meaning of those words (*Principles* §27, AW 452b).

Berkeley thus distinguishes ideas, images, from notions, which can be conceptual (if not abstract).
Notions can be devised by inference, as Locke claimed that ideas of reflection were formed.
From such notions, we can infer the existence of other persons.

> In a large sense, indeed, we may be said to have an idea or rather a notion of *spirit*; that is, we understand the meaning of the word, otherwise we could not affirm or deny anything of it. Moreover, as we conceive the ideas that are in the minds of other spirits by means of our own, which we suppose to be resemblances of them; so we know other spirits by means of our own soul, which in that sense is the image or idea of them; it having a like respect to other spirits that blueness or heat by me perceived has to those ideas perceived by another (*Principles* §140).

Notice that Berkeley is accepting a modified version of the resemblance hypothesis, one that is different from the one that Descartes rejected and Locke partially accepted.
Locke used the resemblance hypothesis as support for his claim that material objects cause our ideas.
Obviously, Berkeley does not follow Locke in this way.

Consider two different refinements of the resemblance hypothesis.

> RH1. My ideas resemble material objects.
> RH2. My ideas resemble their causes.

Berkeley rejects RH1, but accepts RH2.
Ideas can only resemble other ideas.

> But, you say, though the ideas themselves do not exist without the mind, yet there may be things like them of which they are copies or resemblances, which things exist without the mind in an unthinking substance. I answer, an idea can be like nothing but an idea; a color or figure can be like nothing but another color or figure (*Principles*, §8, AW 448b).

So, my ideas resemble, we presume, the ideas in the minds of other persons.
And, they resemble their causes, which are ideas in the mind of God.
Indeed, it is from the need to infer a cause of my ideas that we can infer the existence of God.

> When in broad daylight I open my eyes, it is not in my power to choose whether I shall see or not, or to determine what particular objects shall present themselves to my view; and so likewise as to the hearing and other senses - the ideas imprinted on them are not creatures of my will. There is, therefore, some other will or spirit that produces them (*Principles* §29, AW 453a).

Similarly, the long passage about the beauty of the world in the Second Dialogue (AW 476a-b) is intended as a premise in an inference to the existence of God.

> *Philonous*: Men commonly believe that all things are known or perceived by God because they believe the being of a God, whereas I, on the other side, immediately and necessarily conclude the being of a God because all sensible things must be perceived by him (Second Dialogue, AW 477a).

Berkeley thus claims that we can know of our selves, other persons, and God, despite having no ideas of the objects of our knowledge.

> A human spirit or person is not perceived by sense, as not being an idea; when therefore we see the color, size, figure, and motions of a man, we perceive only certain sensations or ideas excited in our own minds; and these being exhibited to our view in sundry distinct collections, serve to mark out unto us the existence of finite and created spirits like ourselves. Hence it is plain we do not see a man, if by *man* is meant that which lives, moves, perceives, and thinks as we do, but only such a certain collection of ideas as directs us to think there is a distinct principle of thought and motion, like to ourselves, accompanying and represented by it. And after the same manner we see God; all the difference is that, whereas some one finite and narrow assemblage of ideas denotes a particular human mind, whithersoever we direct our view, we do at all times and in all places perceive manifest tokens of the divinity: everything we see, hear, feel, or anywise perceive by sense, being a sign or effect of the power of God; as is our perception of those very motions which are produced by men (*Principles* §148).

Our ability to infer affords us knowledge of the existence of God.
Yet, according to Berkeley, inference cannot yield knowledge of a material world.

One might reasonably worry that Berkeley chooses arbitrarily between legitimate and illegitimate invocations of an ability to infer.
If we can infer our selves, other persons, and God, why can't we infer material objects or abstract ideas?
I'll put this question aside to return to a methodological concern with which we began.
Locke, seeing the limits of sense experience to yield knowledge, accepted some skepticism, some humility.
Berkeley prefers to reject Locke's materialism to combat skepticism and what he sees as a consequent atheism.

## V. Avoiding Skepticism and Atheism

Berkeley's central concerns are to combat the atheism and skepticism which he thinks arises from materialism, and the materialistic side of dualism.

> For, as we have shown the doctrine of matter or corporeal substance to have been the main pillar and support of *skepticism*, so likewise upon the same foundation have been raised all the impious schemes of *atheism* and irreligion. Nay, so great a difficulty has it been thought to conceive matter produced out of nothing, that the most celebrated among the ancient philosophers, even of those who maintained the being of a God, have thought matter to be uncreated and co-eternal with Him. How great a friend material substance has been to *atheists* in all ages were needless to relate. All their monstrous systems have so visible and necessary a dependence on it that, when this corner-stone is once removed, the whole fabric cannot choose but fall to the ground, insomuch that it is no longer worth while to bestow a particular consideration on the absurdities of every wretched sect of *atheists* (*Principles*, §92).

Berkeley argues that materialism posits a world which is independent of God.
If our sensations depend on a world of objects, we at best push God out of our explanations, and at worst dismiss God from our natural science.
Berkeley thus sees natural-scientific explanations as evidence of atheism.

Berkeley also argues that materialism entails that we do not experience the objects in themselves.
We can not get out of our minds into those objects, so we are forced into skepticism.
All the properties we experience are sensible, and so in us.
If we posit matter in addition, we can have no knowledge of it.
This is the problem I mentioned at the beginning of the first set of notes on Berkeley.

> So long as men thought that real things subsisted without the mind, and that their knowledge was only so far forth *real* as it was conformable to *real things*, it follows they could not be certain they had any real knowledge at all. For how can it be known that the things which are perceived are conformable to those which are not perceived, or exist without the mind? (*Principles* §86).

Skepticism and atheism are wrong, says Berkeley.
Thus, idealism is right.

VI. Persistence and Intersubjectivity

Locke and Descartes posit matter as the principle cause of our ideas.
This matter really has only the primary qualities as properties.
But on the materialist view, there is no yellow, no sweetness in external objects.
As applied to objects, terms for secondary qualities are mere names.

Berkeley interprets terms for secondary qualities as referring to our mental states.
The lemon is yellow, since I really have a yellow sensory experience.

> *Philonous*: That the colors are really in the tulip, which I see, is manifest. Neither can it be denied that this tulip may exist independent of your mind or mine; but that any immediate object of the senses, that is, any idea or combination of ideas, should exist in an unthinking substance or exterior to all minds, is in itself an evident contradiction (First Dialogue, AW 468b).

Berkeley's account solves the problem of error for our beliefs based on the senses, like Descartes's wax example and Locke's water experiment.
This is the problem that led both Descartes and Locke to reject the resemblance hypothesis for ideas of secondary qualities.
For Berkeley, there is no problem, since all ideas are independent, and since we need not ascribe contradictory properties to an external object.
For the wax, I have a yellow idea, and then a clear idea; I have a hot idea and then a cold idea; I smell an aroma, and then fail to smell it.
For the water experiment, I have two separate, independent ideas.
Since we need not ascribe these conflicting ideas to an external object, other than an infinite God, we find no contradiction.
So, the problems of error that motivated Descartes and Locke are obviated.
But Berkeley has a new set of problems.

One of Berkeley's new problems is the problem of intersubjectivity.
How do we account for different people having similar experiences?
Another problem is persistence.
How do we account for the fact that objects do not seem to go in and out of existence as we look at and away from them?

Berkeley posits God to ensure both intersubjectivity and persistence.
On a metaphoric level, our experiences are like peering into the mind of God.
The metaphor of peering into the mind of God can not be taken literally, though, since the same problem about experiencing sensations and not their causes arises here.

> Philosophers...should abstain from metaphors (*On Motion*, §3, AW 504b).

Literally, an idea must subsist in some mind or other, if it is to persist.
Sensible things have to be perceived.

But it does not follow that they are frequently created and annihilated.

> For, though we hold indeed the objects of sense to be nothing else but ideas which cannot exist unperceived; yet we may not hence conclude they have no existence except only while they are perceived by us, since there may be some other spirit that perceives them though we do not. Wherever bodies are said to have no existence without the mind, I would not be understood to mean this or that particular mind, but all minds whatsoever. It does not therefore follow from the foregoing principles that bodies are annihilated and created every moment, or exist not at all during the intervals between our perception of them (*Principles*, §48).

Here's a helpful limerick concerning persistence; I do not know who wrote it.

> There was a young man who said, "God
> Must think it exceedingly odd
> When he finds that this tree
> Continues to be
> When there's no one about in the quad."
>
> "Dear sir, your confusion is odd.
> I am always about in the quad.
> And that's why this tree
> will continue to be
> Since observed by, yours faithfully, God."

In Berkeley's world, there are colors, sounds, and smells.
The apple is just how I experience it.

> The ideas imprinted on the senses by the author of nature are called *real things*; and those excited in the imagination, being less regular, vivid, and constant, are more properly termed *ideas*, or *images of things* which they copy and represent (*Principles* §33, AW 453b).

Berkeley's world, while not a material world, is not a world of imagination.
It is a real world of real ideas.
The drawback for Berkeley is that we are left with only our mental states.
Berkeley's world is purely psychological.

The big question for Berkeley is whether we can transcend our own mental states to refer to, or understand, a world external to us, even if it is not a physical world.
The solipsistic picture of Descartes returns.
Hume shows that the prospects are even worse for empiricism, even if we reject Berkeley's idealism.