Dryden and the new science

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Dryden and the new science

by

James D. Bateman

A Thesis Submitted to the
Graduate Faculty in Partial Fulfillment of
The Requirements for the Degree of
MASTER OF ARTS

Major: English

Signatures have been redacted for privacy

Iowa State University
Ames, Iowa
1975
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John Dryden's poetry demonstrates one of the major problems facing a seventeenth-century poet, the problem of finding authority for metaphor in an age which could ask for a language free from metaphor. A poet's work is not made easier when Thomas Sprat in his History of the Royal Society complains of "this vicious abundance of Phrase, this trick of Metaphors, this volubility of Tongue, which makes so great a noise in the World."¹ The attitude toward language reflected by Sprat is one of several developments resulting from the work of the new philosophers, or new scientists. Their work, which led to Newton's famous discoveries, successfully undermined the previously existing authorities for metaphor, especially those represented by the "Antients" and, eventually, those represented by the Bible. Still, Dryden was able to write poetry, not by clinging exclusively to the old authorities, but by incorporating as well into his poetry, consciously or unconsciously, some of the ideas and methods of the new scientists. Chief among these new ideas were attitudes forced by an emphasis on a method of reasoning which involved both inductive and deductive thought and by an increased awareness of space and time. These need elaboration before we look at Dryden's poetry; while the new awareness of space and time and the inductive and deductive reasoning are often closely related, the two can be separated for purposes of explanation.

The new philosophy has two main branches: one is usually associated with Bacon and the other with the main stream of thinkers whose work led more directly to Newton. In his History, Sprat acknowledges the Society's
debt to the "new Philosopher" Bacon, "In whose Books there are everywhere scattered the best arguments, that can be produc'd for the defense of Experimental Philosophy" (p. 35). The Baconian method of discovering truth is that process which

derives axioms from the senses and particulars, rising by a gradual and unbroken ascent, so that it arrives at the most general axioms last of all.  

This kind of thinking appears in the Royal Society in the repeated emphasis on Experiment. In outlining the scientists' "Method of Inquiring," Sprat lays down, "as their Fundamental Law, that whenever they could possibly get to handle the Subject, the Experiment was ... performed by some of the Members themselves" (p. 83). And he says of this procedure that the scientists

have never affirm'd any thing, concerning the cause, till the trial was past; whereas, to do it before, is a most venomous thing in the making of Sciences: for whoever has fix'd on his Cause, before he has experimented; can hardly avoid fitting his Experiment, and his Observations, to his own Cause, which he had before imagin'd; rather than the Cause to the truth of the Experiment itself. (p. 103)

The Baconian approach is essentially inductive and, as a result, atomistic; a belief that experiment and observation will lead directly to truth assumes that the discrete objects one studies are real and independent. We see atomistic elements in Robert Boyle, for example, a Royal Society member quoted by E. A. Burtt as saying that the elements of experiments are "such corporeal agents, as do not appear either to work otherwise than by virtue of the motion, size, figure, and contrivance of their own parts." Burtt goes on to say that "These parts are ultimately reducible to atoms, equipped with primary qualities alone."  

Sprat argues for more experimentation in his age, which he claims
is filled with prophecies of plagues and public misery, prophecies Sprat does not believe constructive; he argues that the new science can help, for it is now the fittest season for Experiments to arise, to teach us a Wisdome, which springs from the depths of Knowledge, to shake off the shadows, and to scatter the mists, which fill the minds of men with a vain consternation. (p. 362)

Furthermore, in calling for the Church of England to support the new philosophy, Sprat explains that the "universal Disposition of the Age is bent upon a rational Religion." The Church, then, should "persist, as it has begun, to incourage Experiments, which will be to our Church as the British Oak is to our Empire, an ornament and defence to the soil wherein it is planted" (p. 374). Little does Sprat know that the Church will one day become ornamental as a result of his science.

As R. F. Jones points out, one implication of an experimental science using Baconian induction is that the received, traditional authority of the ancient philosophers is denied. To conduct experiments without assuming causes and to allow the mind to reason freely about the observations made is not possible if one holds strictly to the authority of, say, Aristotle in matters of science. Sprat's criticism of the ancient philosophers is rather direct: "they fix'd, and determin'd their judgements, on general conclusions too soon" (p. 30).

As noted earlier, the members of the Royal Society weren't guilty of generalizing "too soon," but they did generalize in a way different from (and perhaps more quickly than) Bacon's way. Alfred North Whitehead remarks that Bacon was more concerned with the qualitative than the quantitative aspects of science:
In this respect Bacon completely missed the tonality which lay behind the success of seventeenth century science. Science was becoming, and has remained, primarily quantitative. Search for measurable elements among your phenomena, and then search for relations between these measures of physical quantities. Bacon ignores this rule of science.5

We can now easily distinguish between the two groups of seventeenth-century philosophers: the strict Baconians are the nonmathematical philosophers, and the rest, whose views I will now discuss, are the mathematical philosophers.

The most essential elements of the mathematical philosophy can be found in the methods and assumptions of Galileo and Newton. As the outline of Galileo's method of discovering truth will suggest, many of the ideas which are given coherent expression in Newton were circulating before Newton was born. I use Newton here because he draws together several important elements of the new science. (The following explanation is simplified for convenience.)

The mathematical philosophers' approach to knowledge parallels the nonmathematicians' approach in that both use induction. But the mathematicians add deduction, which is at least as important for them as is induction. Galileo's three steps necessary for discovering truth—intuition or resolution, demonstration, and experiment—will serve as a useful outline:6

Facing the world of sensible experience, we isolate and examine as fully as possible a certain typical phenomenon, in order first to intuit those simple, absolute elements in terms of which the phenomenon can be most easily and completely translated into mathematical form; which amounts (putting the matter in another way) to a resolution of the sensed fact into such elements in quantitative combinations. Have we performed this step properly, we need the sensible facts no more; the elements thus reached are their real constituents,
and deductive demonstrations from them by pure mathematics (second
step) must always be true of similar instances of the phenomenon,
even though at times it should be impossible to confirm them empiri-
cally. . . . Then with the principles and truths thus acquired we can
proceed to more complex related phenomena and discover what additional
mathematical laws are there implicated. (Burtt, p. 81)

What we need to emphasize here are those phrases which tend to justify the
label mathematical: the elements are resolved into "quantitative combina-
tions," the "sensible facts" are dispensed with, and "pure mathematics"
becomes the realm of truth. The real materials of the universe are geo-
metric figures; truth is abstract, however empirical the process which
leads to truth.

Newton, too, was a strong empiricist, as Burtt argues with repeated
reference to Newton's own words (e.g., pp. 212ff.), but Newton also
believed in the validity of mathematical principles (e.g., pp. 209ff).
Newton was, as Burtt says, "the common heir of the two important and
fruitful movements in the preceding development of science, the empirical
and experimental as well as the deductive and mathematical" (p. 213). The
view we have from Burtt of Newton's experimental-mathematical method
readily reminds us of Galileo's method. Again, there are three steps:

First, the simplification of phenomena by experiments, so that
those characteristics of them that vary quantitatively, together
with the mode of their variation, may be seized and precisely
defined. . . . Second, the mathematical elaboration of such propo-
sitions, usually by the aid of the calculus, in such a way as will
express mathematically the operation of these principles in whatever
quantities or relations they might be found. Third, further exact
experiments must be made . . . .

(p. 221)

This combination of empiricism and mathematics leaves one in the awkward
situation of having to insist on the fundamental reality of "things"--
objects whose motion can be measured, identified in space and time—and on
the reality of abstraction. We must look to the reality of time and space before beginning a study of Dryden's poetry.

Burtt notes that "Since Newton nature came to be thought of by the modern mind as essentially a realm of masses, moving according to mathematical laws in space and time, under the influence of definite and dependable forces" (p. 239). Space and time, although commonly understood in practical, relative terms, exist, as Burtt tells us, as "absolute, true, and mathematical space and time. These are infinite, homogeneous, continuous entities, entirely independent of any sensible object or motion by which we try to measure them; time flowing equably from eternity to eternity; space existing all at once in infinite immovability" (pp. 247-48).

With space and time having become the absolutes necessary for measurement in mathematical philosophy, man was forced to think of the world's events as events measurable by this new space and time; moreover, he was soon compelled to doubt the authority of anything not measurable in these new terms and to doubt as well any other measurement. These doubts, plus the Baconian emphasis on the observation of discrete objects, must make him distrustful of metaphor (the atomism inherent in Baconian induction also contributes to the growing importance of local space and time); for the existence of space and time as central elements of the world denies ultimate authority to metaphors that rely on timeless, spaceless elements. The new philosophers denied the existence of a received truth in science, and, while dedicating their work to God and defending their work by claiming that it revealed more of the intricacies of God's world, they were at the same time separating God's authority
from the government of the natural world around them. These men were not working to establish the ultimate causes of events happening around them, but rather to show how things happened. Granted, the scientists assumed the existence of general truths, usually mathematical or geometric ones. Their awareness of and belief in those truths, however, was dependent not on a revelation of these truths, but on observation, experiment, and reason. The experimental methods laid down the rules for discovering truth. God, once the source of all external authority, in this scheme lost his prestigious position. Galileo made him a "geometrician in his creative labours" and a "First Efficient Cause or Creator of the atoms" (Burtt, pp. 82, 99). Hobbes argued that because an idea is always an image (which for him must be corporeal—a belief produced from an emphasis on the importance of matter moving in space), "we have no idea, no image of God" (Burtt, pp. 127-28). Burtt summarizes Henry More's awkward attempt to preserve God: "since every thing real is extended, God too, for More, must be an extended being" (p. 143). Whether God is written into this system as a creative geometrician or as a celestial mechanic isn't very important; in either capacity he is not superior to the physical rules of the universe. His creation is subject to those rules. We know that in 1615 Galileo was using laws of mechanical motion to interpret passages of Scripture, instead of using Scripture to provide the authority to interpret the physical world. 7

In the old order, explanations for natural phenomena were fitted into a larger order (usually a religious one) and thereby denied independent authority. In the chain of being, for example, the behavior, even the
existence of, the lion as the king of beasts meant that the condition of
kingship was already established in the higher world of man, whose author-
ity derived from the yet higher world of God. Any authority in the lion's
position came only from above—the lion is only a small example of some-
thing greater. Wherever correspondences existed among greater and lesser
things, the greater things, those nearer God, were the authority to which
the things of our world were referred. The exact measurements of science
weren't necessary in a universe that didn't place absolute value on the
world of our sense experience. More specifically, the rules of cause and
effect governing the motion of bodies, and the measurable elements associ-
ated with motion—space and time—were unimportant. The world was in
several ways timeless, or at least the significance of an event was not
determined by its place in a chronological sequence; neither was the
emphasis of the new science on exact spatial measurements part of the
old system.
Some of the differences between these world views can be seen in a comparison of Milton's *Lycidas* and Dryden's *Killigrew Ode*. While technically of different genres, the poems are similar in that each mourns the death of an acquaintance of the poet, praises that person, and offers hope of resurrection. Though both poems are structurally formal, the pastoral elegy also requires a conventional setting and such mythic involvement as the invocation of a Muse. A comparison of these two poems might even suggest that Dryden would not have been able to write a pastoral elegy that strictly followed the conventions used in *Lycidas*. The comparison will serve not only to identify the old and new world views, but also to show Dryden's reliance on the newer view in his emphasis on the importance of local space and time to establish authority in his poem.

Following that comparison, I hope to show that the emphasis on rationalism in *Religio Laici*, though traditional in places, shows a tendency to accept rationalist developments in the new science, an acceptance that is perhaps more significant because it appears in a poem about religion, a poem where one would not so readily expect the incursions of the new science. But more important in relation to the new science are Dryden's verse epistles, which I will discuss as that portion of Dryden's poetry having both the emphasis on local time and space seen in the *Killigrew Ode* and the emphasis on reason found in *Religio Laici*.

Looking at *Lycidas* and the *Killigrew Ode*, we see that the world of the latter is more local, more tangible—solid enough to appear in a history or geography text. What is true of place is also true of time,
character, and action in the Killigrew Ode. The questions "When is this happening?" "Who is involved?" and "What is happening?" can be given more limited answers when asked about the Killigrew Ode than when asked about *Lycidas*. The necessity for more limited answers parallels the new scientists' requirement that they have the materials of experiments before them for first-hand observation; implied in the limited world of the Killigrew Ode is the poet's ability to see for himself (or for others of this world to see with their own eyes) the literal truth of the poem.

Let us begin with "Who?" by looking at the titles. Milton's title does not identify a seventeenth-century person, but the name of a shepherd that starts us thinking not of one shepherd, but of all earlier pastoral figures. Both titles are specific in that they give us names, but the range of meanings for "Lycidas" is far greater than that for "Anne Killigrew." There are no details in *Lycidas* that prohibit simultaneous operation of the different meanings of the name.

The other characters in *Lycidas* do not belong to the seventeenth century either; in fact, some do not belong to this world, although they are "real" characters within the poem. There are Satyrs, Fauns, "Sisters of the sacred well," Nymphs, and emotion-showing plants, to name only a few. Dryden, on the other hand, does not present muses or call on their aid; he brings them to our minds only by referring to himself as a "mortal Muse" (l. 16). The Anne Killigrew he sings about is real and the poet's presentation of her surveys her human qualities and her life on the earth, as a list of the subjects of several stanzas suggests. We learn of her father (II), her birth (III), her position in (or above) seventeenth-
century poetry (IV), her virtues (V), her painting (VI, VII), her death (VIII), her brother (IX).

Killigrew's "warlike brother on the seas," for example, was an Englisher—a real person in a real place; there are no signs to suggest that we read "brother on the seas" as a Biblical or classical figure. The Orinda (l. 62) who died of smallpox, as did Killigrew, was also Killigrew's contemporary. There are other emphases on linear time: Anne Killigrew's brother is on the seas in the "Meantime" and he will be home "too soon"; the narrator's attack on "this lubric and adult'rate age" (l. 63) also pinpoints time. The limits of space and time appear to be violated when the narrator claims that Killigrew was "Born to the spacious empire of the Nine" (l. 68). But we can only flirt with the other-world because a dozen images of local, human politics return us to earth.

In several stanzas there is a suggestion of a world not bound by the time and place of this world, but these suggestions are just that—suggestions; for the poet, like the scientist of his age, must rely on what he can experience and measure if he is to speak with authority. Moreover, these suggestions are made with images which focus our attention on this world and on the separation of this world and an other-world, which we can tentatively call Heaven.

In Stanza III, for example, the poet hesitates to claim that this world and the other-world have common interests or that the other-world is necessarily involved with this world. In the old world view, the interests of earth and Heaven were the same. To answer the question "May we presume to say that at thy birth / New joy was sprung in Heav'n as well
as here on earth?" the narrator explains that "For sure the milder planets
did combine" and "ev'n the most malicious were in trine" on the occasion
of Anne Killigrew's birth, but he does not affirm without the reservation
implied in the opening question that her birth was the occasion for the
planets' moving to combination; granted, the planets did combine, but the
poet's questioning whether joy necessarily resulted from Anne Killigrew's
birth even when he sees the planets combine is a questioning of the old
world view. Traditionally, the intimate relationship between the two
worlds meant that each world participated in the activities of the other;
in fact, they were not two worlds at all, but earthly and Heavenly mani-
festations of God's world. That the worlds of Stanzas III are two distinct
places is further suggested by the contrast of "people of the sky" and
"holiday above" with "one earth" and "mortal ears." In the old world
view, a physical separation was often a barrier overcome with the system
of correspondences, and a metaphor valid in one time or place would have
equal authority in another. There is a suggestion that such is not the
case here when the image of the bees swarming around Plato's mouth is
brought to us only indirectly. The metaphorical assertion that Anne Killi-
grew is another Plato is not present; one presumes that Dryden would have
us make that connection, but he does not insist on it himself in the poem.

The authority for Milton's metaphors rests on a broader, more uni-
versal base than Dryden's. Milton does not use indirection to bring into
the poem "un-real" elements which suggest how universally Lycidas' influ-
ence was felt. The music accompanying the two shepherds (Lycidas and the
narrator) attracted Satyrs, Fauns, and "old Damonetas" (ll. 32-36). The
death of Lycidas affects all of creation, and it is the death of the created world. The relationship of the rose-killing canker, parasitic worms, and killing frost to the loss of Lycidas' music is not expressed in a simile.

There are two passages where Milton and Dryden use the same general image in different ways which should further emphasize the point here. The narrator in Lycidas addresses Mincius and the "fountain Arethuse" (ll. 84-85); Arethuse exists within the poem. Dryden's narrator (who, incidentally, is more easily called "Dryden" than the Lycidas narrator is called "Milton") refers to Anne Killigrew's "Arethusan streams" (l. 68). The shift from noun to adjective significantly moves Arethuse from character to quality, from god to god-like. Similarly, the Lycidas narrator speaks of the poet's hope "to burst out into sudden blaze" (l. 74); Killigrew, born too long after the pentecostal flame, can be only "like a ball of fire" (l. 143). The shift is from metaphor to simile, from identity to similitude.

Perhaps the best example of Dryden's indirectness in imaging the combined this-world and other-world which we are given directly in Lycidas is the description of Killigrew's landscape painting (ll. 108-26). The passage recreates in words the pastoral scenes that Anne Killigrew created on canvas. Thus, the narrative remains "true" and free of mythic figures while simultaneously suggesting images of nymphs and satyrs in the woods and images of Roman and Grecian ruins. To see these things in the Killigrew Odes with the power they have accumulated through use requires the reader to make abstract connections; in Lycidas, these connections are provided and, therefore, the mythic references appear with more authority.
than those in the Killigrew Ode. Dryden repeatedly reminds us of the physical world and uses contemporary places and events to image the other-worldly. There are exceptions of a special kind to this statement—passages and images in Dryden that do depend directly on connections with the other-worldly, connections that are provided in the poem. These are unique because their other-world is Heaven. Before we consider these Biblical images, we should consider that which logically precedes an ascent to Heaven—Death. But there really isn't much to talk about unless we repeat that Anne Killigrew died of smallpox. There is no one corresponding to "sage Hippodates" or "Camus, reverend sire" or the "Pilot of the Galilean Lake" to claim ignorance or knowledge of reason or justification for death. Why? Because no one asked. Death is a given that goes unquestioned; there is no parallel in the Killigrew Ode to the death and resurrection in Lycidas. Milton images a universal death and resurrection when he combines death in nature—the setting sun—with a death symbolic of religious death and purification—human death and rebirth in water, a death and rebirth which suggest Jonah's descent into the whale, Jesus' ability to calm the water, and baptism. The resurrection in the Killigrew Ode is much more limited; while a general resurrection is implied, the only resurrection referred to directly is that of the "sacred poets" who "foremost from the tomb shall bound," and specifically that of Anne Killigrew. Generally, though, there is little attempt by Dryden to speak explicitly on religious matters. (He could, for example, have reminded us of Jesus healing the sick, especially Lazarus.)

For the dead Anne Killigrew the earth we are familiar with still
exists: "In earth the much lamented virgin lies!" (l. 152). The pictures of the dead are vivid: "rattling bones," "sinews o'er the skeletons," "cloth'd with flesh" (st. X). We are reminded of time in three phrases introduced by "when." But we move out of seventeenth-century England to the Valley of Jehosaphat where "The judging God shall close the book of fate." The resurrection, while presented in images not limited to this physical world, draws only on the Christian mythology, and the upward movement is contained. Killigrew is moving from a specific place, the tomb, to a place "before the choir." We can look back to the preceding stanza, where we learned that if any star is brighter than the rest, it is Anne Killigrew. She is a star, not all stars or all light. Lycidas becomes the "genius of the shore," but that shore is one where "all that wander in that perilous flood" (l. 185) can seek help; Lycidas is both the provider of help and help itself. He provides aid not in one place, but in all places.

The upward movement ending the Killigrew Ode irresistibly pushes us up with "bound," "lightest ground," "on the wing," "like mounting larks" (again, a simile), and "before . . . shalt go." We go up with the "sacred poets," who "first shall hear the sound." The one poet, Anne Killigrew, can be the "harbinger of Heav'n" not because she participates in a universal harmony, but because, as we are once more reminded of this world, of what she "so well hast learn'd below."

Determining what elements of the new science are present in Dryden's religious poetry is more difficult, and we must remember that in his works not dealing directly with religious problems, in spite of some
parallels to the new science, Dryden was not moving away from the church—he was a religious man. It is more accurate to say that in Dryden's religious poetry there are efforts to incorporate into his religious thought some of the new understandings coming from the new science. This can be most readily seen in *Religio Laici*, written before Dryden's conversion to Catholicism and before most of the verse epistles (with the one to Charleton the important exception).

Although the discussion of the uses of reason in religion is the focal point of the poem (and my primary interest here), we should note first of all that the framework of the poem reminds us of the boundaries of local time and space as the boundaries that contain the real world. The narrator is a traveller following the path to salvation and is indirectly a guide as he reports to us his experiences along the path, experiences of this world. As one might expect from the title, the poem is usually first-person plural. The poem is delivered on the authority of one man, who claims that his "rugged verse" is "fittest for discourse and nearest prose"; it is the language of argument. In a poem that argues against the ultimate authority of tradition (and a poem not delivered with the aid of a Muse), some of the poet's authority must rest on his authority as an observer. *Religio Laici* is a poem that reveals what its narrator has discovered in following his path; the poem reveals discovered facts. The poem is as much a statement of "how I came to believe what I do" as "here is what I believe." A phrase such as "If on the Book itself we cast our view" shows the narrator in his role of guide. More important is the first-person singular digression to Father Simon's translator:
Thus far my charity this path has tried
(A much unskilful, but well meaning guide);
Yet what they are, ev'n these crude thoughts were bred
By reading that which better thou hast read.  
(11. 224-27)

This is plainly the narrator saying "Here is how I gathered my evidence."
And later, when he asks permission to speak plainly, "Shall I speak plain
and, in a nation free, / Assume an honest layman's liberty?" (11. 316-17),
the narrator again reveals the process by which he came by his knowledge.
The emphasis, again, is on how, an emphasis that reinforces the importance
of a methodology that insists on observation and measurement.

What the narrator learns, and communicates, about reason and religion
is partly traditional and partly new. We have already outlined the newer
view of rationalism that was a part of seventeenth-century science, but
we need here a brief summary of the rationalism which preceded it. Alfred
North Whitehead has called the rationalism of the later Middle Ages "the
belief that the avenue to truth was predominantly through a metaphysical
analysis of the nature of things, which would thereby determine how things
acted and functioned " (p. 39). In Herschel Beker's words, scholastic
rationalism "construed God, His works, and the operations of the human
mind as all exemplifying the essentially rational order of the universe";
for the scholastics, "the realm of nature is to be understood by those
allegedly a priori ideas of order and reason and purpose."

In Religio Laici, this traditional view is found in Dryden's belief
that God's revelation to man is the source of our knowledge, and that
faith is the sufficient and necessary means to know God's truth. He
defends the authority of Scripture against the oral tradition of Catholi-
cism, saying that
... the Scriptures, though not everywhere
Free from corruption, or entire, or clear,
Are uncorrupt, sufficient, clear, entire
In all things which our needful faith require.  (ll. 297-300)

Dryden also defends the private individual's interpretation of the Bible:

If others in the same glass better see
'Tis for themselves they look, but not for me:
For MY salvation must its doom receive
Not from what OTHERS, but what I believe.  (ll. 301-304)

Without denying the authority of man's reasoning, Dryden does discourage
letting private reason disturb earthly harmony:

And after hearing what our Church can say,
If still our reason runs another way,
That private reason 'tis more just to curb
Than by disputes the public peace disturb.  (ll. 445-448)

The function of reason is central here. For Galileo and Newton, once
the empirical data were collected, reason was used to determine what
general truths the data pointed to. In the opening lines of Religio,
the function of the reason is limited to that of a guide: "... reason's
glimmering ray / Was lent not to assure our doubtful way / But guide us
upward to a better day" (ll. 5-7). Some have been able to approach
religious truth with a basically inductive reasoning, "have been led /
From cause to cause to nature's secret head / And found that one first
principle must be" (ll. 12-14). But what that principle was even Ars-
totle and Epicurus were unable to determine by reason alone. Dryden
attacks directly those who would try by reason without revelation to know
God, and he recognizes the limitations placed on God if God can be known
by the unaided reasoning mind. To know God by the use of reason would be
to place him in a system, to know him as a geometer or a mechanic. The
reason must have limits:
How can the less the greater comprehend?
Or finite reason reach infinity?
For what cou'd fathom GOD were more than he.  

The poem both defends and attacks the use of reason; what Dryden is criticizing are some of the claims made for reason's authority in religious matters. Dryden denounces that man who "by his own strength to Heaven wou'd soar":

Vain, wretched creature, how art thou misled
To think thy wit these God-like notions bred!
These truths are not the product of thy mind
But dropp'd from Heaven and of a nobler kind.
Reveal'd religion first inform'd thy sight,
And reason saw not till faith sprung the light.  

The error is in using reason to create truths, the "product of thy mind."

Even in the acceptance of revealed religion as an authority superior to reason there is a parallel to the new science: religious truth, as well as mathematical truth, exists independently of reason's capacity to discover that truth. In this, of course, the mathematical philosophers are not modifying what has been taught by religion for centuries, that there are truths not known to man. But the new science implies that all truths about the world can be known, an implication that, if pursued, leads to the destruction of religious mystery. Even though mathematical truth exists independently of man's knowing it, the scientist can find that truth systematically: he collects his data, puts the facts together to find his truth, and checks that truth by comparison with the world around him. In Religion, there is a movement toward accepting this position in an argument for the Bible's authority:

If on the Book itself we cast our view,
Concurrent heathens prove the story true;
The doctrine, miracles, which must convince,
For Heav'n in them appeals to human sense;
And though they prove not, they confirm the cause,
When what is taught agrees with nature's laws.  
(ll. 146-51)

In the absence of Scripture, heathens have by their "human sense" proved true the Biblical story, put it together in a general way. They are not the originators of that truth, for Heaven made it available to them through their senses. And, as in science, where the experience leading to some mathematical truth doesn't prove, but confirms man's knowledge of the law, the heathens' experience confirms the truths existing in the Bible.

There are similar implications in the passage where Dryden discusses those "men of wit" who aren't born to believe "in gross." These are men who

Must study well the sacred page and see
Which doctrine, this, or that, does best agree
With the whole tenor of the work divine,
And plainliest points to Heav'n's reveal'd design;
Which exposition flows from genuine sense,
And which is forc'd by wit and eloquence.  
(ll. 328-33)

Again, this is largely traditional: reason is being used to determine which interpretations of Scripture are most in simple harmony with the whole of God's plan. The emphasis on simplicity, though long used by ancient and medieval scientists (see Burtt, pp. 39ff.), was still valid for Dryden's contemporaries in science (Burtt cites that principle as one of the major appeals in Copernicus' interpretation of the motion of heavenly bodies), and that emphasis helped smooth the transition from traditional to more contemporary views. These "men of wit" must study the evidence before them—"the sacred page"—and compare it with the larger, known
truths already established in the Bible. The process of discovery here closely parallels Galileo's three-step method. The evidence used initially is the word of the Bible; from this the "whole tenor" is determined; the general truth, the whole tenor, is used to discover meaning in the more obscure passages in the text.

The poet as a discoverer of truth is presented often in Dryden's verse epistles, as well; in these, Dryden does not pose as a conveyor of truths revealed to him, a recorder of his inspirations, but he shows how he came to discover the truth or truths revealed in the poems. The epistles include not only the truths but the process by which one knows those truths. The discovery and communication of these truths depends, then, on the inductive-deductive method of reasoning used by Galileo and Newton and on a recognition of things local and contemporary as the authority for metaphor.

The epistles to Charleton, Roscommon, Congreve, and Kneller have as common elements empirical arguments in the form of progress pieces—historical developments of science, verse, English drama, and painting; and, with varying complexity, these epistles each present a fusion of separate sources of authority and power in this world, a fusion that parallels the process in science of synthesizing known truths to test other data and to establish the existence of additional truths.

The emphasis on chronological, historical development in progress pieces parallels the respect of the new science for linear time, a respect that reminds us of the lost authority of those powers that once transcended time, that had an authority that moved vertically without regard
for the sequences of linear time. Also implied in the progress piece, at least in Dryden's, is the belief that man is capable of improving himself, that he and the world are not deteriorating, a belief that denies the ancient authorities some of their former importance. The "doctrine of deterioration," according to Herschel Baker, is part of the traditional view of the world; the specific application of this doctrine to literature is especially important here. Baker writes:

One of its most persistent corollaries was that of literary authoritarianism. The doctrine of imitation was indispensable for critical theorists of the Renaissance: since the first writers were the best, subsequent literature has represented a steady decline, and a modern's safest strategy is to imitate the mighty dead. Dryden's critical relativism was a powerful challenge a century later . . . . (p. 69, n. 90)

The progress pieces in these poems lead us step-by-step through the development of whatever art or science to the present and to the establishment of an authority that is built by the accumulation of data in the progress piece. The old saying that the whole is greater than the sum of its parts seems to apply here; when one puts together all the observed facts (the individual observations necessary for induction; the separate elements of a progress piece), he is able to discover a greater truth. But the process does not end here, as we will see in the epistle to Charleton, where the authority established in one area is joined to that of another.

The epistle to Charleton, because it deals specifically with developments in science, deserves first and special attention. It begins with an attack on the "tyranny" of Aristotle and on our ancestors who "betray'd / Their free-born reason to the Stagirite" (ll. 1-3). Columbus' discovery,
however accidental, provided empirical evidence to challenge the authority of Aristotle, and, according to the poem, "Columbus was the first that shook his [Aristotle's] throne" (l. 9). Columbus made it possible for more people to admire "the stars that shine in southern skies," which otherwise "Had been admir'd by none but savage eyes" (ll. 19-20). The details, though general, refer to times and places of this earth. We see measurement in the reference to the "western seas" and our "utmost bound" (l. 17) before Columbus, and in the statement that Charleton's fame is "not circumscrib'd with English ground" (l. 34).

The British "assertors of free reason's claim," presented with a partial list of their accomplishments, form an empirical argument for the validity of free reason. Moreover, Bacon, Gilbert, Harvey, and Boyle are strongly empirical philosophers (Burtt, pp. 162-202). Dr. Charleton is both the completion of the list and the result of it. Dryden moves from the authority established on the preceding names to praise Charleton, whose works "unite and still discover more" of "Whatever truths have been by art or chance / Redeem'd from error or from ignorance" (ll. 40, 37-38). Dryden is praising here the processes and accomplishments of science, and his presentation of that praise parallels the scientist's presentation of his material.

This praise leads, as Earl R. Wasserman has demonstrated, to a celebration of the Stuart reign. The scientist's authority and research have given him political authority: "STONEHENGE, once thought a temple, you have found / A throne, where kings, our earthly gods, were crown'd" (ll. 47-48). That Stonehenge is a throne is one of those truths dis-
covered by Charleton, or so it was thought to be then. This process is similar to the third step outlined by Galileo; the truths united are used to discover truths in more complex phenomena. The last couplet insists on the parallel development of science and politics: before Charleton's work, Charles II's refuge "then was for a temple shown, / But, he restor'd, 'tis now become a throne" (ll. 57-58). Moreover, the argument of the poem outlines a rough chronology as the authority of Charleton is developed. The poem begins with Aristotle and our ancestors, moves to the more recent past of Columbus, then to the list of British scientists already well-known in the seventeenth century, and then specifically to Charleton.

As in the epistle to Charleton, the progress pieces in the other epistles are inductive arguments. In the epistle "To the Earl of Roscommon," we are moved from the origins of verse, "Whether the fruitful Nile or Tyrian shore" (l. 1), through Greece and Rome, and down to the seventeenth century where "Britain last / In manly sweetness all the rest surpass'd" (ll. 24-25). The characteristics that improve poetry are cumulative, the evidence empirical: "The Grecians added verse," Rome "brought Grecian numbers home," "barb'rous nations" debased verse to rhyme, Italy improved it "With pauses, cadence, and well-vowell'd words," etc. (ll. 1-25).

Congreve's authority and reputation are developed through a progress piece of English drama. The epistle to Congreve introduces him as a fulfillment in time of the potential of English verse: "the promis'd hour is come at last; / The present age of wit obscures the past" (ll. 1-2). Dryden praises Congreve by combining in the poem various talents of other
dramatists, Jonson and Fletcher

... both to Congreve justly shall submit,
One match'd in judgment, both o'ermatch'd in wit.
In him all beauties of this age we see:
Etherege his courtship, Southerne's purity,
The satire, wit, and strength of Manly Wycherly."

(The same pattern is followed in the brief poem "On Milton"; instead of claiming that the poet's power is given to him by, for example, the Muses, Dryden presents that power as one built up in increments. This accumulation of material is presented to us by a narrator reporting facts relatively free of embellishment. The two people superior in particular areas who join to make Milton are Homer, first in "loftiness of thought," and Virgil, in "majesty." After producing Homer and Virgil, though, "The force of Nature cou'd no farther go: / To make a third she join'd the former two." In this poem, too, the present is not subordinated to the past.)

The progress piece of painting in the epistle to Sir Godfrey Kneller, which culminates in an awareness of perspective, certainly doesn't claim that the oldest examples of the art are best, that all since the first is in decline. We had only the "rudiments" at first, for the "rude original"; "By slow degrees the godlike art advanc'd," and so on (ll. 28, 31, 35). Before the perfection of the techniques of perspective painting, "perspective was lame, no distance true, / But all came forward in one common view" (ll. 39-40); in other words, if the distance were "true," if painting more "accurately," more photographically, reproduced the immediate world of our sense experiences, the painting would somehow be better. The emphasis on the life-like qualities of Kneller's work suggests that the artist is obliged to a degree to duplicate what he sees around him.
in nature. Moreover, the criticism of this "one common view" stresses the importance of physical limits: "No point of light was known, no bounds of art" (l. 41; my emphasis).

The fusion of separately developed powers presented in the epistles, though clear enough in the one to Charleton, is more fully developed in the epistle to Roscommon. The fusion in both, as well as that in the one to Congreve, joins political authority to some other authority. The fullest, final development in the progression of verse outlined for Roscommon is Roscommon's work. Not simply another accomplishment to be added to the list, Roscommon's translations incorporate that which is good in the previous works, so that "The wit of Greece, the gravity of Rome / Appear exalted in the British loom" (ll. 26–27). We should note too that science and art were united early in the poem when the separate "seeds of arts and infant science" became one "noble plant" (ll. 2–3).

Roscommon's power in politics is similarly developed in the poem. He derives from "conquering ancestors," Ireland and England may fight to claim him, and Roscommon the artist is compared to "Great gen' rals . . . descending from command" (ll. 47–57). Roscommon's stature is raised in the poem by the joining of his military and artistic abilities with images from both areas:

Roscommon, whom both court and camps commend, 
True to his prince and faithful to his friend; 
Roscommon, first in fields of honour known, 
First in the peaceful triumphs of the gown, 
He both Minervas justly makes his own. (ll. 68–72)

"Peaceful triumphs of the gown" moves toward a synthesis of the two areas represented by "both Minervas." Because Roscommon "both Minervas justly
makes his own" we know that some of his authority is developed from his own person, not bestowed on him as a gift. (We should note a technique in this poem similar to one in the Killigrew Ode: instead of directly linking Roscommon and Homer with metaphor—calling Roscommon "Homer"—Dryden invites comparison only indirectly by pointing out similarities in circumstances of their lives. In the Killigrew Ode, Anne Killigrew is not directly given the qualities that Dryden claims her painting bestows on the queen, but one infers that the good qualities apply equally to Killigrew.)

Roughly paralleling the rise from Jonson and Fletcher to Congreve in the epistle to Congreve is the development of political power in England. That development begins early in the poem, and it is characteristically historical as the union of literary and political authority begins: "Strong were our sires, and as they fought they writ, / Conqu'ring with force of arms and dint of wit"; "when Charles return'd" the "empire stood" (ll. 3-6). Dryden doesn't depend directly on a belief in the divine right of kings to establish political authority in the poem; the closest he comes to using that belief here is in the Biblical reference "Theirs was the giant race before the flood." Although Dryden's empirical development of political authority is obviously limited, it necessarily precedes the metaphor of royal and literary succession (ll. 42-48). Poetic and political authorities work together; the metaphor is valid because the authority of each is independently developed. The most concise example of this united authority is in the image of Congreve "High on the throne of wit" (l. 53).
It is not necessary to detail the developments that arose separately to produce Kneller's art, but only to point to the union itself in the epistle to Kneller. Near the end of the progression before Kneller—a progression that also shows parallels between the sister arts of painting and poetry—came the "Roman and the Lombard line, / One colour'd best, and one did best design" (ll. 61-62). Addressing Kneller, Dryden writes, "Thy genius gives thee both, where true design,/Postures unforc'd, and lively colours join" (ll. 65-66). Dryden's summary is good: "Of various parts a perfect whole is wrought" (l. 71).

The epistle to Kneller is important not only for those reasons that the other epistles discussed here are important, but also because of the comments it offers on art and the creative process. We have already seen Kneller praised for his life-like paintings, and we are told that because of Kneller's skill, "Nature seems obedient to his will" (l. 8). Although this is traditional insofar as it places man above other things in the world around him, the influence of the new science is seen here in the removal of man from the world of nature—he is separate from it, no longer holding a relatively high position in the system. In comparing painting and poetry, Dryden, addressing Kneller, claims that

Thou paint'st as we describe, improving still,  
When on wild nature we engrat our skill,  
But not creating beauties at our will.  

Nature is "wild," and the artist is able to exercise some control over it. In fact, he appears able to improve on it in his representation:

Likeness appears in every lineament,  
But likeness in thy work is eloquent;  
Though Nature there her true resemblance bears,  
A nobler beauty in thy piece appears.  

(11. 106-09)
Nature is losing its spiritual authority, losing its capacity to manifest the beauty of God's creation; that power is being usurped by the artist. Near the end of the poem, Dryden goes so far as to claim that artists are those "who life bestow" (l. 154). Man is taking over God's position— that of creator; in this poem the emphasis is not on praising God's creation, the harmony of the universe—things we see in Lycidas—but on man and his art separated from the universe around him. Any celebration in the poem moves toward man celebrating his own creative works, not God's creation; for to have a celebration, one must be a part of that which he is celebrating. Even if we admit some hyperbole on Dryden's part, his praise of Kneller in the couplet "Rich in thyself, and of thyself divine, / All pilgrims come and offer at thy shrine" (ll. 102-103) is a celebration neither of God nor nature, but of man.

This celebration of man (here as well as in the other epistles, the Killigrew Ode, Eleonora) by reference to his position and achievements here on earth is consistent with what we know of the new science. With God in effect written out of the universe, or at least considerably reduced from his former position, and the world around us reduced to particles in motion, man must either submit himself to the same kind of observation he has deemed appropriate for the physical world—that is, consider himself an organism composed of moving parts subject to the same mechanical laws discovered to control the rest of the universe—or elevate his mind to a position where it can observe and comment on the goings-on around him.

The foregoing argument is hardly sufficient to show Dryden an apologist for the new science—that he does not claim to be. Nor would
he have considered his poetry a challenge to the authority long estab-
lished by religion. But there is in his poetry an increased emphasis
on matters local and contemporary at the expense of the more traditional
view, a view incompatible with exclusively linear views of time and a view
not requiring precise measurement of physical objects in space. And in
his poetry he is not content to reason deductively from previously
existing authorities; he works to establish inductively in his poetry an
authority from which he can then argue deductively with even greater
authority. That authority is such that Dryden, though not an apologist
for the new science, can quietly assume a position among the "assertors
of free reason's claim."
NOTES


4 "Science and Criticism in the Neo-Classical Age of English Literature," in Journal of the History of Ideas, 1 (1940), rpt. in Essential Articles for the Study of English Augustan Backgrounds, ed. Bernard N. Schilling (Hamden, Conn.: Archon Books, 1961), pp. 337-67. Jones argues that the following are the main principles of seventeenth-century English science: an emphasis on skepticism, on the validity of observation and experimentation, on inductive reasoning, on the opposition to the theory of nature's decay, on the scientist's liberty to investigate and advance his ideas, on the belief that knowledge could advance, and, as I have just mentioned, an insistence on anti-authoritarianism.


6 The summary is Burtt's. He comments: "That Galileo actually followed these three steps in all of his important discoveries in dynamics is easily ascertainable from his frank biographical paragraphs, especially in the Dialogues Concerning Two New Sciences." (p. 81).

7 "Letter to Madame Christina of Lorraine, Grand Duchess of Tuscany: Concerning the Use of Biblical Quotations in Matters of Science" in Discoveries and Opinions of Galileo, trans. Stillman Drake, (Garden City, New York: Doubleday Anchor, 1957), pp. 175-216. Galileo vigorously protests that he is in no way changing the Bible or challenging its authority, and he maintains that if the Bible is correctly interpreted and the laws of physics properly understood, there can be no conflict between them (e.g., p. 176), and he reminds us that the first concern of the Bible must be spiritual (e.g., p. 183). But science is nevertheless to be an aid in interpreting the Bible: "... I do not mean to infer that we need not have an extraordinary esteem for the passages of holy Scripture. On the contrary, having arrived at any certainties in physics, we ought to utilize these as the most appropriate aids in the true exposition of the Bible and in the investigation of those meanings which are necessarily contained therein, for these must be concordant with
demonstrated truths" (p. 183). Galileo also affirms that "in purely physical matters . . . faith is not involved" (p. 179). To support his own position, Galileo reminds us that "Copernicus never discusses matters of religion or faith, nor does he use arguments that depend in any way upon the authority of sacred writings which he might have interpreted erroneously. He stands always upon physical conclusions pertaining to the celestial motions, and deals with them by astronomical and geometrical demonstrations, founded primarily upon sense experiences and very exact observations" (p. 179).


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