

Cambridge University Press
978-1-108-00100-7 - Euclid and His Rivals
Charles L. Dodgson
Excerpt
[More information](#)

ACT I.

SCENE I.

‘Confusion worse confounded.’

[*Scene, a College study. Time, midnight. MINOS discovered seated between two gigantic piles of manuscripts. Ever and anon he takes a paper from one heap, reads it, makes an entry in a book, and with a weary sigh transfers it to the other heap. His hair, from much running of fingers through it, radiates in all directions, and surrounds his head like a halo of glory, or like the second Corollary of Euc. I. 32. Over one paper he ponders gloomily, and at length breaks out in a passionate soliloquy.*]

Min. So, my friend! *That's* the way you prove I. 19, is it? Assuming I. 20? Cool, refreshingly cool! But stop a bit! Perhaps he doesn't 'declare to win' on Euclid. Let's see. Ah, just so! 'Legendre,' of course! Well, I suppose I must give him full marks for it: what's the question worth?—Wait a bit, though! Where's his paper of yesterday? I've a very decided impression he was all for 'Euclid' then: and I know the paper had I. 20 in it.

B

Cambridge University Press
 978-1-108-00100-7 - Euclid and His Rivals
 Charles L. Dodgson
 Excerpt
[More information](#)

2

MINOS AND

[ACT I.]

... Ah, here it is! 'I think we do know the sweet Roman hand.' Here's the proposition, as large as life, and proved by I. 19. 'Now, infidel, I have thee on the hip!' You shall have such a sweet thing to do in *viva-voce*, my very dear friend! You shall have the two propositions together, and take them in any order you like. It's my profound conviction that you don't know how to prove either of them without the other. They'll have to introduce each other, like Messrs. Pyke and Pluck. But what fearful confusion the whole subject is getting into! (*Knocking heard.*) Come in!

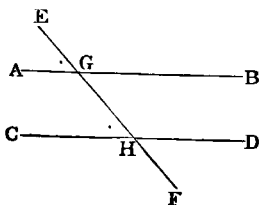
Enter RHADAMANTHUS.

Rhad. I say! Are we bound to mark an answer that's a clear logical fallacy?

Min. Of course you are—with that peculiar mark which cricketers call 'a duck's egg,' and thermometers 'zero.'

Rhad. Well, just listen to this proof of I. 29.

Reads.



'Let EF meet the two parallel lines AB , CD , in the points G , H . The alternate angles AGH , GHD , shall be equal.

‘For AGH and EGB are equal because vertically opposite, and EGB is also equal to GHD (Definition 9); therefore AGH is equal to GHD , but these are alternate angles.’

Did you ever hear anything like that for calm assumption?

Min. What does the miscreant mean by ‘Definition 9’?

Rhad. Oh, that’s the grandest of all! You must listen to that bit too. There’s a reference at the foot of the page to ‘Cooley.’ So I hunted up Mr. Cooley among the heaps of Geometries they’ve sent me—(by the way, I wonder if they’ve sent *you* the full lot? Forty-five were left in my rooms to-day, and ten of them I’d never even heard of till to-day!)—well, as I was saying, I looked up Cooley, and here’s the Definition.

Reads.

‘Right lines are said to be parallel when they are equally and similarly inclined to the same right line, or make equal angles with it towards the same side.’

Min. That is very soothing. So far as I can make it out, Mr. Cooley quietly assumes that lines, which make equal angles with *one* line, do so with *all*. If we had Mr. Cooley in the Schools, I *think* we should pluck him.

Rhad. But as to this answer?

Min. Oh, give it full marks! What have we to do with logic, or truth, or falsehood, or right, or wrong? ‘We are but markers of a larger growth’—only that *we* have to mark foul strokes, which a respectable billiard-marker doesn’t do as a general rule!

Cambridge University Press
 978-1-108-00100-7 - Euclid and His Rivals
 Charles L. Dodgson
 Excerpt
[More information](#)

4

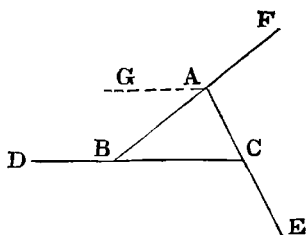
MINOS AND

[Act I.]

Rhad. There's one thing more I want you to look at. Here's a man who puts 'Wilson' at the top of his paper, and proves Euc. I. 32 from first principles, it seems to me, without using any other theorem at all.

Min. The thing sounds impossible.

Rhad. So I should have said. Here's the proof.



'Slide $\angle DBA$ along BF into position GAF , GA having same direction as DC (Ax. 9); similarly slide $\angle BCE$ along AE into position GAC . Then the ext. $\angle s = \angle CAF, FAG, GAC =$ one revolution $=$ two straight $\angle s$. But the ext. and int. $\angle s = 3$ straight $\angle s$. Therefore the int. $\angle s =$ one straight $\angle = 2$ right angles. Q. E. D.'

I'm not well up in 'Wilson': but surely he doesn't beg the whole question of parallels in one axiom like this!

Min. Well, no. There's a theorem and a corollary. But this is a sharp man: he has seen that the axiom does just as well by itself. Did you ever see one of those conjurers bring a globe of live fish out of a pocket-handkerchief? That's the kind of thing we have in Modern Geometry. A man stands before you with nothing but an axiom in his hands. He rolls up his sleeves. 'Observe, gentlemen, I have nothing concealed. There is no deception!' And

Cambridge University Press
978-1-108-00100-7 - Euclid and His Rivals
Charles L. Dodgson
Excerpt
[More information](#)

Sc. I.]

RHADAMANTHUS.

5

the next moment you have a complete theorem, Q. E. D. and all!

Rhad. Well, so far as *I* can see, the proof's worth nothing. What am I to mark it?

Min. Full marks: we *must* accept it. Why, my good fellow, I'm getting into that state of mind, I'm ready to mark *any* thing and *any* body. If the Ghost in Hamlet came up this minute and said 'Mark me!' I should say 'I will! Hand in your papers!'

Rhad. Ah, it's all very well to chaff, but it's enough to drive a man wild, to have to mark all this rubbish! Well, good night! I must get back to my work. [*Exit.*

Min. (indistinctly) I'll just take forty winks, and—

Snores.

Cambridge University Press
 978-1-108-00100-7 - Euclid and His Rivals
 Charles L. Dodgson
 Excerpt
[More information](#)

ACT I.

SCENE II.

Οὐκ ἀγαθὸν πολυκοιρανίῃ· εἰς κοίρανος ἔστω,
 εἰς βασιλεὺς.

[MINOS *sleeping*: to him enter the Phantasm of EUCLID. MINOS opens his eyes and regards him with a blank and stony gaze, without betraying the slightest surprise or even interest.]

§ I. A priori reasons for retaining
Euclid's Manual.

Enc. Now what is it you really require in a Manual of Geometry?

Min. Excuse me, but—with all respect to a shade whose name I have revered from early boyhood—is not that rather an abrupt way of starting a conversation? Remember, we are two thousand years apart in history, and consequently have never had a personal interview till now. Surely a few preliminary remarks—

Enc. Centuries are long, my good sir, but *my* time to-night is short: and I never was a man of many words. So kindly waive all ceremony and answer my question.

Min. Well, so far as I can answer a question that comes upon me so suddenly, I should say—a book that will exercise the learner in habits of clear definite conception, and enable him to test the logical value of a scientific argument.

Enc. You do *not* require, then, a complete repertory of Geometrical truth?

Min. Certainly not. It is the *ἐνέργεια* rather than the *ἔργον* that we need here.

Enc. And yet many of my Modern Rivals have thus attempted to improve upon me—by filling up what they took to be my omissions.

Min. I doubt if they are much nearer to completeness themselves.

Enc. I doubt it too. It is, I think, a friend of yours who has amused himself by tabulating the various theorems which might be enunciated in the single subject of Pairs of Lines. How many did he make them out to be?

Min. About two hundred and fifty, I believe.

Enc. At that rate, there would probably be, within the limits of my First Book, about how many?

Min. A thousand, at least.

Enc. What a popular school-book it will be! How boys will bless the name of the writer who first brings out the complete thousand!

Min. I think your Manual is fully long enough already for all possible purposes of teaching. It is not in the region of new matter that you need fear your Modern

Cambridge University Press
 978-1-108-00100-7 - Euclid and His Rivals
 Charles L. Dodgson
 Excerpt
[More information](#)

Rivals: it is in *quality*, not in *quantity*, that they claim to supersede you. Your methods of proof, so they assert, are antiquated, and worthless as compared with the new lights.

Enc. It is to that very point that I now propose to address myself: and, as we are to discuss this matter mainly with reference to the wants of *beginners*, we may as well limit our discussion to the subject-matter of Books I and II.

Min. I am quite of that opinion.

Enc. The first point to settle is whether, for purposes of teaching and examining, you desire to have one fixed logical sequence of propositions, or would allow the use of conflicting sequences, so that one candidate in an examination might use *X* to prove *Y*, and another use *Y* to prove *X*—or even that the same candidate might offer *both* proofs, thus ‘arguing in a circle.’

Min. A very eminent Modern Rival of yours, Mr. Wilson, seems to think that no such fixed sequence is really necessary. He says (in his Preface, p. 10) ‘Geometry when treated as a science, treated inartificially, falls into a certain order from which there can be no very wide departure; and the manuals of Geometry will not differ from one another nearly so widely as the manuals of algebra or chemistry; yet it is not difficult to examine in algebra and chemistry.’

Enc. Books may differ very ‘widely’ without differing in logical sequence. Let me give you a few instances of conflicting logical sequences in Geometry. Legendre proves my Prop. 5 by Prop. 8, 18 by 19, 19 by 20, 27 by

28, 29 by 32. Cuthbertson proves 37 by 41. Reynolds proves 5 by 20. When Mr. Wilson has produced similarly conflicting sequences in the manuals of algebra or chemistry, we may then compare the subjects: till then, his remark is quite irrelevant to the question.

Min. I do not think he will be able to do so: indeed there are very few logical chains *at all* in those subjects—most of the propositions being proved from first principles. I think I may grant at once that it is essential to have *one* definite logical sequence, however many manuals we employ: to use the words of another of your Rivals, Mr. Cuthbertson (Pref. p. viii.), ‘enormous inconvenience would arise in conducting examinations with no recognised sequence of propositions.’ This however applies to *logical* sequences only, such as your Props. 13, 15, 16, 18, 19, 20, 21, which form a continuous chain. There are many propositions whose place in a manual would be partly arbitrary. Your Prop. 8, for instance, is not wanted till we come to Prop. 48, so that it might occupy any intermediate position, without involving risk of circular argument.

Euc. Now, in order to secure this uniform logical sequence, we should require to know, as to any particular proposition, what other propositions were its logical descendants, so that we might avoid using any of these in proving it?

Min. Exactly so.

Euc. We might of course give this information by attaching to each enunciation references to its logical descendants: but this would be a very cumbrous plan.

Cambridge University Press
 978-1-108-00100-7 - Euclid and His Rivals
 Charles L. Dodgson
 Excerpt
[More information](#)

10

MINOS AND EUCLID.

[ACT I.]

A better way would be to give them in the form of a genealogy, but this would be very bulky if the enunciations themselves were inserted: so that it would be desirable to have numbers to distinguish the enunciations. In that case (supposing *my* logical sequence to be adopted) the genealogy would stand thus:—(see *Frontispiece*).

Min. Would it not be enough to publish an arranged list (which would be all the better if numbered also), and to enact that no proposition should be used to prove any of its predecessors?

Enc. That would hamper the writers of manuals very much more than the genealogy would. Suppose, for instance, that you adopted, in the list, the order of theorems in my First Book, and that a writer wished to prove Prop. 8 by Prop. 47: this would not interfere with my logical sequence, and yet your list would bar him from doing so.

Min. But we might place 8 close before 48, and he would then be free to do as you suggest.

Enc. And suppose some other writer wished to prove 24 by 8?

Min. I see now that any single list must necessarily prevent many possible arrangements which would not conflict with the agreed-on logical sequence. And yet this is what the Committee of the Association for the Improvement of Geometrical Teaching have approved of, namely, 'a standard sequence for examination purposes,' and what the Association have published in their 'Syllabus of Plane Geometry.'

Enc. I think they have overlooked the fact that they