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A BRIEF HISTORY OF SOCIAL CHOICE

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Some fundamental elements

- 1 According to McLean and Urken (1995) “Social Choice is the study of all procedures for producing group decision from individual preferences”.
- 2 The past is rich and we brought several concepts to modern Social Choice.
- 3 Borda count, Condorcet method, ...

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2.1. Jean-Charles, chevalier de Borda (1733 - 1799)

Short Biography

- 1 **Background:** French mathematician, physicist, political scientist, and sailor.
- 2 **Living places:** Dax (born), Paris, Mézière, Bordeaux, crosses the Atlantic several times, ...
- 3 **Interested in:** Ballistic, fluid mechanics, hydrography and cartography, Chairman of the Commission of Weights and Measures (**measurement theory**: meters, kg, etc.), **Elections**, ...
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New concepts: The Borda Count

- 1 Criticized the Condorcet method: not workable in practice and no winner might occur.
- 2 Proposed a new method: ranking candidates by giving each the points corresponding to their ranks. The voters give the candidate they favored least one point, the next candidate two points, and so on. The winner is the candidate who got more points, after making the summation of the points attributed to each candidate by each voter.
- 3 Scoring technique: also used in multiple criteria decision analysis.

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3 **Interested in:** Calculus (Integral), Inspector General of the Mint, Secretary of the Académie des Sciences, probability and the philosophy of mathematics, **Elections**, . . .

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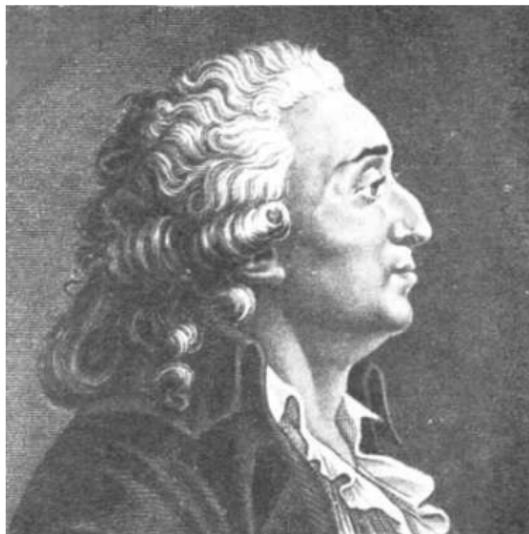
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Source: commons.wikimedia.org/wiki/File:
Condorcet-NB.jpg



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- 2 *Essai sur la constitution et les fonctions des assemblées provinciales* (1788).
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New concepts: The Condorcet method

- 1 **Condorcet method:** It's a pairwise election method where ranked ballots are used to simulate many head-to-head elections. The winner of a Condorcet election is the candidate who wins all pairwise matchups
(robla.net/1996/politics/condorcet.html).
- 2 Condorcet was aware of his Paradox of voting.
- 3 Several methods can be used to solve this drawback: graph “kernel” in ELECTRE methods for choice problem statements (B. Roy, 1985).

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2 **Living places:** Geneva, Poland, ...

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New concepts: several

- 1 In the cyclical case, Condorcet produces an arbitrary winner.
- 2 Condorcet method is manipulable.
- 3 Assuming that all orderings are equiprobable, he identified all possible permutations of individual preferences for a given outcome. Then, he determined probability ratios.

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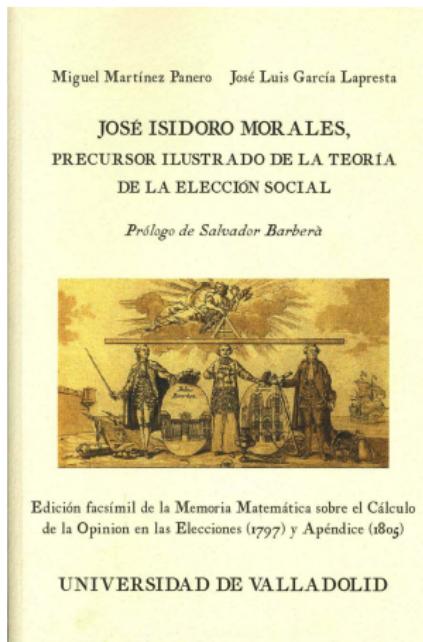
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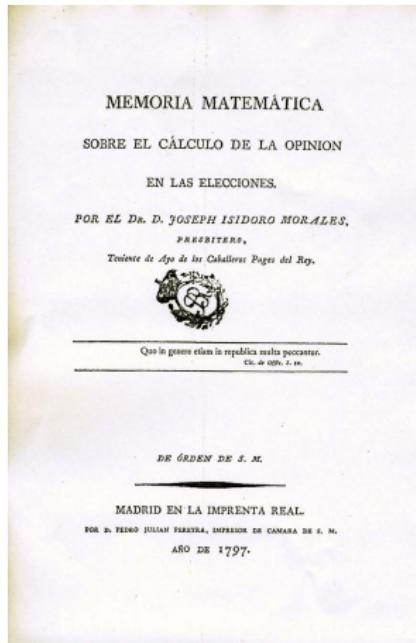
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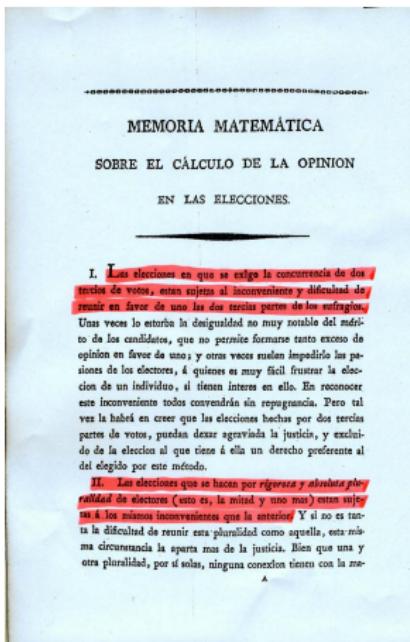
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Source: Wikipedia



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Conclusions

New concepts: **several** (1)

- 1 Abandoned the Borda count because its **susceptibility to manipulation**.
- 2 Borda and Condorcet methods pinpoint to different directions; he preferred the **Condorcet principle**.
- 3 He discussed **plurality and runoff procedures**.

3. “But...”

3.3. Pierre Claude François Daunou (1761 - 1840)

New concepts: **several** (2)

- 1 Qualified majorities can be **minority veto schemes**.
- 2 Borda could violates the **independence w.r.t. irrelevant alternatives**.
- 3 Only unanimity would guarantee that a majority winner is also a Borda winner (**pervasive implication**).
- 4 Demonstrated that a **Borda looser** cannot be a **Condorcet winner**.

3. "But..."

3.3. Pierre Claude François Daunou (1761 - 1840)

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Short Biography

- 1** **Background:** English author, mathematician, logician, Anglican deacon, photographer, ...
- 2** **Living places:** Daresbury near Warrington (born), Oxford, ...,
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Source: [richardwiseman.wordpress.com/ ... /](http://richardwiseman.wordpress.com/)



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1 The **Principles** of Parliamentary Representation (1884).

(PR.)

2 A Discussion . . . (1873).

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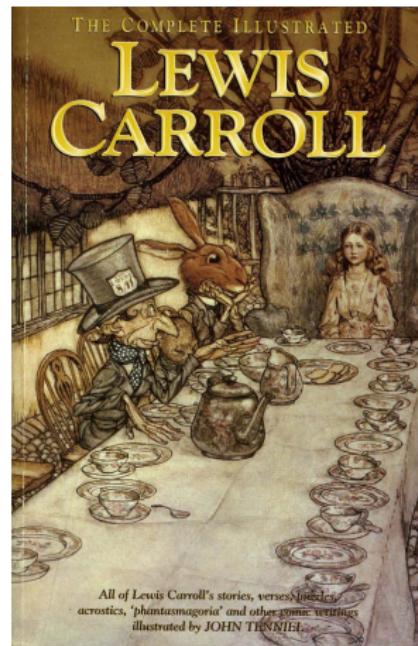
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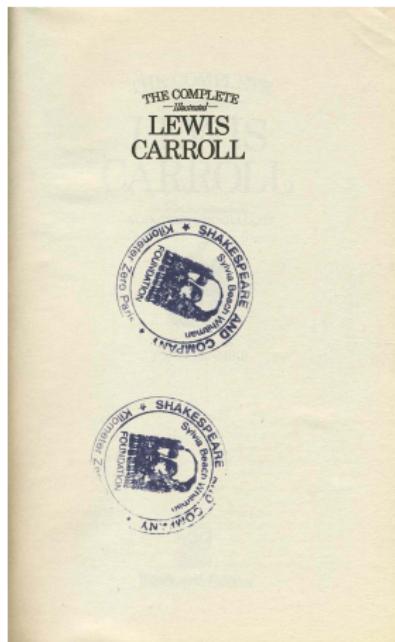
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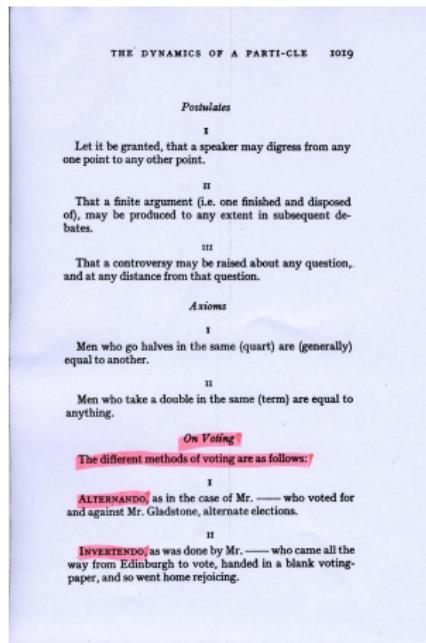
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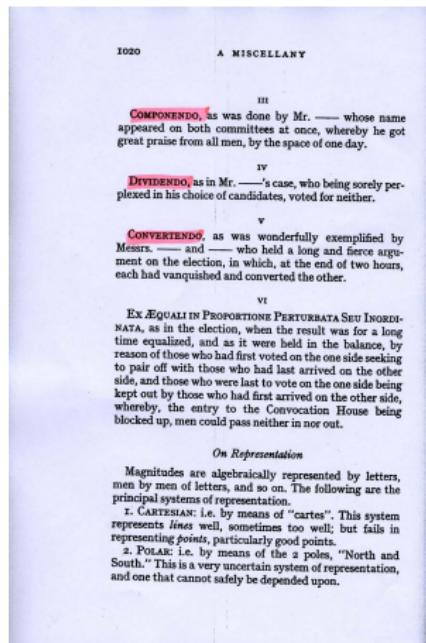
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New concepts: Several (1)

- 1 In an election without a Condorcet winner, Dodgson's method is designed to find the candidate that is "closest" to being a Condorcet winner.
- 2 In case of cycles, for choosing a winner he proposed voters to change their votes in order to produce a consensus ranking based on inversion.
- 3 "The Dodgson winner if it can be made a Condorcet winner is "only" by interchanging as few adjacent alternatives in the individual rankings as possible" (F. Brandt, 2009).

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New concepts: Several (3)

- 1 The apportionment problem.
- 2 Dodgson and its works on Tennis Tournaments.
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Source: Wikipedia



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New concepts: Some

- 1 Nanson's method **removes those choices** of a certain margin (from the Borda score) that are equal or below the average score of Borda count method. Then, the **ballots are re-labeled** as if the remaining candidates were exclusively in the ballots. This **process is repeated**, if necessary, until the only **winner is found**.
- 2 Showed that several methods are **not Condorcet efficient** (they can reject a Condorcet winner).
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- 1 **Background:** German cardinal of the Catholic Church from Germany (Holy Roman Empire), philosopher, jurist, mathematician, astronomer,
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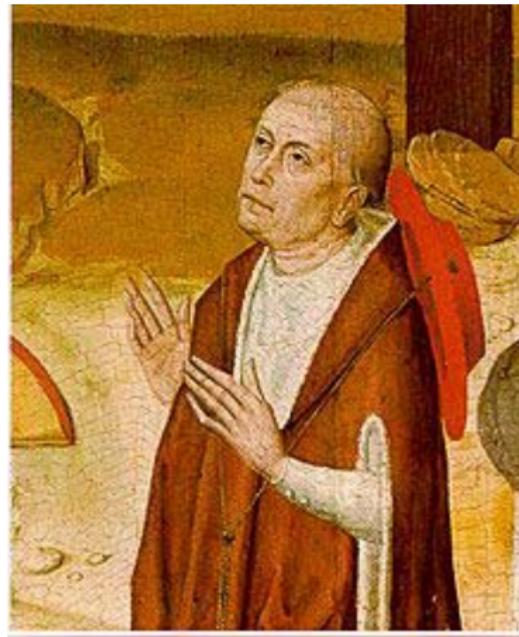
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Source: Wikipedia



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1 N. Von Kues. *De Concordantia Catholica* (1431).

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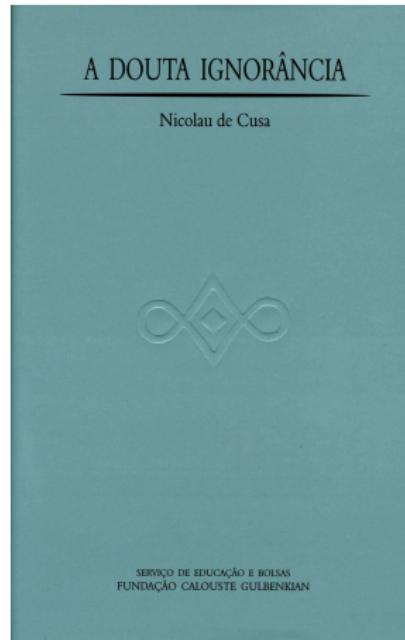
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New concepts: Some interesting ones

- 1 A weighting voting systems (voting by nations) to elect bishops,
- 2 Proposed a Borda count with secret voting. It's different from the open voting as in Lull's procedures (members of a cathedral, abbey,).
- 3 Von Kues was more concerned with strategic votes.

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Ramon Llull
Llibre d'Evast
e Blanquerna

A cura de Maria Josepa Gallofré
Pròleg de Lola Badia



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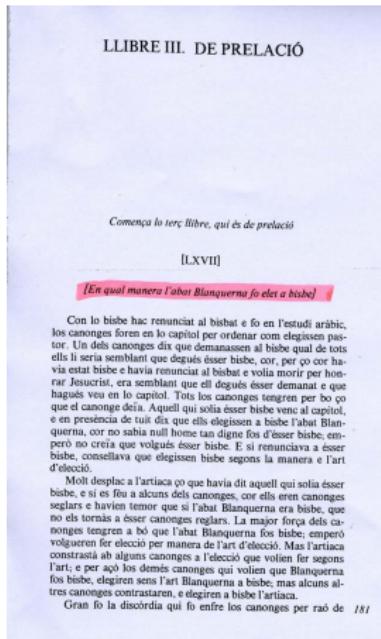
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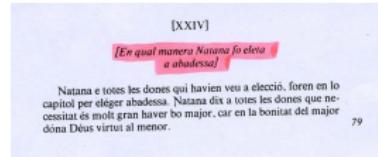
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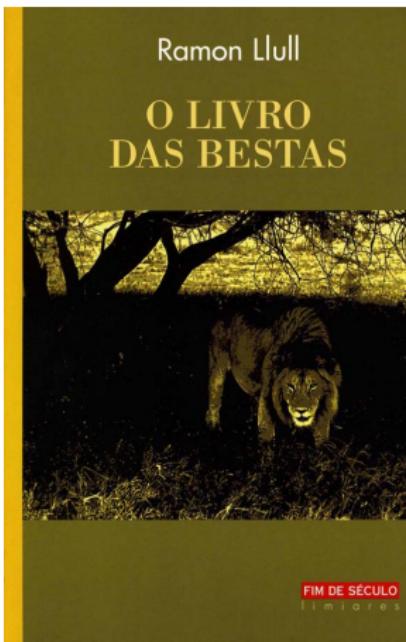
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New concepts: Very interesting ones (1)

- 1 Proposed two election methods. Both apply the principle of selecting pairs of objects from a larger set.
- 2 Consider 36 compartments or cells and represent the 36 combinations of 2 candidates from a set of 9. In his exhaustive pairwise comparison method, “the winner should be is the one with the most votes in the most compartments”.
- 3 According to McLean and Urke (1995) the interpretation of the winner statement is ambiguous and can be interpreted into two natural ways.

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Assign 0 points for the last place,
- 2 Otherwise, it leads to the Copeland winner.
- 3 In De Arte Eleccionis, R. Llull recommended a Condorcet procedure.

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- 2 **Living places:** Rome, Pompeia, Syria, . . .
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Source:

www.moser-pennyroyal.com/.../Ashen_Sky.html



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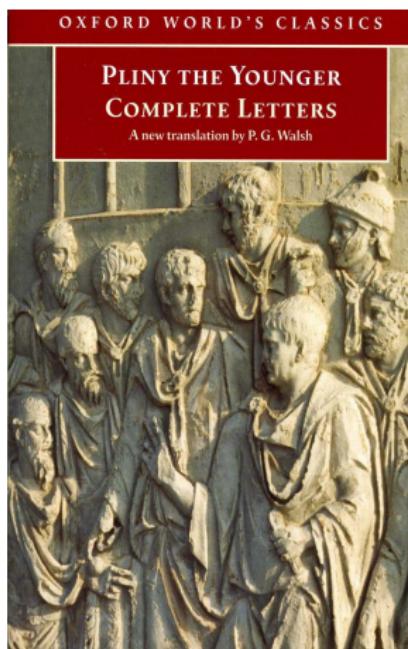
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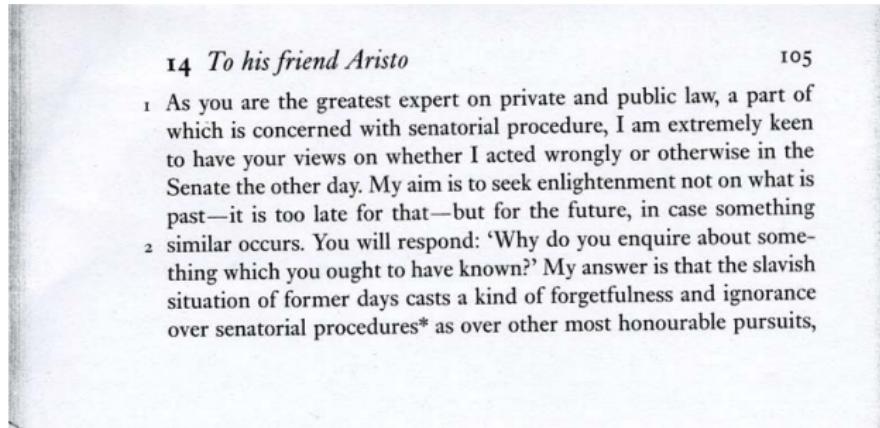
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for how few of us have the patience to wish to learn what we shall not apply in practice? Then too it is difficult to retain what you have learnt unless you practise it. So the resumption of freedom has found us ill-educated and ignorant, but, fired by the sweetnes of that freedom, we are compelled to perform certain duties before we are acquainted with them.

In days of old the custom was that, not merely by listening, but also by observing, we used to learn from our elders the procedures which we were next to follow, and then in our turn we were to pass them on to the younger generation. Thereafter our young men were then lent immediate experience in periods of military service, so that they grew accustomed to command by obedience, to exercise leadership by following others. Then before becoming candidates for office, they would stand at the doors of the Senate House¹ to observe state policy before sharing responsibility for it. Each individual had his father as his teacher, the greatest and the oldest men in the state took on parental duties for those who were fatherless. Thus men were instructed by example (the most reliable means of attaining knowledge) about the powers of proposers, the rights of voters, the discretion of magistrates, and the freedom of the rest. They also learnt when they should yield and when they should hold out, the time for silence and time limits for speaking, the distinction between competing proposals, the way of introducing supplements to existing motions—in short, the entire conventions of senatorial procedure.

Admittedly, when we were young men, we performed military service, but at that time military excellence was under suspicion, sluggishness was rewarded, leaders had no authority, and common soldiers showed no deference. Authority was nowhere in evidence, nor obedience either, for the whole scene was lax, disorganized, and topsy-turvy. In a word, all was better forgotten than remembered. We then trained our gaze on the Senate, but a Senate which was fearful and speechless, for it was dangerous to express your convictions, and humiliating to repress them. What was it possible to learn at that time, or what point was there in having learnt such things, when the Senate was summoned to be wholly idle or wholly wicked, when it was kept in being to be now a laughing-stock and now ripe for grief? Once we became senators, for many years we witnessed and endured the same evils in which we then took part, so that our talents were blunted, broken, and bruised by them, affecting even

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¹⁰ our later days. There has been only a brief period (for every era of greater happiness is shorter) in which it has been our pleasure to come to know our identity, and to apply that knowledge.

So I am the more justified in begging you, first to pardon any error which I may have made, and second, to remedy it by your knowledge, for it was always your speciality to be familiar with laws both public and private, ancient and modern, exceptional and everyday.

¹¹ Moreover, I believe that even those whose regular handling of numerous cases did not allow for any ignorance, will have found the kind of question which I am putting to you not sufficiently commonplace, or even unfamiliar. Accordingly, I shall win further forgiveness if I happen to have erred, and you will be more deserving of praise if you can offer guidance on a matter which one doubts one ever learnt.

¹² The trial before the Senate implicated the freedmen of the consul Afranius Dexter.⁴ It was not clear whether his death was attributable to suicide or to the crime or the negligence of his servants. Following the investigation, one senator (who? I myself, but no matter) thought that they should be acquitted, a second that they should be relegated to an island, and a third that they should be punished with death.

¹³ These proposals were so different from each other that they could only be considered one by one, for what have execution and relegation in common? No more indeed than relegation and acquittal, though a vote for acquittal is somewhat closer to a vote for relegation than is one for execution, for the first two leave a man with his life, but the third deprives him of it. Meanwhile those opting for punishment by death and those voting for relegation were sitting together, seeking to postpone their disagreement by a momentary pretence of harmony.

¹⁴ I demanded that the three proposals be counted as three, and that two of them should not be united in a short-lived truce. So I insisted that those who thought that the freedmen should be executed should detach themselves from those proposing relegation, and that in the meantime they should not combine in opposing those voting for acquittal, when later they would be at odds with each other. I argued that it mattered very little whether they both disagreed with one proposal, since they were not supporting the same one. A further point which seemed to me surprising was that the man who had proposed relegation for the freedmen and execution for the slaves

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had been compelled to subdivide his proposal, whereas the proposer of death for the freedmen was being counted in with the advocate of relegation. For if it had been necessary for the subdivision of one because he was combining two issues, I did not see how the proposals of two such different submissions could be combined.

So let me now render an account of my understanding of the situation to you as if you had been there, and though the case is terminated, as though it were still undecided; let me now assemble at leisure the points I then made intermittently in the face of many loud protests. Let us imagine that three judges only had been assigned to this case, and that the first of them had decided that the freedmen should be executed, the second that they should be relegated, and the third that they should be acquitted. Will the first two judgements combine forces and eliminate the third, or will each of the three separately have the same validity as each of the others, so that the first cannot be joined to the second any more than the second to the third? So in the Senate likewise, the proposals advanced as different ought to be accounted differently. But if the one identical person submitted that the freedmen should be both executed and relegated, they would surely not suffer both death and relegation on the basis of a single judgement. In short, a judgement combining such diverse punishments could surely not be considered a single one. So when one person proposes that they be executed and another that they be relegated, how can this be seen as a single judgement advanced by two persons, when it did not appear as one advanced by one person?

Again, does not the law* clearly teach that proposals for execution and for relegation must be distinguished from each other, when it prescribes a division in these words: 'You who make this judgement proceed to this side, and you who support all other measures proceed to the side which you approve?' Scrutinize and weigh each word. 'You who make this judgement', that is, you who believe that they are to be relegated, 'proceed to this side', that is, to the side where the proposer of relegation is seated. This makes it clear that those who believe that they should be executed cannot remain at that side. 'You who support all other measures': note that the law was not content to say 'other measures', but added 'all'. So there is surely no doubt that those who opt for execution take a wholly different view from those who support relegation. 'Proceed to the side you

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approve': surely the law itself seems to summon, compel, and drive those who dissent to proceed to the opposite side? Does not the consul, too, not merely by the ritual words but also by a gesture of the hand, indicate where each is to remain or to cross over?
²¹ But the objection can be made that if the proposals advanced for execution and relegation were separated, the proposal for acquittal would prevail. What relevance has this to the voters? It is certainly unfitting for them to wage war by every means and on every count to prevent the outcome of a more merciful proposal. However, those voting for execution and those who advocate relegation ought to be mustered against those for acquittal, and these against each other. Just as in some public shows the lot extracts and preserves an individual to join battle with the victor, so perhaps in the Senate there are certain primary and certain secondary contests, and when two of the proposals clash, the third awaits the one which comes out on top.
²² What of the fact that if the first proposal is approved, the rest fall? What rational basis, then, can there be for not affording the proposals equal standing, when they have no such standing subsequently? Let me repeat my point more clearly. When the proposer of relegation pronounces his opinion, unless those who favour execution cross to support a different measure, it will be vain for them subsequently to dissociate themselves from the proposer with whom they were in agreement a little before.
²³ But why should I assume the mantle of the teacher, when I wish to learn whether the proposals should have been separated or voted upon one at a time? I obtained the result I demanded,²⁴ but none the less I wish to know whether I should have demanded it. How did I obtain it? The person who was proposing the exaction of the death penalty was defeated by the fairness, if not perhaps the legality, of my demand. He renounced his proposal, and went over to the proposer of relegation, doubtless because he feared that, if their motions were separated, which seemed likely on other grounds, the proposal for acquittal would gain the majority of votes. Indeed, there were far more supporters of this one motion than of each of the others. Then those, too, who had been attracted by his authority were left high and dry when he crossed over, and they abandoned the motion which the sponsor had renounced, and they trooped after him whom they followed as a leader as if he had become a deserter. So the three motions became two, and once the third was eliminated, the second prevailed.

5. What happened before?

5.1. Pliny the Younger

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For since the third could not prevail over both of the others, it chose which of them would prevail over it.* Farewell.

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5.1. Gaius Plinius Caecilius Secundus (61 AD - ca. 112 AD)

New concepts: A few, but important

- 1 Letter to Titius Aristo. Three options for the slaves: (1) immediate execution; (2) banishment, and a third one.
- 2 At the Senate Pliny proposed the following rule: “voters to go to as many sides of the room as there were options under discussion”.
- 3 If the opinion was one-dimensional, he shows that the banishment was the Condorcet winner among the three options.

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THANK YOU VERY MUCH!