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Office hours:
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Concepts and Measures of Voting Power

Summer Semester 2016

In this course we will be concerned with the ideal of fair representation in democratic voting institutions. Particularly, our main tool of thinking about this ideal will be voting power and our ways of approaching voting power will be three-fold: what do we mean by voting power? how can we (adequately) measure it? and how do these measures aid us in our normative analysis of institutions? Corresponding to these questions are the three overarching blocks of this course – a conceptual, a technical and an applied part – which we will cover in this order but never in isolation: our conceptual analysis will motivate the technical exposition and a reflective grasp of both elements will be necessary for our specific applications.

Organisational details

The course aims to seriously acquaint you with core contributions to the literature on voting power – key papers, conceptual distinctions and quantitative measures – and guide you in applying them to a specific voting institution. To this end, each week we will have a $\sim$ 60 min. lecture followed by a $\sim$ 30 min. discussion on the compulsory readings for the given topic. As the starting point for the discussions will be your weekly responses to these readings, you will have to submit them before the respective lecture (one day in advance – see the deadlines in the **Schedule**).

Although our weekly meetings are split into a lecture and a discussion part, they need not be separated. We are a compact group so please feel free to interrupt throughout both with questions and with points from the assigned texts and your reading responses.

Literature

There are a few compulsory texts that you have to read (almost) every week and that you can find listed in section **I. Reading Responses**. Your reading responses should be based on these texts but you are also free to draw on the suggested and additional literature. There are two authoritative monographs in the field – from a philosophical and a more technical standpoint – which you are encouraged to consult throughout the course (we will read excerpts of each):

> **Morriss, Peter** (1987). *Power: A Philosophical Analysis*. Manchester: Manchester University Press.
> **Felsenthal, Dan S. & Machover, Moshé** (1998). *The Measurement of Voting Power: Theory and Practice, Problems and Paradoxes*. Cheltenham: Edward Elgar.

Grading

You can take the course for either **2 CP**, or **6 CP**. For **2 CP**, 30% of your grade comes from attendance and participation in the weekly discussions and 70% comes from your written reading responses (see section **I. Reading Responses** for guidelines, a short sample reading response and a week-by-week breakdown of the topics and literature). Please submit your responses by e-mail.

2 CP

Element	**Weight**
Attendance & Participation	30%
Reading responses	70%
Total	**100%**

For **6 CP**, you would also have to do an outline on a case study (three pages) and write a report of $\sim 3,000$ words (guidelines on these elements are in section **II. Case Studies**).

6 CP

Element	**Weight**
Attendance & Participation	10%
Reading responses	30%
Case study outline	30%
Case study report	30%
Total	**100%**

Please make sure that you attend every class! (Speak to me if you have to miss a lecture.) Attendance and participation in the discussions is not just an element counting towards your grade but also a learning opportunity to master concepts and probe into issues both of which you would need for your presentations.

The allocation of the case study presentations will be, as nearly as practicable, according to your preferences. In the first weeks of the course you will be given descriptions of the case studies and asked to submit a ranking. Everyone should hopefully receive if not their first than at least their first or second choice.

Questions and Comments

Feel free to ask questions or approach with ideas before, during and after the lectures. You can always also come by during office hours or just drop me an e-mail (send me a note if you want to arrange another time).

Schedule

Week	Date			Room	Lecture	Reading responses
01	21 April	Thursday	12:00 – 14:00	S 25 (GEO II)	L 01	
	26 April	*Tuesday*	*midnight*			*RR 01 deadline*
02	28 April	Thursday	12:00 – 14:00	S 25 (GEO II)	L 02	
	05 May	HOLIDAY				
	10 May	*Tuesday*	*midnight*			*RR 02 deadline*
03	12 May	Thursday	12:00 – 14:00	S 25 (GEO II)	L 03	
	17 May	*Tuesday*	*midnight*			*RR 03 deadline*
04	19 May	Thursday	12:00 – 14:00	S 25 (GEO II)	L 04	
	24 May	*Tuesday*	*midnight*			*RR 04 deadline*
05	25 May	Wednesday	18:00 – 20:00	01.23 (GW II – across Claudia Ficht's office)	L 05	
	26 May	HOLIDAY				
	31 May	*Tuesday*	*midnight*			*RR 05 deadline*
06	02 June	Thursday	12:00 – 14:00	S 25 (GEO II)	L 06	
	09 June	WITTGENSTEIN WEEK				
	14 June	*Tuesday*	*midnight*			*RR 06 deadline*
07	16 June	Thursday	12:00 – 14:00	S 25 (GEO II)	L 07	
	21 June	*Tuesday*	*midnight*			*RR 07 deadline*
08	23 June	Thursday	12:00 – 14:00	S 25 (GEO II)	L 08	
09	30 June	Thursday	12:00 – 14:00	S 25 (GEO II)	L 09	
10	07 July	Thursday	12:00 – 14:00	S 25 (GEO II)	WRAP UP & FEEDBACK	
	31 July	*Sunday*	*midnight*			*extra RR deadline*
	16 August	*Tuesday*	*midnight*			*outline deadline*
	16 September	*Friday*	*midnight*			*report deadline*

I. Reading Responses: Texts, Deadlines, Comments

Format: Each reading response should be one (max. two) A4 pages of 12pt Times New Roman text with 1.25 line spacing. Please allow for some margins – for example, 3cm all around is okay – and don't forget to properly reference your responses.

What are reading responses (RRs)? It is easier to say what they are not. RRs are not summaries of the texts – understanding the papers and being able to paraphrase their core points in your own words is certainly a prerequisite to writing a good RR but that's not enough. RRs are also not essays – one or two pages is a skimpy space to develop a full-fledged argument (with a literature review, summary of existing positions, etc.). Thus, you are free to assume that the reader (me) is familiar with the texts and should keep the summaries of the points you are responding to as short as possible (a couple of sentences to a brief paragraph). You are also free to dive right into these points without worrying about 'proper' essay-style introductions and conclusions.

Simply put, an RR contains your thought-out response(s) to a reading. Try to single out one or two (max. three) points from the compulsory papers that you find interesting/challenging/problematic, paraphrase them very briefly (but accurately) and then say what is interesting/challenging/problematic about them (ideally relating the points to each other and to the wider topic of the lecture as well as our previous discussions). Although less formal than essays, RRs are not stream of consciousness exercises – spend some time thinking about what you want to say and how you want to say it (putting your thoughts in succinct up-to-the-point paragraphs is often much harder). Every point you respond to should be well argued for (or against) and you are encouraged to try to come up with original solutions to some problems you have identified. Hopefully, after the first couple of weekly readings, you will find your RRs start to 'speak' to each other – feel free to refer to earlier points you have made and to—as it were—converse with yourself across your RRs as you go along.

You can choose to respond to points in one, two or all of the weekly compulsory papers (of course, feel free to use the suggested readings as well). Nevertheless, if you focus on a single paper, try to at least briefly relate it to the other compulsory texts. An RR (but not all of your RRs) can also be about something you do not understand in a text(s). Don't just say 'I don't understand X'! Describe X, explain what it is about it that you don't understand and come up with specific questions – a significant step towards grasping something is articulating what specifically it is about it that you don't grasp. We will discuss such points in class but you can always also drop by and ask me questions on points you don't understand.

Drawing on additional literature – beyond the compulsory texts – is allowed but certainly not necessary for writing an excellent RR. Nevertheless, if you want to do that, use the references in the compulsory and suggested papers. You can also simply ask me for extra references on topics you find interesting.

[Sample] Reading Response 01

Marina Uzunova

Number your RRs.

Don't forget your name!

Presumably definitions of concepts should ideally be equivalence statements. That is, they should pick out those instances we associate with a term, no less – but also no more. Wagner's ([3]) proposed definition seems to suffer from the latter problem. To have power, according to Wagner ([3]: 3), is to have power *to do* something which is the same as to *be able* to do something. Power, then, in its core meaning is simply an *ability* and specifying the acts – such as, political acts – which people are *able* to do yields different types of power ([3]: 4).

Use proper citations – including page numbers! The style is up to you as long as it's consistent.

Summarise briefly the paper's point you are responding to.

Clearly, if one has the power to do something, he also has the ability to do it. Yet is the reverse true? Are all ascriptions of an ability (to do something) cases of having power (to do something)? Take my ability to use my eyes. I can see the pen on my desk yet to say that I have the power to see the pen on my desk sounds exaggerated. Or, in the context of voting, take my ability to cross out the name of my preferred candidate on the ballot sheet – while I *can* easily do that, surely it's a stretch to also say that I have the *power* to do it.

The problem is that while every instance of power does seem to be an instance of ability, not every instance of ability is an instance of power. Power, as Wagner ([3]: 4) concurs contra Dahl ([1]), might not be a *relation* but it also seems not to be *just an ability* – it is a kind of an ability.

Try to engage, even if briefly, all the compulsory texts as they relate to the point(s) you are raising. Here, for example, you can also bring in Riker's ([2]: 344) distinction between ego- and other-oriented power.

At least two points follow from this. If power is a kind of an ability, then the next proper question in defining it is – what kind exactly? And if to have *power* to do something means to have *some-kind-of-an-ability* to do something, then the appropriate way of deriving types of power is not by qualifying the *acts* one is able to do but the *something* he is in-some-way-able to do. After all, as Wagner ([3]: 4) says, we would know that Sam has political power if Sam did a political *thing*.

Make sure that you spell out exactly the point you are making.

[1] Dahl, Robert A. (1957). The Concept of Power. *Behavioral Science*, 2(3), 201–215.

[2] Riker, William H. (1964). Some Ambiguities in the Notion of Power. *The American Political Science Review*, 58(2), 341–349.

[3] Wagner, R. Harrison (1969). The Concept of Power and the Study of Politics. In Roderick Bell, David V. Edwards and R. Harrison Wagner (Eds.), *Political Power: A Reader in Theory and Research* (pp. 3–12). New York: The Free Press/London: Collier-Macmillan Limited.

Don't forget to list your references. If you're short on space, you can push them on a new page – they don't count towards the length of an RR.

Week 01

21 April (Thu), 12:00 – 14:00

Introduction, Motivation, History

S 25 (GEO II)

In the first lecture we will deal with organisational issues as well as have a general and historical introduction to the course. Hence, there are no compulsory readings and no RRs for lecture one. Nevertheless, below you will find some suggested texts which you can consult if of interest.

COMPULSORY READINGS:

None

SUGGESTED READINGS:

Felsenthal, Dan S. & Machover, Moshé (2005). Voting Power Measurement: A Story of Misreinvention. *Social Choice and Welfare*, 25(2), 485–506.

Grofman, Bernard & Scarrow, Howard (1981). Weighted Voting in New York. *Legislative Studies Quarterly*, 6(2), 287–304.

Riker, William Harrison (1986). The First Power Index. *Social Choice and Welfare*, 3(4), 293–295.

Week 02

Power, Voting power, *A priori* power

28 April (Thu), 12:00 – 14:00
S 25 (GEO II)

In lecture two we will approach the subject conceptually and try to answer two basic questions: what is power in general and voting power in particular? what do we mean by *a priori* power [our main focus in the course] and why are we interested in it?

There are two RRs (RR 01 & RR 02) relating to lecture two which address these questions and which you will have to submit before and after week two, respectively (we will discuss the second set at the beginning of week three). You should have enough time for this as we start relatively late in April and there are no compulsory readings either for lecture one, or lecture three (plus there is a holiday gap on May 5th, giving you two weeks to do the readings for RR 02 and more than two for RR 01).

COMPULSORY READINGS 01:

RR 01 DEADLINE:
26 April (Tue), midnight

Dahl, Robert A. (1957). The Concept of Power. *Behavioral Science*, 2(3), 201–215.

Morriss, Peter (1987). *Power: A Philosophical Analysis*. Manchester: Manchester University Press ('Part I—What power is and what power is not' on pp. 8–46).

Riker, William Harrison (1964). Some Ambiguities in the Notion of Power. *The American Political Science Review*, 58(2), 341–349.

> You can ignore the at times arcane notation of the models in Riker – focus on the conceptual distinctions he makes and think about whether you agree or not (and why).

SUGGESTED READINGS:

Barry, Brian (1980). Is It Better to be Powerful or Lucky? Part 2. *Political Studies*, 28(3), 338–352.

Try to approach these texts with the first set of questions in mind: what is power? can we arrive at a general concept or do types of power differ essentially? what does (or can) power mean in a voting context?

COMPULSORY READINGS 02:

RR 02 DEADLINE:
10 May (Tue), midnight

Braham, Matthew & Holler, Manfred J. (2005). The Impossibility of a Preference-Based Power Index. *Journal of Theoretical Politics*, 17(1), 137–157.

Napel, Stefan & Widgrén, Mika (2005). The Possibility of a Preference-Based Power Index. *Journal of Theoretical Politics*, 17(3), 377–387.

Braham, Matthew & Holler, Manfred J. (2005). Power and Preferences Again: A Reply to Napel and Widgrén. *Journal of Theoretical Politics*, 17(3), 389–395.

SUGGESTED READINGS:

Schmidtchen, Dieter & Steunenberg, Bernard (2014). On the Possibility of a Preference-Based Power Index: The Strategic Power Index Revisited. In Rudolf Fara, Dennis Leech and Maurice Salles (Eds.), *Voting Power and Procedures: Essays in Honour of Dan Felsenthal and Moshé Machover* (pp. 259–286). Cham/Heidelberg/New York/Dordrecht/ London: Springer (focus on pp. 264–274).

Again, for now don't worry about not following the notation – focus on the conceptual arguments. The debate in the above papers is unique in involving both philosophers and economists conversing on very fundamental issues in the field. Try to relate them to the general themes of lecture two and the distinction between *a priori* and *a posteriori* power in particular.

Week 03

12 May (Thu), 12:00 – 14:00

Voting games, Probabilistic & Axiomatic approaches

S 25 (GEO II)

Lecture three will cover the language we will use throughout most of the rest of the course – that of cooperative game theory in general and simple as well as weighted voting games in particular. We will also discuss the two common approaches to presenting power indices – the probabilistic and axiomatic frameworks which we will revisit in later weeks. There are no RRs due on this week's topics but you can consult some textbook references in the suggested readings (listed in the order in which it is advisable to read them).

COMPULSORY READINGS:

None

SUGGESTED READINGS:

Straffin Jr., Philip D. (1983). Power Indices in Politics. In Steven J. Brams, William F. Lucas and Philip D. Straffin, Jr. (Eds.), *Political and Related Models* (pp. 256–321). New York: Springer-Verlag (pp. 256–262).

This is the place to start if you're completely new to simple games. There are also some good exercises.

Shapley, Lloyd Stowell (1962). Simple Games: An Outline of the Descriptive Theory. *Behavioral Science*, 7(1), 59–66.

Simple games were introduced by von Neumann and Morgenstern but Shapley's paper brought them to the fore.

Peleg, Bezalel & Sudhölter, Peter (2007 [2003]). *Introduction to the Theory of Cooperative Games* (2nd ed.). Berlin/Heidelberg: Springer-Verlag (pp. 9–12 and pp. 16–18).

This is a very concise textbook introduction to cooperative and simple games with examples and exercises.

Felsenthal, Dan S. & Machover, Moshé (1998). *The Measurement of Voting Power: Theory and Practice, Problems and Paradoxes*. Cheltenham: Edward Elgar (pp. 11–34).

This is the authoritative monograph in the field and you are highly encouraged to get acquainted with it. The notation, however, can be at times confusing so it is advisable to first read through at least some of the texts above.

Laruelle, Annick & Valenciano, Federico (2008). *Voting and Collective Decision-Making: Bargaining and Power*. Cambridge: Cambridge University Press (pp 47–48).

A (very) short introduction to the axiomatic and probabilistic approaches.

Week 04

The Banzhaf index

19 May (Thu), 12:00 – 14:00
S 25 (GEO II)

In week four we will look at the Banzhaf(-Penrose) index, one of the two main a priori indices. We will see how to calculate it, trying to motivate it on the basis of our previous discussions. As an example, we will also look at its axiomatisation due to Dubey and Shapley – the method is not without its critics but having a grasp on how axiomatisations proceed is useful for handling the literature. The Banzhaf axiomatisation, compared to Shapley-Shubik's, for example, is quite straight-forward so it's a good opportunity to learn the ideas behind the method. In week six we will analyse it from a probabilistic point of view.

COMPULSORY READINGS 03:

RR 03 DEADLINE:
17 May (Tue), midnight

Banzhaf III, John F. (1965). Weighted Voting Doesn't Work: A Mathematical Analysis. *Rutgers Law Review*, 19(2), 317–343 (focus on pp. 317–335).

Dubey, Pradeep & Shapley, Lloyd S. (1979). Mathematical Properties of the Banzhaf Index. *Mathematics of Operations Research*, 4(2), 99–131 (focus on pp. 99–106).

SUGGESTED READINGS:

Penrose, Lionel S. (1946). The Elementary Statistics of Majority Voting. *Journal of the Royal Statistical Society*, 109(1), 53–57.

Felsenthal, Dan & Machover, Moshé (1998). *The Measurement of Voting Power: Theory and Practice, Problems and Paradoxes*. Cheltenham: Edward Elgar (pp. 38–51).

Again, try to relate the index to our previous discussions: for example, you can start by asking yourself if it is a good measure of *voting* power (and why) and how it defines voting power. Having discussed power conceptually, we are now looking at reasonable ways of measuring it, so think about how well the Banzhaf index does that. Also, our goal after all is to be able to analyse institutions – can you anticipate any problems with achieving fair representation which such a power distribution cannot account for?

In your RRs, you can ignore the steps in the axiomatisation – we will go through them in class. Nevertheless, you should read and think about the axioms. Of how much help do you think they are, for example, in aiding us in comparing different power measures?

Week 05

The Shapley-Shubik index

25 May (Wed), 18:00 – 20:00

01.23 (GW II – across Claudia Ficht's office)

Having studied the Banzhaf index, in week five we will turn to the Shapley-Shubik measure. Again, we will learn how to calculate it as well as try to already compare the two indices.

RR 04 DEADLINE:

24 May (Tue), midnight

COMPULSORY READINGS 04:

Shapley, Lloyd S. & Shubik, Martin (1954). A Method for Evaluating the Distribution of Power in a Committee System. *The American Political Science Review*, 48(3), 787–792.

Laruelle, Annick & Valenciano, Federico (2008). *Voting and Collective Decision-Making: Bargaining and Power*. Cambridge: Cambridge University Press (pp. 41–44).

Felsenthal, Dan & Machover, Moshé (1998). *The Measurement of Voting Power: Theory and Practice, Problems and Paradoxes*. Cheltenham: Edward Elgar (pp. 35–38 for I-Power and pp. 171–176 for P-Power).

SUGGESTED READINGS:

Shapley, Lloyd S. (1988 [1953]). A Value for n-Person Games. In Alvin Elliot Roth (Eds), *The Shapley Value: Essays in Honor of Lloyd S. Shapley* (pp. 31–40). Cambridge/New York/Melbourne: Cambridge University Press.

> Shapley's original paper introducing his value for general cooperative games – Shapley-Shubik's index is an application of this value to simple games. If you are new to the Shapley value, read Roth's text first.

Roth, Alvin Elliot (1988). Introduction to the Shapley Value. In Alvin Elliot Roth (Ed.), *The Shapley Value: Essays in Honor of Lloyd S. Shapley* (pp. 1–27). Cambridge/New York/Melbourne: Cambridge University Press.

Dubey, Pradeep (1975). On the Uniqueness of the Shapley Value. *International Journal of Game Theory*, 4(3), 131–139.

> Dubey's axiomatisation of the Shapley value (and the Shapley-Shubik index). We won't look into it in class but you can try it out as an exercise.

Felsenthal, Dan & Machover, Moshé (1998). *The Measurement of Voting Power: Theory and Practice, Problems and Paradoxes*. Cheltenham: Edward Elgar (pp. 177–196 for the Shapley value and pp. 196–211 for the Shapley-Shubik index).

Dubey, Pradeep & Shapley, Lloyd S. (1979). Mathematical Properties of the Banzhaf Index. *Mathematics of Operations Research*, 4(2), 99–131.

> Having some knowledge of the Shapley-Shubik index, it is worth revisiting (at least the first part of) this text .

You are already in a position to compare the two indices so try to do that. One famous distinction between the Banzhaf/Shapley-Shubik indices is Felsenthal and Machover's I-Power/P-Power idea. So a possible line of a reading response could be an answer to the question: How persuasive does it sound to you? You can relate your ideas to the issues raised by Laruelle and Valenciano with respect to the axiomatic comparison of Banzhaf and Shapley-Shubik. In week six we will approach the two indices from a probabilistic point of view which would be an opportunity for you to go back to your RRs 04 and re-evaluate them.

Week 06

A probabilistic comparison

02 June (Thu), 12:00 – 14:00
S 25 (GEO II)

In week six we will give a probabilistic interpretation of both the Banzhaf and Shapley-Shubik indices. This is based on Owen's Multilinear Extension (MLE) as well as Straffin's – more intuitive – presentation of the same idea with respect to the two indices.

If time permits, we will also look at some other voting power measures proposed in the literature.

RR 05 DEADLINE:
31 May (Tue), midnight

COMPULSORY READINGS 05:

Straffin Jr., Philip D. (1988). The Shapley-Shubik and Banzhaf Power Indices as Probabilities. In Alvin Elliot Roth (Ed.), *The Shapley Value: Essays in Honor of Lloyd S. Shapley* (pp. 71–81). Cambridge/New York/Melbourne: Cambridge University Press (pp. 71–78).

SUGGESTED READINGS:

Owen, Guillermo (1988). Multilinear Extensions of Games. In Alvin Elliot Roth (Ed.), *The Shapley Value: Essays in Honor of Lloyd S. Shapley* (pp. 139–151). Cambridge/New York/Melbourne: Cambridge University Press (pp. 139–143).

Owen, Guillermo (1975). Multilinear Extensions and the Banzhaf Value. *Naval Research Logistics Quarterly*, 22(4), 741–750 (pp. 741–744).

Our presentation of the MLE is based on these two texts – don't worry about reading and understanding them before the lecture but feel free to consult them afterwards to make sure you have a good grasp of the idea.

Straffin Jr., Philip D. (1977). Homogeneity, Independence, and Power Indices. *Public Choice*, 30(1), 107–118 (pp. 107–113).

An earlier – and shorter – presentation of Straffin's probabilistic distinction between the Banzhaf/Shapley-Shubik indices.

You should be able to understand the main point – if not every single step in the model – of Straffin's comparison of the two indices from a probabilistic stand point (drop by and ask if you have difficulties!). Try to relate it to our discussions on conceptualising power in general and *a priori* power in particular.

Week 07

Achieving Fairness: Equality

16 June (Thu), 12:00 – 14:00
S 25 (GEO II)

Measuring voting power is not an end in itself. Usually our goal is to evaluate some institution and be able to say how fair or unfair it is or to even try to design a fair institution from scratch. Naturally, such an evaluation depends on a normative understanding of what 'fairness' means. In weeks seven and eight we will face the normative questions and look at two such understandings relevant to democratic representative systems (as the ones in your case studies). We will start with the problem of achieving equal representation ('one person, one vote') and see how Penrose's square root rule can help us do that.

Nevertheless, equal representation need not be (entirely) fair and we will try to come to grips with what exactly such 'deviations' could look like and how they could come about.

RR 06 DEADLINE:
14 June (Tue), midnight

COMPULSORY READINGS 06:

Felsenthal, Dan S. & Machover, Moshé (1998). *The Measurement of Voting Power: Theory and Practice, Problems and Paradoxes*. Cheltenham: Edward Elgar (pp. 63–72).

Dixon, Jr., Robert G. (1965). Reapportionment Perspectives: What Is Fair Representation?. *American Bar Association Journal*, 51(4), 319–324.

SUGGESTED READINGS:

Banzhaf III, John F. (1966). Multi-Member Electoral Districts. Do The Violate the 'One Man, One Vote' Principle. *The Yale Law Journal*, 75(8), 1309–1338 (focus on pp. 1319–1324).

> You might want to read this text and the one by Felsenthal and Machover side-by-side: Banzhaf gives a clearly written step-by-step reasoning leading to the square root rule.

Rosenthal, Albert J. (1968). Some Doubts Concerning the Proposal to Elect the President by Direct Popular Vote. *Villanova Law Review*, 14(1), 87–91.

> This is a direct response (part of a symposium) to Banzhaf's application of his work to the Electoral College (which will be the subject of a case study) – it probes into considerations, such as minority rights, beyond equality of representation.

Anderson, Margo J. (2015 [1988]). The Tribal Twenties: National Origins, Malapportionment, and Cheating by the

Numbers. In Margo J. Anderson, *The American Census: A Social History* (2nd. ed., pp. 133–155). New Haven/London: Yale University Press.

> A dramatic real-world example of Felsenthal and Machover's simple illustration of a rural-urban divide (p. 71 in the compulsory text).

Don't worry if you don't understand every step in the derivation of the square root rule – we will work it out in class. You can, thus, take the general result for granted. Nevertheless, you should be able to state what it says and what its assumptions are (as discussed informally by Felsenthal and Machover, and Banzhaf, for example). You are also particularly encouraged to think about the relation – and divergence – between equal and fair representation.

Week 08

Achieving Fairness: Majoritarianism

23 June (Thu), 12:00 – 14:00
S 25 (GEO II)

In week eight we will look at a second understanding of fairness which could seriously clash with the equality standard – namely, majoritarianism.

COMPULSORY READINGS 07:

RR 07 DEADLINE:
21 June (Tue), midnight

Felsenthal, Dan S. & Machover, Moshé (2005). Enlargement of the EU and Weighted Voting in its Council of Ministers. VPP 01/00. London: London School of Economics and Political Science (pp. 23–26).

Felsenthal, Dan S. & Machover, Moshé (1998). *The Measurement of Voting Power: Theory and Practice, Problems and Paradoxes*. Cheltenham: Edward Elgar (pp. 72–78).

SUGGESTED READINGS:

Foster, Hal (2000). The Great US Election Disaster. *London Review of Books*, 22(23), 36–37 (read also the comments).

Hertzberg, Hendrick (2004). Reckless Driver. *The New Yorker*, 25.

Lears, Jackson (2010). Naderland. *London Review of Books*, 32(7), 7–10 (focus on the comments).

We will go through the technical steps together so don't worry about them. You should, however, have an understanding of what the (mean) majority deficit is and why it is a problem. How do you think the choice – if necessary – between equality and majoritarianism should be resolved? Could there be other fairness standards clashing with these two (if yes, try to come up with a specific, not necessarily real-world, example)?

The three articles in the suggested readings give a serious recent example of a failing in majoritarianism (in fact, pluralism) – the US presidential election of 2000 when a candidate with a plurality of the popular vote (Gore) failed to be elected (this is not an isolated case though not too frequent either – a similar outcome has obtained in three other US elections). While not obligatory, for your RR 07 you are highly encouraged to discuss this case on the basis of the compulsory readings and everything we have learned so far. A thorny issue in this election – and in evaluating voting outcomes in general – was the assignment of responsibility. Revisit our discussions from a priori vs a posteriori analysis to ways of achieving fair representation and imagine you are to evaluate the outcome: how would you allocate responsibility? Give a critical response.

Week 09

A Sample Case Study

30 June (Thu), 12:00 – 14:00
S 25 (GEO II)

In the final week before your presentations I will present a sample case study based on the EU Council of Ministers. For the 6 CP students who are going to present during the next two weeks, you are encouraged to start thinking about your own assignments and raise issues and ask questions throughout the lecture. Use this – as every – class to the fullest: as a preparation but also as a risk-free venue where you can try out your own ideas. We will do the revision and a Questions & Answers session in the following week, so there will be time during and after the presentation to discuss everything.

For the 2 CP students, there is an extra RR on the Council of Ministers topic. It should be about 1,500 words (∼ three pages) and is due a month from this week (end of July), so you will have enough time to read the articles as well as go over any material you feel you need to revisit. The articles are two short opinion pieces and a short more neutral article on a 2007 controversy around Poland, particularly Poland's proposal to set up the Council weights according to the Penrose square root law. Try to comment on this while keeping in mind what we have discussed: what the square root law says, what its assumptions and purpose are, how it relates to the kind of power being equalised, what the conception as well as assumptions behind this power are, etc. You should now be in a position to give an *informed* opinion, drawing and revising if necessary your ideas in the previous RRs.

COMPULSORY READINGS:

Mulvey, Stephen (2007). Poles in war of words over voting. *BBC News*. Available at: `http://news.bbc.co.uk/2/hi/europe/6227834.stm`.

Baldwin, Richard & Widgrén, Mika (2007). Poland's square-root-ness. *Vox*. Available at: `http://voxeu.org/article/polands-square-root-ness`.

Charlemagne (2007). Why voting weights don't matter. *The Economist*. Available at: `http://www.economist.com/blogs/certainideasofeurope/2007/06/why_voting_weights_dont_matter`.

Felsenthal, Dan S. & Machover, Moshé (1997). The Weighted Voting Rule in the EU's Council of Ministers, 1958-95: Intentions and Outcomes. *Electoral Studies*, 16(1), 33–47.

This reading is **not** compulsory for the RR but it is relevant for the presentation so have a look at it if you want.

EXTRA RR DEADLINE:
31 July (Sun), midnight

SUGGESTED READINGS:

Felsenthal, Dan S. & Machover, Moshé (1998). *The Measurement of Voting Power: Theory and Practice, Problems and Paradoxes*. Cheltenham: Edward Elgar (pp. 142–170).

Brams, Steven J. & Affuso, Paul J. (1985). New Paradoxes of Voting Power on the EC Council of Ministers. *Electoral Studies*, 4(2), 135–139.

See pp. 234–237 of the Felsenthal and Machover text for a discussion.

Napel, Stefan & Widgrén Mika (2011). Strategic versus Non-Strategic Voting Power in the EU Council of Ministers: The Consultation Procedure. *Social Choice and Welfare*, 37(3), 511–541.

Week 10

07 July (Thu), 12:00 – 14:00

Revision and Questions & Answers session

S 25 (GEO II)

In this week we can go through anything that you are still unclear about so browse the material and bring your questions or worries. If there is interest, we can quickly get acquainted with some other popular indices. This will also be the perfect week to do the student evaluation forms and hear from you about what you liked/didn't like/found helpful/not so helpful/found lacking/etc.

Case Study Outlines

16 August (Tue), midnight

Instead of a presentation, there will be a case study outline of three pages. It is basically a written version of your presentation – so put in what you have done so far plus what you intend to do for your report. That way, afterwards I can give you feedback and suggestions. Of course, you might decide to change something for the report in the end, that's normal. But try to already come up with a detailed plan for your work (plus whatever part of it you have already done). Send them in by 16 August by e-mail. Then you'll have exactly a month for the report.

CASE STUDY 02:

Christina Meyer 3-page outline
United Nations General Assembly

CASE STUDY 04:

Kevan Skorna 3-page outline
US Electoral College

II. Case Studies: Outlines and Comments

Each of the four case studies concerns a representative system that can be described as a weighted voting game. Your broad task is the following:

> Imagine that the system is put before you in your capacity as a judge. You must decide whether it is a *fair* or an *unfair representative system* based on both a **positive** and a **normative** analysis. The normative side should inform your criterion (or criteria) of fairness while the positive side should help you determine whether this criterion is met. Both your presentation and your report should conclude with a clear decision that is substantiated by the two types of analysis.

Normative analysis
On the normative side, you should be explicit about the value you think the representative system should satisfy, i.e. you should think and be clear about the conditions under which you think the system can be said to be: 1) *representative* and 2) representative in a *fair* way. You should provide *reasons* for this criterion or criteria: for example, why be concerned about population proportionality, or majoritarianism, or the protection of minority interests. (Note that your conclusion need not be binary in the sense of 'the system is fair or unfair': if you base your analysis on *more than one* criterion, you might conclude that it is fair according to one and unfair according to another. Still, in such a case, try to provide recommendations for how to weigh the criteria or how to change the system so as to improve it.)

Positive analysis
On the positive side, you are expected to apply *at least two* power indices to your allotted system. It is up to you to choose which ones – Shapley-Shubik and/or some of the Banzhaf variants – but you should again give conceptual or methodological reasons for your choice.[1] That is to say, you should motivate your choice based on your conception of what you need to measure in order to determine whether the normative criterion is met. Don't spend time worrying about the technical side of the actual computation – you will use an on-line tool that does that quickly for you once you have, as you do, the weights and the quotas (see below). Your primary concern at this stage is not with coming up with the numbers but with making them speak. The main question you should be thinking about and answering is not 'How do I calculate the power distribution?' (the on-line tool will do that for you) but 'What do I do with the power distribution?' To this end, you are encouraged to 'play with' the voting games (for example, what would happen if you treat certain members as a bloc) and try out modified alternatives. You should also use additional data – beyond the game form – such as total population, population composition, or other characteristics you think are relevant to evaluating the fairness of the system.

[1] If you want to explore further power indices, let me know. It is not necessary for your assignments but we could discuss or have additional materials for some other popular measures.

Power calculations
The weighted voting games in the case studies are relatively large and you are not expected (or encouraged to try – the course will be over before you finish) to calculate your chosen indices by hand. You can use the 'Computer Algorithms for Voting Power Analysis' created by Dennis and Robert Leech:[2]

`http://homepages.warwick.ac.uk/~ecaae/`

Use the `ipdirect` or `ipgenf` algorithm for the Banzhaf indices[3]:

`ipdirect`: `http://homepages.warwick.ac.uk/~ecaae/ipdirect.html`
`ipgenf`: `http://homepages.warwick.ac.uk/~ecaae/ipgenf.html`

and the `ssdirect` or `ssgenf` algorithm for Shapley-Shubik:

`ssdirect`: `http://homepages.warwick.ac.uk/~ecaae/ssdirect.html`
`ssgenf`: `http://homepages.warwick.ac.uk/~ecaae/ssgenf.html`

Basic outline
Both your presentation and report should contain the following elements:[4]

1. DESCRIPTION OF THE INSTITUTION: You should describe the members and workings of your allotted institution including the players, the decision-making procedure as well as who is the *object* of representation (this will allow you to think about *fairness*), what kind of decisions the institution makes (legislative, budgetary, taxation, etc.) and *who* is affected by these decisions (this will aid you in thinking about *representation*). You should also address changes in the set-up – such as revisions of the weights and quota – as well as the reasons behind them or what they were trying to achieve. As a step towards your analysis think about any peculiar features of the institution: for example, are there any 'dominating' (in some sense) players, how are representatives elected (the first tier in a two-tier system) – at large? proportionally? – etc.

2. NORMATIVE PART: At some point you should state the normative criterion/criteria you are using (think about 'one person, one vote', majoritarianism, minorities, etc.). (See also previous page.)

3. POSITIVE PART: You should explain how this normative criterion can be met. For example, if you wanted to achieve or check if a system satisfies 'one man, one vote', how you would go about doing that. You should present your power analyses as well as any other, if any, statistical or computational results/descriptions you have prepared. (See also previous page.)

4. EVALUATION/CONCLUSION: Finally, you should integrate the previous two parts and arrive at a substantiated conclusion.

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[2] The website contains instructions which are quite straightforward. Nevertheless, speak to me if you have any questions or encounter problems.

[3] The absolute Banzhaf index is referred to as the Penrose index.

[4] You don't have to structure them under these headings or in such order – the organisation and format is up to you. But at some point or another you should describe and engage with these points.

Comments

Don't take your judge role literally! You should present not a legal but a philosophical and power analysis. Of course, if there are some key legal considerations – such as the constitutional requirement of equality in the US – you should take them into account, particularly in your normative thinking. But don't get tangled up in legal cases and precedents – let them inform your thinking, if they must, but then put them aside and make your own judgement.

Obviously, any power analysis lies on an idea of why it is important to measure the worth of people's votes. One such idea is equality so you should take this as a *minimum* requirement – how to achieve 'one person, one vote', for example. But you should go beyond mere equality and interrogate whether there are – in the context of your institution – any other possible claims of over/under-representation or unfairness.

PRESENTATION

Your presentation should be about 30 min. followed by an about 15 min. discussion during which you will get feedback from the class. You will get a summary of this and other feedback from me after the presentation – send me your slides after you have presented!

The presentation should end with your at least tentative conclusion based on your work so far. If there are points or studies you didn't have time to look into/carry out, state them in your presentation and draw out the implications, i.e. how they would affect your analysis: for example, you might say 'My preliminary conclusion based on A, B, C and D is X. But I still have to carry out E and F. If it turns out that G is the case, then I would have to conclude Y.'

REPORT

Your written report should tie all the loose ends of your presentation and contain a full analysis of your case study. You will have time to consider anything that was outstanding before as well as think about and incorporate the feedback.

The report should be at least 3,000 and maximum 4,000 words (excluding references – the style is up to you, just keep it consistent) properly structured and referenced. As in your RRs, use a readable 12pt font with 1.25 line spacing and allow for some margins. The last presentations are on 14 July and you will get the feedback summary immediately after (don't forget to send me your slides). **The deadline for submitting the reports is midnight on 16 September (Friday)**, i.e. two months afterwards. Send them via e-mail to me.

LITERATURE

Each case study description contains references to some relevant literature. You are free to find more (and encouraged to do so for the report) although it is meant to be sufficient for starting you off on preparing and conducting your own analysis. So, particularly for the presentation, it might be wise to stick to this literature and not waste time getting buried in more – it is perfectly enough to understand the given institution as well as the main problems you would potentially need to address. Nevertheless, if an issue you want to tackle involves collecting more statistics, for example, you would need to do so.

Case Study 01

Nassau Board of Supervisors

Nassau is one of New York state's sixty two counties. Weighted voting games have characterised its main legislative body, the Nassau Board of Supervisors, ever since the beginning of the twentieth century and up to 1993 when the system was finally pronounced unconstitutional. Throughout this period, Nassau's decision-making procedure has been subject to a series of amendments, controversies and litigations, particularly due to the very special size of its biggest town, Hempstead. Table 1 summarises the weighted voting systems used by the Board during the twentieth century.

Table 1: Nassau Board of Supervisors: Weights & quotas, 1918–1993

Supervisor	**Voting weights**				
	1918–1921	1922–1936	1938–1971†	1972–1981	1982–1993
Hempstead town, I	4	4	7	35	30
Hempstead town, II	4	4	7	35	28
Oyster Bay town	2	2	3	32	22
North Hempstead town	2	2	6	23	15
Long Beach city	*	1	1	3	7
Glen Cove city	*	1	1	2	6
Total	12	14	25	130	108
Quota	**6**	**7**	**15**	**71**	**65**
——*% of total*	*50%*	*50%*	*60%*	*55%*	*60%*

* Indicates years prior to the incorporation of a city.
† This weight distribution was revised in 1942 and 1962 but there is no explicit public data. Nevertheless, the same principle of *qualified* majority established in 1938 held throughout the whole period so you can use these weights to analyse it.

Source: Grofman and Scarrow (1979), *Jackson v. Nassau County &c.* (1993), *League of Women Voters &c.* (1984).

While following the guidelines when working on this case study, be sure to outline the reasons for the number of modifications to Nassau's weighted voting system – what were the reasons for them and what were they trying to achieve? Can you find weights and a quota that meet the 'one person, one vote' principle? What happens when you treat Hempstead's two supervisors as a single player? Like many states and counties in the US in the 1940s, Nassau went through a fairly quick rural-urban transition. Additionally, it had a consistent and – towards the second half of the century – growing ethnic minority of African-American citizens. Consult Table 2 and think about what Nassau's population composition implies for representation. Find out how representatives are elected from the five municipalities (towns and cities) – when did the county see its first elected African-American representative?

Finally, given your evaluation of the institution, trace the post-1993 version of Nassau's legislature. Does it solve the problems, if any, you have identified? How would you go about fixing them, if you had to?

LITERATURE: You can find an explanation of how New York counties are governed, including the role of the Board of Supervisors, in Johnson (1969: 4–7). Further discussion of New York, with brief references to Nassau, is in Grofman and Scarrow (1981). The particular case of Nassau – the problems with its weighted voting system as well as all related litigation – is discussed in Felsenthal and Machover (1998: 117–132) and in Grofman and Scarrow (1979, particularly pp. 177–183). On this point, see also Imrie (1973). The two cases – *Jackson v. Nassau County &c.* (1993) and *League of Women Voters &c.* (1984) – also contain factual information on the county's voting system and the worries motivating the challenges to it.

POWER ALGORITHM: As the size of the voting body in this case study is extremely small, it does not matter whether you use the `ipdirect` or `ipgenf` algorithm for the Banzhaf indices, or the `ssdirect` or `ssgenf` algorithm for Shapley-Shubik – it's up to you.

References

Felsenthal, Dan S. & Machover, Moshé (1998). *The Measurement of Voting Power: Theory and Practice, Problems and Paradoxes*. Cheltenham: Edward Elgar.
Grofman, Bernard & Scarrow, Howard (1979). Iannucci and Its Aftermath: The Application of the Banzhaf Index to Weighted Voting in the State of New York. In Steven Brams, Andrew Schotter and Gerhard Schwödiauer (Eds.), *Applied Game Theory* (pp. 168–183). Würzburg, Wien: Physica-Verlag.
Grofman, Bernard & Scarrow, Howard (1981). Weighted Voting in New York. *Legislative Studies Quarterly*, 6(2), 287–304.
Imrie, Robert W. (1973). The Impact of the Weighted Vote on Representation in Municipal Governing Bodies of New York State. *Annals of the New York Academy of Sciences*, 219(1), 192–199.
Johnson, Ronald E. (1969). An Analysis of Weighted Voting as Used in Reapportionment of Country Governments in New York State. *Albany Law Review*, 34(1), 1–45.

Cases:

Jackson v. Nassau County Board of Supervisors (1993). 818 Federal Supplement 509.
League of Women Voters of Nassau County v. Nassau County Board of Supervisors (1984). 737 F.2d 155.

Table 2: Nassau County: Population Characteristics, 1910–1990

	1910	1920	1930	1940	1950	1960	1970	1980	1990
NASSAU	83,930	126,120	303,053	406,748	672,765	1,300,171	1,428,838	1,321,582	1,287,348
—Geography									
——Urban	13,467	42,993	139,242	195,750	267,626	1,295,650	1,424,277	1,317,547	1,282,701
——(%)	16.05%	34.09%	45.95%	48.13%	39.78%	99.65%	99.68%	99.69%	99.64%
——Rural	70,463	83,127	163,811	210,998	405,139	4,521	3,803	4,035	4,647
——(%)	83.95%	65.91%	54.05%	51.87%	60.22%	0.35%	0.27%	0.31%	0.36
—Ethnicity									
——White	81,541	122,934	294,747	393,213	655,008	1,258,566	1,355,754	1,204,208	1,115,119
——(%)	97.15%	97.47%	97.26%	96.67%	97.36%	96.80%	94.89%	91.12%	86.62%
——African-American	2,317	3,036	7,960	13,226	16,955	21,336	65,679	90,743	111,,057
——(%)	2.76%	2.41%	2.63%	3.25%	2.52%	1.64%	4.60%	6.87%	8.63%
Glen Cove city	*	8,664	11,430	12,415	15,130	23,817	25,770	24,618	24,149
——% of county	*	6.87%	3.77%	3.05%	2.25%	1.83%	1.80%	1.86%	1.88%
—Ethnicity									
——White	*	N/A	10,583	11,500	13,744	21,698	23,868	22,091	20,719
——(%)	*	N/A	92.59%	92.63%	90.84%	91.10%	92.62%	89.74%	85.80%
——African-American	*	N/A	812	973	1,357	2,032	1,739	1,647	1,883
——(%)	*	N/A	7.10%	7.84%	8.97%	8.53%	6.75%	6.69%	7.80%
Hempstead town	44,297	70,790	186,735	259,318	432,506	740,738	801,592	738,517	725,639
——% of county	52.78%	56.13%	61.62%	63.75%	64.29%	56.97%	56.10%	55.88%	56.37%
—Ethnicity									
——White	N/A	N/A	182,334	250,729	175,078	702,987	750,872	656,610	605,481
——(%)	N/A	N/A	97.64%	96.69%	40.48%	94.90%	93.67%	88.91%	83.44%
——African-American	N/A	N/A	4,250	8,422	6,031	24,206	46,784	68,492	87,644
——(%)	N/A	N/A	2.28%	3.25%	1.39%	3.27%	5.84%	9.27%	12.08%
Long Beach city	*	*	5,817	9,036	15,586	26,473	33,127	34,073	33,510
——% of county	*	*	1.92%	2.22%	2.32%	2.04%	2.32%	2.58%	2.60%
—Ethnicity									
——White	*	*	5,742	8,833	15,294	25,543	30,604	29,612	29,163
——(%)	*	*	98.71%	97.75%	98.13%	96.49%	92.38%	86.91%	87.03%
——African-American	*	*	65	194	286	869	2,236	3,293	2,599
——(%)	*	*	1.12%	2.15%	1.83%	3.28%	6.75%	9.66%	7.76%
North Hempstead town	17,831	26,370	62,202	83,385	142,613	219,088	235,007	218,624	211,393
——% of county	21.25%	20.91%	20.53%	20.50%	21.20%	16.85%	16.45%	16.54%	16.42%
—Ethnicity									
——White	N/A	N/A	60,195	80,401	65,205	192,831	221,296	198,395	182,710
——(%)	N/A	N/A	96.77%	96.42%	45.72%	88.02%	94.17%	90.75%	86.43%
——African-American	N/A	N/A	1,913	2,888	1,076	18,825	12,184	13,561	13,922
——(%)	N/A	N/A	3.08%	3.46%	0.75%	8.59%	5.18%	6.20%	6.59%
Oyster Bay town	21,802	20,296	36,869	42,594	66,930	290,055	333,342	305,750	292,657
——% of county	25.98%	16.09%	12.17%	10.47%	9.95%	22.31%	23.33%	23.14%	22.73%
—Ethnicity									
——White	N/A	N/A	35,803	41,820	19,432	243,247	329,114	297,500	277,046
——(%)	N/A	N/A	97.11%	98.18%	29.03%	83.86%	98.73%	97.30%	94.67%
——African-American	N/A	N/A	920	748	619	790	2,736	3,750	5,009
——(%)	N/A	N/A	2.50%	1.76%	0.92%	0.27%	0.82%	1.23%	1.71%

* Indicates census decennials prior to the incorporation of a city.
333 Indicates data which is approximated from available statistics.
N/A Indicates census decennials where data is missing.

Source: The United States Census Bureau, Official Decennial Census of Population and Housing, 1910–1990.

Case Study 02

United Nations General Assembly

The General Assembly is the only one of the key decision-making bodies in the United Nations that is to this day based on equal representation. That is to say, every member country, regardless of size, GDP, etc., is endowed with a single vote in the Assembly. In this case study, you are going to analyse the Assembly during its very first session in 1946.[5] Its characteristics are summarised in Table 3.

As a first step, you should explain the role of the Assembly, the kind of decisions it takes and the reasons behind using the 'one country, one vote' principle. That is, what was (and is) the normative motivation behind giving equal representation to each *country* (instead of its *population*)? Any index you take will give you the same result when applied to this system: in fact, you don't need an index to tell you what the voting power of each country is – can you guess? You should also determine if there are under- and over-represented countries. What is the minimal share of the population of these countries that can pass a proposal? (*Hint*: Order the countries from least to most populous and start adding up the votes from the smallest onwards until you reach the quota – what is the share of these countries' population from the total?)

More interestingly, you should consider various blocs or groups of countries. In other words, by taking a number of members as a single player and giving to this player the sum of the single votes of the respective countries, you can construct a number of interesting weighted voting games to shed light on how power is distributed across such 'global spheres'. These groupings are up to you – for example, you might use the blocs in Dixon (1983), or in Newcombe, Wert and Newcombe (1971), or continents, or the global South and North (global West and East, respectively). Don't forget to calculate the total population of each bloc so that you can compare it to the power distributions you get. What do your results tell you about the representation of *citizens* in the Assembly? (Additionally, you could think of another criterion – GDP, for instance – and compare your results to that.)

This arrangement has been criticised by a number of countries (which ones do you think?), proposals for its substitution with a weighted voting system accumulating over the years. Consider the weighted voting game proposed in Table 3. Discuss it as a proposal for a *fair representative* system in the UN. Also, use it to evaluate the power of the blocs you focused on previously and compare your results.

LITERATURE: Have a look at Penrose's (1946) very short article, in which he not only introduced his version of the Penrose-Banzhaf Index but also the Square Root Law. The paper concludes with an application to the then emerging UN. When thinking about the fairness of the 'one state, one vote' principle as applied to the UN, have a look at McNicoll (1999). Newcombe, Wert and Newcombe (1971), Newcombe, Young and Sinaiko (1977) and Dixon (1983) all deal with measuring power of various blocs in the UN.

[5] When the number of member countries was still relatively small.

POWER ALGORITHM: As the size of the General Assembly is relatively large, you should use the `ipgenf` algorithm for the Banzhaf indices, or the `ssgenf` algorithm for Shapley-Shubik.

References

Dixon, William J. (1983). The Evaluation of Weighted Voting Schemes for the United Nations General Assembly. *International Studies Quarterly*, 27(3), 295–314.
McNicoll, Geoffrey (1999). Population Weights in the International Order. *Population and Development Review*, 25(3), 411-442.
Newcombe, Hanna, Wert, James & Newcombe, Alan (1971). Comparison of Weighted Voting Formulas for the United Nations. *World Politics*, 23(3), 452–492.
Newcombe, Hanna, Young, Christopher & Sinaiko, Elia (1977). Alternative Pasts: A Study of Weighted Voting at the United Nations. *International Organization*, 31(3), 579–586.
Penrose, Lionel Sharples (1946). The Elementary Statistics of Majority Voting. *Journal of the Royal Statistical Society*, 109(1), 53–57.

Table 3: UN General Assembly: I. Session, 1946

	Country	Population ('000), 1950	*Actual*: Votes ('one state, one vote')	*Proposal*: Votes (proportional to population)
1	Argentina	17,150	1	10
2	Australia	8,177	1	5
3	Austria	6,938	1	4
4	Belarus	7,745	1	5
5	Belgium	8,628	1	5
6	Bolivia	2,714	1	2
7	Brazil	53,975	1	31
8	Bulgaria	7,251	1	4
9	Canada	13,737	1	8
10	Chile	6,082	1	4
11	China	543,776	1	316
12	Colombia	12,000	1	7
13	Costa Rica	966	1	1
14	Cuba	5,920	1	3
15	Denmark	4,268	1	2
16	Dominican Rep.	2,380	1	1
17	Ecuador	3,452	1	2
18	Egypt	21,514	1	13
19	El Salvador	2,200	1	1
20	Ethiopia	18,128	1	11
21	France	41,832	1	24
22	Greece	7,566	1	4
23	Guatemala	3,146	1	2
24	Haiti	3,221	1	2
25	Honduras	1,487	1	1
26	India	376,325	1	219
27	Iran	17,119	1	10
28	Iraq	5,719	1	3
29	Lebanon	1,335	1	1
30	Liberia	930	1	1
31	Luxemburg	296	1	1
32	Mexico	28,296	1	16
33	Netherlands	10,027	1	6
34	New Zealand	1,908	1	1
35	Nicaragua	1,295	1	1
36	Norway	3,265	1	2
37	Panama	860	1	1
38	Paraguay	1,473	1	1
39	Peru	7,632	1	4
40	Philippines	18,580	1	11
41	Poland	24,824	1	14
42	Russia	102,799	1	60
43	Saudi Arabia	3,121	1	2
44	South Africa	13,683	1	8
45	Syria	3,413	1	2
46	Turkey	21,238	1	12
47	Ukraine	37,298	1	22
48	UK	50,616	1	29
49	US	157,813	1	92
50	Uruguay	2,239	1	1
51	Venezuela	5,094	1	3
	Total	**1,701,451**	**51**	**990**
	Quota (*two-thirds of total*)		34	660

Case Study 03

US House of Representatives

In Shapley and Shubik's text in (and the lecture notes for) week 05, we have seen the workings of the complex US federal game, consisting of the President, Senate and House of Representatives. In this case study, you are to ignore the first two chambers of Congress and focus on the power – and representation – within the House. The decision-making process in the House can be represented as a weighted voting game with US states as the relevant players and a certain quota as the rule ensuring passage or defeat of a bill.

The tricameral Congress system was agreed on after heated debates and a compromise during the so called Philadelphia Convention of 1787 which, most famously, lead to the signing of the US Constitution. Your task will be to analyse the proposals and outcome of these discussions and decide whether you think the result was, in the words of Lincoln about a century later, a 'government of the people, by the people, for the people'. The final form of Congress, known as the Connecticut Compromise, consisted of what we have today: two chambers – a Senate where every state has the same number of votes, and a House where votes are proportional to population. The reason it is called a compromise is that it merged two different proposals, the so called Virginia, or Large States, Plan and the New Jersey, or Small States, Plan. The first provisioned two chambers, *both* apportioned according to population, while the second proposed a single chamber where every state has the same number of votes. These details are summarised in Table 4. The final form of the House that emerged from the Convention is summarised in Table 5.

When describing the institution in this case study, you should put it in the context of the larger Congress system. Some questions to consider are: what was at stake in the debates, i.e. what was the motivation and worries behind the two Plans? why are they called the Large States and the Small States Plan? it is said that the final Senate was meant to represent *states* while the final House was meant to represent *citizens* – why? representation during the Convention was based on free men and *three-fifths* of the slaves in the state – why? what kind of decisions does the House make?

A particularly pronounced critique of the Virginia Plan came from one of Maryland's five delegates at the Convention, Luther Martin[6] – the person now credited, thanks to Riker (1986), as the author of the first power index (or at least the intuition behind such indices). He worried that the Plan's provisions gave too much power of large states over small states. Do you think that was true? In addition to the weighted games given in the two Tables, 'play around' with the weights – for instance, consider games where large states act as a bloc (a single player), or games where both large and small states act as separate blocs, or interrogate the North-South divide by again considering blocs of states. Finally, draw your conclusion(s) about how fair the Connecticut House was with respect to representation.

LITERATURE: As a very short and easy introduction to the case study, read Riker (1986) first – he mentions a number of problems involved in the situation. After-

[6] Not Martin Luther!

wards, it might be helpful to read Felsenthal and Machover's (2005) discussion. As background reading to the actual Convention, read Reynolds II (1987) who offers a detailed description of Luther Martin's role and objections at the Convention as well as the major points of contention. Luther Martin's actual words are in Martin (1787).

POWER ALGORITHM: The size of the House is small enough to be handled by both the `ipdirect` or `ipgenf` algorithms for the Banzhaf indices, as well as the `ssdirect` or `ssgenf` algorithms for Shapley-Shubik – which ones you use is up to you.

References

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Reynolds II, William L. (1987). Luther Martin, Maryland and the Constitution. *Maryland Law Review*, 47(1), 291–321.

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Table 4: The Virginia and New Jersey Plans

	State	Population†	Sq. root of population	Virginia Plan: Delegates (votes)‡	New Jersey Plan: Delegates (votes)ϒ
1	Virginia	420,000	648	5	1
2	Pennsylvania	360,000	600	4	1
3	Massachusetts	360,000	600	4	1
4	New York	233,000	483	2	1
5	Maryland	218,000	467	2	1
6	Connecticut	202,000	449	2	1
7	North Carolina	200,000	447	2	1
8	South Carolina	150,000	387	2	1
9	New Jersey	138,000	372	1	1
10	New Hampshire	102,000	319	1	1
11	Georgia	90,000	300	1	1
12	Rhode Island	58,000	241	1	1
13	Delaware	37,000	192	1	1
	Total	**2,568,000**	**5,505**	**28**	**13**
	Quota			15	7

† The population numbers are those used during the Philadelphia Convention, as reported by the South Carolina delegate Charles Cotesworth Pinckney (1788: 283). The eligible population, on the basis of which the convention assigned representatives, consisted of free men and three-fifths of the slaves in a state.

‡ These were the number of votes provisioned by the Virginia Plan for *both* chambers.

ϒ The New Jersey Plan provisioned just *one* chamber with these number of votes.

Table 5: The Connecticut Compromise: House of Representatives

	State	Population[†]	Sq. root of population	Delegates (votes)[‡]
1	Virginia	420,000	648	10
2	Pennsylvania	360,000	600	8
3	Massachusetts	360,000	600	8
4	New York	233,000	483	6
5	Maryland	218,000	467	6
6	Connecticut	202,000	449	5
7	North Carolina	200,000	447	5
8	South Carolina	150,000	387	5
9	New Jersey	138,000	372	4
10	New Hampshire	102,000	319	3
11	Georgia	90,000	300	3
12	Rhode Island	58,000	241	1
13	Delaware	37,000	192	1
	Total	**2,568,000**	**5,505**	**65**
	Quota			33

[†] See the notes to Table 4.

[‡] These were the number of votes in the House.

Case Study 04

US Electoral College

In this case study, you are going to analyse the Electoral College – the system by which the United States *indirectly* elects its President. There are provisions for what happens in case the Electoral College fails to make a choice, but you are to ignore them: then you end up with a weighted voting game with the states as the relevant players and a majority quota which has to be passed for a candidate to be elected.

You should start by describing the institution, addressing in particular some features which are important to this system. These include the following, among others: who are the electors? how are they elected? who votes in the College? what was the motivation behind choosing an indirect electoral system?

The actual weighted voting game during the 2000 election is summarised in Table 6. Based on your power analysis, estimate each state's power in the Electoral College game: does *each* citizen have an equal ability of electing their President?

An interesting task is to analyse the game based on blocs of states. That is to say, group states into a single player and give that player a voting weight equal to the sum of its states. You can choose what blocs to look into but popular divisions that shed light on the power dynamics in the College are, for example, blocs of North and South states as well as blocs of Democratic, Republican and swing states.

Two other tasks to think about are the following. What is the minimal group of citizens who can elect a President? (*Hint*: Order the states from least to most populous and start adding up the votes from the smallest onwards until you reach the quota – what is the share of these state' population from the total?) The 2000 election is fairly unique as it was one of the few times when the elected President (George W. Bush) had not won the popular vote (that was Albert Gore, Jr.). Explain how this could happen. Can you think of a way of fixing this problem while retaining the weighted voting game form of the College?

LITERATURE: A very thorough discussion of the Electoral College system is in a 1968 symposium in the *Villanova Law Review*. Start with Banzhaf (1968) and continue with the comments by Bayh (1968), Mundt (1968), Sparkman (1968) and Peirce (1968). Read also Rosenthal (1968) and Sickels (1968). Miller (2013) is an excellent recent discussion of the issues around the College. Data on the 2000 election is in National Archives and Records Administration (n.d.).

POWER ALGORITHM: As the size of the Electoral College is relatively large, you should use the `ipgenf` algorithm for the Banzhaf indices, or the `ssgenf` algorithm for Shapley-Shubik.

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Table 6: The Electoral College in 2000

	State	Population†	Electoral votes
1	Alabama	4,040,587	9
2	Alaska	550,043	3
3	Arizona	3,665,228	8
4	Arkansas	2,350,725	6
5	California	29,760,021	54
6	Colorado	3,294,394	8
7	Connecticut	3,287,116	8
8	Delaware	666,168	3
9	D.C.	606,900	2
10	Florida	12,937,926	25
11	Georgia	6,478,216	13
12	Hawaii	1,108,229	4
13	Idaho	1,006,749	4
14	Illinois	11,430,602	22
15	Indiana	5,544,159	12
16	Iowa	2,776,755	7
17	Kansas	2,477,574	6
18	Kentucky	3,685,296	8
19	Louisiana	4,219,973	9
20	Maine	1,227,928	4
21	Maryland	4,781,468	10
22	Massachusetts	6,016,425	12
23	Michigan	9,295,297	18
24	Minnesota	4,375,099	10
25	Mississippi	2,573,216	7
26	Missouri	5,117,073	11
27	Montana	799,065	3
28	Nebraska	1,578,385	5
29	Nevada	1,201,833	4
30	New Hampshire	1,109,252	4
31	New Jersey	7,730,188	15
32	New Mexico	1,515,069	5
33	New York	17,990,455	33
34	North Carolina	6,628,637	14
35	North Dakota	638,800	3
36	Ohio	10,847,115	21
37	Oklahoma	3,145,585	8
38	Oregon	2,842,321	7
39	Pennsylvania	11,881,643	23
40	Rhode Island	1,003,464	4
41	South Carolina	3,486,703	8
42	South Dakota	696,004	3
43	Tennessee	4,877,185	11
44	Texas	16,986,510	32
45	Utah	1,722,850	5
46	Vermont	562,758	3
47	Virginia	6,187,358	13
48	Washington	4,866,692	11
49	West Virginia	1,793,477	5
50	Wisconsin	4,891,769	11
51	Wyoming	453,588	3
	Total	**248,709,873**	**538**
	Quota		270

† The 2000 elections were based on the 1990 population census.

Source: The United States Census Bureau, Official Decennial Census of Population and Housing, 1990; National Archives and Records Administration (n.d.).