Fr Polit (2018) 16:80–95
https://doi.org/10.1057/s41253-017-0050-9

DATA, MEASURES AND METHODS

Causation, lawhood and determinism in electoral systems research: why 'Duverger's law' deserves to be called a law

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Published online: 7 November 2017

Abstract In the 1950s, Maurice Duverger formulated several propositions connecting electoral systems and the number of political parties partaking in the election. For example, he put forward that a simple-majority single-ballot system favours the two-party system. This claim has been referred to as *Duverger's law*. Throughout the years, there has been a lot of debate about whether this claim (and other generalisations in the social sciences) deserves to be called a 'law'. In this paper, we defend the view that Duverger's law does deserve to be called a law. To argue for this, we present an account of lawhood based on the work of the philosopher Sandra Mitchell. In this account, the criterion for lawhood is spatio-temporal stability (and not, for example, determinism). We argue that spatio-temporal stability is the reason that many of the laws of physics are considered laws. We then show that Duverger's law is spatio-temporal in the same way that many of the laws of physics are. Correspondingly, we conclude that Duverger's law deserves to be called a law, as much as many of the laws of physics deserve this title. We finish with a reflection on the difference between determinism and lawhood, and argue that they should be separated conceptually.

Keywords Electoral systems · Maurice Duverger · Sandra Mitchell · Scientific laws

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Introduction

The French political scientist Maurice Duverger became famous in the 1950s for his work on the relation between electoral systems and the number of political parties. His key propositions are the following (Benoit 2006, p. 70; Duverger 1959, pp. 217, 239):

(D1) The simple-majority single-ballot system favours the two-party system
(D2) Proportional representation favours multi-partism
(D3) The majority system with a second-round runoff favours multi-partism

In a simple-majority single-ballot system, there is one member of parliament to be elected in each voting district. The candidate who gets more votes than any other candidate is elected (even if there is no majority, i.e. the candidate's score is less than 50%). Duverger considers two other systems: proportional representation (multiple members of parliament for each district; seats allocated based on percentage of votes for each political party) and the majority system with a second-round runoff (if no candidate receives more than 50% of the initial votes, there is a second round with the top two candidates).

Note that at this stage we use the neutral label 'proposition' for (D1)–(D3). As Kenneth Benoit notices, there is a divergence in the labels attributed by political scientists after Duverger:

> The former proposition, linking two-party to single-member district plurality electoral systems, came to be known as *Duverger's law*, mainly because Duverger himself had termed this relationship a law. The second proposition, stating that under proportional systems there is a tendency towards multipartism, came to be known as *Duverger's hypothesis*. (2006, p. 70; italics in original)

This labelling habit raises two epistemological questions which we will address in this paper. The first question is:

(1) Is there a good epistemological reason to call (D1) a 'law'?

We will argue that the answer to this question is positive. The second question is:

(2) Is there a good epistemological reason to call (D2) and (D3) also 'laws'?

Benoit seems to believe that the answer to question (1) is negative, since he claims that it 'retains the label of "law" mainly through force of habit' (2006, p. 76). This is our first motivation to write this paper: we disagree with this judgement and want to argue against it. Other political scientists (e.g. Colomer 2005) seem to be hesitant. They sometimes use the label 'law' (for all propositions), while on other occasions they use the label 'hypothesis'. This gives us a second motivation to write this paper. We think there is no reason to hesitate: (D1)–(D3) deserve to be called laws.

The structure of this paper is as follows. In the section "Duverger's propositions: meaning and evidence", we present background knowledge about Duverger's propositions which we need in the following sections. In "The spatio-temporal stability of Duverger's (first) law", we show that (D1) is a causal generalisation with *very high spatio-temporal stability*. In "Sandra Mitchell's account of scientific laws and its application to Duverger", we show that spatio-temporal stability is what matters according to recent philosophical theories of scientific laws, and that this is the property which makes laws of nature (i.e. laws formulated by the natural sciences) laws. The sections "The spatio-temporal stability of Duverger's (first) law" and "Sandra Mitchell's account of scientific laws and its application to Duverger" together constitute and support our positive answer to question (1). In "Duverger's hypothesis versus Duverger's law", we show that (D2) and (D3) also have very high spatio-temporal stability. They have the same epistemological status as (D1), which implies a positive answer to question (2). In "Lack of conceptual separation between determinism and lawhood", we point out that the concepts of 'lawhood' and 'determinism' should not be mixed up, while such mixing has occurred in the labelling history of Duverger's propositions.

While this paper is certainly interesting for philosophers of science (it gives examples of how certain concepts can be applied), our main target audience consists of political scientists and other social scientists. Our paper offers a conceptual framework for thinking about lawhood in the social sciences, with Duverger as an exemplar to show how the framework functions.

Duverger's propositions: meaning and evidence

(D1)–(D3) are generalisations: they are not about one object (e.g. one country), but about a group of objects (viz. the set of democratic countries—countries that have democratic elections). In the "Causation, intervention and asymmetry" subsection, we explain in more detail what it means that they are *causal* generalisations. In the "Correlations and underlying mechanisms" subsection, we briefly present the evidence for the claims.

Causation, intervention and asymmetry

As is well known, correlation does not imply causation. Benoit gives the following example:

> Consider the well-known relationship between where students sit in a classroom and their grades in that course. Better students tend to sit toward the front, but this association does not imply that moving a given student from the back to the front row will guarantee he or she receives a better grade. (2007, p. 368)

We use this example because it uses an idea that is important for causation: intervening. If by intervening on where students sit (i.e. moving them) you can improve their grades, then there is a causal relation between classroom location and

grades. Otherwise, this is a mere correlation (due to a common cause). Analogously, claims (D1)–(D3) imply more than a correlation. (D1) means that if we intervened on electoral systems (i.e. give all countries a simple-majority single-ballot system), the number of countries with a two-party system would increase. And (D2) means that if we intervened in the opposite way (i.e. impose proportional representation systems in all countries), the number of countries with a multiparty system would increase.

To clarify the meaning of intervening further, let us consider one of the reversed claims:

> Multi-partism (as result of a given election) favours proportional representation (as an electoral rule in the given election).

Suppose that after an election in a simple-majority single-ballot system two political parties are represented in the parliament of a country. Then, you intervene on this: you force each party to split up in three smaller ones. No one believes that such an intervention could change the electoral laws under which the elections took place: that would be backward causation. This intervention may have an effect on electoral laws at future elections, but not on electoral laws valid at past elections.[1]

Correlations and underlying mechanisms

Duverger performed an extensive comparative study of the relation between electoral systems and number of parties. His evidence supports the view that there is a correlation:

- In countries with a two-party system, the simple-majority single-ballot system occurs more than on average in all democratic countries.
- Conversely, the probability that a country with a simple-majority single-ballot system has a two-party system is higher than the probability of two-party systems in all democratic countries.

This correlation is a good starting point for the argumentation. But correlation does not imply causation. Duverger brings in a causal direction by invoking two social mechanisms, which he labels ‘the mechanical effect’ and ‘the psychological factor’. Benoit explains these mechanisms thus:

> The mechanical effect of electoral systems describes how the electoral rules constrain the manner in which votes are converted into seats, while the psychological factor deals with the shaping of voter (and party) responses in anticipation of the electoral law’s mechanical constraints. (Benoit 2006, p. 72)

Let us look at the first mechanism in more detail. When polling stations are closed, votes are counted. This is done by people (with all kinds of technological

[1] In a similar way, one cannot affect the number of people that have smoked 20 years ago by somehow curing all the lung cancers now. This is why we don’t believe that current lung cancer is a cause of past smoking. But current lung cancer may be a cause of future smoking (e.g. because people reason that they will die anyway because of lung cancer, so they may as well smoke as much as they want).

assistance) who perform certain roles in the electoral system, e.g. 'chairman of totalization office' or 'secretary' or 'assessor' in such offices. The interaction between all these people which count and process votes in a predetermined, highly structured way leads to the proclamation of a result (again by an individual with a specific social role) in terms of seats in the parliament.

This whole process is an input–output system in which votes are processed according to certain electoral rules and result in a distribution of seats. There is always a certain mismatch between share of votes and share of seats. As Benoit puts it:

> The mechanical effect of electoral systems operates on parties through the direct application of electoral rules to convert votes into seats. In the mapping of vote shares to seat shares, some parties—almost always the largest ones—will be 'over-represented,' receiving a greater proportion of seats than votes. Because this mapping is a zero-sum process, over-representation of large parties must create 'under-representation' of the smaller parties. (2006, p. 73)

The key to understanding the 'mechanical effect' is the fact that the degree of over-representation of large parties varies: in simple-majority single-ballot electoral systems, application of the electoral rules leads, on average, to higher over-representation of large parties than the application of electoral rules in proportional representation systems.

An important aspect of this mechanism is that it is causally directed. The people involved do not count seats and convert them into votes. They count votes and convert them into seats. And electoral rules are also an input of the process, not an output. The rules are in the heads of the individuals (and implemented in the computer programmes they use). They are in no way an output of the vote processing system.

About the second mechanism, Benoit writes:

> Duverger's psychological effect comes from the reactions of political actors to the expected consequences of the operation of electoral rules. The psychological effect is driven by the anticipations, both by elites and voters, of the workings of the mechanical factor, anticipations which then shape both groups' consequent behavior (Blais and Carty 1991, p. 92). Under electoral rule arrangements that give small or even third-place parties little chance of winning seats, voters will eschew supporting these parties for fear of wasting their votes on sure losers. Political elites and party leaders will also recognize the futility of competing under certain arrangements, and will hence be deterred from entry, or motivated to form coalitions with more viable prospects. (2006, p. 74)

Again, we have individuals with certain roles ('party leader', 'voter') behaving and interacting in certain ways. The mechanism rests on two assumptions about how relevant behaviour is determined:

- What voters do in the polling station is influenced by their knowledge of the electoral system and the degree to which it favours large parties.

- What party leaders do in terms of pre-election coalitions is influenced by their knowledge of the electoral system and the degree to which it favours large parties.

Again, there is a clear temporal and causal order: the existing electoral rule influences what is in the mind of voters and party leaders, which in turn influences their behaviour.

The spatio-temporal stability of Duverger's (first) law

In this section, we argue that (D1) has high spatio-temporal stability. In "What does spatio-temporal stability mean?", we clarify what spatio-temporal stability is. In "Temporal stability resulting from the underlying social mechanisms", we argue that (D1) indeed has this property. In "Spatial stability resulting from the same underlying mechanisms", we discuss a potential counterargument: the so-called exceptions to Duverger's law.

What does spatio-temporal stability mean?

Let us a start with temporal stability. We use a well-known example from the philosophical literature on scientific laws and scientific explanation (see, for example, Salmon 1989, p. 15). Consider the following claims:

(G) No gold sphere has a mass greater than 100,000 kg
(U) No enriched uranium sphere has a mass greater than 100,000 kg

Both claims are true *now*. But there is an important difference. The critical mass for enriched uranium is just a few kilograms. So, we cannot create such a sphere because a much lighter sphere would already explode. This means that we have a good scientific reason to believe that (U) will be true in the future and has been true in the past for a long time. In other words: we have reasons to believe that (U) has high temporal stability: it has been true and will remain true for a long period.

This contrasts with (G). This claim is true because it just happens to be the case that no one did produce such a sphere till now. There is enough gold in the world, and there is no reason to believe that the sphere would explode. So claim (G) should be attributed a low temporal stability: it is true now, but it may very well be false in one month, or in one year, and so on.

The same line of reasoning can be developed with respect to regions in which a claim is valid. Some claims are considered to be valid in the whole universe, some in more restricted regions (e.g. on the whole earth or on parts of it). This means that besides degrees of temporal stability (as illustrated in (G) and (U)) we can also distinguish degrees of spatial stability.

Temporal stability resulting from the underlying social mechanisms

What reasons do we have to believe that (D1) has high temporal stability? What reasons do we have to believe that (D1) will still hold, for example, in 100 years? There are two:

(TS1) In 100 years, the 'mechanical effect' will still be present. Application of the electoral rules will still lead, on average, to higher over-representation of large parties in simple-majority single-ballot systems

(TS2) In 100 years, the 'psychological effect' will still be present. Voters and party leaders will anticipate in similar ways as they do now

In other words: the underlying social mechanisms are crucial. To the extent that we believe that these mechanisms will remain active in the future, we may attribute high temporal stability to (D1). Since the 'mechanical effect' is somehow a mathematical consequence of the electoral rules, this mechanism can be safely regarded as stable over time. (TS2) is more open for debate. André Blais (2016, pp. 127–128) uses the term 'strategic deserter' to refer to voters who decide to desert their favoured party (which is expected to be weak) in favour of a second preferred party that is anticipated to be much stronger. In order for (TS2) to be true, there has to be a substantial share of such strategic deserters in the future. Duverger suggested that strategic desertion would be all over the place; in his view, there would be hardly any loyal voters. This assumption is false (see Blais 2016, but also Dunleavy and Diwakar 2011), but is not needed to believe in the temporal stability of the psychological effect. As long as a substantial number of the voters are strategic deserters, there will be a considerable psychological effect. Only if almost all voters stick loyally to their preferred party even if it has no chance of winning the seat at stake, the psychological effect would become insignificant.

For the overall temporal stability of the (D1), it is important to note that the two mechanisms are complementary with respect to their strength. Imagine a country with an overwhelming share of strategic deserters. This may result in elections where in each district, the same two big parties are 'observable' (this is the term which Dunleavy and Dawikir use for parties getting 1% or more of votes in a district), while all other parties are 'unobservable' (i.e. get less than 1% of the votes). In this case, the psychological effect is very strong, but the impact of the mechanical effect minimal: the small parties get no seats, but that is proportional to their vote share (which is almost nothing). We can also imagine a country with almost no strategic voters. This may result in larger vote shares for 'third parties' (= all parties except the two biggest ones nationwide), but then the mechanical effect comes in very strongly: parties may, for example, have 10 or 15% of the votes in all districts, but hardly any seats. This variable and complementary strength is important for the temporal stability of (D1): if in the future the impact of the psychological mechanism diminishes, the impact of the mechanical one increases.

Spatial stability resulting from the same underlying mechanisms

Analogous arguments can be given for spatial stability:

(SS1) The 'mechanical effect' is present in all democratic countries
(SS2) The 'psychological effect' is present in all democratic countries

Again, the mechanisms play a crucial role: the 'mechanical effect' is inherent in the conversion procedure, so it is present in all countries in which votes are correctly processed (i.e. where there is no fraud).

As to the psychological effect, the political scientists we have already mentioned (Blais (2016) and Dunleavy and Diwakar (2011)) argue that there are regional differences in its strength. For instance, Blais has calculated that in the 2014 US Congressional election in 6% of the districts (34 out of 397) there were three viable candidates (candidates with 5% or more votes). In the other 94% districts, there were only two viable candidates (Blais 2016, p. 127). In the 2015 general election in the UK, only 1.9% of the districts (12 out of 650) had two viable candidates. The most typical situation was three viable candidates (this happened in 42.8% of the districts). These figures indicate that the psychological effect is much stronger in the USA than in the UK and Canada (which is the third country that Blais considers). Blais refers to his own older empirical work (Blais and Carty 1991) to argue that the psychological effect is real, despite the regional differences. For instance, the mean vote share of 'third parties' (i.e. all parties except the top two nationwide taken together) is 29% in proportional representation systems, while it is only 17% in simple-majority single-ballot systems.

Let us summarise the results of the "Temporal stability resulting from the underlying social mechanisms" and "Spatial stability resulting from the same underlying mechanisms" subsections. Taken together, the social mechanisms that Duverger has put forward give us good reasons to attribute high spatio-temporal stability to (D1). (D1) is valid for all democratic countries, independently of where they are located in the world (spatial stability), and we have reasons to believe that it has been valid since political elections exist and will remain valid as long as political elections continue to exist.

Why the 'exceptions' are not a counterargument

The causal relation between smoking and lung cancer (like most causal relations in the biomedical sciences) is probabilistic, not deterministic: smoking is *not* a sufficient cause of lung cancer. However, we have good scientific evidence to believe that smoking is a positive causal factor for lung cancer: if all people in the world smoked, there would be more lung cancers than if no one in the world smoked. Analogously, the causal relation between electoral systems and number of political parties is a non-deterministic, probabilistic one. Exceptions are well known. On the one hand, not every democratic country with a simple-majority single-ballot system has a two-party system:

> Two well-known exceptions concern Canada and India, both employing single-member district plurality electoral systems but both supporting more than two parties. (Benoit 2006, p. 76)

So, we cannot claim the following:

> The simple-majority single-ballot system is a *sufficient cause* of the two-party system.

Neither can we claim the following:

> Proportional representation is a *sufficient cause* of multi-partism.

Austria is often mentioned here as an exception (Benoit 2006, p. 76). So Duverger's law should not be seen as expressing a sufficient cause.

There are several ways to deal with these 'tough cases'.[2] We focus on Canada and India because they are 'tough cases' for (D1) while Austria relates to (D2). A first way is this:

> In Canada and India, the 'mechanical effect' and the 'psychological effect' are present, but they are overruled by counteracting mechanisms initiated by ethnic heterogeneity and deep social cleavages.

A second way is:

> In Canada and India, the 'mechanical effect' and the 'psychological effect' are absent.

It is clear that if you take the second option, India and Canada are seen as real exceptions: you consider (D1) to be false in those countries. However, if you choose the first option, you consider (D1) to be true in Canada and India as well as in other democratic countries. What make Canada and India special is that in these countries there are strong other factors which overrule the tendency pinned down in (D1).

It will be clear that we choose the first option. Our arguments for this choice can be found in "Temporal stability resulting from the underlying social mechanisms". The second option is not viable because the 'mechanical effect' is inherent in vote-to-seat conversion procedures (so it cannot be absent in Canada and India) and because the 'psychological effect' can only be absent if Canadian and Indian politicians and voters had a peculiar kind of instrumental rationality in political matters (a kind of rationality that only they have, as opposed to the inhabitants of other democratic countries).

Sandra Mitchell's account of scientific laws and its application to Duverger

The core ideas of Mitchell's pragmatic account of scientific laws

After discussing some philosophical examples similar to (G) and (U) above, Sandra Mitchell writes:

> Having displayed the variation of the nature of contingency of the standard philosophical examples, I now want to show how what scientists have

[2] We call them 'tough cases' because they may be 'exceptions' or not, depending on further beliefs we have. This becomes clear immediately.

> identified as laws are also variable in the same way. At one end of the *continuum* are those regularities whose *conditions* are *stable* over all *time* and *space*. At the other end are the so-called accidental generalizations. And in the vast middle is where most scientific generalizations are found. It is my view that to reserve the title of "law" for just one extreme end is to do disservice to science by collapsing all the interesting variations within science into one category, non-laws. (2000, p. 254; italics added)

This quote is a good summary of her account. We have emphasised words that are particularly relevant for our discussion here. First, it is clear that the idea of spatio-temporal stability comes from Mitchell. Second, she talks about a continuum: some scientific generalisations have more spatio-temporal stability than others. Finally, in order to find out where a generalisation is located in the continuum we have to look at the conditions under which the generalisation is valid.

In "Some physical laws on Mitchell's continuum", we illustrate how Mitchell's account works by applying it to some physical laws. In "Duverger's law in the 'vast middle' of the continuum", we show that, like the physical laws discussed in the "Some physical laws on Mitchell's continuum" subsection, Duverger's law (D1) must be situated in what Mitchell calls 'the vast middle'.

Some physical laws on Mitchell's continuum

The laws of physics are often used as exemplars for what laws are. As an example, consider the pendulum law, which describes the behaviour of a pendulum:

$$T = 2\pi\sqrt{\frac{L}{g}}$$

In this formula, T is the period of the pendulum, L the length of the pendulum and g the acceleration due to gravity. On which conditions does the validity of this law rely? It is valid for pendula near a body that is much heavier than the pendulum itself and is extended sideways in both directions of the motion of the pendulum. As a consequence, it is valid near the Earth (where we have observed it), but not in outer space. The law is—literally—globally valid, but not universally valid: it is valid in the spatial region around the Earth, but not in the whole universe. With respect to temporal stability, it is important that the Earth was formed throughout billions of years, with mass increasing and shape shifting. There was a time, in a very distant past, where the law was not valid near the Earth. However, we do not have any reason to expect that it will become invalid in the near future: the mass and shape of the Earth arguably are stable over long periods of time, and this makes the pendulum law temporally stable.

In sum, we have very high temporal stability and intermediate spatial stability (globally valid—near the Earth—but not in the whole universe). Therefore, this law is to be located in the 'vast middle' of the continuum of spatio-temporal stability.

It is easy to understand that for several other kinematic laws, e.g. Galileo's law of free fall, a similar line of argument can be developed. Our second elaborate example

comes from a different discipline within physics: waves and sound. Stokes' law of sound attenuation expresses the loss of intensity of sound when travelling:

$$\alpha = \frac{2\eta\omega^2}{3\rho V^3}$$

In this formulation, α is the rate at which the amplitude of the plane wave decreases; η the dynamic viscosity coefficient of the medium; ω the sound's frequency; ρ the medium's density; and V the speed of sound in the medium. From this formulation, it is clear that the validity of this law depends on the presence of a *medium* (specifically, a Newtonian fluid[3]). Without a medium, the sound wave cannot travel and correspondingly will not lose intensity. And if the medium is not a Newtonian fluid, the sound wave behaves differently. Stokes' law is valid in the atmosphere of the Earth because that behaves like a Newtonian fluid. It is also valid in water and other Newtonian liquids. Stokes' law is not universally valid, since the majority of outer space does not correspond to a Newtonian fluid. Yet it might be valid on some planets we have yet to discover. So, the spatial stability is at least intermediate. Regarding temporal stability, the law depends on how stable the properties of Newtonian fluids are in time. It is fair to say that they are very stable, since they depend on the (chemical) composition of the liquids. So, Stokes' law of sound attenuation, like the pendulum law, has an intermediate spatial stability and a high temporal stability. It is therefore also located in the 'vast middle' of Mitchell's continuum.

Most physical laws are located in this vast middle. Some physical laws, however, are situated in (the scarcely populated) extreme end of Mitchell's continuum because they have extremely high spatial stability as well as extremely high temporal stability. Some examples of such extremely stable laws are: Newton's three laws of motion, his law of universal gravitation and the law of conservation of mass energy.

Duverger's law in the 'vast middle' of the continuum

With respect to spatial stability, Duverger's (D1) is similar to the natural laws that are globally valid: (D1) is valid in the whole (human) world, but not in the whole universe. It also has a substantial temporal stability: it has been and will remain valid as long as political elections exist. This makes it quite special compared to much other causal knowledge in the social sciences.

As an example to illustrate this special status, we use some claims from Chapter 7 of the book *The Rise of New Labour. Party Policies and Voter Choices* (Heath et al. 2001), which is about the social and political factors that determine the outcomes of contemporary British elections. In order to understand the example we give, it is important that throughout the book the authors divide the electorate into five social groups: 'petite bourgeoisie' (small employers (less than 25 employees) and own account workers), 'salariat' (i.e. managerial and professional occupations), 'routine

[3] Newtonian fluids behave according to Newton's law of viscosity. Common examples are water, milk, alcohol and air, but certain types of paint fall outside this category.

non-manual class' (ancillary professional and administrative occupations), 'working class' (occupations with routine manual labour and technical occupations) and 'unemployed'.

In the elections between 1974 and 1992, the Conservative Party got between 65 and 77% of the votes of voters belonging to the petite bourgeoisie. Their overall result (all categories) never exceeded 50% (it varied from 35 to 47%). In the 1997 elections, the Conservative Party got only 42% of the petite bourgeoisie votes, but that is still much more than their average result in 1997 (30%). These data support the following causal claim:

> In the U.K electorate, being petite bourgeoisie member is a positive causal factor for voting for the Conservative Party.

Similar causal claims can be made with other social categories as cause variable and/or the Labour Party as effect variable. They belong to what is usually called 'electoral sociology': studying who votes for whom. The causal claims made here are spatially more restricted than in the case of Duverger: they are about the UK only. Their temporal stability depends among other factors on the strategies of the political parties involved. And these strategies may change over time.

A lot of causal knowledge in the social sciences is, with respect to spatio-temporal stability, situated in the same range as the electoral sociology example: rather restricted. This is what makes Duverger's propositions special: their spatio-temporal stability is much higher than we normally see in the social sciences.

Duverger's hypothesis versus Duverger's law?

As mentioned in the introduction, some political scientists seem to hesitate. For instance, Camille Bedock writes:

> Duverger's (1951) 'laws' analyse the link between electoral systems and the format of party systems. (2014, p. 371)

The quotation marks indicate some uncertainty. Josep Colomer starts his 2005 paper by announcing that he wants to look at 'Duverger's "laws" (or hypotheses) upside down' (p. 1). In the title of the paper, he only uses the label 'laws', while further in the paper he uses phrases like labels 'Duverger's first law' and 'Duverger's second law or hypothesis' (p. 12). He too seems to be unsure about the appropriate label.

Our arguments in the previous sections entail that there should be no doubt about proposition (D1): it deserves to be called a law. However, the argument we developed with respect to (D1) has implications for (D2) and (D3) too:

- The key claims about spatial stability in the "Temporal stability resulting from the underlying social mechanisms" subsection ((SS1) and (SS2)) not only provide grounds to consider (D1) spatially stable. They are also grounds for regarding (D2) and (D3) as spatially stable.
- The same holds for (TS2) and the temporal stability of (D2) and (D3).

- (TS1) has to be adapted slightly. For (D2), the appropriate variant is 'In 100 years, the 'mechanical effect' will still be present. Application of the electoral rules will still lead, on average, to less over-representation of large parties in proportional representation systems'.

Lack of conceptual separation between determinism and lawhood

A consequence of the Mitchell-style account of scientific laws that we have adopted and applied is that 'determinism' and 'lawhood' are to be treated as conceptually entirely separated. We clarify this further in "Conceptual separation". In "Conceptual blur", we show that the opposite has happened in the labelling history of Duverger's propositions: the concepts were blurred, and they still are.

Conceptual separation

If the degree of spatio-temporal stability is the only criterion to call a proposition a law or not, this entails that the other property (i.e. whether the proposition is deterministic or not) is *irrelevant*. So, the account of laws we have adopted implies conceptual separation. This conceptual separation makes it possible to call probabilistic causal claims like (D1)–(D3) laws and give a good reason for doing so without worrying about their non-deterministic character.

Physics also contains some non-deterministic laws. Take for example the second law of thermodynamics, which is commonly written as:

The entropy of a closed system always increases.

In this formulation, the law looks deterministic. Yet, as Boltzmann showed, it is not impossible for the entropy of a closed system to decrease, it is just highly improbable. Boltzmann argued that macro-states with high entropy are realised by more micro-states than the low-entropy ones (Callender 2004, p. 242). As a consequence, low-entropy states are rare. Correspondingly, if a system is in a micro-state that corresponds to a low-entropy macro-state, it will most likely evolve to a micro-state corresponding to a higher entropy macro-state. So even though the second law of thermodynamics is often formulated deterministically, it is in fact non-deterministic.

Conceptual blur

It should now be clear why the concepts of 'lawhood' and 'determinism' should not be mixed up. But such mixing has occurred in the labelling history of Duverger's propositions. Duverger has created some havoc by making strong, deterministic claims such as:

> Dualist countries use the simple-majority vote and simple-majority vote countries are dualist. (1959, p. 217)

'Dualist countries' are countries with a two-party system. What Duverger claims is false because it is too strong (cf. the counterexamples to the strong 'sufficient cause' versions of the propositions discussed in "Spatial stability resulting from the same underlying mechanisms").

Early critics of Duverger, such as Grumm 1958, have argued that we should not call Duverger's propositions laws because they are false if interpreted deterministically. This kind of criticism uses a conceptual framework in which determinism is a necessary condition for calling something a law. As is clear now, we think these are not good conceptual apparatuses.

In the recent literature, there still is conceptual mixing going on. For instance, Benoit writes:

> Despite the *law-like* character of the propositions formulated by Duverger, it is now standard in the study of electoral institutions to treat institutional characteristics as producing tendencies in party systems that are probabilistic, not deterministic in nature. (2006, p. 76; italics added)

We would have written:

> Despite the *deterministic* character of the propositions formulated by Duverger […].

That would be clear and correct, and keep the two issues—determinism and lawhood—separated.

Conclusions and possibilities for further research

Summary

In this article, we have investigated the epistemological status of the famous claims of Maurice Duverger:

(D1) The simple-majority single-ballot system favours the two-party system
(D2) Proportional representation favours multi-partism
(D3) The majority system with a second-round runoff favours multi-partism

We have argued that all three should be called laws because of their quite high degree of spatio-temporal stability. Political scientists seem to be in doubt about which label is appropriate, but we have argued that there is no ground for this hesitation.

A consequence of our view is that issues about determinism should be clearly separated from issues about lawhood. That would increase the clarity (and thus quality) of the work of political scientists and philosophers of social science on this and related topics.

Further applications of the conceptual framework: political science in general

The conceptual framework presented here (the idea of spatio-temporal stability and the distinction between determinism and lawhood) can be used to reflect on several other claims in political science. The label of 'law' is used on other occasions, e.g. in the so-called iron law of oligarchy which states that organisations after some time inevitably are ruled by a small elite group (oligarchy). This thesis was originally presented in Robert Michels in 1911 (in a book in German, translated as Michels 1915) and is almost always referred to as a law.[4] It is interesting to apply the general ideas behind our analysis of Duverger's laws to this case and similar case, in order to find out whether or not there is a good reason to call the claim at hand a law.

Other possible further applications are empirical regularities that are generally thought of as laws, but usually without being explicitly labelled as such. The democratic peace proposition in international relations theory, which states that democracies do not go to war with one another, is a good example. Jack Levy judges this thesis as follows:

> The idea that democracies almost never go to war with each other is now commonplace. The sceptics are in retreat and the proposition has acquired a nearly law-like status, confidently invoked by policy makers as well as by scholars. (1994, p. 352).

Our conceptual framework allows political scientists and philosophers of the social sciences to reflect about such cases too.

Further application of the conceptual framework: electoral studies

An interesting development in electoral studies is that the opposite causal relationship (from number of political parties to electoral systems) also has been investigated. For instance, Josep Colomer writes:

> This article suggests that we may look as Duverger's 'laws' (or hypotheses) upside down: it is the number of parties that can explain the choice of electoral systems, rather than the other way around. (2005, p. 1)

The phrase 'rather than' creates the expectation that Colomer rejects the original causal relation as put forward by Duverger. But that is not the case. Colomer continues:

> The emphasis on this line of causality does not deny, of course, that existing electoral systems offer different positive and negative incentives for the creation and endurance of political parties. However, precisely because electoral systems may have important consequences on shaping the party

[4] Some examples: the general *Brittanica Online Encyclopedia* has an entry on 'The Iron Law of Oligarchy' (see https://www.britannica.com/topic/iron-law-of-oligarchy) the academic and specialised *Encyclopedia of the Social and Behavioural Sciences* has an entry on 'Oligarchy (Iron Law)' (see Ansell 2001).

> system, it can be supposed that they are chosen by already existing political actors in their own interest. (2005, p. 1)

So Colomer argues that there is a second causal relation, in the opposite direction. Kenneth Benoit (in different paper than the one we have used till now) agrees with this. In his view, a complete theory of elections must look at …

> … the dynamic interplay between the forces exerted by political institutions on political parties and the forces exerted by parties to reshape institutions. (2007, p. 370)

Again, the idea is that there is also a causal relation from political parties to electoral institutions. It goes without saying that our conceptual framework can also be applied to this second, opposite causal relation. That would be an interesting complement to what we have done here.

Acknowledgements The authors thank Leen De Vreese, Bert Leuridan, Dingmar van Eck and two anonymous referees for comments on earlier versions of this paper. Inge De Bal is research assistant of the FWO (Research Foundation—Flanders).

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