

Writing Style and Legal Traditions

Using computational tools to investigate the development of the writing style of
the European Court of Justice

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The European Court of Justice (ECJ)¹ in many ways is a unique court, and it has undergone a remarkable transition in its roughly 55 years of existence. While it originally consisted of just seven judges, six of whom hailed from a country with a French law tradition, it now consists of 28 judges from all major European legal families. Originally designed as an international court with jurisdiction to adjudicate disputes about the interpretation of an international treaty with a rather narrow scope, it has developed into what might be the single most powerful court in Europe. Despite the ECJ's importance, the drivers of its decisions are not well understood. Commentators take different views on whether its decisions are mainly motivated by legalistic considerations (Sankari 2013), whether the ECJ is best understood as a political actor with strong preferences towards European integration (Rasmussen 1986), whether the political background of individual actors plays a role (Frankenreiter 2017,

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1. In this paper, the term ECJ denotes the highest branch of the European Union (EU) judiciary, the *Court of Justice of the European Union* (CJEU). The term EU is used to denote both the EU and its predecessor organisations, the European Coal and Steel Community and the European Community/European Economic Community.

2018), and to what degree the French legal culture, which dominated the ECJ at least during its early years of existence, still influences the output of EU courts today (Komárek 2009; Zhang, Liu, and Garoupa 2018). The study presented in this chapter focuses on one specific aspect of the ECJ's output, namely the writing style of its opinions, and uses a computational approach to explore whether the French influence has become less dominant over the years.

The style of opinion writing at the ECJ is a contentious issue. Those critical of the Court accuse it of using an inscrutable style which does not reveal the true drivers of legal decisions (Brown and Kennedy 2000, 55), voicing concerns that this style might undermine the authority of the Court (Arnull 2006, 13). Joseph Weiler once demanded that the ECJ “abandon the cryptic, Cartesian style which still characterises many of its decisions and move to the more discursive, analytic, and conversational style associated with the common law world” (Weiler 2001, 225). Its defenders admit that the style of the ECJ can seem apodictic, but maintain that this style is a necessity given the collegial nature of decision-making at the Court (Bobek 2015b, 171).

It appears that this dispute is related to different assumptions about the role of the French legal tradition in the evolution of the writing style of the ECJ. Different jurisdictions have produced different ways of opinion writing (Goutal 1976; Wetter 1960). For example, the French legal tradition is commonly associated with the short and seemingly apodictic form of reasoning which the ECJ is often criticized for. Common law judges, by contrast, are customarily described as being more transparent about the “real” motivations behind decisions. Those critical of the writing style of the ECJ essentially accuse it of not having adopted sufficient elements of the writing style of common law judges, or in other words, to write in a style that is too heavily influenced by the French legal tradition. This reasoning would seem particularly plausible if judges from countries with a French legal tradition have had an outsize influence on the development of the ECJ's writing style. By contrast, it seems much

more plausible to argue that the writing style today is a reasonable response to the institutional constraints the ECJ faces if its writing style is the result of a process in which the Court was able to develop its style free from the dominant influence of any specific tradition.

Given this apparent disagreement about the role of the French legal tradition in the evolution of the writing style of the ECJ, it is worthwhile to explore the use of quantitative tools using text as data to shed light on this question. Such an investigation also showcases the potential of such techniques to complement qualitative research in important ways. Only by using such tools does a researcher have a realistic chance to include more than a small sample of cases in such an analysis. Only by devising quantitative tests can the question whether the French legal tradition has had an outsize role on the development of the writing style of the ECJ be answered in a way that is independent from the subjective judgment of individual researchers. Arguably, computational tools also offer the benefit of being able to detect subtle trends which might be missed by qualitative research. This paper thus contributes to the growing body of literature that brings to bear the tools of “stylometry” to help better understanding legal and judicial writings.

French legal culture and the style of the ECJ's opinions

The ECJ today is one of the most important courts in Europe, and its decisions have greatly influenced European law in many different areas. French legal culture has had an outsize influence on the ECJ, at least during the first decades of its existence (Mancini and Keeling 1995; Perju 2009). For one, the ECJ was designed to resemble the French Conseil d'Etat (Komárek 2009, 818). Second, its working language has always been French (McAuliffe 2012, 203), potentially putting native French speakers at an advantage over their peers from other countries (Mancini and Keeling 1995, 398).

Most importantly, however, a large majority of the ECJ's members came from countries with a French law tradition during its early years.² Since its establishment, the ECJ has in principle always consisted of one judge per Member State (Art. 19 Treaty on European Union (TEU)). Judges are appointed by the Member State governments for periods of six years and can be reappointed for an unlimited number of times (Art. 253(1) Treaty on the Functioning of the European Union (TFEU)). Although the law envisions the appointment of judges "by common accord of the governments of the Member States" (Art. 253(1) TEU), in practice one slot is allotted to each Member State government.³ As a result, initially, 6 judges came from countries influenced by the French law tradition,⁴ while only one judge came from a country with a German legal tradition.⁵

Commentators by and large agree that the prevalence of the French also affected the style of its early opinions, which not only used the same opening phrase, but were also, similar to their French counterparts, relatively short and "assembled in a succinct, syllogistic structure, with a dry tone and abstract style" (Bobek 2015b, 169).

However, there are various reasons to believe that the French legal culture today is less influential at the ECJ than it used to be during its early years. First, a number of institutional reforms (most importantly,

2. For the classification of countries, I follow the classification in La Porta, Lopez-de-Silanes, and Shleifer (2008), with the exception that I treat countries formerly under Soviet influence as a distinct group of countries.

3. Traditionally, Member State governments would not question candidates proposed by other governments. The Treaty of Lisbon established a panel which evaluates the suitability of candidates before they are appointed to the ECJ (Art. 255 TFEU), and reportedly some governments have withdrawn candidates after they received a negative review by the panel (Waele 2015, 44 et seq). For a more detailed account of the institutional setting, see Frankenreiter (2017) and Frankenreiter (2018).

4. Belgium, France, Italy, Luxembourg, and the Netherlands (which were given two slots in order to ensure that the number of judges at the ECJ was uneven).

5. Germany.

the introduction of a chamber system) that were implemented to allow the ECJ to deal with dramatically increasing case numbers (Gabel 2003) changed the original institutional design. Second, and more crucially, multiple rounds of EU enlargements brought judges from other legal traditions to the ECJ, which today consists of 28 judges from all major European legal families. Figure 1 contains a map of all countries in the EU, displaying both the year of the accession to the EU and the prevalent legal tradition in the country.

Commentators differ in their assessment of whether these changes have had a significant impact on the style of opinion writing at the Court. Some argue that the increased diversity has changed the ECJ's style of reasoning and in particular weakened the influence of the French legal tradition (Bobek 2015a; Mancini and Keeling 1995, 400-2; Perju 2009, 363), with one commentator even calling it "rather an exaggeration" to stress the French influence still today (Komárek 2009, 818). Others, mostly those critical of its writing style, contend that it is still heavily influenced by the French legal tradition and by the choice of French as the working language of the Court. Arnulf (2006, 12-13) even described the ECJ's writing style as being stuck in the 1950s and 1960s.

Who is right? Does the writing style of the ECJ today blend influences from all the legal traditions from which the ECJ members hail in a more or less egalitarian way, or does the adoption of some stylistic elements commonly associated with other legal traditions amount to nothing more than window dressing? It seems reasonable to assume that both parties in this debate have some valid arguments on their side. On the one hand, the ECJ seems to have adopted some of the features which are commonly associated with common law and the German legal traditions, such as including in its opinions references to prior decisions and embracing the so-called "principle of proportionality" (Mancini and Keeling 1995). On the other hand, the ECJ still writes in a strong version of what Posner (1995) calls the "formal style" of judicial reasoning. At the same time, it seems impossible to answer this question on the basis of quali-



Figure 1. Map of the European Union. This figure shows a map of all countries in the EU, together with information on the respective year of accession. Colors and color patterns indicate a country's prevalent legal tradition. Dark grey: French law. Black: German law. Light grey: common law. Vertical lines: Nordic law. Horizontal lines: Countries formerly dominated by the Soviet Union. White: non-member countries.

tative research alone. How should one determine whether the changes to the writing style are sufficient to conclude that the newly created “internal diversity [...] had profound effects on the Court’s argumentative practices, greater than the Court’s alleged desire to remain faithful to its French origins” (Komárek 2009, 818)? Answering this question requires a quantification of the different effects which qualitative tools can hardly ever achieve.

Using computational tools to study writing style

Against this background, the study presented in this chapter explores the use of quantitative, in particular computational, tools to improve our understanding of the development of the ECJ’s writing style. In doing so, it also attempts to showcase the potential as well as the limitations of computational methods to enrich our understanding of the development of legal institutions.

This study makes two contributions to the discussion on the development of writing style at the ECJ. It attempts to track the development of the writing style of the ECJ over time to see whether the qualitative assessments reported above are reflected in the data. It also tests two different hypotheses regarding the development of the ECJ’s writing style. First, in an attempt to test the impact of EU enlargements, it asks if the writing style of the ECJ as a whole has become more similar over time to the writing of judges from new EU Member States during their first few years at the court. Second, in an attempt to estimate the continuing influence of the French legal tradition, it asks if the writing style of the ECJ has, on average, become more similar over time to the writing of newly appointed judges from countries with a French legal tradition, as compared to their peers from other countries.

In order to test these hypotheses, one first has to find a way to attribute opinions to individual judges. In the context of the ECJ, this is not trivial. Judges at the ECJ sit in chambers of 3, 5, or 15 judges, cases are decided by way of majority voting, and all opinions are issued *per curiam*.

Nevertheless, the judge responsible for writing the opinion is known in every case. Early in the proceedings, the President of the Court⁶ assigns one judge to act as *Judge Rapporteur*. This judge remains responsible for drafting the opinion irrespective of whether he or she supports the outcome favored by the majority of judges.

Also, other judges are reported to interfere with the drafting process (Edward 1995). This might call into question whether the *Judge Rapporteur* can really be seen as the author of an opinion, or whether the influence of other judges is so strong that the identity of the *Judge Rapporteur* hardly matters. Another potential source of disturbance is the fact that every judge is assisted by a number of clerks, the so-called *référéndaires* (Bobek 2015b, 168). Despite these potential confounds, this study assumes that the *Judge Rapporteur* retains some amount of influence over the contents and the style of the opinion, so that the opinion can be attributed to him or her. Some of the results obtained below in fact seem to confirm that the person acting as *Judge Rapporteur* has at least some amount of influence over the style of an opinion.

There are of course numerous ways to analyse and quantitatively compare the style of legal opinions. Examples of measures used in previous studies include simple metrics such as the length of opinions (Goutal 1976) and slightly more complex measures such as the average number of words in paragraphs or sentences, the average length of words, the diversity of word or sentence length, the number of different words in opinions, and the ratio of words that appear exactly once in an opinion (Wahlbeck, Spriggs II, and Sigelman 2002).

This study examines similar measures, but its focus lies mostly on another measure of writing style. In line with a number of recent contributions from various fields (Carlson, Livermore, and Rockmore 2016;

6. The President of the Court is elected by the judges for periods of three years (Art. 253(3) TFEU).

Hughes et al. 2012; Rosenthal and Yoon 2011), it uses the frequency distribution of so-called “function words” as a “stylistic fingerprint” (Carlson, Livermore, and Rockmore 2016) of different authors or groups of authors. Function words are words that do not in themselves convey any meaning; rather, they establish the relationship between those parts of speech that do. Function word frequencies have a relatively long history of use in stylometry, and have been used to relate, distinguish, and uncover authorship in other literary contexts (Hughes et al. 2012; Binongo 2003). Because of the possibility to express the same message in various ways, authors might differ in their use of function words even when they are arguing the same point.

At first glance, one might think that this measure is not well suited for an investigation of how different legal traditions influenced the writing style of a court, because it is admittedly hard to relate this measure to common notions about what constitutes a “typical” opinion written in a jurisdiction belonging to one of the various legal traditions. At the same time, it allows for the development of a rather objective measure for how different the style of two different opinions or groups of opinions is. One can then use this measure of difference to document the development of the writing style over time, and to link changes to other events such as judges from new Member States taking office.

It seems worth pointing out that the use of function words in analyses of judicial writing style is particularly helpful if and insofar as the use of function words is independent from opinion content. The reason for this is that, like in many other courts (see Bowie, Songer, and Szmer 2014; Maltzman and Wahlbeck 2004), opinion assignment at the ECJ is not random. If one were to use features related to the content of a case as a measure of judicial style, one would risk conflating the effects of non-random opinion assignment with the effects of a judge’s writing style.⁷

7. To understand what this means, consider an example: assume that one were to treat the example of the frequency of the use of the word “liberté” as a measure of writing style.

To the extent that function words are unrelated to the content of a text, the same problem does not occur. However, it seems well possible that certain function words appear more often in the context of certain topics than in others, which opens the way for opinion assignments to influence the occurrence of function words. This might be particularly true at the ECJ, where chunks of text are frequently copied from previous decisions.

This study uses a new dataset consisting of the text of all opinions issued by the ECJ between its establishment in 1952 and February 2015. As the working language of the ECJ is French, the dataset contains the French versions of the opinions.⁸ All opinion texts were downloaded from the official databases of EU law using a Python script.⁹ Of the 10,226 judgments issued during this time period, French opinion texts are available online for 10,131.¹⁰ The date of the decision, *Judge Rapporteur*, and other information about the cases were obtained from metadata provided by the court databases.

Using this dataset, the study first documents that the writing style of the ECJ has changed over time. It tracks trends in different measures for style and uses the distribution of function words to show that, just like at the SCOTUS (Carlson, Livermore, and Rockmore 2016) and in literature in general (Hughes et al. 2012), there seems to exist a “style of the time” in the decision-making of the Court that is different from how judges write

A judge who acts as *Judge Rapporteur* in many cases involving the four freedoms of the common market might frequently use this word merely to describe what the case is about; it would be a mistake to conclude that it is his style to use this word more often than others.

8. Judgments by the ECJ are regularly translated into various languages after being issued.

9. <https://curia.europa.eu/> (accessed December 1, 2017) and <http://eur-lex.europa.eu/> (accessed December 1, 2017). Note that, for older opinions, accents are not displayed in the text provided by the websites. Therefore, in order to guarantee uniformity of the dataset, I have omitted the accents in all texts. This leads to some amount of inaccuracy because it makes it impossible to differentiate between some words, for example *a/à* and *ou/où*.

10. Judgments whose French opinion texts are not available online cluster around 1990, with a second (smaller) cluster around 1997.

in other periods. This study goes on to explore two different possible causes for the observed changes in style. First, it attempts to understand the role of the various rounds of EU enlargements. In particular, it asks whether judges from new Member States influenced the writing style of all judges. The study finds evidence that two rounds of enlargements (1973 and 1995) were followed by substantial changes to the writing style of the ECJ. However, there is no evidence suggesting that sitting judges adopted features of the writing style of judges from new Member States. Second, the study asks whether new judges from countries with a French law tradition were on average more likely to influence the development of the writing style of the entire court in subsequent years than other judges. It finds evidence in support of this hypothesis. This can be interpreted as suggesting that the French legal culture has had an outsize influence in shaping the decision-making of the ECJ, even as the Court became more diverse.

Evidence from simple measures of style and clarity

This first part of the empirical investigation explores how common notions about the writing style of the ECJ and its development are reflected in a number of rather quantitative measures of style. Figure 2 displays the development of four key stylistic features of ECJ opinions over time: opinion length, average sentence length, average number of syllables per word, and type-token ratio.¹¹ Each opinion is represented by one point

11. The NLTK and Pyphen packages in Python were used to obtain these measures: The number of tokens was determined by counting all numbers and words in the opinion's reasoning. The `sent_tokenize` function in NLTK was used to divide the reasoning into individual sentences in order for them to be counted. The average number of syllables was obtained by hyphenating all words in the reasoning using Pyphen, counting the resulting syllables, and dividing the syllable count by the total number of words. The type-token ratio was determined by counting the number of different words in the opinion's reasoning and dividing the result by the total number of words.

in each of the panels, with the x-axis representing the year that the opinion was issued (and the y-axis giving the feature measurement). A brief inspection of the figure seems to confirm the contention by those commentators who argue that the style of the ECJ's writing has undergone a significant evolution over time.

Opinion length. The first (uppermost) panel displays the number of tokens (words and numbers) per opinion. It is readily apparent that this number has grown steadily over time. During the first two decades of the ECJ's existence, opinions on average had below 2,000 tokens; only a small number of opinions went beyond 8,000 tokens. Similar to other courts (Black and Spriggs 2008), the length of opinions has grown considerably. By the mid-2000s, the average length of opinions had grown by more than 150%. Individual opinions have grown to the length of short books, with the longest opinion ever counting more than 50,000 tokens.¹² On average, the length of opinions grows by around 105 words per year.¹³ The growth in opinion length certainly is in line with the claim that the ECJ has over the time distanced itself from the French model of opinion writing, which is known for its comparably short opinion texts (Goutal 1976). However, it can potentially also be explained by other factors such as an increase in cases which raise complex factual and technical questions. Such cases likely became more common with the proliferation of secondary EU law, a considerable share of which deals with rather technical matters, and the increasing importance of the European Commission as an administrative agency.

Average sentence length. The next panel, which displays the average number of tokens per sentence, conveys a much more interesting development. It is evident that, while the average sentence length seems to

12. Judgment of 15 October 2002, *Limburgse Vinyl Maatschappij NV and Others v Commission*, joined cases C-238/99 P, C-244/99 P, C-245/99 P, C-247/99 P, C-250/99 P to C-252/99 P and C-254/99 P, ECLI:EU:C:2002:582.

13. Linear regression indicates that this effect is highly statistically significant.

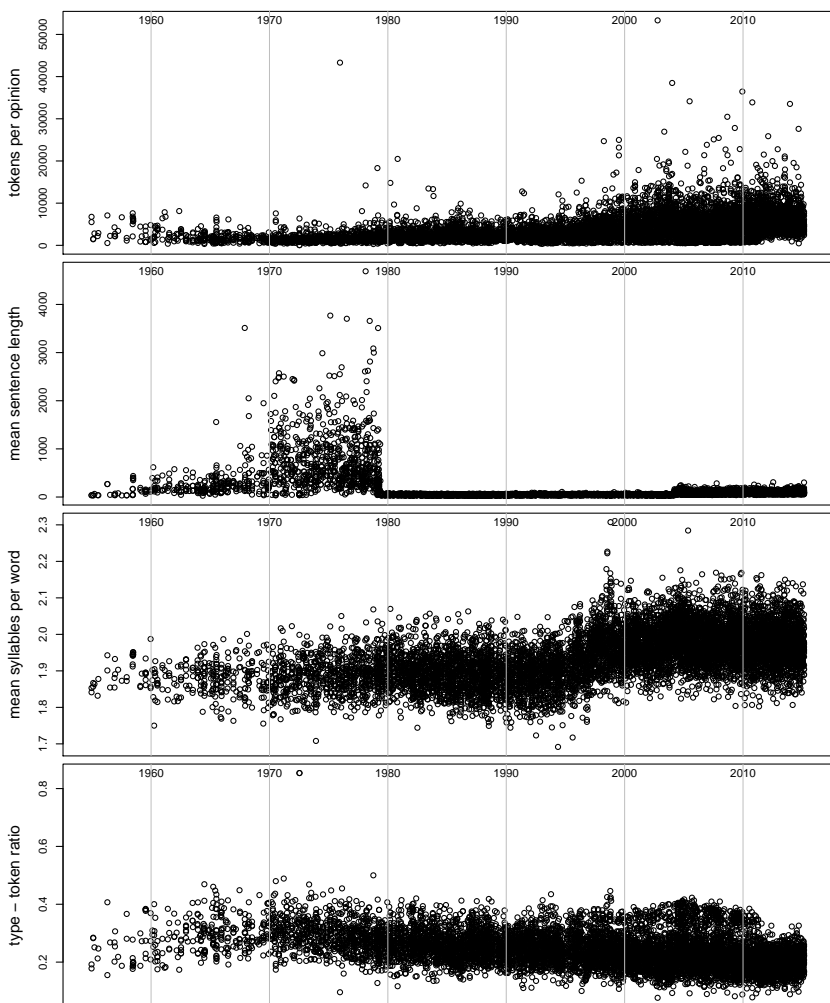


Figure 2. *Development over time of four measures of style over time. Each opinion is represented by one point per panel.*

increase during most periods in time, it took a sharp turn downwards in the late 1970s. In fact, until early May 1979 many opinions had an average sentence length of several hundred tokens; the number of tokens per sentence in opinions published between June 1979 and May 1980 averaged “just” around 52.¹⁴ To understand what happened, it makes sense to have a closer look at decisions issued around that time. Before the change, many opinions were written in just one or very few sentences, with different reasons given in the form of subordinate clauses (of all opinions written before 1979, more than 80% consisted of less than 10 sentences, and more than 60% consisted of less than 10 sentences). The ECJ would often begin its reasoning with the phrase *attendu que* and then lay out its reasons in what Michal Bobek has called the “succinct, syllogistic structure” typical of the French drafting style. The ECJ apparently abandoned this way of structuring its reasoning completely and started using a lot more main clauses.¹⁵ This shift was followed by period of time in which the ECJ used rather short sentences (the average sentence length between 1980 and 2000 was around 48 words per sentence). Around the time of the 2004 EU enlargement, the ECJ seems to have partly changed back to using longer sentences: the average sentence length has grown to more than 90 in all opinions issued since 2005.

14. A t-test comparing the average length of sentences in the time periods 1970-1978 and 1980-2000 indicates that this change is highly statistically significant.

15. As an example, consider two decisions from May 1979, *Henningsen Food* (case 137/78, ECLI:EU:C:1979:117), and *Galster v Hauptzollamt Hamburg-Jonas* (case 183/78, ECLI:EU:C:1979:143). Both decisions decided cases concerning the interpretation of the Common Custom Tariff, both were decided by the First Chamber featuring the same sample of three judges, and the Italian judge Giacinto Bosco acted as *Judge Rapporteur* in both decisions. In the French version of the judgment in *Henningsen Food*, a decision dated May 2, 1979, the legal reasoning commences with the phrase *attendu que*, followed by a list of reasons in the form of subordinate clauses separated by semi-colon. This sentence does not span the entire judgment, but still covers several pages. In *Galster v Hauptzollamt Hamburg-Jonas*, by contrast, the Court still writes in rather long sentences, but a sentence usually does not cover more than a single paragraph or argument.

Average number of syllables per word. A different development can be observed in the third panel, which reports the average number of syllables per word. The length of words appears to have been relatively constant until the late 1990s. Then, the measure ticks upwards.¹⁶ This change could indicate that the language of the ECJ's opinions has become more technical at this point in time, but it is beyond the scope of this article to investigate further how this shift manifested itself in the writing of the ECJ.

Type-token ratio. The last panel depicts one aspect of the variability of language use, namely the so-called type-token ratio (obtained by dividing the number of different words in a text by the total number of words). The measure slopes downwards slightly, but appears to stay relatively constant over time, with a rather high amount of variation between different judgments issued at the same point in time.

What can we learn from an inspection of these measures? First, as noted before, the data seem to confirm that, on various dimensions, the writing style of the ECJ has changed since its early days. Apparently the most far-reaching shift occurred in 1979, when the ECJ, in a rather abrupt change, stopped delivering its arguments mostly in the form of subordinate clauses.

Second, the data also confirm that the writing of the ECJ is relatively unaccessible. This can be demonstrated by calculating Kandel/Moles scores from the data, which are a version of the Flesch Reading Ease statistics¹⁷ adapted to the specifics of the French language (François and

16. A t-test confirms that the increase between the time periods 1990-1994 and 1998-2002 is highly statistically significant.

17. The Flesch Reading Ease statistics has been used in research on American courts, for example in recent studies on the SCOTUS (Carlson, Livermore, and Rockmore 2016) and on State Supreme Courts (Goelzhauser and Cann 2014).

Fairon 2012).¹⁸ Scores are commonly ranked between 0 and 100, with 0 indicating texts that are very difficult to read. Opinions written by the ECJ consistently score below 0, with an overall average of around -57. Readability seems to have improved over time, however. For opinions issued since 2000, the average score is around -20, with around 26% of opinions achieving a score of 0 or better. Only .5% of opinions achieve a score of more than 30, which designates texts which are less than “very difficult” to understand. These results seem to confirm allegations by those critics of the ECJ who lament its unclear style of writing.¹⁹

Third, the measures described above can be used in an attempt to understand if the person acting as *Judge Rapporteur* can influence the writing style of an opinion, i.e., if judges differ in their writing style. In order to test this hypothesis, the measures displayed in Table 2 are regressed on a categorical variable indicating the person acting as *Judge Rapporteur* and a range of control variables.²⁰ There appear to be two measures which vary widely depending on the person acting as *Judge Rapporteur*: first, the overall length of opinions and second, the type-token ratio. Differences between the individual judges on the other measures are less pronounced, although on all dimensions at least some judges are depicted as differing significantly from their peers.

18. Kandel/Moles scores are calculated based on the following formula:

$$KM = 207 - 1.015 \frac{\text{count(words)}}{\text{count(sentences)}} - 73.6 \frac{\text{count(syllables)}}{\text{count(words)}} \quad (1)$$

19. Note that the score was calculated from measures obtained by means of natural language processing, and it seems possible that the software used was not in all instances able to determine correctly features such as the length of a sentence. Therefore, these scores should be taken with a grain of salt.

20. Controls consist of dummy variables indicating the year of the opinion, the type(s) of procedure and the subject matter(s) of the case (both as indicated in the databases of the ECJ) as well as the chamber deciding the case, the latter interacted with the three-year period in which the case was decided (note that judges are assigned to chambers anew every three years).

This result is interesting for at least two reasons. The first reason is related to the observation that changes in measures (2) to (3) appear to reflect changes in the writing of the entire Court. The fact that most individual judges also do not show substantial differences in this regard might be interpreted as showing that the judges have limited leverage in deciding on the overall structure of reasoning and the vocabulary they use to build their opinions. By contrast, they seem to be able to influence the overall length of the opinion, and the relationship between the *Judge Rapporteur* and the measures of the variability of language use seems to indicate that they might be able to influence the style of writing as well. In any case, this result suggests that neither the collegiate nature of decision-making at the ECJ nor the involvement of clerks in the drafting process prevent judges from leaving their individual marks on their opinions. However, this conclusion of course rests on the assumption that there are no systematic differences in the set of cases dealt with by individual *Judge Rapporteurs*, which both are correlated with the stylistic measures described above and are not captured by the set of controls used in the regression analysis.

Fourth, it might be interesting to consider whether these measures can be used to uncover the drivers of the changes described above. The analysis above showed that there were two or potentially three major changes in the development of the writing style at the ECJ. First, in 1979, the ECJ abruptly started to use much shorter sentences. Second, in the late 1990s, the vocabulary used in its opinions seems to have become somewhat more demanding. And third, around 2004, the ECJ partly reversed its previous embrace of shorter sentences. It is interesting to note that all these changes were preceded by different rounds of EU enlargement which brought into office judges from countries with different legal traditions.

One might therefore ask, for example, whether it is possible to determine if the changes observed in 1979 were the result of the accession to the EU of Denmark, Ireland, and the UK just 6 years before? In order

to explore this possibility, a subset of the data including all decisions between 1973 and 1980 are used in regressions similar to those described above. In fact, it appears that, during the period leading to the shift in the ECJ's way of structuring opinions, all judges from the then-new Member States were among those who scored considerably lower on both the number of tokens per sentence and the percentage of sentences with more than 20 tokens. However, these judges are not the only ones whose opinions used shorter opinions than average, and it is impossible to conclude that they influenced other judges to do so.

Evidence from the distribution of function words

The preceding analysis has demonstrated how the writing style of the ECJ has evolved over time. It has also shown that judges seem to differ in how they write. However, based on the simple measures used above, the analysis has been unable to determine if the changes were the result of a loss of influence of the French legal tradition. This second part of the empirical investigation investigates whether the distribution of function words as a measure of style can provide additional insight on this question.

The analysis in this paper uses a list of function words which is on display in Table 4 in the Appendix. As the French language relatively often relies on short fixed phrases, the list includes words as well as a number of bigrams, trigrams, 4-grams and 5-grams.

A Python script was used to count the occurrence of function words in the individual judgments, resulting in feature vectors encoding how often a certain function word is used in an individual judgment. In the empirical analysis, I do not use the feature vectors directly. Instead, following Carlson, Livermore, and Rockmore (2016), as well as Hughes et al. (2012), I use the symmetrized Kullback-Leibler (KL) divergence as a measure for the difference between the distribution of function words in

two samples of cases.²¹ For this, I normalize all feature vectors so that they add up to 1.²² I then calculate the KL divergence as follows:

$$D_{KL}(P, Q) = \frac{1}{2} \sum_i \left(P(i) \log \frac{P(i)}{Q(i)} + Q(i) \log \frac{Q(i)}{P(i)} \right) \quad (2)$$

The resulting values for D_{KL} are distributed between 0 and 1, with 0 indicating identical distributions, and 1 meaning that both distributions are so different that is impossible to learn anything about one from the other.

Changes over time

In a first step, the analysis demonstrates that the evolution of the writing style of the ECJ also manifests itself in the use of function words. Just as in the context of the SCOTUS (Carlson, Livermore, and Rockmore 2016) and literature in general (Hughes et al. 2012), changes in the use of function words over time allow us to distinguish between samples of text produced in close succession and samples of text produced at distant points in time. One can describe such an analysis as an attempt to ascertain whether there is a discernible “style of the time” in the writing of the ECJ.

This analysis begins by examining the relationship between the distance in time between two samples of writing and their similarity. For this analysis, in a first step, information on the use of function words is aggregated at the year level. That is, for all years in the time period under observation, all the feature vectors from decisions handed down in this year are summed over. The KL divergence is calculated for all pairs

21. In the remainder of this article, KL divergence refers exclusively to symmetrized KL divergence.

22. Note that, because the KL divergence is not defined for distributions in which any item appears 0 times, I follow Carlson, Livermore, and Rockmore (2016) in adding .0001 to all probabilities after normalizing.

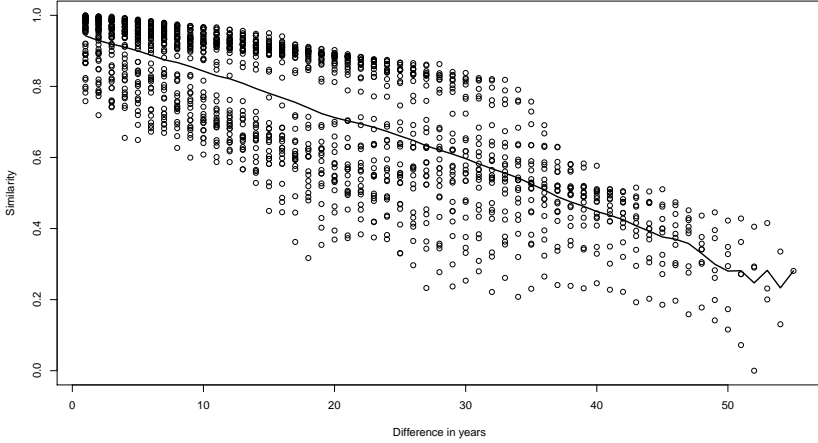


Figure 3. *Similarity and temporal distance*

of years starting in 1960.²³ KL divergence scores are scaled to obtain a similarity score ranging from 1 to 0, with 1 indicating the most similar observation in the resulting dataset, and 0 indicating the least similar observation. The results are displayed in Figure 3. The x-axis indicates the temporal difference between two years, while the y-axis indicates the similarity score. Each pair of years is represented by one point. The line shows the average similarity score for all judgments with a similar difference in years. From Figure 3, it is apparent that the difference between the use of function words in the text produced by the courts increases with the difference in time.

Next, the analysis turns to the relationship between the similarity of the texts produced by pairs of judges and the distance between their time in office. For this, the information on the use of function words is aggre-

23. Earlier years are omitted, because a very limited number of judgments was produced during these years.

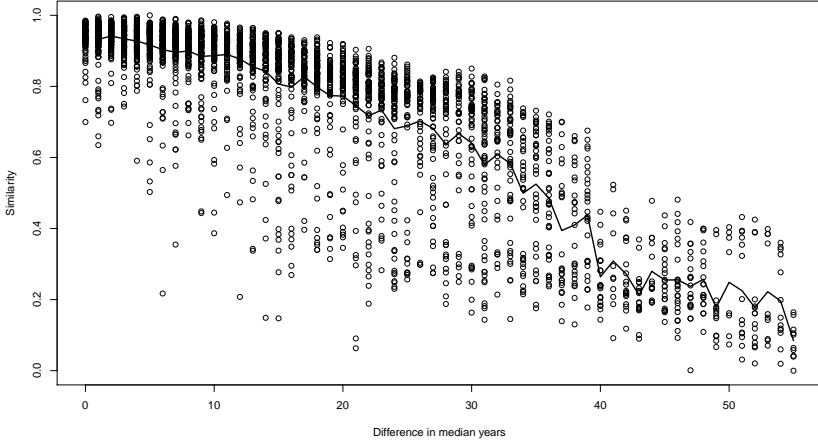


Figure 4. *Similarity between different judges as a function of time*

gated at the judge level. For each judge who authored at least 20 opinions, the median year he or she served at the ECJ is determined. Then, similar to the analysis above, the KL divergence for each pair of judges in the dataset is computed, and the resulting values are scaled to obtain a similarity score similar to the one used above. The results are displayed in Figure 4. The x-axis indicates the temporal difference between the median year of the judges’ tenures at the court, and the y-axis displays the similarity score. Again, it can be seen that, the further apart two judges’ tenures are, the bigger is the difference in their use of function words.

Lastly, the analysis uses spectral clustering (Luxburg 2007) to determine whether judges are, on average, more similar to judges serving at the ECJ during the same period in time, or to judges from countries with the same legal tradition. Spectral clustering is an unsupervised algorithm which can be used to sort individuals into groups based on observed similarities between these individuals. If the “style of the time” was the dominant factor in determining a judge’s writing style, we would expect judges with overlapping tenure to be clustered together. If judges from different

legal cultures could be distinguished by their writing style, we would expect them to be clustered together. As described above, this article assumes the existence of five distinct legal cultures from which judges at the ECJ are drawn: French law, German law, (English) common law, Nordic law, and jurisdictions formerly under the influence of the Soviet Union.

This analysis again uses similarity scores obtained from scaling the KL divergence between feature vectors representing the use of function words by individual judges. Judges and similarity scores are then represented as a network with judges as nodes. Edges are placed between the nodes based on the similarity score of the respective judge pair: each judge is connected to the 5 judges (representing roughly 5% of all judges) with the highest similarity scores in the set. Duplicate edges are treated as one edge. The resulting network graph forms the basis of the analysis using spectral clustering. Spectral clustering classifies nodes in a network as belonging to one of a previously defined number of groups based on the relationship between the nodes. I specify the number of groups to be equal to the number of legal traditions represented at the ECJ (5). The results from this analysis are presented in Table 1.

One can immediately see that the legal tradition of a judge's home country has at most very limited effects on the cluster he or she is classified into.²⁴ For example, in cluster 5, judges from all countries are present. Rather, the spectral clustering analysis effectively grouped the judges into clusters according to the time they served at the court. Cluster 1 contains almost all judges appointed to the court before 1967. In cluster 2, almost all judges were appointed between the late 60s and the early 80s. Cluster 3 consists of judges appointed in the 80s and early 90s, cluster 4 of judges appointed in the 90s, and all judges appointed after

24. Note that a similar result is obtained by rerunning the spectral clustering analysis on a smaller set of judges including only the judges in Table 1 cluster 5.

Table 1. Results of Spectral Clustering - All Judges

Cluster 1		
Delvaux (BE, 1952-1967)	Kutscher (DE, 1970-1980)	Rossi (IT, 1958-1964)
Monaco (IT, 1964-1970)	Riese (DE, 1952-1963)	Rueff (FR, 1952-1962)
Catalano (IT, 1958-1961)	Hammes (LU, 1952-1967)	Strauss (DE, 1963-1970)
Lecourt (FR, 1962-1976)	Trabucchi (IT, 1962-1972)	Donner (NL, 1958-1964)
Cluster 2		
de Wilmars (BE, 1967-1984)	Due (DK, 1979-1994)	Capotorti (IT, 1976-1976)
van Kleffens (NL, 1952-1958)	Everling (DE, 1980-1988)	Touffait (FR, 1976-1982)
Bosco (IT, 1976-1988)	Koopmans (NL, 1979-1990)	Bahlmann (DE, 1982-1988)
Ó Dálaigh (IE, 1973-1974)	Pescatore (LU, 1967-1985)	Mackenzie Stuart (UK, 1973-1988)
Sørensen (DK, 1973-1979)	O'Keeffe (IE, 1975-1985)	Serrarens (NL, 1952-1958)
Cluster 3		
Joliet (BE, 1984-1995)	Grévisse (FR, 1981-1982)	O'Higgins (IE, 1985-1991)
Kapteyn (NL, 1990-2000)	Zuleeg (DE, 1988-1994)	Galmot (FR, 1982-1988)
Murray (IE, 1991-1999)	de Almeida (PT, 1986-2000)	Rodríguez Iglésias (ES, 1986-2003)
Chloros (GR, 1981-1982)	Schockweiler (LE, 1985-1996)	Slynn (UK, 1988-1992)
Díez de Velasco (ES, 1988-1994)	Kakouris (GR, 1983-1997)	
Cluster 4		
Jann (AU, 1995-2009)	Sevón (FI, 1995-2002)	Macken (IE, 1999-2004)
da Cunha Rodrigues (PT, 2000-2012)	Wathelet (BE, 1995-2003)	Rosas (FI, 2002-2015)
Mancini (IT, 1988-1999)	Ragnemalm (SE, 1995-2000)	Hirsch (DE, 1994-2000)
Puissochet (FR, 1994-2006)	La Pergola (IT, 1994, 1999-2006)	von Bahr (SE, 2000-2006)
Colneric (DE, 2000-2006)	Ioannou (GR, 1997-1999)	Schintgen (LU, 1996-2008)
Edward (UK, 1992-2004)	Gulmann (DK, 1994-2006)	Skouris (GR, 1999-2015)
Timmermans (NL, 2000-2010)		
Cluster 5		
Berger (AU, 2009-)	Silva da Lapuerta (ES, 2003-)	Kasel (2008-2013)
Toader (RO, 2007-)	Lenaerts (BE, 2003-)	Bonichot (FR, 2006-2018)
Biltgen (LU, 2013-)	Lindh (SE, 2006-2011)	Arabadjiev (BL, 2007-)
Rodin (HR, 2013-2021)	Levits (LV, 2004-)	Fernlund (SE, 2011-)
Arestis (CY, 2004-2014)	Juhász (HU, 2004-)	Barthet (MT, 2004-)
Ilešič (SI, 2004-)	Malenovský (CZ, 2004-)	Ó Caoimh (IE, 2004-2015)
Prechal (NL, 2010-)	Klučka (SK, 2004-2009)	von Danwitz (DE, 2006-)
Tizzano (IT, 2006-)	Makarczyk (PL, 2004-2009)	Šváby (SK, 2009-)
Larsen (DK, 2006-)	Küris (LT, 2004-2010)	Safjan (PL, 2009-)
Schiemann (UK, 2004-2012)	Lõmus (EE, 2004-2013)	Jarašiūnas (LT, 2010-)
da Cruz Vilaça (PT, 2012-)	Vajda (UK, 2012-2018)	Jürimäe (EE, 2013-)

2002 are allocated to cluster 5. This result suggests that the style of individual judges is more influenced by the “style of the time” than by a style of a particular group of judges.

Overall, the findings in this part provide solid evidence for the hypothesis that the style of the ECJ changes over time in a way that makes it possible to attribute a judge to a certain time period in the decision-making of the court. By contrast, this part offers no evidence that judges from countries with similar legal traditions share a common style.

The drivers of changes in style

The analysis above shows that the writing style of the ECJ has changed over time, and that the stylistic fingerprints of judges offer only limited hints to the legal tradition in which the judge was raised. One question that remains unresolved is whether the several rounds of EU enlargements which brought judges from new countries to the ECJ have contributed to the changes in writing style. This part of the analysis explores whether the distribution of function words can be used to shed light on this question.

To set the stage for this analysis, Figure 5 displays yet another graphical depiction of the development of the ECJ’s writing style over time. Figure 5 uses a technique called multidimensional scaling (Fischman 2015) to represent the feature vectors for all years of opinion writing at the ECJ in a two-dimensional space based on the KL divergences between all pairs of years. The plot on the top shows the results for all years between 1955 and 2014, the plot on the bottom omits the first 15 years. The color of the dots shifts from older (light grey) to newer (dark grey) decisions.

The plots confirm yet again that the style of the ECJ has evolved over time. Interestingly, two of the three significant changes depicted in Figure 2 above also seem to have affected the distribution of function words: In the late 1970s, after years of relative stability, the style of the ECJ appears to change rather quickly in order to enter a new period of stability. This period lasts during the 1980s and into the second half of the

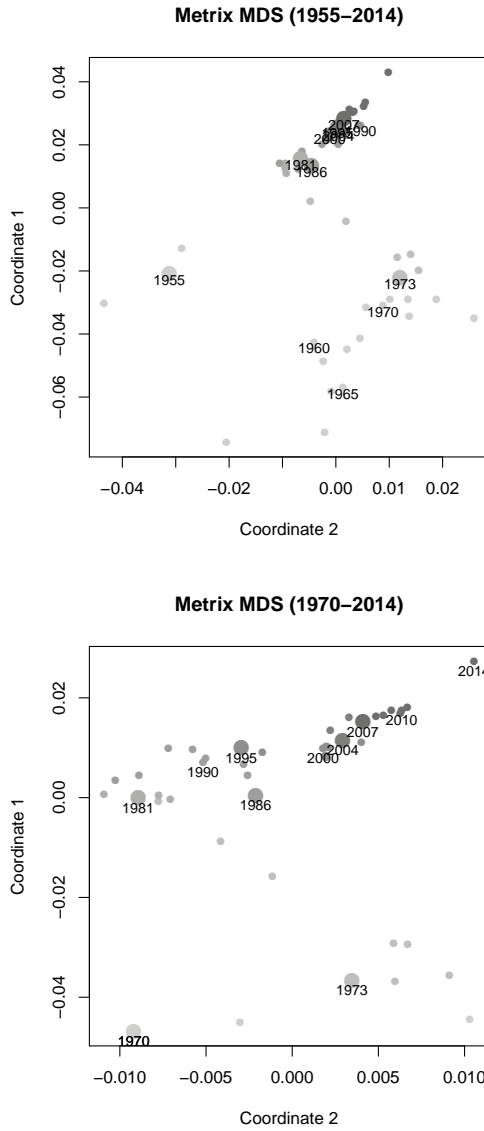


Figure 5. Multidimensional scaling of KL divergences between different years

1990s, when the style of the ECJ again changes rather quickly to enter a new area of stability which lasts almost until the end of the time period under observation. These changes seem to reflect the changes to the general structure of opinions and the length of sentences which occurred in the late 1970s, as well as the change in the complexity of the vocabulary which occurred in the late 1990s.

In the following, two alternative and at least partly competing hypotheses about the development of the ECJ's writing style are tested. The first hypothesis is that EU enlargements have been a driver of the change in style. The second hypothesis is that the French legal culture still dominates the Court to the extent that those judges who come from a country with a French legal tradition have more influence on the overall writing style of the ECJ than their peers.

Did EU enlargements change the writing style of judges at the ECJ? The analysis above revealed two clear instances in which the accession of new Member States to the court was followed by significant changes in the writing style of the court. Remarkably, both rounds of accession were among those that had the most substantial impact on the composition of the ECJ. In 1973, for the first time, two judges from common law countries entered the court alongside the first judge from a Nordic law country. In 1995, the number of judges from Nordic law countries increased from 1 to 3 and the number of judges from German law countries rose from 1 to 2. By contrast, the two rounds of enlargements in the 1980s only brought judges from French law countries to the ECJ. The 2004 EU enlargement increased the number of judges at the ECJ by 10 and can be therefore seen as the most consequential change to the composition of the court. However, most judges came from countries which had only recently undergone great changes in their legal systems, with many of them attempting to adopt features of the legal systems of countries in Western Europe. Therefore, it seems questionable whether those judges could bring with them a strong sense of their own legal tradition which could influence the style of legal reasoning at the ECJ.

To investigate more thoroughly whether the new judges played a role in changing the style of the ECJ following the 1973 and 1995 accessions, the analysis turns to whether the writing of the other judges at the Court in subsequent years became more similar to the writing of the new judges during their early years on the Court. For this, for each judge actively serving at the ECJ in 1973, the following steps are taken: First, the feature vector representing the use of function words in judgments authored by this judge the years 1973-1975 is obtained. Second, the same is done for judgments authored by all other judges during the same time period. Third, this last step is repeated for all 3-year periods starting between 1974 and 1988 (i.e., a feature vector is obtained for the writing of all other judges between 1974 and 1976, between 1975 and 1977, all the way to the time period 1988-1990). Finally, the KL divergence representing the difference in the use of function words between opinions authored by the judge between 1973 and 1975 and the opinions authored by other judges in the same and in later time periods is calculated, resulting in a measure for whether the writing of all other judges at the Court became more similar or more dissimilar to the writing of individual judges in the time period 1973 to 1975.

This setup allows for an exploration of whether the ECJ, in its writing, was more influenced by some judges than by others. If one judge or a group of judges did exercise a stronger influence on the development of the writing style of the entire court, one should expect the distance between the judges' initial writing and the writing of the other judges at the ECJ in later time periods either to decrease over time or at least to increase at a slower pace as compared to judges who were less influential.

The results of this analysis are displayed in the upper part of Figure 6. It can be seen that the distance between the writing style of all judges in the period 1973-1975 and the writing style of the entire court rapidly increases as the court enters the late 1970s. Again, this likely is a reflection of the change in the overall structure of opinions documented above, and confirms the finding that the style of the ECJ changed rather quickly

during that time period. However, the differences in style increase at a roughly equal pace for all judges who served at the ECJ in the mid-1970s. In particular, we do not observe that this increase would be less pronounced for the judges from those countries which acceded to the EU in 1973.

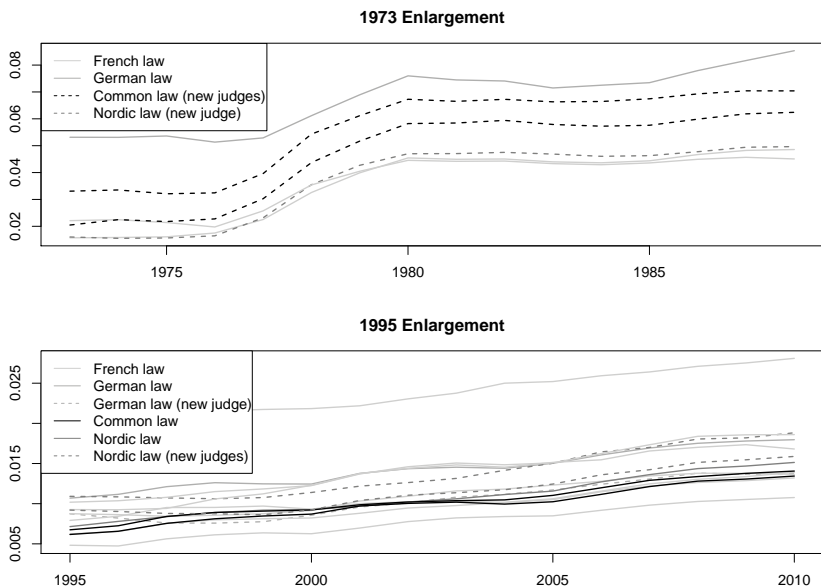


Figure 6. *Development of writing style of ECJ in comparison to the writing of judges between 1973 and 1975*

The same test is repeated for the 1995 enlargement of the EU. The results of this second test are displayed in the lower part of Figure 6. For this time period, it seems like the writing style of the ECJ initially became more similar to the writing style of judges from the new Member States during their early years: while the lines indicating judges from old Member States slope upwards for the years 1996-2000, the lines representing judges from new Member States move horizontally, or even slope down-

wards. However, if the ECJ during these years in fact changed because those new judges influenced the writing of their colleagues, this effect did not last long. The writing style of the ECJ 15 years later was more different from their writing style as from that of their colleagues.

In sum, there is only very limited evidence that it was the writing of the judges joining the ECJ in 1973 and 1995 that caused the writing style of the ECJ to change in the years following these rounds of enlargement.

The analysis now turns to the second hypothesis described above: Did judges from countries with a French legal tradition have more influence on the development of the writing style of the ECJ than their peers from other countries? To answer this question, the analysis conducts what can be considered as a more general version of the test implemented above for which it relies on regression analysis. Put very simply, it investigates if the writing style of the other judges at the ECJ became on average more similar to the writing style of a judge belonging to a specific group during the first years after his or her taking office, as compared to other judges who took office at the same time. This last point is different from the analysis above, in which new judges are compared with all the other judges serving at the ECJ when they took office.

For this test, judges are sorted into groups based on the time of their first appointment to the ECJ. The regular tenure of half of the judges ends every three years (Art. 253(2) TFEU). While some judges enter the court as a replacement for a judge who has left office before the end of his or her official tenure, most judges assume office at the beginning of such a three-year period. The first of these regular changes in the composition of the ECJ took place in October 1958, the second one in 1964, and subsequent changes happened every three years in October. All judges appointed to the ECJ in a given three year period starting on January 1 (with the first three-year period covering the time period January 1, 1958, to December 31, 1961) are treated as one group of judges.

Next, for each judge who took office in 1958 or later, the frequency of function words in texts written by this judge during the first three years

Table 2. *Summary statistics*

	Obs.	Mean	Std. Dev.	Min.	Max.
KL_0	68	.0193	.0188	.0057	.1399
KL_3	68	.0210	.0189	.0065	.1320
KL_6	68	.0201	.0241	.0076	.1323
KL_9	68	.0270	.0220	.0079	.1473
$Trad_{French}$	68	.4853	.5035	0	1
$Trad_{German}$	68	.1176	.3246	0	1
$Trad_{Commonlaw}$	68	.1764	.3451	0	1
$Trad_{Nordic}$	68	.1029	.2721	0	1
$Trad_{Soviet}$	68	.1176	.3246	0	1
$Trad_{strongFrench}$	68	.1765	.3841	0	1

of his or her time in office is determined. Then, information on the use of function words in all opinions written by other judges during four time periods is obtained: first, the first three years in office of the respective judge; second, the three-year period three years later; third, the three-year period six years later; and finally, the three-year period nine years later. KL divergences are calculated between the texts attributed to the respective judge during his first three years in office and the texts written by other judges in the respective time periods. KL_0 represents the KL divergence between the texts authored by one judge and the texts authored by the rest of the ECJ during the same time period. KL_3 , KL_6 , and KL_9 contain the KL divergences between the texts authored by one judge and the texts authored by all other judges in the three year periods 3, 6, and 9 years later. Table 2 provides summary statistics for this dataset.

This dataset is then used in a regression analysis to detect whether judges from specific countries have a bigger influence on the development of the writing style of the ECJ than others:

$$y_i = \beta_0 + \beta_1 KL_{0,i} + \beta_2 p_i + \gamma X_i + \epsilon_i, \epsilon \sim N(0, \sigma). \quad (3)$$

In (3), y_i is the KL divergence between a judge's writing during his or

her first three years in office and the writing of all other judges on the court in later periods of time (either KL_3 , KL_6 , or KL_9). $KL_{0,i}$ is the KL divergence between the judge's initial writing and the writing of the rest of the court during the same time period. p_i indicates the three-year period in which the judge joined the ECJ. Lastly, X_i is a vector of dummy variables indicating the legal tradition of a judge's home jurisdiction.

Table 3 reports the results of this regression analysis. One can first see (columns (1), (4), and (7)) that the different groups of legal traditions as defined above do not differ significantly from common law judges, which is the baseline group in these regressions. This means that there is no indication that judges from countries with a French legal tradition have on average been more able than others to influence the development of the writing style of the ECJ.

However, this result might be caused by the fact that the group of countries with a French legal tradition as defined above encompasses countries as diverse as Portugal, Greece, and the Netherlands. Even if judges from France were more able to influence the ECJ's style of reasoning, this effect could be counteracted if, for example, judges from Portugal were on average less influential. For this reason, the analysis is rerun using an additional indicator for whether a judge is from a country with a strong French tradition, which is defined as encompassing Belgium, France, and Luxembourg. Different from the other countries, these countries also use French as an official language. Therefore, judges from these countries might be more than others able to influence the writing style of the ECJ.

Table 3. *OLS regression.*

Estimates obtained from ordinary least squares regression. *p*-values based on heteroscedasticity-robust standard errors in parentheses. Controls for judge time period included in all regressions. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

[illegible]

Columns (2), (5), and (8) as well as (3), (6), and (9) reveal that the variable indicating whether a judge is from a country with a strong French legal tradition is negative and significant for the second and the third set of regressions, and negative throughout the specifications. This effect is also substantial. For example, for an average judge, the writing style of the other judges after nine years is more different from his or her initial writing than it was in the beginning. For judges from French-speaking countries, this effect is reverted: on average, the writing style of the other judges is less different from his initial writing nine years later than it is during the three years after he or she entered the Court.²⁵

This result suggests that judges with a strong French legal tradition are more able than others to influence the writing style at the ECJ. One might interpret this finding as evidence that the French influence at the ECJ is still substantial.

Concluding remarks

This study is one of the first to explore the use of computational text analysis in an analysis of the development of the writing style of judges at the ECJ. It documents that the writing style of the ECJ has evolved in a way that can be tracked by means of a range of different measures. It also finds that judges serving at the ECJ at a specific point in time use function words in a way that makes it possible to isolate a specific “style of the

25. Note that this result is largely robust across alternative specifications, robust to shortening the period in time under observation, and robust to changing the definition of which country has a strong French legal tradition. In additional regressions, dummy variables indicating a judge’s home country are used instead of variables indicating his or her legal tradition. Consistently, French judges are depicted as being more influential than other judges. Belgium and Luxembourg both appear in the group of top 5 influential countries, while the five least influential countries include four countries that accessed the EU in 2004. This result can also be seen as a confirmation that the method developed here captures a meaningful effect.

time”, while judges from countries with the same legal tradition do not seem to conform in their use of function words more than other judges. Finally, the study sets out to uncover some of the drivers of the change in style over time. While it fails to provide evidence for the hypothesis that the various rounds of EU enlargements have had an effect on the writing style of the ECJ, its findings suggest that judges from French-speaking countries throughout the years were able to influence the development of the writing style of the ECJ to a higher degree than other judges. This can be interpreted as evidence that the French legal culture still dominates the court to some extent at least.

More generally, the study demonstrates how computational methods can inform debates about judicial institutions. The writing style of the ECJ is a contested topic, with some commentators accusing the ECJ of clinging to an outdated French version of opinion writing, while others defend the Court against such criticism by arguing that its writing style has changed considerably over time. So far, most commentators have relied solely on qualitative evidence in support of their arguments. This study provides, apparently for the first time, quantitative evidence of the development of the ECJ’s writing style over time. It will be interesting to see how this debate, as well as other debates, will change in the face of a growing availability of evidence gained from analyzing large quantities of legal texts by means of computational methods.

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Appendix

Table 4. *Function words and phrases used in the present study*

Single words
a actuellement afin ai ailleurs ainsi ait alors ancien ancienne anciennes anciens apparemment apparente apparente apparentes apparents apres assez au aucun aucune aucunes aucuns auquel laquelle aurait auront autant autre autrefois autrement autres aussi aussitot autour autre autrefois autrement autres autrui auxquels auxquelles avant avec aura autant aux auxquels auxquelles avaient avais avait avant avoir avons ayant beaucoup bien bon bonne bonnes bons c ca car cause ce ceci cela celle celles celui cependant certain certaine certaines certains certes ces cet cette ceux chacun chacune chaque chez ci clairement comme comment complet complete com- pletes complets compris comprise comprises conformement consequemment considerablement contre correct correcte correctes corrects couramment d dans de dedans dehors deja depuis dernier derniere dernierement dernieres derniers derriere des desormais dessous dessus devait devant devraient devrait dire directement dis dit dite dites doit doivent donc dont du due durant dus effectivement egalement elle elles en encore enfin en- semble ensuite entendu entier entiere entiers entre envers environ essentiellement est et etaient etant etais etait etc ete etions etre eu eurent eut eux evidemment excepte exclusive exclusivement facilement facon faire faisant fait faite faites faut fois font furent fut generalement grave graves haut hors ici il illegitime ille- gitimes ils immediatement in inclu inclue inclus inclus inclusive inclusivement incorrect incorrecte incorrects incorrectes injust injuste injusts injustes j jadis jamais je jusque jusqu just justes l la laquelle le legit- ime legitimes le quel les lesquelles lesquels leur leurs loin lors lorsqu lorsque lui ma maintenant mais malgre maniere me meme memes mes met mettait mieux mis mise moindre moins mon montant n naturellement ne neanmoins ni nombreuse nombreuses nombreux non normalement notamment nous nos notre nul on ont or ostensif ostensive ou ou outre par pareillement parfois parmi part particulierement partout pas pendant permet permettait permettant permettent permettraient permettrait permis peu peut peuvent plein pleine pleines pleins plupart plus plusieurs plutot pour pourtant pourra pourraient pourrait pouvant premier pre- miere premieres premiers pres presque principalement probablement prochain prochaine prochaine- ment prochaines prochains propre pu puis puisque puisqu puisse qu quand quant quasi que quel quelles quelqu quelque quelquefois quelques quels qui quiconque quoi quoique raison rapidement recemment rien s sa sait sans sauf saurait se selon sera serait serieuse serieusement serieuses serieux seront ses seul seule seuls seules seulement si sinon soient soit son sont sous souvent subsequemment suis suivant suivante suivantes suivants surtout sur ta tant tantot te tel telle tellement telles tels tes ton toujours tous tout toute toutefois toutes tres trop tu un uns une unes unique uniquement va vers vide vides vient viennent voire vont vos votre vous vraiment y
Bigrams
a bas a part a nouveau a savoir a travers apres cela attendu que au-dela au-dessous au maximum au minimum au moins autant de bien que bien sur celui-ci chaque fois charge de ci-apres ci-dessous combien de comme quoi considerant que d'abord d'ailleurs d'ou d'un d'une de l de la de nouveau denue de depuis peu du coup du moins en apparence en attendant en cela en consequence en bas en effet en fonction en outre en commun en tout entre-temps grace a grace au grace aux hors de hors d la-bas la-dessus lors de meme que nulle part par consequent par exemple par lequel parait-il parce qu parce que peut-etre pour cela quand meme sans doute s'agit s'agissait sur quoi tandis que y compris
Trigrams
a cause de a ces mots a cote de a partir de au cours de au lieu de au lieu que au sein de c'est pourquoi dans l'immediat de sorte que de toute facon en cours de en cours d en dehors de en face de en raison de il arrive que n'importe comment n'importe lequel n'importe ou n'importe quand n'importe quel n'importe qui n'importe quoi par la presente par le present pas du tout tous les jours tout a fait tout de suite tout le monde
4-grams & 5-grams
a la place de a la suite de c'est-a-dire par la faute de ou que ce soit s'il te plait s'il vous plait tout a l'heure a la suite de quoi un de ces jours un jour ou l'autre