"Let Me Just Interrupt You": Estimating Gender Effects in Supreme Court Oral Arguments[*]

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February 16, 2023

Abstract

Oral argument is the most public and visible part of the U.S. Supreme Court's decision-making process. Yet, what if some advocates are treated differently when they argue their case before the Court, solely because of aspects of their identity unrelated to the case? In this work, we use a causal inference framework to quantify the effect of an advocate's gender on interruptions of advocates. Leveraging nearly four decades of U.S. Supreme Court oral argument transcript data, we identify a clear and consistent gender effect, with female advocates interrupted more frequently than male advocates. We demonstrate that, for most justices, the gender effect dwarfs other influences on justice interruption behavior including ideological alignment between justices and advocates. Through a series of corroborative analyses, we further demonstrate the consistency and strength of the gendered interruption behavior of the justices.

Word Count: 9,345

Keywords: U.S. Supreme Court; Oral Argument; Gender Bias; Causal Inference; Text-as-Data

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Introduction

Oral argument is the most public and visible part of the U.S. Supreme Court's decision-making process. For an hour or more, advocates on conflicting sides of the nation's most important political and legal controversies can press their arguments, while Supreme Court justices interject to pepper them with questions and comments about their argument. After, the members of the Court meet in a private conference where the justices offer their initial votes and begin the process of drafting opinions explaining those votes. A rich literature documents how the public arguments inform the decisions of the Court, with prior work indicating that oral argument influences the information justices have (e.g., Johnson 2001, 2004), the issues discussed in decisions (e.g., Black, Johnson and Wedeking 2012), and the voting of Supreme Court justices (e.g., Johnson, Wahlbeck and Spriggs 2006). Scholarly understanding of oral argument thus accords with the contention by Justice Blackmun that, "A good oralist can add a lot to a case and help us in our analysis of what the case is all about" (Strum 2000, 298).

Yet this raises an important question: what if some advocates are treated differently by the justices, solely because of aspects of their identity unrelated to the case? Consider the Supreme Court's oral argument in *United States v. Texas* in November of 2021. The case dealt with a Texas state law that effectively banned abortion after six weeks for women in the state. Arguing the case on behalf of the United States, Solicitor General Elizabeth Prelogar—a woman—was interrupted regularly by the justices, with one particularly poignant example occurring in this exchange with Associate Justice Samuel Alito:

> GENERAL PRELOGAR: While I certainly acknowledge, Justice Alito, that an injunction that would bind state court judges is extremely rare, it's not unheard of, and I think, in the unprecedented facts of this case, it's appropriate relief. And —
>
> JUSTICE ALITO: Well, judges have been enjoined —

GENERAL PRELOGAR: —and the reason for that is—

JUSTICE ALITO: —let me just interrupt you —judges have been enjoined from performing unlawful acts.

Interruptions of this sort are not unique at oral argument for the U.S. Supreme Court. Though interruptions are common throughout oral argument, recent work has demonstrated that female advocates as well as female justices are, in the aggregate, interrupted more frequently and given less time to speak than their male colleagues (see, e.g., Jacobi and Schweers 2017a). This aggregate pattern of gendered interruptions relates to an emerging consensus on the influence of gender on judicial behavior more generally that covers the gamut from oral argument (e.g., Jacobi and Schweers 2017a; Patton and Smith 2017) to deliberation (e.g., Boyd, Epstein and Martin 2010) and through to voting (e.g., Collins and Moyer 2008; Boyd, Epstein and Martin 2010; Szmer, Sarver and Kaheny 2010; Szmer, Kaheny, Sarver and DeCamillis 2013; Gleason and Smart 2022).

Clearly women being interrupted more frequently has stark consequences for their participation in political and legal spaces. Interruptions are a way for someone to assert dominance over a conversation, forcing another to stop speaking and listen instead (Zimmermann and West 1996), and that the justices might more frequently assert their dominance over female advocates than male advocates detracts from the ability of women to fully participate at the Court. Yet establishing that women are being interrupted more frequently *because* they are women is a difficult causal problem. In the case of Supreme Court oral argument, for instance, women may systematically represent different ideological perspectives for which the probability of being interrupted by a justice are greater than some baseline interruption rate. Likewise, as Solicitor General Prelogar's affirmative action quote demonstrates, given systemic disadvantages, the average woman who pursues and gains the role of advocate before the Supreme Court is likely to be systematically different than the average man who does the same, and their relationship to the Court's underlying ideological divisions may reflect this. In both cases, differences in interruption rates are not *directly* attributable to

gender, though they are *indirectly*. By way of example, consider gender differences in judicial appointments, the pinnacle achievement for those in the legal profession, by the party of recent presidents. During his four years in office, approximately 24% of federal judges appointed by then-President Donald Trump were women, compared to 42% of appointments during the tenure of then-President Barack Obama (Gramlich 2021); as of the end of July 2022, fully 77% of the appointments by President Joe Biden had been women. In all, these appointment dynamics mean the ideology of the politician in power influences judicial career prospects differently by gender, and may analogously influence the distribution of observed ideologies of justices and advocates.

In this article, we begin to untangle the difficult causal question of whether female advocates are interrupted more often at oral argument *because* they are women. To do so, we leverage a careful causal research design in companionship with data from over 3,000 oral argument sessions featuring over 770,000 advocate statements (called "utterances" by computational linguistics) by more than 4,000 unique advocates. Our approach offers two important methodological advances on prior work. First, we leverage conversational chunking to isolate the interactions between dyads—a single advocate and a single justice—which allows us to disentangle one justice's propensity for interruption from other justice interruption propensities. Second, and relatedly, we introduce a measurement approach for operationalizing interruption rates across those conversational chunks that takes into account the number of words spoken, allowing us to more directly compare differences in justice interruption rates across the gender of the advocate.

Our analysis of this extensive data demonstrates the bias that female advocates face before the Court. Throughout our analysis, we find consistent evidence most justices interrupt female advocates more often than male advocates. Moreover, we find that the effect of gender on justice interruption behavior far outweighs that of other hypothetical influences on interruption behavior. Even ideological factors pale in comparison to the gender effect, with the gender effect anywhere from three to five times greater than the effect of ideological

4

disagreement, or arguments where justices are likely—based on their ideological predisposi-tions and the argument being made by the advocate—to disagree with the advocate. The effect is identifiable among most justices on the Court, but particularly prominent among the moderate and conservative justices. A series of corroborative analyses further establish the primacy of gender as the primary factor driving interruption behavior among most jus-tices. Moreover, in establishing this effect, our causal framework permits us to state all our assumptions explicitly rather than let them be left up to interpretation (Lundberg, Johnson and Stewart 2021), and provides a more careful and robust approach for this critical area of legal and political inquiry.

Gender and Debate

It is well-established that, when participating in social, political, and legal spaces, women confront more frequent and more significant barriers than men. In deliberative settings, women often speak less than men (Karpowitz and Mendelberg 2014; Mendelberg and Kar-powitz 2016), and may be expected to use different words, phrases, and linguistic styles (e.g., Hancock and Rubin 2015; Gleason and Smart 2022). Should they choose to go into political representation, women seeking office face greater primary competition from men, forcing them to be even better candidates (Lawless and Pearson 2008). Once in Congress, women are given fewer leadership opportunities (Kanthak and Krause 2012; Barnes 2016). In committees, they are likely to be interrupted more often when they are speaking (Miller and Sutherland 2022). Should a woman instead choose to go into the legal profession, they likewise face significant hurdles to their participation. Though law schools now admit more women than men on average, the vast majority of prestigious positions remain male-dominated (St. Eve and Luguri 2021). Indeed, given the gender biases throughout the legal profession, female lawyers who are able to reach the highest levels of their profession and argue cases before the Court are undeniably exceptional; for instance, in 2020-2021 only 18% of attorneys arguing before the Court were women (St. Eve and Luguri 2021).

5

The barriers to women's full participation in these elite spaces was explicitly pointed out by a woman during oral argument at the Court. In 2022, during the Supreme Court's oral argument in two cases addressing affirmative action in college admissions, Solicitor General Prelogar remarked on the necessity of affirmative action in areas where there were extreme disparities.[1] Her example was one close to the Court: extreme disparities in gender of the advocates who argued the cases the justices chose to hear and decide each term. As Solicitor General Prelogar remarked:

> The Court is going to hear from 27 advocates in this sitting of the oral argument calendar, and two are women, even though women today are 50 percent or more of law school graduates. And I think it would be reasonable for a woman to look at that and wonder, is that a path that's open to me, to be a Supreme Court advocate? Are private clients willing to hire women to argue their Supreme Court cases? When there is that kind of gross disparity in representation, it can matter and it's common sense.

Solicitor General Prelogar's comments noted disparities in representation, but did not note disparities in behavior women receive once they are participating in these high spaces of legal debate. As Miller and Sutherland recently noted in their analysis of gendered interruption patterns in Congressional committee hearings, "a long-standing body of work has shown that men employ a number of tactics in conversation—including interruption—to exert social dominance (e.g., Zimmermann and West 1996)" (Miller and Sutherland 2022, 3). Interruptions serve to cut off the speech of another and to assert dominance over the conversation. Even the female *justices* on the Court—equals by design of their male colleagues—are interrupted more frequently than the male justices (e.g., Jacobi and Schweers 2017*b*) during oral argument, heightening concerns about the ability of women to participate in this

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[1]*Students for Fair Admissions v. President & Fellows of Harvard College* and *Students for Fair Admissions v. University of North Carolina.*

critically important space.

Oral Argument and the U.S. Supreme Court

Accordingly, the space we focus on is oral argument, the public discussion of cases before the Court where advocates from each side are given an equal amount of time—approximately thirty minutes—to present their case. During this time, justices are free to interrupt, speak, and ask questions. While the most visible form of discussion at the Court, the arguments are also widely understood as opportunities for the justices to gain information (e.g., Johnson 2004), elucidate issues, and possibly even change another justice's vote (e.g., Johnson 2004; Black, Johnson and Wedeking 2012; Ringsmuth, Bryan and Johnson 2013). The arguments are also an increasingly public presentation of the Court, with live audio broadcast by the Court as well as recorded audio and transcripts released by the Court shortly afterwards. In all, oral argument is a critical component of the work of a justice on the Court, and the most public-facing element of their work.

It is well-understood that the justices' ideological preferences influence their behavior on the Court (Segal and Spaeth 2002; Zorn and Bowie 2010), and oral argument is no different. Indeed, recent work suggests the influence of ideology on behavior at oral argument may even be growing; Jacobi and Sag (2019) argue that increasing political polarization in the United States precipitated increased ideological behavior at oral argument around 1995, leading justices to interrupt more often and speak more frequently as a result of their ideological differences. This follows from prior work indicating that liberal justices are more likely to interrupt conservative arguments, and conservative justices are more likely to interrupt liberal arguments (Johnson, Wahlbeck and Spriggs 2006; Jacobi and Schweers 2017a). Justices are most likely to ask questions of sides they are ideologically opposed to; indeed, the number of questions asked to each side has been leveraged as a consistent predictor of the likely winner of a case in the past, as those sides asked more question are viewed as the likely loser (Roberts 2005). Taken together, a justice is more likely to interrupt,

more likely to speak to, and more likely to ask questions of an attorney arguing against the justice's perceived ideological inclinations.

Perhaps unsurprisingly given the above, the justice's behavior at oral argument is predictive of how the justice then votes in the case (see, e.g., Jacobi and Rozema 2018; Dietrich, Enos and Sen 2019). Both the number of questions (Roberts 2005) and the tone of the questions (Black, Treul, Johnson and Goldman 2011; Dietrich, Enos and Sen 2019) have been shown to be predictive of how justices ultimately vote on the merits. For advocates, the time is therefore invaluable in structuring the discussion of the case, setting the table for a possible successful outcome, and making their pitch to the broader public (Sullivan and Canty 2015; Jacobi and Schweers 2017a). Those who do so well can hope that their performance may increase the probability of success when the justices vote (Johnson, Wahlbeck and Spriggs 2006; McGuire and McAtee 2007).

Interruptions at Oral Argument

Oral argument is therefore critical, both in terms of the case outcomes and in terms of serving as a public face of the Court, and its centrality to the role of the Court in our political system is perhaps only growing as these arguments become more politicized (Jacobi and Sag 2019). The growing importance of, and focus on, oral argument has been accompanied by attention to the conversational dynamics at play, and particularly the extent to which the conversations are marked by interruptions. The earlier excerpt from an exchange between Justice Alito and Solicitor General Prelogar provides an example of one such interruption. The interruptions can be broken down into two different types: justices interrupting the advocates and justices interrupting other justices. In the latter case, the interruptions are often deemed inappropriate; the justices are equals, and thus none should interrupt another (see, e.g., Jacobi and Schweers 2017a). Responding to concerns that the female *justices* were not getting the opportunity to speak, the Court recently instituted new rules around oral argument, with each justice permitted to take a turn to ask questions uninterrupted after

an attorney's allotted time has expired.[2]

In the former case, interruptions of advocates are part and parcel of the design of oral argument. Indeed, the Court's own guide for counsel arguing before the Court states, "If you are speaking and a Justice interrupts you, cease talking immediately and listen" (*Guide for Counsel*, 9). In this setting, interruptions stop the development of an argument so that a justice may move the argument in a different direction. Importantly, the rate of these interruptions of advocates has been increasing over time (Sullivan and Canty 2015). Along with the increase in the number of interruptions, Jacobi and Sag (2019) document the shifting role of the justices at oral argument, wherein justices take on the role of advocates, interrupting more often and speaking more frequently to advocate their positions. Yet while the Court sought to actively deal with interruptions of *justices*, for interruptions of *attorneys* the Court's response has been more limited, with the Court only instituting a new norm around trying to allow attorneys to speak uninterrupted for the first two minutes before justices can begin to address their arguments.[3]

The decision of the Court to institute this new norm of uninterrupted time recognizes the challenge that interruptions introduce for advocates attempting to develop and present their argument to the justices. The Court, though, faces a trade-off, as the justices must be able to ensure advocates are answering any questions the justices have, are directly addressing what the justice sees as the central arguments of the case, and have the opportunity to discuss what the justice sees as any weaknesses in the advocate's argument. In that vein, interrupting an advocate may be appropriate if it can redirect from irrelevant discussions or away from misunderstandings.

To this end, we expect two central factors that might influence interruption behavior:

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[2]Adam Liptak, "Supreme Court Tries to Tame Unruly Oral Arguments", *New York Times*, November 1, 2021.

[3]Dan Berman and Ariane de Vogue, "Supreme Court gives lawyers 2 minutes with no interruptions," *CNN*, October 3, 2019.

whether a justice agrees or disagrees with the argument being made (or *ideological alignment* with the advocate) and the stylistic *quality* of the argument. Unfortunately, both factors are potentially intertwined with the gender of the advocate. In terms of style, the Court publicly lays out their own guidance for the style of argument before the Court. The Guide for Counsel notes that advocates before the Court should "speak in a clear, distinct manner" and should "[b]e careful to use precise language" while using "[s]imple words" (*Guide for Counsel*, 10). Moreso than the simple guidance, justices have beliefs about the quality of oral argument; former Justice Blackmun even graded the quality of an advocate's oral argument, a fact Johnson, Wahlbeck and Spriggs (2006) exploited in their own analysis of the efficacy of oral arguments. Thus, justices may be more likely to interrupt when the stylistic quality of the argument is low. On this front, there are two ways we might expect female counsel to be different than male. First, given the barriers we note above that women must overcome to reach the point of arguing cases before the Court, we might expect women to have, in general, higher stylistic quality than men arguing before the Court. By way of comparison, prior work on Congress has noted that women work harder and better represent their constituents (Lazarus and Steigerwalt 2018) and that, under different institutional conditions, women are more effective at legislating. Considered in the context of a legal profession where they are consistently excluded from high-prestige positions, women participating in oral argument at the Supreme Court are likely to make arguments of exceptionally high quality.

Turning next to the entwining of ideology and gender, and again because of the discrimination that women face in the legal profession, there is also a substantial gender effect on the type of cases that women lawyers represent at the appellate level (St. Eve and Luguri 2021). As an analysis of the Seventh Circuit by the American Bar Association (St. Eve and Luguri 2021, 21) revealed:

> Women argued more often in criminal cases and other cases that involved the
> government—like immigration and habeas cases—and at lower rates in civil cases.
> And among civil cases, the gender gap was particularly pronounced in cases that

may be perceived as complex due to the structure of the case (class actions), its content (e.g., antitrust), or money at stake (as indicated through the involvement of a major law firm). Women were more likely to argue cases that involved the government, especially federal and local governments. An attorney representing the government was twice as likely to be a woman (compared to attorneys who represented non-governmental entities). Similarly, if an attorney worked for the government, this nearly doubled the chance that the attorney was a woman than if the attorney worked elsewhere. Among all the women attorneys who argued in front of the Seventh Circuit in 2019, nearly half were government lawyers.

The gender disparity in representation means that women are more likely to represent particular types of arguments at the Supreme Court, arguments that might make them systematically more likely to be ideological allies (or opponents) of the justices on the Court.

Taken together, prior work is limited by the extent to which it struggles to disentangle the influence of gender on interruptions from other factors, notably the ideological agreement or disagreement of advocates and justices. The challenge we confront echoes many others encountered by scholars studying hypothetical influences on judicial behavior, as justice's ideological preferences are entwined with other justice- and case-level characteristics.[4] As a result, we have preliminary evidence from prior work that gender matters, but little understanding of *how* and *how much* it matters, particularly relative to the ideological differences between justice and advocate. To address this, we introduce a causal framework that lays out how gender influences interruption behavior at the Court. Our approach demonstrates that the magnitude of the effect of gender on interruption behavior is well beyond the magnitude of the effect of ideology (and style) on interruption. To further buttress our causal claims, we also undertake corroborative causal mediation analyses. We turn now to describing our

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[4]For an example of scholars attempting to wrestle with similar challenges in oral argument, see the extensive supplemental work in Black et al. (2011) to try to address concerns with respect to ideological alignment and oral argument questions.

approach.

Research Design

Our goal of quantifying the effect of advocate gender in oral argument is inherently a causal goal. As Lundberg, Johnson and Stewart (2021) explain, in the social sciences, the "dominant mode of quantitative inquiry" has been "hypotheses about regression coefficients." However, the focus on regression coefficients limits a researcher to a particular class of models and parametric assumptions. In contrast, stating an explicit theoretical causal estimand allows researchers to thoroughly investigate *what* the aim of the statistical analysis is and make explicit the assumptions behind the analysis.

In our setting, we ideally want to estimate a counterfactual: if everything else in an oral argument had remained the same, but we swapped a female advocate for a male advocate, would judges have behaved differently? In causal terminology, we are interested in the average treatment effect of advocate gender on a justice interrupting that advocate. Following causal frameworks for quantitative social science (Morgan and Winship 2015; Lundberg, Johnson and Stewart 2021), we subsequently discuss the decisions behind our research design—from the idealized causal experiment to causal estimands that can be estimated from data. As Rubin (1974) noted, "design trumps analysis" for observational (non-experimental) studies. Thus, we make our research design intentional and clear before we begin analyzing data.

Idealized experiment. Let's entertain the following idealized (but ultimately infeasible) experiment. Before an oral argument, each side randomly assigns a male or female advocate who are otherwise identical in all other respects. Then we aggregate judges' behavior towards male and female advocates and compare the differences.[5] Clearly, due to the high-stakes nature of the U.S. Supreme Court, we will never be able to intervene and

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[5]This experimental design is similar to other "audit studies" that measure the causal effect of other kinds of social biases such as the relationship between race-aligned names,

randomly assign advocates. Instead, we have to rely on *observational* (non-experimental) data and careful research design to move towards a causal interpretation of our estimates.

Unit of Analysis. In order to precisely state a theoretical causal estimand, e.g. the average treatment effect of gender on interruption, we first need to define our unit of analysis, the quantity that is our idealized counterfactual and over which we aggregate.

Definition of a valid chunk. Oral arguments are composed of *utterances*—a continuous piece of speech from a single speaker—made by both advocates and justices. We are interested in aggregating them to short multi-utterance *chunks* of oral arguments, each representing an exchange between a justice and advocate,[6] to investigate our causal question about justices interrupting advocates. We define a *valid chunk* as four or more contiguous utterances in which there are exactly two speakers—a single justice and a single advocate— where the advocate makes the first utterance, and each speaker has two or more utterances. Valid chunks are extracted with a greedy algorithm, iterating through utterances in the transcript, adding each utterance to the current chunk as long as they are from the same advocate–justice dyad, otherwise starting a new candidate chunk. We require a chunk to begin with the advocate so there is an opportunity to be interrupted by the justice. The example exchange in the introduction between General Prelogar and Justice Alito is a valid chunk.

Formally, we define our unit of analysis for a chunk with Chunk ID i, having Justice ID j_i, and an Advocate ID a_i. For convenience we often refer to chunk i with notation $i|j$ to also

resume content, and employer preference (Bertrand and Mullainathan 2004) and gender signal, entrepreneurial pitches, and investor preference (Brooks, Huang, Kearney and Murray 2014).

[6] Automatic conversation disentanglement is an open task in natural language processing (Mehri and Carenini 2017; Elsner and Charniak 2010) and estimating the causal effects where multiple judges are speaking and interrupting the same advocate simultaneously is an avenue for future research.

indicate its justice j, since our primary analysis is of justice's interruption behavior within chunks. Although we report aggregate measures across all justices, most of our analysis focuses on individual justices since we know each justice each has their own background, experience, and thus implicit or explicit biases. Because our unit of analysis consists of a single advocate, we can condition on specific attributes of the advocate such as their gender and ideology which we operationalize below.

Operationalization of variables. One contribution of this paper is precise, interpretable, and careful operationalization of the following variables: gender signal of an advocate (T), ideological alignment of an advocate and justice (A), and token-normalized interruption rates (Y).

Gender signal of an advocate (T). Thus far, we have been relatively loose in our description of the "gender" of an advocate and what it means to define a causal quantity of gender. We formally conceptualize "gender" as the binary[7] gender signal given by an advocate's outward appearance. As previous researchers have discussed at length, we should be wary of estimating the causal effects of "immutable characteristics" such as gender or race (Berk, Li and Hickman 2005; Holland 2008; Sen and Wasow 2016). However, we follow previous work that argues that *gender signal*—as opposed to *biological sex assigned at birth*—is a variable we could hypothetically manipulate. For example, we could hire an actor to say the exact same script but flip the gender presentation of the actor.

We operationalize the *gender signal* of advocates through the following two-stage process. In the first stage, we create an automatic heuristic to extract the formal title of an advocate— Mr. or Ms.—stated by the Chief Justice when introducing the advocate in the utterance prior to the advocate's first utterance. For example, in oral argument for *Bowsher v. Synar*, Chief Justice Burger introduced the first advocate, Lloyd Cutler, by stating "Mr. Cutler, you may

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[7]While we understand there are more than two genders, the U.S. Supreme Court never introduces an advocate with an explicitly non-binary gender title like 'Mx.' (we observe no such cases in our data), and we restrict our analysis to binary gender.

proceed whenever you are ready," and later turned the floor over to opposing counsel Lois Williams by, after the conclusion of a lengthy statement by another advocate, stating "Very well. Ms. Williams?" Our heuristic extracts "Ms." and assigns it to female and "Mr." and assigns it to male. We move to the second stage when the first stage fails to extract a gender signal —which happens for just 0.75% of the unique advocates in our dataset—as when for example if the advocate is introduced with another title such as "General" or similar. In those cases, we look up the first name of the advocate in a first-name gender dictionary.[8] In all, our two-stage approach assigns gender for approximately 99.8% of advocates, with the vast majority assigned based on pronouns used by the justices themselves.

Ideological alignment of an advocate and justice (A). In order to capture the ideological alignment of the justice and the advocate, we need measures of advocates' and justices' ideological preferences. For the justice, we measure ideology using the average (arithmetic mean) of the justice's time-varying Martin-Quinn score (Martin and Quinn 2002), and treat any values less than zero as a liberal justice, and values greater than zero as a conservative justice. For the advocate, we rely on the Supreme Court Database's (Spaeth, Epstein, Martin, Segal, Ruger and Benesh 2021) coding of the ideological direction of the decision of the Court and whether or not the advocate won; if the advocate won and the direction of the decision is conservative, we indicate the advocate was making a conservative argument to the Court and vice versa for liberal arguments. With a measure of the ideological proclivities of the justice and a measure of the ideological direction of the argument being made by the

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[8]We use the World Gender Name Dictionary (Raffo and Lax-Martinez 2018) which aggregates statistics on gender of names from administrative data such as the US Social Security Administration and Census Bureau. We note a limitation of this source is that it assigns binary gender to names that could be ambiguous, e.g. "Alex", based on the observed most likely gender. However, this is an extremely small proportion of our overall data.

attorney, we then create our ideological alignment variable for each chunk i:

$$
A_i = \begin{cases} 1 & \text{if advocate } a_i \text{ and justice } j_i\text{'s ideological preferences match} \\ 0 & \text{otherwise} \end{cases} \tag{1}
$$

We define ideological alignment for an advocate and justice in the context of a specific case; an advantage of this approach is that attorneys—many of whom appear multiple times before the Court—can be ideologically aligned with a justice in one case but not in another case based on the argument they are making.

Token-normalized interruption rates (Y). In creating the outcome variable, Y, we aim to account for variation in the speaking rates of various advocates. Thus, for a single valid chunk i, we define the token-normalized interruption rate as

$$
Y_{i|j} = \frac{\text{number of advocate utterances interrupted by justice } j \text{ in chunk } i}{(\text{number of advocate tokens in chunk } i)/1000} \tag{2}
$$

Intuitively, this represents: if an advocate is trying to say 1,000 words during arguments, how many interruptions from a justice would the advocate endure (on average) by the time they got to 1,000 words?[9]

In our data, interruptions are identified deterministically by two different markers in the transcript: double dashes and two dots. Note, these transcripts are manually created and follow standardized protocols for recording interruptions, a fact we leverage automatically identify all interruptions. Later, we look at the robustness of the transcription of interruptions over the transcript years in Figure 1.

Unit specific quantity. Following Lundberg, Johnson and Stewart (2021), we define a counterfactual quantity of interest for a single unit: for a specific justice and chunk,

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[9]The inverse perspective is: if there is a constant interruption rate $Y_{i|j}$, the average number of tokens uttered before interruption is $1000/Y_{i|j}$ (as per the expectation of the negative binomial distribution).

the difference in interruption rates if the advocate was female or male. We use *potential outcomes notation* (Rubin 1974) in which $Y(T = 0)$ and $Y(T = 1)$ represent the potential (counterfactual) outcomes given that the unit is treated, $T = 1$, and not treated, $T = 0$, respectively. Formally, for a given justice, j and chunk, i, we are interested in the the following *unit-specific quantity* of interruption rate given counterfactual genders

$$Y_{i|j}(T_i = F) - Y_{i|j}(T_i = M) \tag{3}$$

Target population. Lundberg, Johnson and Stewart (2021) emphasize that a careful research design must also state a target population, "over whom or what do we aggregate [the] unit-specific quantity?" For the remainder of our analysis, we only include justices who participate in more than 1,000 valid chunks in order to ensure we have enough data to reliably support any research conclusions.[10] Given this set of valid justices, our target population is all advocates a justice has or would encounter.

Theoretical causal estimand. For a fixed justice, how much would intervening to change the gender signal of the advocate change the rate the justice interrupted the advocate? The target estimand, the average treatment effect for justice j, is the average of this unit-specific quantity over all advocates and chunks.

$$\tau_{\text{Gender}}^j := E\left(Y_{i|j}(T_i = F) - Y_{i|j}(T_i = M) \right) \tag{4}$$

Causal identification assumptions. In order to estimate causal effects from data,

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[10]Based on our filtering criteria, we considered fifteen judges, namely, Anthony M. Kennedy, Antonin Scalia, Byron R. White, David H. Souter, Elena Kagan, John G. Roberts Jr., John Paul Stevens, Ruth Bader Ginsburg, Samuel A. Alito Jr., Sandra Day O'Connor, Sonia Sotomayor, Stephen G. Breyer, Thurgood Marshall, Warren E. Burger, and William H. Rehnquist.

one needs to state the causal *identification* assumptions that will link estimates from data to the theoretical causal estimand. We state these assumptions explicitly as many of these assumptions cannot be measured empirically.

Markov assumption for conversational chunks. We make the assumption that the conversational dynamics between a justice and an advocate in one chunk do not influence the conversational dynamics in a subsequent chunk. This is a Markov independence assumption over conversational chunks. We acknowledge this is a strong assumption; however, if we do not make this assumption and instead assume previous interactions influence the current one, we need to account for all the text and interruptions of the previous chunks as potential confounders. In this scenario, we very quickly run into causal positivity violations, $0 < Pr(T = 1|X = x) < 1 \ \forall x$ where X is a variable representing previous conversational dynamics. This would make the causal effects not *identified* and we would be unable to reach any conclusions. Thus, we opt for our Markov assumption.

No unmeasured confounding. We assume there are no unmeasured confounding variables that cause both treatment—gender signal—and outcome—interruption rates. See Table 2 for one measured confounder, the case topic. See our section on corroborative analyses for our results remaining the same despite possible threats to this assumption such as speech disfluencies, advocate experience, and ideological alignment as causal mediators between gender signal and interruption.

Empirical estimands. Given the aforementioned causal identification assumptions, we translate the theoretical estimand—Equation 4—to an empirical estimand that can be estimated from data. We use τ to refer to theoretical estimands and θ for their corresponding empirical estimands. In these empirical formulations, T_i refers to the observed advocate gender in chunk i, heuristically inferred from the text as described previously. The empirical estimate of average treatment effect for a given justice is simply the the difference in mean interruption rates between female and male advocates with whom the justice interacts during

valid chunks,

$$\theta^j_{\text{Gender}} := \left(\frac{1}{n_{j,T_i=F}} \sum_{i:j_i=j,\mathbf{T_i=F}} Y_{i|j} \right) - \left(\frac{1}{n_{j,T_i=M}} \sum_{i:j_i=j,\mathbf{T_i=M}} Y_{i|j} \right), \qquad (5)$$

where, for example, $n_{j,T_i=F}$ indicates the number of chunks for justice j where advocates' gender is female.

We can compare this to an analogous empirical quantity about difference due to ideological alignment:

$$\theta^j_{\text{Ideological Alignment}} := \left(\frac{1}{n_{j,A_i=1}} \sum_{i:j_i=j,\mathbf{A_i=1}} Y_{i|j} \right) - \left(\frac{1}{n_{j,A_i=0}} \sum_{i:j_i=j,\mathbf{A_i=0}} Y_{i|j} \right) \qquad (6)$$

Then for each justice, we can compare the magnitudes of θ^j_{Gender} and $\theta^j_{\text{Ideological Alignment}}$. However, we note that ideological alignment does not have a clear analogue of an idealized experiment or theoretical causal estimand and is purely for comparison purposes.

Data

We acquired the Supreme Court Oral Arguments Corpus (Danescu-Niculescu-Mizil, Lee, Pang and Kleinberg 2012) from the Cornell Conversational Analysis Toolkit (ConvoKit) (Chang, Chiam, Fu, Wang, Zhang and Danescu-Niculescu-Mizil 2020). The corpus covers more than 8,000 oral argument transcripts from more than 7,700 cases decided between 1955 and 2019. Due to limitations related to the reliability and consistency of the transcription, we limit our analysis to October Terms 1982 through 2019. The corpus is organized at the level of an utterance, or a speaker's turn during a particular oral argument. In all, we have 776,193 utterances across 3,424 cases. Of the 4,025 unique advocates, we identify 551 as female, or approximately 14% of all unique advocates (see the section above for our algorithm to identify female and male advocates). Overall, we find that approximately 25% of all advocate utterances are interrupted, reflecting the extent to which the dialogue is

Corpus Details	
Years	1982-2019
Cases	3,424
Unique advocates	4,025
Unique female advocates	551

Chunk Details	All Data	Valid Chunks
Count	–	65,768
Number of Tokens	37,880,545	23,614,820
Number of Utterances	776,193	520,579
Prop. Advocate Utterances Interrupted	0.25	0.21
Median Num. Tokens Per Chunk	–	296
Median Num. Utterances Per Chunk	–	6

Table 1: *Descriptive Statistics of the Corpus and Dataset.*

driven by justices.

We segment the oral argument transcript utterances into valid chunks which—as described in the Unit of Analysis section above—are sequential exchanges between a single justice and a single advocate of at least four utterances. In the bottom half of Table 1, we provide summary statistics on these chunks. We identify 65,768 valid chunks in all. Though some utterances that are not in valid chunks are removed, the dataset with valid chunks remains extremely large; there are more than 23 million tokens spoken across more than 520,000 utterances. The rate of interruptions remains similar across the two sets, with advocates interrupted approximately 21% of the time in the chunk data as compared to 25% in the entire corpus.
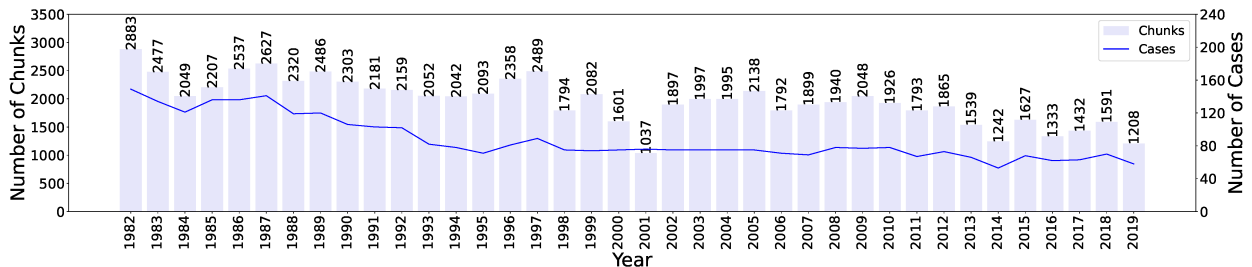

Figure 1: *Number of Chunks and Cases per Supreme Court Term.* Plots indicate the number of valid chunks (bars) and the number of cases (line) per October Term.

As evidence that the chunking approach remains a consistent representation of oral ar-

gument, in Figure 1 we plot the number of valid chunks we identify each Court term (the bars) alongside the number of cases decided by the Court during that term (the line). The number of chunks tracks closely with the number of cases over time. Our chunking approach reflects the drop in the number of cases heard by the Court during an average term over time, and—in spite of any possible changes in the justice's behavior during oral argument across this time period (see, e.g., Jacobi and Sag 2019)—provides broad and consistent coverage of oral argument during the entire time period under study.

Notably, the rate at which women participate in these exchanges has changed significantly over time. In Figure 2, we plot the number of valid chunks featuring a woman either as an advocate (left panel) or as a justice (right panel). The participation of women as advocates increased marginally from the 1980s until about the turn of the century, but has generally leveled out to an average of around 12% of arguments during an October Term more recently. The dearth of female advocates, of course, is not lost on those following and working around the Court, as Solicitor General Prelogar's comments in the affirmative action cases reflected.
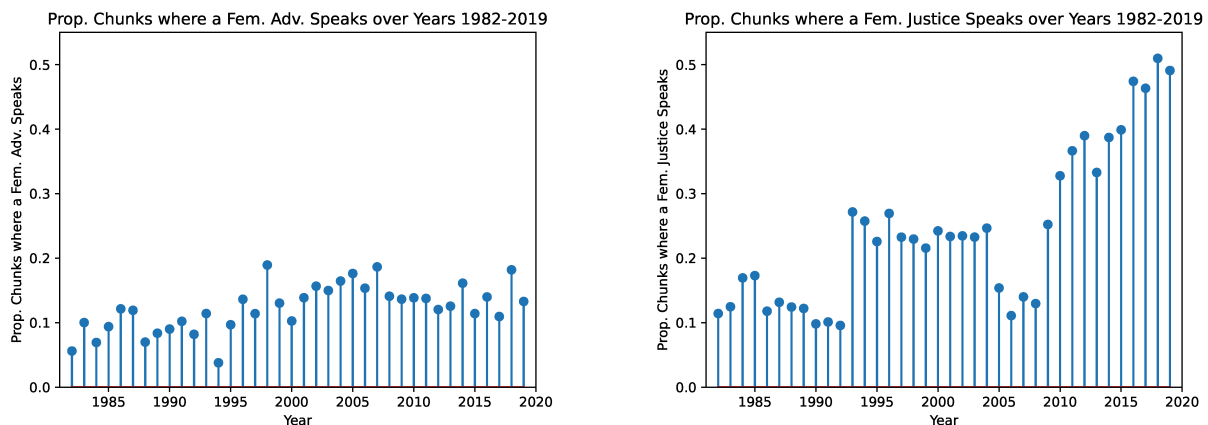

Figure 2: *Participation of Women in Oral Argument Exchanges on the U.S. Supreme Court* These plots provide the proportion of exchange chunks featuring a female advocate (left panel) or female justice (right panel) by October Term.

On the other hand, the proportion of chunks featuring a female justice has shifted consistently, and unsurprisingly, with changes in the membership of the Court. The right panel of Figure 2 makes plain the shifts associated with the addition or subtraction of female justices.
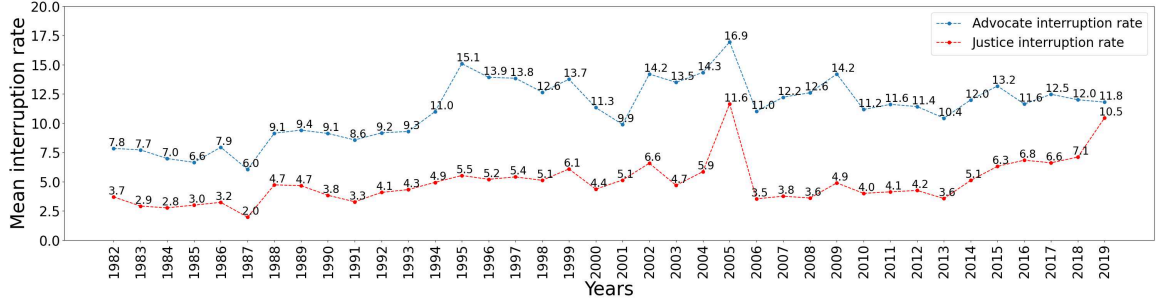
Figure 3: *Interruption Rate Over Time.* This plot presents the Court-level average of a token-normalized interruption rate (y-axis) by October Term (x-axis). The blue line is the advocate being interrupted by justices and the red line is justices being interrupted by advocates.

Indeed, the shifts are approximately proportional to the gender composition of the Court itself during each October Term, reflecting the extent to which the chunking approach we take validly captures the dynamics of oral argument on the Court.

Interruptions

With the data in hand, we turn to measuring interruptions. We take chunks as our unit of analysis, and analyze the token-normalized interruption rate, where interruption is defined as the justice interrupting an advocate. By way of interpretation, a rate of 4.0 would indicate that for every 1,000 tokens of speech for the advocate, we would expect them to be interrupted four times.

In Figure 3, we plot the Court-level average of the token-normalized interruption rate over the time period of our study (blue) and also, for comparison purposes, plot the token-normalized rate of justices being interrupted by advocates (red). Two dynamics bear mentioning and again speak to the validity of our measurement approach. First, there is a marked increase in the token-normalized interruption rate of advocates in the mid-1990's. The evidence of a change in the justices' interruption behavior at this point in time is consistent with recent work by Jacobi and Sag (2019) who identified this as the point at which the polarization of the political system changed the behavior of justices during oral argument.

Second, the increase persists from that point forward throughout the rest of the time series under analysis. Indeed, the *lowest* rate during the entire 25 years span after the 1994 term is 9.9 in OT2001, an interruption rate that is greater than any of the preceding years. As the Court's bar expanded to include marginally more female advocates, the rate of interruptions likewise increased. Of course, this also coincided with changes in the ideological composition of the Court as well as the gender composition of the Court, both factors that may contribute in different ways to the gendered differences in observed interruption behavior. In all, this further undercores the necessity of a careful causal research design to understand and disentangle the complex causal story. Before doing so, we turn to address one more challenge.

Gendered Issues

The substantive issue of the case stands as an additional and potent confounder. Specifically, prior work has established that women are interrupted less frequently across settings when they are perceived to be speaking from a position of authority (e.g., Miller and Sutherland 2022). In the context of oral argument, the attorneys are generally understood to be, universally, operating at a deficit with respect to the justices. However, when female advocates before the Court are addressing a "women's issue", they are likely to be perceived as operating from a position of authority; that being the case, we might expect female advocates to be interrupted less frequently than male advocates when the issue of the case is a "women's issue", as has been found in other settings (Miller and Sutherland 2022; Patton and Smith 2017).

In our corpus of Supreme Court oral arguments, we find a gendered issue dynamic consistent with that of prior work in other settings. Specifically, we separated the chunks into sets based on whether or not the case addressed a women's issue. Applying the approach taken by Szmer, Sarver and Kaheny (2010), we identify as relating to women's issues those cases coded by the Supreme Court Database as being about the issues of sex discrimination,

abortion, and privacy. Out of 65,768 valid chunks, we identify 1,591 chunks in cases about women's issues (approximately 2.4% of chunks), a small though meaningful subset of the Court's work.

In Table 2, we present the conditional means of interruption rate (Y) of male and female advocates (T) for women's issues and other issues (C). Among all other issues (i.e., cases not coded as women's issues), male advocates are interrupted approximately 10.9 times per 1,000 tokens, whereas female advocates are interrupted approximately 12.4 times per 1,000 tokens. In stark contrast, in chunks from cases about women's issues the dynamics are almost precisely opposite; male advocates are interrupted approximately 12.5 times per 1,000 tokens, whereas female advocates are interrupted approximately 10.8 times per 1,000 tokens.

$E[Y|C = \text{Other issue}, T = M]$	10.902
$E[Y|C = \text{Gender issue}, T = M]$	12.474
$E[Y|C = \text{Other issue}, T = F]$	12.358
$E[Y|C = \text{Gender issue}, T = F]$	10.815

Table 2: Conditional means of interruption, Y given whether the case topic is about gender issues or not (C). Here the number of chunks in which the case topic is a $C = $ Gender issue is only 1,591.

Thus, in women's issues cases—argument settings where female advocates are understood to be speaking from a position of authority—we find that they are significantly less likely to be interrupted than male advocates. Beyond the difference in interruption behavior by the justices, women are also more likely to represent parties in cases about women's issues, with the odds ratio between T and C equal to 1.989. Considering these dynamics in conjunction with the very small number of chunks (and cases) that deal with women's issues, we exclude women's issues cases from subsequent analyses. Nevertheless, we hasten to emphasize that the difference we observe in gendered interruption rates between women's issues and other issues highlights the ability of justices to behave differently.

Results

Our subsequent analysis of interruption behavior focuses, therefore, on chunks from cases that were not coded as women's issues. The dataset for this analysis represents, as noted above, the overwhelming bulk of activity at the U.S. Supreme Court. We begin with an analysis of the rates that justices interrupt male and female advocates differently. In Table 3, we present the interruption effect of gender (column 2) and, for comparison, the interruption effect of ideological alignment (column 3). The rows calculate the interruption effects across different levels of justice aggregates: tabulated across all justices, across only male justices, and across only female justices. Recall that θ_{Gender} is equal to $E[Y \mid \text{Gender} = \text{F}] - E[Y \mid \text{Gender} = \text{Male}]$, such that positive values indicate higher interruption rates for female advocates, and negative values indicate higher interruption rates for male advocates.

Justices	θ_{Gender}	$\theta_{\text{Ideological Alignment}}$	$\left\lvert \dfrac{\theta_{\text{Gender}}}{\theta_{\text{Ideological Alignment}}} \right\rvert$
All	0.90±0.19	-0.25±0.12	3.60
Male	1.06±0.22	-0.20±0.13	5.30
Female	0.43±0.36	-0.39±0.24	1.10

Table 3: *Effects on advocate interruption rate, aggregated by justice gender.* Positive θ_{Gender} indicates justices interrupt female advocates more often than they interrupt male advocates. Negative $\theta_{\text{Ideological Alignment}}$ indicates justices interrupt ideologically opposed advocates more often than they interrupt ideologically aligned advocates. The last column shows the absolute ratio of point estimates to aid interpretation.

Across all justices, female advocates are interrupted more frequently, with a point estimate of 0.90 indicating they are interrupted on average nearly one additional time per 1,000 words in comparison to male advocates. The dynamic is more striking when the results are disaggregated by the gender of the justice; male justices interrupt female advocates more than one additional time per 1,000 tokens. In comparison, though female justices are also more likely to interrupt female advocates than male advocates, the effect size (0.43) is far

smaller, well less than half the magnitude of the effect among male justices.[11]

The substantive magnitude of the effect is made clear by a comparison to the effect of ideological alignment on interruption behavior. Across all justices, and particularly for male justices, the gender effect on interruption behavior dwarfs the effect of ideological alignment. Among all justices, the effect of gender is approximately 3.5 times greater than the effect of ideological alignment. Among just the male justices, though, the effect is well more than five times greater than the effect of ideological alignment. In contrast, the effect among female justices is nearly identical to the effect of ideological alignment. In all, we have clear evidence that—in the aggregate—advocate gender influences the interruption behavior of Supreme Court justices at oral argument, and the effect is largely concentrated among male justices.

Justice-Level Analysis

We turn, therefore, to a justice-level analysis. Doing so allows us to better identify the individual behavior underlying the aggregate results we observe. We calculate the effects of advocate gender and ideological alignment on the interruption rate at the level of the justice, analyzing effects by focusing on justice-specific chunk subsets. This approach recognizes that the aggregate rates are themselves a function of the multitude of personalities, preferences, and biases that justices bring to the Court.

We present the results of the justice-level analyses in Figure 4. We order the justices along the y-axis, in descending order by θ_{Gender} and indicate for each justice the ideological classification on the basis of the average Martin & Quinn scores (where L is *Liberal* and C is *Conservative*) along with the total number of valid chunks our estimates are based on for that justice (in parentheses). The far left panel presents the rate justices are interrupting

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[11]In the supplemental material, we address and reject the possibility that differences in the rates of advocates interrupting justices may lead to different conversational dynamics and influence the differences in rates of justices interrupting advocates.
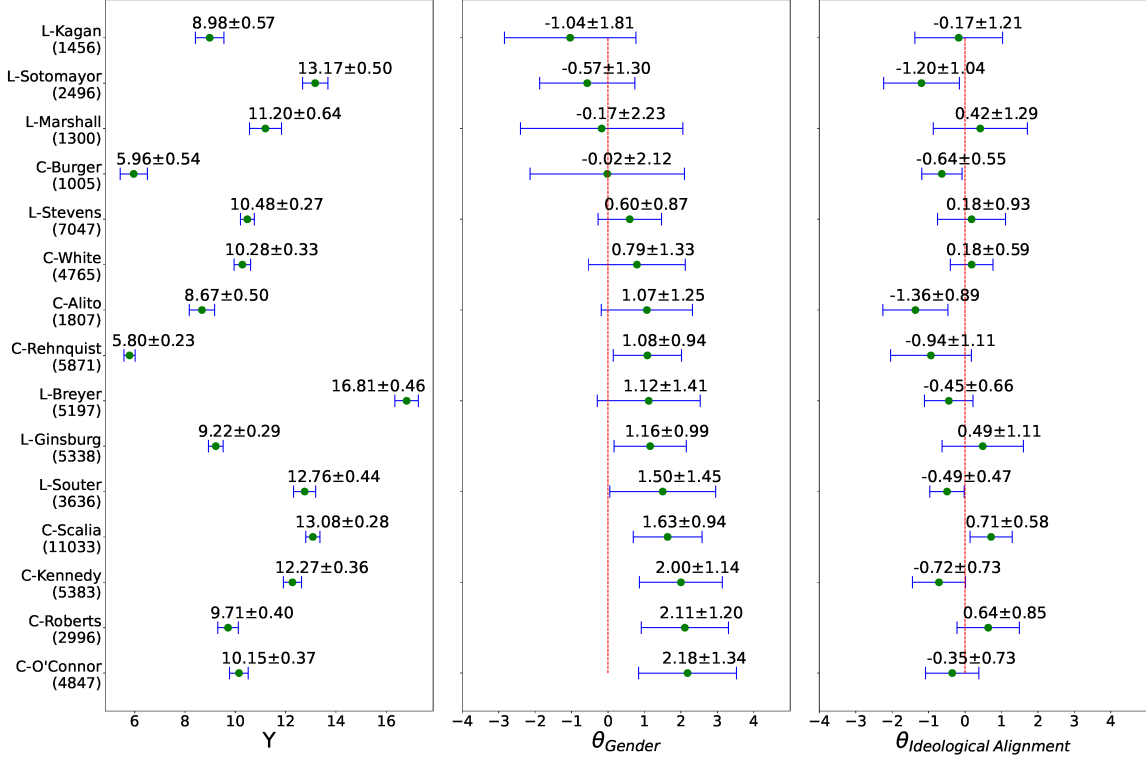
Figure 4: *Plot of Justice Interruption Rates, Effect of Gender, and Effect of Ideological Alignment.* Justice-specific estimates (points) and boostrapped confidence intervals (line segments) for justice interruption rate (left panel), gender effect (center panel), and ideological alignment (right panel). Higher values indicate more interruptions.

advocates in all valid chunks for which they participate, the center panel presents the gender effect on interruption rates (where higher values indicate the justice is more likely to interrupt a female advocate), and the right panel presents the effect of ideological alignment on the justice's interruption behavior (where higher values indicate the justice is more likely to interrupt an advocate whose ideology on the case aligns with the justice's).

We use a nonparametric bootstrap method (Wasserman 2004, ch. 8) to infer confidence intervals for interruption rates, the total effect of gender, and the total effect of ideological alignment for each justice. We utilize 10^4 bootstrap samples of chunks for each justice and report 95% bootstrap confidence intervals (CI) via the normal interval method (Wasserman 2004, ch. 8.3).

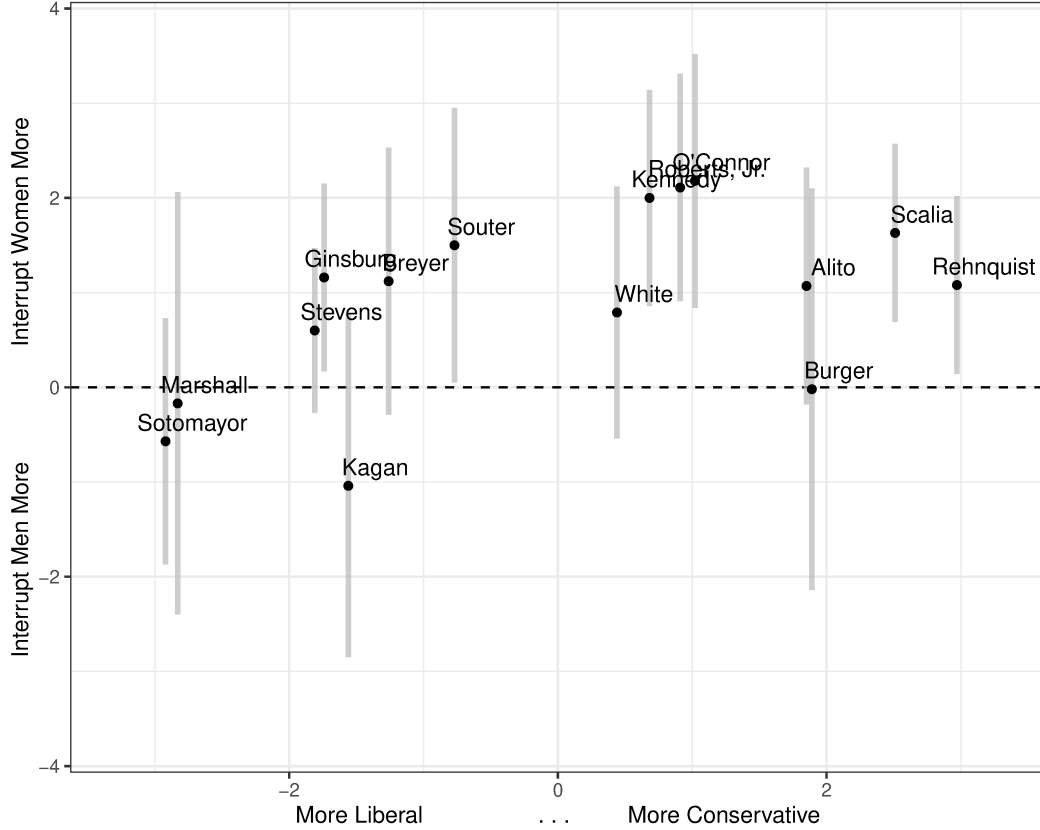Four justices stand out in the analysis for the substantive and statistical significance

Figure 5: *Justice Interruption Rates (y-axis) by Martin & Quinn Ideology Scores (x-axis).*

of the gender effect in their exchanges with advocates at oral argument: Associate Justice Sandra Day O'Connor, Chief Justice John Roberts, Associate Justice Anthony Kennedy, and Associate Justice Antonin Scalia. The effects among this group range from 1.63 (for Justice Scalia) to 2.18 (for Justice O'Connor). For these two justices, the results thus indicate that for every 1,000 tokens spoken by a female advocate, she will be interrupted 1.63 times more frequently in exchanges with Justice Scalia relative to a male advocate, and 2.18 times more frequently in exchanges with Justice O'Connor relative to a male advocate. For each, the gender effect is more than twice the magnitude of the ideological alignment effect.

On the other hand, only four justices out of the fifteen in our study interrupt male advocates more frequently than female advocates at *any* magnitude, and for each the 95% confidence intervals cover zero. Therefore, we can not confidently say, based on this data, that *any* justice interrupts male advocates most frequently in comparison to female advocates.

Another notable dynamic emerging from these analyses is the extent to which the gender effect covers nearly the entirety of the ideological elements of the Court's composition. Three of the five most liberal justices in our analysis interrupt male advocates more frequently than female advocates, though—to reiterate—the confidence intervals for each cross zero. To illustrate justices' ideological preferences more clearly, in Figure 5, we plot the justice-level gender effects by the justice's ideology score. First, seven of the eight conservative justices in the dataset interrupt female advocates more frequently than male advocates, with Burger being the only exception. Among these, the effect sizes we identify are statistically significant at the 95% level. The largest point estimates are concentrated among the more moderate conservatives (Kennedy, O'Connor, and Roberts); interestingly, each was also often portrayed as the median justice during at least part of their tenure on the Court.

Among the more liberal justices, a few patterns bear mentioning. First, uncertainty around the point estimates in most of the cases cautions against firm conclusions of a gender effect. Of the seven justices rated as liberal, only two—Justices Ginsburg and Souter—demonstrate a statistically significant effect of advocate gender on their interruption behavior; in both cases, the justice interrupts female advocates more frequently than male advocates, and at rates generally commensurate with the group average among their more conservative colleagues.

Second, three liberal justices—Sonia Sotomayor, Thurgood Marshall, and Elena Kagan—interrupt men more frequently than they do women within the dataset under examination. This group is particularly interesting in that it contains the two female justices (Sotomayor and Kagan) who have most recently joined the Court within our dataset.[12] While O'Connor and Ginsburg were trailblazing women in the legal profession, within the period under study here both are more likely to interrupt female advocates than male advocates. In contrast, Sotomayor—who joined the Court in 2009—and Kagan—who joined the Court in 2010—are

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[12]Associate Justices Amy Coney Barrett and Ketanji Brown Jackson have, of course, joined the Court in recent years, and offer an avenue for future exploration.

marginally more likely to interrupt male advocates. Taken together, we have clear evidence of a gender effect on interruption behavior that tracks across most justices on the Court.

Corroboration: Causal Mediation Analysis

The analysis above begs further corroborative analysis to support the claim that the estimated effects relate to gender specifically. For instance, one might be concerned that the observed gender effect is not a function specifically of gender, but is instead a function of differences in the ideological orientations of male and female advocates and the members of the Court, particularly in light of Figure 5. Moreover, one might question whether the broader professionalization biases faced by women in the legal profession yields a qualitatively different pool of advocates, leading to differences in interruption behavior. In both cases, one might worry that the observed gender effect therefore does not capture the causal effect of gender on interruption behavior, but rather that the observed effect of gender operates through ideological differences or differences in advocates' speech qualityin yielding the observed effects. To address this, we turn to a causal mediation analysis (Pearl 2001; Imai, Keele and Tingley 2010; VanderWeele 2016)

Our analysis focuses on two pathways through which the gender effect may operate: differences in the ideological orientation of advocates and justices, and differences in quality or style of arguments by advocates of different genders. In the former case, as discussed above professionalization and prospects for career progression may be different for women representing particular types of arguments and cases before the Court, leading to different patterns of representation at the Court for particular arguments that may be more or less likely to yield interruption by justices. If female advocates are more likely to represent liberal arguments during the time period under study while the Court is consistently composed of a majority of conservative justices, the effect of gender may operate through the ideological differences between advocate and justice. We maintain the same approach to measuring ideological alignment, and incorporate it now through a causal mediation approach.

Beyond the ideological alignment pathway, we also analyze two dimensions related to argument quality: speaking fluidity and advocate experience. Consider first speaking fluidity, or the extent to which an advocate can seamlessly present their argument without stumbling over their words. At a basic level, if an advocate is proceeding seamlessly through their argument, the justice must be more aggressive to interrupt; alternatively, if an advocate is stumbling over their words, then there are more natural opportunities for a justice to interrupt. If we expect differences in the presentation styles of women and men at the Court, whether because of differences in the legal profession (e.g., St. Eve and Luguri 2021) or because of the efforts of advocates to conform with gender schemas (e.g., Gleason and Smart 2022), then we would expect the effect of gender to operate through stylistic differences in oral argument quality.

To capture speaking fluidity, we turn to counts of *speech disfluencies*, or disruptions in the flow of a speech by an advocate. Though there are many types of speech disfluencies, one of the most visible is stuttering or stopping and starting in order to repeat words or phrases. In oral argument transcripts, these types of speech disfluencies are typically indicated by the presence of a dash followed by a repeat of the word or phrase that had preceded the dash. We automatically extracted these types of speech disfluencies at the utterance level. In the process of doing so, we found that such disfluencies are unreliably indicated in the digital versions of oral argument transcripts, and therefore we limit our analysis to the years 2007 through 2019.[13]

Beyond speaking fluidity, we also explore the potential of *advocate experience* as a variable on the causal path between advocate gender and interruption. Again, given differences in the participation of women as advocates before the Court, women advocates may have less experience on average. If justices are more likely to interrupt advocates who are inex-

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[13]This analysis includes eight judges who were involved in greater than 1000 chunks, namely Anthony M. Kennedy, Antonin Scalia, Elena Kagan, John G. Roberts Jr., Ruth Bader Ginsburg, Samuel A. Alito Jr., Sonia Sotomayor, Stephen G. Breyer.

perienced, then the effect of gender would operate through an experience path. To capture experience, we employ a dichotomous indicator of prior experience arguing before the Court. The first time an advocate argues before the Court, the indicator takes on the value of 0. For any additional arguments, the indicator takes on the value of 1. Though our causal mediation analysis of starts in 2007, We search for prior advocate experience back to 1980 to ensure full coverage of an advocate's experience.

With the updated data, we undertake a causal mediation analysis, including speech disfluencies, experience, and ideological alignment as mediators. We calculate the natural direct effects (NDE) and natural indirect effects (NIE) via the assumptions and formulas presented in Keith, Rice and O'Connor (2021). We report the overall results in Table 4. We find all the natural indirect effects are near zero, indicating that the effect of gender *directly* to interruption is the main driving force for the differences in interruption we observe.

All justices (n=36,633)	NDE	NIE
Speech disfluencies as mediator	0.39±0.34	-0.02±0.12
Ideological alignment as mediator	0.41±0.39	0.01±0.03
Advocate experience as mediator	0.31±0.36	-0.01±0.03
Male justices (n=27,703)	NDE	NIE
Speech disfluencies as mediator	0.61±0.44	0.02±0.15
Ideological alignment as mediator	0.66±0.50	0.02±0.04
Advocate experience as mediator	0.56±0.47	0.02±0.03
Female justices (n=9,560)	NDE	NIE
Speech disfluencies as mediator	-0.22±0.36	-0.10±0.10
Ideological alignment as mediator	-0.20±0.37	0.00±0.02
Advocate experience as mediator	-0.36±0.37	-0.07±0.05

Table 4: *Corroborative analyses.* Causal mediation estimates of the natural direct effect (NDE) from gender to interruption and the natural indirect effect (NIE) from gender through the mediator speech disfluencies, ideological alignment, or advocate experience to interruption, aggregated across justices. Due to transcript quality, we only use data from 2007-2019 which includes 8 justices total (5 male and 3 female). We report the number of chunks (n) for these subsets of data.

Discussion

With a conservative supermajority in place today in 2023, the U.S. Supreme Court finds itself at the center of battles over power and politics in the United States. In this article, we tackle a critical question regarding the business of the Court: can men and women participate equally in the nation's most prominent legal debates? To do so, we address the complex causal challenges in disentangling the effect of an advocate's signalled gender before the Court from the many other legal, political, and social factors that contribute to the representation of arguments by male or female advocates before the Court. Beyond disentangling the influence of gender and other effects on the interruption behavior of the justices, our approach also offers the added benefit of allowing us to examine differentials in interruption behavior at the level of the justice, providing insights on the behavioral underpinnings of bias in interruption behavior at the Court.

We find a strong gender effect in the interruption behavior of U.S. Supreme Court justices, with most justices interrupting female advocates markedly more frequently than male advocates in their conversational dialogues. In terms of magnitude, we find that this gender effect significantly outpaces most other potential explanations of interruption behavior. Further, while our approach yields gender differences on the order of one to two additional interruptions of women, recall that is per 1,000 tokens spoken in exchanges with an individual justice; with an average of over 11,000 tokens spoken in each case, the effect quickly multiplies within an oral argument, across a term, and then over a series of terms.

Interestingly, and consistent with work in other areas, we find that the dynamics reverse when the conversations turn towards areas traditionally thought of as women's issues, including the right to privacy. Finally, we demonstrate that the effect is most concentrated among more conservative members of the Court, with some of the most liberal members of the Court within our timeframe of study interrupting male advocates more frequently than female advocates. In all, the work conclusively demonstrates that conversational dynamics on the nation's highest court are significantly shaped by the genders of the lawyers appearing

before the Court.

The observed conversational dynamics in the behavior of the justices has stark implications going forward. Our results show a concentration of gendered interruption effects among conservative justices on the Court; with the possibility that the Court's composition will maintain 2023's super-majority of conservative justices, it is clear that Solicitor General Prelogar's comments reflect not just a lack of representation, but a shortfall in the ability of women to actively participate even once they appear before the Court. Moreover, more recent liberal additions (Justices Sotomayor and Kagan) to the Court have shown a tendency to operate in the opposite direction, interrupting male advocates more frequently than female advocates. Given the potential of this emerging dynamic, future research might examine whether the polarization of the Court yields differences in the ability of advocates to participate equitably in discussing the nation's top legal issues.

Our findings contribute to the burgeoning research on the inability of women to participate in legal, political, and social spaces (e.g., Miller and Sutherland 2022; Ban, Grimmer, Kaslovsky and West 2022) and does so at a more granular level for legal scholars, providing opportunities for future research to explore solutions. Our approach is generalizable and offers clear pathways for future research to extend the analysis into more recent terms and other decision-making contexts. In the former case, future work can examine how the addition of the Court's two most recent appointments—conservative justice Amy Coney Barrett and liberal justice Ketanji Brown Jackson—relate to the historical patterns of interruption behavior. In the latter case, the major effort of the Biden administration to increase the diversity of the federal judiciary offers a clear pathway forward for understanding how similar efforts might influence the dynamics observed at the U.S. Supreme Court. In both cases, our analysis suggests that to understand the U.S. Supreme Court, it is vitally important to understand the ways justice behavior is shaped by gender dynamics.

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Supplemental Material

Contents

A   Heatedness of Discussions

While we focus on the justice interruptions of attorneys, the opposite does occur at the Court. As such, one potential concern is that male advocates interrupting female justices more frequently may lead to, on average, fewer opportunities for female justices to interrupt male advocates, or may actually lead to the reverse–a more heated discussion in which interruptions escalate. To examine this dynamic further, we look at the heatedness of conversations, or the extent to which justices and advocates are interrupting one another within chunks. The underlying idea is that if male advocate interruptions of female justices are decreasing opportunities for interruptions, then we might expect a negative relationship between advocate interruptions and just interruptions. On the other hand, one might also be concerned that the interruption of the female justice escalates interruption behavior, leading to more heated discussions in which the interruptions (by justice of advocate, and by advocate of justice) escalate. In either case, we would expect strong correlations between advocate and justice interruptions, with particular concern for differences across gender pairings.

We plot the results in Figure 6. Across gender groupings, we find no evidence that advocate interruptions lead to fewer opportunities for justice's interrupting advocates; indeed, we primarily find only that as interruptions very loosely go hand-in-hand, with correlation coefficients consistently around 0.2, suggesting increases in advocate interruptions of justices are very slightly positively correlated with increases in justice interruptions of advocates across the different combinations of gender by judge and advocate.
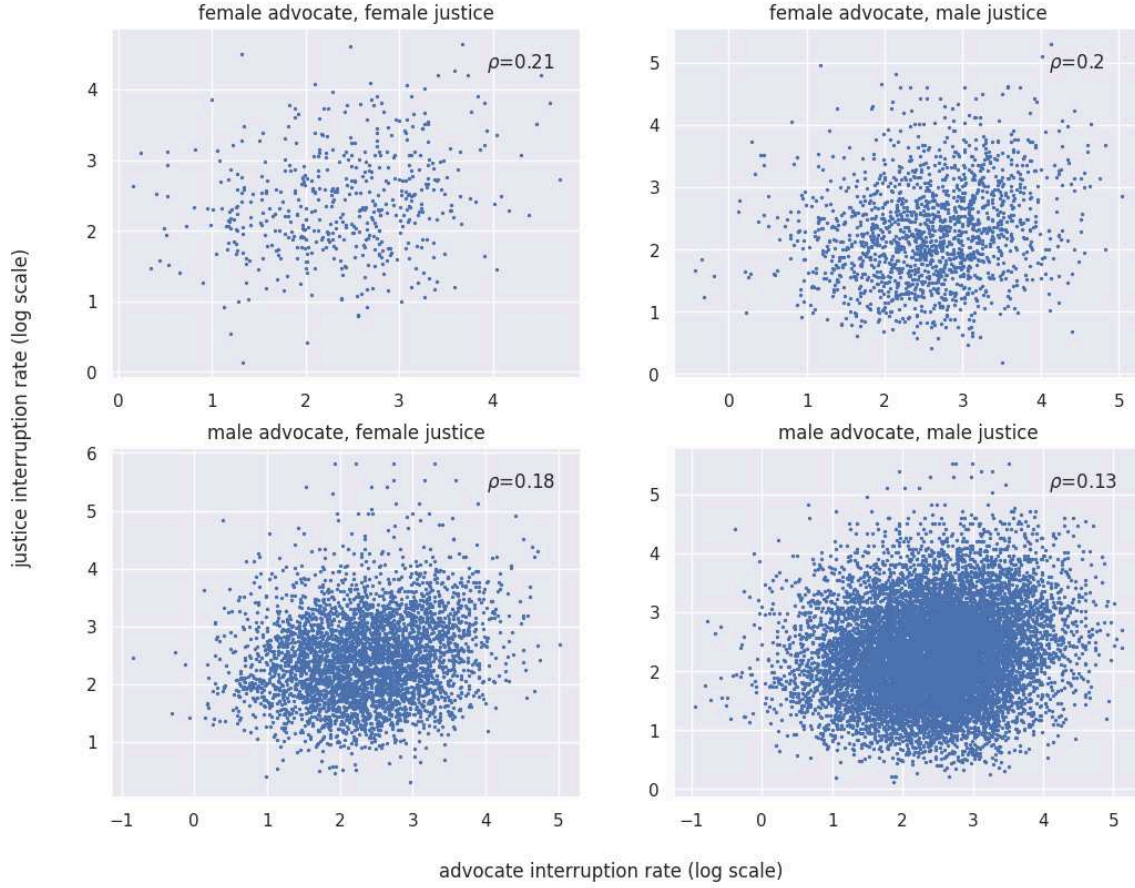
Figure 6: Heatedness: the relationship between advocates being interrupted by justices (x-axis) versus justices being interrupted by advocates (y-axis). Each blue dot is a chunk from a case. We put both axes in log scale and report the pearson correlation coefficient ρ.