



The politics of piracy: political ideology and the usage of pirated online media

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Abstract

There is a lack of clarity in information systems research on which factors lead people to use or not use technologies of varying degrees of perceived legality. To address this gap, we use arguments from the information systems and political ideology literatures to theorize on the influence of individuals' political ideologies on online media piracy. Specifically, we hypothesize that individuals with a more conservative ideology, and thus lower openness to experience and higher conscientiousness, generally engage in less online media piracy. We further hypothesize that this effect is stronger for online piracy technology that is legally ambiguous. Using clickstream data from 3873 individuals in the U.S., we find that this effect in fact exists only for online media piracy technologies that are perceived as legally ambiguous. Specifically, more conservative individuals, who typically have lower ambiguity intolerance, use (legal but ambiguously perceived) pirated streaming websites less, while there is no difference for the (clearly illegal) use of pirated file sharing websites.

Keywords Political ideology · Ambiguity intolerance · File sharing · Legal issues · Online streaming · Piracy

1 Introduction

Since its inception, the Internet has, despite providing great benefits to society, also enabled a large variety of illegal and potentially harmful activities. For instance, when Napster, the online peer-to-peer file sharing platform that had been widely used to download pirated material, first emerged in 1999, it triggered a paradigm shift which has had substantial

consequences for how media content has been consumed ever since. Illegal file sharing almost became a “national pastime” [1], with 30 billion songs being illegally downloaded from file sharing platforms between 2004 and 2009 alone [2]. As Lars Ulrich, one of the founding members of the American heavy metal band Metallica, put it: “Napster hijacked our music without asking. They never sought our permission. Our catalogue of music simply became available as free downloads on the Napster system” [3].

Naturally, in recent years, scholars have exhibited great interest in understanding the implications of such pirated media distribution networks and have paid particular attention to two aspects. First, scholars scrutinized how file sharing relates to existing copyright laws and whether changes to these laws appear expedient given the emergence of this new technology [4–6]. Second, they have sought to understand the economic impact of file sharing technologies, for instance regarding cannibalization of product sales [7–9].

Given the important legal and economic ramifications of pirated media distribution technologies which were identified in such prior work, a host of research concerned itself with understanding the factors that drive users to use or not use such technologies. However, extant research is starkly limited in three important aspects. First, prior research is limited in its measurement of piracy. Most studies rely on

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self-report measures [10–13], which are likely to suffer from social desirability bias in research that covers a topic as sensitive as online media piracy. Second, extant research is limited regarding the dependent variable. It overwhelmingly focuses on merely explaining attitudes or intentions regarding piracy rather than on explaining actual behavior [11–15]. The few studies that do study actual piracy behavior [16, 17] suffer from the abovementioned problem of self-reports. Third, extant studies are limited regarding their choice of independent variables. In particular, most research studies antecedents like national income level and level of education [18], self-control [11, 12, 19], motivations [17], or attitudes [11, 12]. However, there is hardly any research that goes beyond such surface-level demographics or rather malleable psychological constructs and that studies users' more stable underlying personalities. Brown and MacDonald's [10] study is a notable exception in that they link the personality traits of honesty–humility, conscientiousness, and openness to experience to illegal media content downloading. However, like much other research, they relied on self-reports and only studied attitudes towards piracy. In sum, there is still a very limited understanding of the deep-level antecedents of engagement in this kind of online behavior.

Advancing our understanding of the issue, however, is important, not the least because technology has already evolved further and now provides other means than file sharing for consuming media content. Such file sharing denotes a peer-to-peer technology where users upload and download, and thus share, files via an online platform. The second dominant form [20] of consuming online pirated content is streaming, i.e., a process in which the content is consumed online and not permanently downloaded [21]. While a substantial number of legal paid offers such as Netflix and iTunes have emerged and keep emerging, a large array of possibilities to digitally consume such content without compensation for the rights holder exists as well. We will refer to such services as “pirated file sharing” and “pirated online streaming” throughout the paper.

In our paper, we aim to address the important gap in our understanding of the antecedents of online piracy by drawing on the notion of political ideology and its underlying motivational structure. Specifically, there are three personality characteristics that are tightly linked to the motives determining political ideology and which form the basis of our theorizing: Openness to experience, conscientiousness, and ambiguity intolerance [22].

We hypothesize that openness to experience and conscientiousness are linked to the use of new technologies. In particular, we propose that people higher in openness to experience are more likely to engage in online media piracy because they tend to be more inquisitive and more unconventional and thus more likely to try new things, even when they might be illegal [10]. People higher in conscientiousness, in contrast, are

typically less likely to engage in online media piracy because they usually ascribe greater importance to order and diligence and thus disapprove of behavior that can be considered to involve breaking rules [10]. Similarly, we contend that ambiguity intolerance is crucial to understanding differences in the use of pirated online streaming and file sharing websites. We expect pirated online streaming websites, whose legal situation remains unclear to the general public [23, 24], to be used to a lesser extent by individuals with stronger ambiguity intolerance. In contrast, we expect to observe no such differences for file sharing websites, the primary purpose of which is clearly illegal in the U.S.

We empirically capture openness to experience, conscientiousness, and ambiguity intolerance by measuring individuals' political ideologies, i.e., the extent of their liberal or conservative attitudes. Prior scholars have demonstrated that individuals' political ideologies are linked to openness to experience and conscientiousness [25], as well as ambiguity intolerance [26–28], and have already introduced political ideology to information systems research [29–32].

We apply an innovative measure of political ideology [33] based on a methodology by Flaxman et al. [34] which allows us to infer individuals' ideologies from their online media consumption. Specifically, we analyze clickstream data which tracks the web browsing behavior of 3873 individuals in the U.S. and link their political ideologies and their visits to a list of websites that offer pirated media content in the form of either downloads or streaming services. We find broad support for our theorizing.

Our paper makes several contributions. We contribute to the online piracy literature [17], particularly that on the effects of personality [10], by explaining online piracy through users' political ideology. We detail the underlying theoretical mechanisms and move beyond a simplistic reiteration of the stereotype that conservatives are generally less likely to use new technologies such as online media piracy websites. In particular, we identify political ideology as an important explanatory variable for the diverging adoption of pirated file sharing and online streaming, two technologies that differ in the ambiguity of their legal status. Our theoretical link and the corresponding empirical findings thus provide a more nuanced view on the subject of online media piracy than does prior literature. Furthermore, we add to the wider literature that strives to explain technology use through personality characteristics. We contend that our findings may have more general consequences for predicting the use of new technologies or services that may be ambiguous regarding their perceived legality [35, 36], and which might thus be used to different degrees by people of different levels of ambiguity tolerance.

2 Theory and hypotheses

2.1 Political ideology, openness to experience, and conscientiousness as antecedents of online media piracy

A core tenet of political ideology research is that differences in ideology are grounded in differences in underlying personality characteristics [22, 37]. Thus, individuals' political ideologies, conceptualized as their more liberal or more conservative attitudes and beliefs, are the reflection of fairly stable personality traits rather than merely differences in situational circumstances [38, 39]. This is to say that political ideology is a phenomenon that does not exist separately from personality but that it emerges as the result of individuals holding certain values and convictions, which at least partially arise from and correspond to differences in personality.

Scholars have consequently been able to provide much evidence of personality differences between individuals of different political leanings. They have shown, for instance, that liberals tend to exhibit higher cognitive complexity [40] and lower need for cognitive closure [41, 42]. Furthermore, such personality characteristics have been found to translate into differences in actual every-day behavior outside the political sphere, both in information systems use [29–32, 34, 43–45] and in areas as diverse as lifestyle choices and purchase behavior [25, 46], management practices [47, 48], and interpersonal relations [49, 50].

Specifically, prior research has demonstrated that political ideology is closely linked to the traits of openness to experience [51, 52] and conscientiousness [25, 52]. Individuals that subscribe to a more conservative ideology also tend to possess comparably lower levels of openness to experience and higher levels of conscientiousness. They are, in other words, typically less inclined to try new things, exhibit lower aesthetic sensitivity, tend to have less complex personalities, be more conventional and less creative (i.e., exhibit less openness to experience), as well as usually more diligent and achievement-oriented, more self-disciplined, and more organized and careful (i.e., exhibit greater conscientiousness) [53].

Both traits, in turn, are closely associated with a variety of behaviors. Openness to experience is linked, for example, to certain preferences that lead to conscious choices of music [54] or sports [55] as well as to unconscious consequences such as language style selection in speech [56]. Conscientiousness predicts a host of consequences as well, ranging from, for instance, college students' time spent in class to their use of swear words [57].

There are two key mechanisms that link dispositions rooted in personality with observable behavior. First,

personality traits come with specific attitudes that comprise affective, cognitive, and conative aspects, which tend to make individuals behave in a trait-consistent, dispositional way in a given situation [58]. In addition, personality traits tend to influence individuals' choice of situations, leading to individuals typically opting for situations which are consistent with their personalities, further encouraging the expression of trait-consistent behavior [59].

Based on these ideas, we thus hypothesize that the traits of openness to experience and conscientiousness are also associated with pirated online media consumption. In particular, we argue that people high in openness to experience, i.e., people with a less conservative worldview, are more likely to seek out opportunities to and actually do engage in online media piracy because they are more inquisitive and more unconventional, and thus more likely to try new things, even when they might be illegal [10]. People high in conscientiousness, i.e., more conservative individuals, in contrast, are less likely to engage in online media piracy because they ascribe greater importance to order and diligence and thus avoid and disapprove of behavior that may be considered to involve breaking rules [10].

In fact, prior research has already established first linkages between both traits and attitudes towards online media piracy. Specifically, Brown and MacDonald [10] showed among other things that individuals who have more positive attitudes towards online media piracy also tend to score higher on openness to experience due to higher ratings on the factors of creativity and inquisitiveness. Such individuals may, thus, consider online media piracy as a novel and exciting way to consume media content. Conversely, these authors found that individuals who exhibit more negative attitudes towards online piracy tend to score higher on conscientiousness because they typically have higher ratings on the facets of being organized and diligent. A perception of online media piracy as an unorderly activity that is reckless and irresponsible may explain their more negative attitudes towards it.

Combining our theoretical arguments made above, we propose that the personality structure of more conservative individuals makes them use all types of online media piracy, i.e., pirated online streaming and file sharing, less than more liberal individuals. Of course, in arguing this, we are making the additional assumption that users can distinguish websites that provide pirated content from those that make legitimate content offerings. Given that websites offering pirated material usually offer an extraordinary wealth of content at zero cost to the users, which must seem 'too good to be true,' we deem this assumption reasonable. Formally, we thus hypothesize:

Hypothesis 1a *An Internet user's degree of conservatism is negatively associated with his or her use of pirated online streaming websites.*

Hypothesis 1b *An Internet user's degree of conservatism is negatively associated with his or her use of pirated file sharing websites.*

2.2 Political ideology, ambiguity intolerance, and the consequences for different types of online media piracy

Beyond its links to openness to experience and conscientiousness, political ideology has a particularly intimate relationship with the trait of ambiguity intolerance. This is evident from a number of studies that link ambiguity intolerance to conservatism [26–28, 60–62]. Individuals with greater ambiguity intolerance tend to exhibit a higher motivation to seek certainty, tend to prefer familiar and clearly defined situations, and are more inclined to quickly establish assessments and conclusions [46, 63]. Consequently, they have, for example, usually specific preferences regarding literature [64, 65], art [66], and music [67]. They also typically perceive ambiguous situations as more threatening and are therefore more motivated to avoid them [26]. Ambiguity intolerance is also expressed in the degree of cognitive rigidity in thinking [68]. Specifically, conservatives tend to be stronger categorizers, i.e., perceive the world in more clearly defined and dichotomous “black and white” categories, whereas liberals tend to be more accepting of “different shades of grey” [69] and have a higher inclination to think in terms of probabilities [70].

We argue that the interplay between a technology's ambiguity and potential users' ambiguity intolerance has substantial consequences for technology use. Previous research appears to be compatible with this notion, linking ambiguity to the use of, for instance, new farming technology [71] and entrepreneurial innovation [72].

Specifically, we extend prior ambiguity research on online technology use, in particular with regard to the use of technologies that may be used to infringe copyrights, and reason that conservatives and liberals differ in their use of such technologies. We propose that, other things equal, conservatives tend to avoid using online technologies of ambiguous perceived legality whereas we expect no such tendency regarding technologies that are clearly legal or clearly illegal. Existing research on political ideology demonstrated that differences in ambiguity tolerance actually translate into behavior, especially with respect to which items individuals prefer to possess or use. For example, scholars found that more conservative individuals tend to have a greater preference for the unambiguous, simple, and familiar rather than

the ambiguous, complex, and unfamiliar across a wide array of areas, e.g., in literature [64, 65], art [66], and music [67].

Our selected empirical context of pirated streaming and file sharing technology is particularly well-suited to examine the effects of ambiguity [73]. Due to the rapid pace of innovation in digital content sharing, the social and economic ramifications of such innovation are often not immediately clear. This is especially the case with regard to potentially arising copyright issues, to which lawmakers and courts can typically only react with substantial delay, resulting in a time lag until all ambiguities and interpretation issues have been resolved [36]. This leaves both copyright holders and media consumers in a state of uncertainty because current rules and regulations may not be applicable to new technologies by simple analogy. As a consequence, such ambiguity in law and enforcement may substantially impact individuals' actions.

In fact, the perceived legality of some content sharing technologies currently remains ambiguous for the end user in the U.S. Whereas distributing and downloading copyrighted material is clearly illegal under U.S. law, pirated online streaming is currently generally legal for the end user (though not for the platform operator) [74]. However, the U.S. government has strongly pushed for changes in legislation to criminalize online streaming in recent years. While proposed bills such as SOPA (Stop Online Piracy Act) and PIPA (Preventing Real Online Threats to Economic Creativity and Theft of Intellectual Property Act) were not passed due to strong public opposition and have been placed on hold in 2012 [24], the government has been reviving its efforts to ban pirated streaming of copyrighted material [23]. As a consequence, the legality of pirated online streaming is generally not clear to the general public [23, 24]. In fact, a brief Google search conducted by the authors revealed that users' perceived ambiguity regarding the legality of streaming is high, as is evident from heated discussions among Internet users in online forums, blogs, and Q&A sites. The legal situation, at least from a layperson's perspective, for pirated online streaming thus remains convoluted. The legal situation for file sharing, in contrast, is unambiguous.

We argue that, other things equal, the use of online services differs depending on the perceived ambiguity of the services' legality and on users' political ideologies. Specifically, we propose that conservative-leaning users are less tolerant of the ambiguity around pirated online streaming and are thus less likely to use it than are liberal-leaning users. Pirated file sharing's legal status, however, is unambiguous, and we therefore expect to find a smaller difference between users of varying political ideology. We thus advance the following hypothesis:

Hypothesis 2 *The association of an Internet user's degree of conservatism with the use of pirated online streaming*

websites is more pronounced than the association with his or her use of pirated file sharing websites.

3 Methodology

3.1 Sample

We test our hypotheses using clickstream data. Clickstream data has become an important data source in Internet research, as it has several advantages over traditional data sources such as surveys or experiments. First, as we track actual behavior of the subjects, we avoid self-report biases such as the consistency motif, social desirability, or priming effects [75]. Second, as clickstream data collection is very unobtrusive, we can assume that we capture genuine behavior [76, 77]. Third, we are able to minimize temporal behavioral biases through a longitudinal data collection, as we collect the clickstream data over a period of six months.

The clickstream data we use in this paper is derived from a panel of web users maintained by comScore, a U.S.-based market research firm [77]. The users in the panel were incentivized to participate and provided informed consent regarding the collection of their browsing behavior. Our initial dataset comprises 17,097 individuals from 9933 households in the U.S. Their Internet activity on their home computers was tracked for six months from March until August 2014. This timeframe follows prior work [33] and was selected to ensure reasonable temporal proximity to the 2012 U.S. presidential elections, the results of which were used to determine the political slant of online news websites that we employed to infer users' political ideologies (see the following section for details). After removing all individuals from the dataset who did not meet the criteria for the measurement of political ideology (an average of at least four page views per month on relevant news websites), our final sample consists of 3873 individuals from 3361 households.

3.2 Measuring Political Ideology

We follow Graf-Vlachy et al. [33] and measure political ideology using an unobtrusive approach. Specifically, we use a scale developed by Flaxman et al. [34], which employs information on individuals' news media consumption to infer their political ideologies. Such an approach is tenable since empirical evidence shows that political preferences of news media outlets are typically closely aligned with those of their audiences [78–81]. Flaxman et al. [34] approximate the political orientation of the top 100 news outlets by assigning a “conservative share” based on the fraction of their readership that had voted for the Republican candidate in the 2012 U.S. presidential election (see Appendix 1). This allows the construction of an unobtrusive measure based on

actual behavior, i.e., online news consumption, which side-steps many of the issues from which self-report measures suffer [75].

We approximate the political ideology of the individuals in our sample by calculating a weighted average conservative share of the online news outlets they visited in the six-month observation period. Weighting is performed using the relative page views each news outlet accounts for. The formula below shows the calculation of political ideology for a given individual i , with w being an index over all 100 news websites for which political slant data is available:

$$\text{PoliticalIdeology}_i = \frac{\sum_{w=1}^{100} (\text{conservativeshare}_w * \text{pageviews}_{i,w})}{\sum_{w=1}^{100} \text{pageviews}_{i,w}}$$

We consequently measure political ideology on a scale from 0 to 1, with higher values indicating greater conservatism. To ensure the validity of our measure, we only include individuals who regularly consumed online news and therefore, in line with Flaxman et al. [34], we limit our sample to individuals with, on average, at least four page views per month on these news outlets.

We validated our political ideology measure by comparing our distribution to the one found in the sample of Flaxman et al. [34]. This comparison is appropriate and informative because our sample stems from a different data source and covers a different timeframe. We further compare our data to the voting records and exit polls of the 2012 presidential election. Both comparisons strengthen our conviction regarding the validity of the measure [33]. First, where Flaxman et al. [34] find 66 percent of users to have an ideology score between 0.41 and 0.54, we find 65 percent of our sample in that range. In addition, the ideological distance between two randomly selected individuals in their sample is 0.11 and 0.12 in our sample. Second, our measure indicates that liberals have a stronger representation in young age groups than conservatives, which is in line with the presidential election voting records [82]. We also find that liberals are more likely to live in metropolitan areas than are conservatives, which is in line with presidential election exit polls [83].

3.3 Measuring use of pirated online streaming and file sharing websites

We measure the use of pirated file sharing and online streaming websites using two binary variables indicating whether a given individual visited any such websites during the observation period. To identify relevant websites, we conducted a systematic search of all second-level domains in our sample that had at least 20 page views and which contained any of the following keywords: “stream,” “movie,” or “film.” We subsequently manually checked all resulting domains for

relevance by visiting the corresponding website and retained only domains in our list that actually offered links to pirated file sharing or online video streaming of movies or television shows. In the cases where websites offered both services, we assigned them to the category that best described the majority of the website's offering. Additionally, we performed an online search for "free online movies" and "free online TV shows" and thus added several additional domains to our list. In total, we identified 47 streaming and 39 file sharing domains (see Appendix 2).

3.4 Control variables

To prevent non-focal variables from confounding our result, we include a set of control variables into our regression models. Specifically, all regressions control for age, gender, annual household income, and Internet usage. Age is the focal user's age in years, gender is the user's self-reported gender. We included household income because it proxies for socio-economic status and education [84] and we measured it on an ordinal scale from 1 through 13, indicating household income brackets from below 15,000 US\$

to above 250,000 US\$. We further controlled for Internet usage, which was measured in brackets coded as 1 through 3, indicating less than 5 h, between 5 and 16 h, and more than 16 h per week, respectively. All data for control variables were provided by comScore.

4 Results

4.1 Descriptives

Table 1 contains summary statistics and pair-wise correlations for all variables used in our analyses. To test for multicollinearity, we calculated the mean variance inflation factor, which at 1.01 is well below the suggested threshold of 10.0 [85, 86].

4.2 Regression models

Since our dependent variable is binary, we use a logistic regression. The results are presented in Table 2. Models 1 and 3 are the control models for H1a and H1b, respectively.

Table 1 Descriptives and correlations ($n = 3,873$)

Variables	Mean	SD	1	2	3	4	5	6	7
Streaming Site Use	0.23	0.42	1						
File Sharing Site Use	0.20	0.40	0.21*	1					
Political Ideology ¹	0.44	0.09	-0.09*	-0.05*	1				
Age	37.05	16.08	-0.27*	-0.22*	0.09*	1			
Gender ²	0.54	0.50	0.03*	0.18*	0.02	-0.06*	1		
Internet Usage	2.32	0.71	0.17*	0.12*	-0.05*	-0.04*	0.02	1	
Household Income	6.20	3.24	-0.06*	-0.02	0.00	0.03	0.06*	-0.05*	1

¹Liberal = 0, Conservative = 1

²Male = 0, Female = 1

* $p < 0.05$

Table 2 Logistic regression results

Variables	Dep. Variable: Online Streaming		Dep. Variable: File Sharing	
	Model 1	Model 2	Model 3	Model 4
Age	-0.05*** (0.00)	-0.05*** (0.00)	-0.04*** (0.00)	-0.04*** (0.00)
Gender ¹	0.09 (0.08)	0.10 (0.08)	0.93*** (0.09)	0.94*** (0.09)
Internet Usage	0.64*** (0.06)	0.63*** (0.06)	0.44*** (0.06)	0.43*** (0.06)
Household Income	-0.03** (0.01)	-0.03** (0.01)	-0.02 (0.01)	-0.02 (0.01)
Political Ideology ²		-1.65*** (0.48)		-0.79 (0.51)
Constant	-0.96*** (0.20)	-0.26 (0.28)	-1.58*** (0.21)	-1.24*** (0.30)
Observations	3,873	3,873	3,873	3,873
R ²	0.1026	0.1053	0.0947	0.0953

Notes: ¹Male = 0, Female = 1

²Liberal = 0, Conservative = 1

All Models calculated using logistic regressions; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Model 2 includes a negative and significant ($p < 0.001$) coefficient for political ideology. It thus provides support for H1a, suggesting that conservatives are less likely to use pirated online streaming services. Model 4 exhibits a negative but insignificant coefficient for political ideology ($p > 0.05$). It therefore suggests that there is no difference in the use of illegal file sharing services between conservatives and liberals, lending no support to H1b. However, the results of models 2 and 4, in tandem, appear to support the notion we advanced in H2 in that they suggest that the effect on political ideology is stronger for pirated online streaming than it is for file sharing.

To further corroborate our results, we ran additional bivariate probit regression models which allow to simultaneously predict both dependent variables in one single model (Table 3). We chose a probit model because there is no bivariate logit estimator. Model 5 is the control model, and Model 6 incorporates the two dependent variables of interest. We observe similar results as in the individual logistic regressions: The coefficient for political ideology is highly significant ($p < 0.001$) and large for the dependent variable of online streaming use, whereas it is not significant ($p > 0.05$) and comparably small for the dependent variable of pirated file sharing use. The findings from this additional regression analyses thus corroborate our findings.

5 Discussion

In our paper, we studied personality antecedents explaining differences in the use of technologies to access pirated online media content. In particular, we explored why usage differs with regard to two technologies that exhibit different degrees of perceived ambiguity of their legal status, specifically pirated file sharing and pirated online streaming websites. We built on prior political ideology research to hypothesize

about the relationship between political ideology, openness to experience, conscientiousness, ambiguity intolerance, and technology use. To measure political ideology and the use of pirated file sharing and online streaming websites, we drew on clickstream data capturing actual user behavior, thereby alleviating concerns about various biases [75]. This is particularly relevant in our context as the sensitive and partially illegal nature of pirated media consumption might lead to untruthful responses in self-reports [10, 87]. Our findings corroborate extant research which has shown that political ideology serves as an important predictor of behavior, in particular with regard to information systems [29–32, 34, 43–45].

Our research thus contributes to the online piracy literature [10, 17] by offering a nuanced explanation for piracy on the grounds of users’ political ideology and associated personality traits. In crafting and testing this explanation, we advance beyond common knowledge and the simple stereotype that conservatives make less use of new technologies such as online media piracy websites. In particular, we use the concept of ambiguity intolerance, one of the core personality characteristics underlying political ideology, in our theorizing. We propose that such ambiguity intolerance does not only motivate conservatives to disapprove of ambiguity in areas such as literature [64, 65], art [66], and music [67], but also has consequences for technology use. Heightened legislative activity around the criminalization of pirated online streaming, both past and present [23, 24], increased perceived ambiguity surrounding this technology. We propose that more conservative individuals tend to perceive this ambiguity as a threat [26] and react by withdrawing from such situations. Their greater cognitive rigidity in thinking makes it harder for them to obtain a differentiated assessment of pirated online streaming but instead tends to make them resort to dichotomous “black and white” thinking and consequently avoid the use altogether [27, 68, 69]. This is

Table 3 Bivariate probit regression results

Variables	Model 5		Model 6	
	Online streaming	File sharing	Online streaming	File sharing
Age	-0.03*** (0.00)	-0.02*** (0.00)	-0.03*** (0.00)	-0.02*** (0.00)
Gender ¹	0.05 (0.05)	0.53*** (0.05)	0.06 (0.05)	0.53*** (0.05)
Internet Usage	0.37*** (0.04)	0.25*** (0.04)	0.36*** (0.04)	0.25*** (0.04)
Household Income	-0.02** (0.01)	-0.01 (0.01)	-0.02** (0.01)	-0.01 (0.01)
Political Ideology ²			-0.97*** (0.28)	-0.45 (0.29)
Constant	-0.60*** (0.12)	-0.95*** (0.12)	-0.18 (0.16)	-0.75*** (0.17)
Observations	3,873		3,873	
Log-likelihood	-3594		-3587	

Notes: ¹Male = 0, Female = 1

²Liberal = 0, Conservative = 1

All Models calculated using logistic regressions; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

in clear contrast to our findings on pirated file sharing where the legal status is unambiguous and where thus no differences in behavior between conservatives and liberals can be found. These findings complement and extend existing studies found in the literature on the link between openness to experience and conscientiousness and online media piracy. Brown and MacDonald [10] found a positive association between the two traits and attitudes towards online media piracy. While we, by proxy of political ideology, find the same association in unreported analyses, we highlight that this overall effect is driven only by the legally ambiguous form of pirated online streaming.

By extension, we contribute to the literature on technology and services use more broadly by conjecturing that the specific case of pirated media consumption examined in our paper might generalize. Technologies and services, especially new ones, can, after all, differ greatly in the degree of legal ambiguity they involve [35]. Our findings suggest that conservatives—due to their relatively lower ambiguity intolerance—may be generally less willing to engage with and use technologies or services that exhibit ambiguity, whereas there may be no difference in adoption between liberals and conservatives for those that are unambiguous. Thus, we propose that political ideology—and specifically the underlying trait of ambiguity intolerance—may more generally be another important personality-related antecedent of usage decisions [88–90]. While this notion is compatible with prior research, for example on the use of social media, which found that liberals are more likely to use such technologies [29, 30, 32], our study goes beyond it. This is because prior research did not explicitly compare technologies differing in their degree of ambiguity and did not explicitly relate adoption to the specific traits and social-cognitive motives underlying political ideology.

Our research also has implications for practice. On the one hand, the knowledge of individuals' political ideology and subsequent online behavior allows firms to potentially address these individuals in a more targeted way when introducing new technologies or service offerings. We demonstrate that it would be possible for firms to make predictions about users' personality traits and behavior from their browsing history using news consumption as a proxy. This goes beyond most of today's web personalization measures, which rely on content choices actively made by users within the website or on demographics and that are thus usually unable to segment website visitors according to actual personality characteristics. Using political ideology as a personality proxy could allow firms to highly customize their offerings and messaging to specifically account for differences in the personality traits underlying political ideology.

We specifically suggest that ambiguity intolerance may inhibit technology use in the case of more conservative individuals, which has implications for firms' communication

with their prospective customers. Depending on a prospective customers' ideology, firms might wish to individually adjust the balance between, for example, stimulating customers' imagination regarding an offering's benefits, and reducing ambiguity through clear messaging to alleviate possible adverse effects of ambiguity in purchasing decisions. Firms may also selectively enhance their offering, for instance by offering guarantees or free trials, for those customers considered to be especially prone to ambiguity intolerance.

Even more directly, our findings have implications for communication strategies of firms that are either hurt or profit from technologies that are perceived as legally ambiguous. Companies that might wish to curb the use of an ambiguous technology (e.g., the holders of media rights whose content is illegally distributed on streaming websites), should consider addressing conservative and liberal users differently. Whereas conservatives are likely more sensitive to messaging highlighting potential legal risks, other communication strategies, like highlighting fairness concerns, might be more effective in communicating with more liberal audiences. Conversely, firms wishing to promote the use of (legal) technologies that are perceived as legally ambiguous might wish to focus their communication efforts on more conservative users to alleviate their concerns about the legality of their services. Such politically targeted communication is feasible not only through the analysis of browsing history data, as mentioned above, but also because we know which audiences frequent which media outlets, so that advertisements or editorial content can be placed accordingly.

As any empirical research undertaking, ours has several limitations that present opportunities for further research. First, we base our measure of political ideology on a relatively novel methodology. While this measure doubtlessly has many benefits, most notably the possibility to unobtrusively collect observational data, it would benefit from further validation against traditional ideology measures. This is particularly the case as recent literature has identified problems in using behavioral online data as a replacement for survey data when making inferences about political behavior [91]. While we have no theoretical a priori reasons to suspect so, it would also be possible that the news consumption that people exhibit online may diverge from their offline news consumption with regard to the political orientation of the frequented news outlets. This could of course bias our data.

Second, we cannot fully rule out selection biases in our data. For example, our measure of political ideology is, by definition, only applicable to individuals who actually consume online news and signing up for the comScore panel may be correlated with a certain attitude towards privacy, and ultimately with political ideology. However, we are not aware of any specific theoretical reasons that would let us expect such a bias in the sample. Additionally, we cannot strictly rule out that high-intensity users of pirated

online media might be underrepresented in the sample due to self-selection, or that included users' behavior may be influenced by the fact that they know that their behavior is being tracked. However, comScore tracks panel members' browsing behavior in a very subtle fashion, making it likely that members' online behavior is not substantially affected.

Third, and closely related to both prior issues, our sample might be biased in other ways. Specifically, the number of individuals in our sample is reduced substantially when we remove all individuals for whom we cannot reliably calculate a political ideology score because they made insufficient visits to relevant news websites [33, 34]. This reduction in sample size affects sample characteristics such as, for instance, the mean values of gender, income, and age. While these changes are statistically significant (which is to be expected in such large datasets), none of the observed changes were large in terms of effect size [90]. Nevertheless, the changes in sample composition raise the question of generalizability of our findings. Specifically, it remains unclear in how far our results hold in populations beyond people who are consuming online news. Future research might thus study the political ideology of Internet users that do not (or rarely) consume relevant online news and seek to replicate our findings in fully representative samples.

Fourth, potential limitations stem from our measurement of the use of pirated file sharing and streaming websites. For instance, it is conceivable that, despite our best efforts, we missed some websites that individuals in our sample visited and that served pirated material. Given our sample size and the overall number of unique domains visited, there appears to be no practical solution to arrive at a perfect selection in this regard. While we are inclined to believe that this possible imperfection will likely only introduce random noise (because the political composition of the users of a missed website is unlikely to be systematically different from that of other websites of the same type), we acknowledge that it could lead to bias. Relatedly, some websites provide both streaming and downloading functionality. While the main functionality of each website was clearly identifiable, our classification of each individual website may also be imperfect in this regard. Further, some users might not have been aware of the possibility to engage in pirated online media consumption altogether. Although we control for several variables that explain the awareness of this possibility (finding, e.g., positive effects of being younger and spending more time on the web on the number of visits to pirated media online media websites), such selection issues might potentially introduce bias into our analyses.

Fifth, as we do not measure openness to experience, conscientiousness, and ambiguity intolerance directly, we cannot empirically confirm that the variance in website use is indeed caused by these personality characteristics, and not by other characteristics related to the ideology

measure. While we acknowledge the possibility, having reviewed the existing literature on political ideology, we could not identify different personality characteristics that were theoretically superior or would better account for our empirical findings. Nevertheless, future research might wish to study the precise mechanisms at play. It is, for example, conceivable that conservatives might subscribe to a different worldview than liberals in that conservatives might readily perceive everything that is not clearly and explicitly illegal as legal and normatively appropriate, whereas liberals might more strongly deliberate on the ambiguity of the situation and let other moral considerations enter their decision calculus. Future research might thus wish to explore such possibilities, potentially also using more fine-grained measures of ideology, for example separating out social and economic conservatism [92].

Lastly, since our measure and our sample are from the U.S., the generalizability of our findings to other countries or cultures might be limited. This limitation provides a particularly rich opportunity for future research, as the political landscape of other countries, e.g., in continental Europe, is much more diverse than the Anglo-Saxon two-party system, potentially allowing the use of political ideology as a proxy for other, more fine-grained personality characteristics.

In summary, our paper establishes differences in political ideology, and thus in openness to experience, conscientiousness, and ambiguity intolerance, as fundamental predictors of individuals' online behavior in ambiguous contexts, specifically the adoption of technologies that differ in their lawfulness. We encourage scholars to further build on our results. For one, scholars could further validate the implications of ambiguity on technology use by studying ambiguity with respect to other types of technologies beyond website use and by measuring ambiguity in ways other than through political ideology. For another, we are confident that political ideology as an unobtrusive measure of underlying personality traits carries great potential for information systems research, and we thus urge other scholars to explore its consequences with regard to other personality traits and types of online behavior.

Appendices

Appendix 1

Domain	Con- servative Share	Domain	Conserva- tive Share
timesofindia.india- times.com	0.04	economist.com	0.12

Domain	Con- servative Share	Domain	Conserva- tive Share
northjersey.com	0.14	ocregister.com	0.15
mercurynews.com	0.17	nj.com	0.17
sfgate.com	0.19	baltimoresun.com	0.19
courant.com	0.22	jpost.com	0.25
prnewswire.com	0.27	sun-sentinel.com	0.27
nationalpost.com	0.28	thestar.com	0.28
bbc.co.uk	0.30	wickedlocal.com	0.30
nytimes.com	0.31	independent.co.uk	0.32
philly.com	0.32	hollywoodreporter.com	0.33
miamiherald.com	0.35	huffingtonpost.com	0.35
guardian.co.uk	0.37	washingtonpost.com	0.37
online.wsj.com	0.39	news.com.au	0.39
dailykos.com	0.39	bloomberg.com	0.39
dailyfinance.com	0.39	syracuse.com	0.39
usnews.com	0.39	timesunion.com	0.40
time.com	0.40	reuters.com	0.41
telegraph.co.uk	0.41	businessweek.com	0.42
cnn.com	0.42	politico.com	0.42
theatlantic.com	0.42	nationaljournal.com	0.43
altnet.com	0.43	ajc.com	0.44
forbes.com	0.44	seattletimes.com	0.44
rawstory.com	0.44	newsday.com	0.44
cbsnews.com	0.45	rt.com	0.45
theepochtimes.com	0.46	latimes.com	0.47
ssmonitor.com	0.47	realclearpolitics.com	0.47
usatoday.com	0.47	cnbc.com	0.47
dailymail.co.uk	0.47	mirror.co.uk	0.47
news.yahoo.com	0.47	abcnews.go.com	0.48
upi.com	0.48	chicagotribune.com	0.49
ap.org	0.50	nbcnews.com	0.50
suntimes.com	0.51	freep.com	0.52
azcentral.com	0.53	tampabay.com	0.54
orlandosentinel.com	0.54	thehill.com	0.57
nationalreview.com	0.57	news.sky.com	0.57
detroitnews.com	0.59	express.co.uk	0.59
weeklystandard.com	0.59	foxnews.com	0.59
washingtontimes.com	0.59	jonline.com	0.61
newsmax.com	0.61	factcheck.org	0.62
reason.com	0.63	washingtonexaminer.com	0.63
ecanadanow.com	0.63	americanthinker.com	0.65
twincities.com	0.67	jacksonville.com	0.67
opposingviews.com	0.67	chron.com	0.67
startribune.com	0.68	breitbart.com	0.70
star-telegram.com	0.74	stltoday.com	0.75
mysanantonio.com	0.77	denverpost.com	0.80
triblive.com	0.85	sltrib.com	0.85
dallasnews.com	0.86	kansascity.com	0.93
deseretnews.com	0.94	topix.com	0.96

Domain	Con- servative Share	Domain	Conserva- tive Share
knoxnews.com	0.96	al.com	1.00

Appendix 2

Pirated online streaming	Pirated file sharing
coolmoviezone.com	1337x.orf
film-club.net	bayprate.me
filmlush.com	bestmatorrents.com
fmovief.net	bitsnoop.com
free-tv-video-online.me	extratorrent.cc
fullmovie-hd.com	extratorrentlive.com
fullmovie2in.com	eztv.it
happystreams.net	fastpiratebay.eu
icefilms.info	isohunt.to
losmovies.com	kickass.to
movie.to	limetorrents.com
movie25.cm	mma-torrents.com
movie25.so	piratebay.com
movie2k.tv	pirateproxy.in
movie2kto.me	pirateproxy.net
movie2kto.so	rarbg.com
movie4k.to	thepiratebay.ee
moviease.com	thepiratebay.se
movielush.com	thepiratebay.si
movierulz.com	thepiratebaymirror.net
movies2k.tv	torrentdownloads.me
movieshd.co	torrenthound.com
movietube.cc	torrentproject.com
movietube.co	torrentreactor.net
moviezfever.com	torrents.fm
primewire.ag	torrents.to
putlocker-movie.eu	torrentus.eu
rapidmoviez.com	torrentus.si
rapidmovies.eu	torrentz-proxy.com
snagfilms.com	torrentz.eu
solarmovie.ag	torrentz.pro
solarmovie.is	torrentz.sx
solarmovie.me	unblockedpiratebay-proxy.com
solarmovie.mx	worldwrestlingtorrents.net
solarmovie.so	xtremewrestlingtorrents.net
solarmovie.tl	xtremewrestlingtorrents.org
stream2k.eu	yify-torrent-org
topdocumentaryfilms.com	yify-torrents.com
tunemovie.so	yourbittorrent.com
watch-free-movie-online.net	
watch-movies-tv.info	
watchfreemovies.ch	

Pirated online streaming	Pirated file sharing
watchmovie-online.com	
watchmovies.to	
zmovie.co	
zmovie.tw	
zmovie.li	

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