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Trademarks, Triggers and Online Search

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Abstract

Internet search engines display advertisements along with search results, providing them with a major source of revenue. The display of ads is triggered by the use of keywords, which are found in the searches performed by search engine users. The fact that advertisers can buy a keyword that contains a trademark they do not own has caused controversy worldwide. To explore the actual effects of trademark and keyword advertising policies, we exploit a natural experiment in Europe. Following a decision by the Court of Justice of the European Union, Google relaxed its AdWords policy in continental Europe in September 2010. After the policy change, Google allowed advertisers to select a third party's trademark as a keyword to trigger the display of ads, with only a limited complaint procedure for trademark owners. We use click-stream data from European Internet users to explore the effect this policy change had on browsing behavior. Based on a dataset of 5.38 million website visits before and after the policy change, we find little average change. However, we present evidence that this lack of average effect stems from an aggregation of two opposing effects. While navigational searches are less likely to lead to the trademark owner's website, non-navigational searches are more likely to lead to the trademark owner's website after the policy change. The effect of changing keyword advertising policies varies with the purpose of the consumers using the trademark, and it is more pronounced for lesser-known trademarks. The article points to tradeoffs trademark policy is facing beyond consumer confusion. More generally, the article proposes a novel way how to analyze the effect of different allocations of property rights in intellectual property law.

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I Introduction

Since the commercialization of the Internet in the early 1990s, electronic communication networks have led to significant changes in value chains. Traditionally strong intermediaries – such as record companies, publishers, newspapers, or movie companies – have been struggling to define their future roles and find profitable business models in a radically changed environment of content consumption. At the same time, new intermediaries – such as search engines, auction sites, or social networks – have emerged. In some cases, they threaten to displace traditional intermediaries. In other cases, they complement them or create entirely new business models.

In recent years, the discussion on intellectual property rules for intermediaries has increasingly focused on Internet search engines. In particular, a vigorous debate focuses on whether keyword-based advertising violates trademark law. In Google's version of the system – called Google AdWords – advertisers can buy advertising links in the 'sponsored links' section of a Google search results page. Thereby, advertisers purchase the possibility of having their ad displayed with the search results for a particular keyword that is relevant to their business. When a Google search user enters a search term which contains a keyword bought by the advertiser, the ad will appear in the upper right-hand corner or on top of the search results page. In principle, advertisers are free to select any keyword for their ad. This becomes a legal issue, however, if an advertiser chooses a keyword that has been registered as a trademark by another company.

Trademark owners on both sides of the Atlantic have argued that such use of a trademark as a keyword by a third party violates trademark law and that not only the third party, but also the intermediary search engine can be held liable based on either primary or secondary liability doctrines. Google has argued that it should not be liable for trademark infringement in such cases, as either the third-party keyword registration does not infringe trademark law

or, even if it did, Google cannot be held liable for such infringement. As Google's business model relies extensively on the ad auction mechanism underlying AdWords,[1] it has a vital interest in not becoming involved in trademark-related disputes between trademark owners and third-party advertisers.

One important dimension to whether third parties should be allowed to register trademarks as keywords is the effect such use has on consumer behavior. On the one hand, it could be that consumers become confused by ads based on third-party keyword registrations, because they assume that such ads originate from or are sponsored by the trademark owner. One of the policy justifications for trademark protection is to overcome information asymmetries between product manufacturers or service providers and their customers (Landes and Posner 1987). On the other hand, it could be that consumers realize that an ad based on a third-party keyword registration is not linked to the trademark owner, and that they appreciate the increased information and competition resulting from such keyword use. From a policy perspective, allowing third parties to register trademarked keywords could increase information availability and transparency in the market place and could therefore be desirable (Goldman 2009).

To shed light on this tradeoff and determine the effect of third-party keyword advertising on consumer behavior requires an empirical investigation. Traditionally, evidence on consumer behavior and confusion has been presented in trademark litigation in various forms: Consumer surveys, evidence of actual confusion, expert witnesses or direct comparison of trademarks (McCarthy 2014, §23:2:50; Bird and Steckel 2012; Sarel and Marmorstein 2009). Such evidence reflects the traditionally passive role of the consumer: That she uses the trademark to distinguish between products or services of different origins.

[1]Keywords are sold through auctions where advertisers bid competitively against each other for the position of the ad on the search results page. The mechanisms underlying keyword auctions have been studied extensively (Edelman et al. 2007; Varian 2007), but are not the focus of this article. Of Google's $55.5 billion revenues in 2013, $50.5 billion came from advertising (Google 2014).

Internet search engines have substantially expanded the role trademarks play in the consumers' search processes. First, consumers are now actively using trademarks as they choose a string of words to query a search engine. They decide whether to use a trademark alone to search with, or whether to combine it with other words to make the meaning and use of the trademark more precise. Second, unlike in traditional settings, it is now easy for firms to monitor the use of trademarks by consumers (Goldfarb 2014).

In this environment of active trademark use by both firms and consumers, more direct evidence of consumer behavior is of particular interest. While consumer surveys have been used to measure consumer behavior in the context of keyword advertising (Franklyn and Hyman 2013),[2] and courts have recently begun to explore advanced digital data sources,[3] we propose a novel, more direct and richer way to analyze consumer behavior. We use micro-level click-stream data on web browsing to directly observe consumer browsing behavior. Such data has been used before to explore consumer behavior in the context of software licenses (Bakos et al. 2014); to analyze the effect of illegal music file sharing on legal music consumption (Aguiar and Martens 2013); to document how often search engine results are triggered by competitors' trademarked keywords (Rosso and Jansen 2010); and aggregate summaries of such data has been used to study the implications of a trademarked search term in the actual text of search engine ads (Chiou and Tucker 2012). To our knowledge, our study is the first using this kind of data to explore the relationship between keyword advertising and trademark law.

After the Court of Justice of the European Union held in March 2010 that Google's

[2]On the limited admissibility of survey evidence in keyword advertising cases under U.K. law, see Court of Appeal, Interflora Inc. v. Marks & Spencer plc., [2012] EWCA Civ 1501, [2013] EWCA Civ 319 (Eng.); High Court of Justice, [2013] EWHC 1291, para. 210, 223 (Ch.) (Eng.); under U.S. law, see 1-800 Contacts, Inc. v. Lens.com, Inc., 722 F.3d 1229, 1246-1247 (10th Cir. 2013).

[3]Whereas the U.S. Court of Appeals for the Tenth Circuit has relied on ad impression and click-through data in 1-800 Contacts, Inc. v. Lens.com, Inc., 722 F.3d 1229, 1244 (10th Cir. 2013), the British High Court of Justice has also utilized eye-tracking studies and aggregate summaries of browsing data, [2013] EWHC 1291 (Ch.) (Eng.).

AdWords system does not violate European trademark law,[4] Google changed its Adwords policy in various European countries in September 2010. Following this change, Google allowed third parties to register keywords without the approval of the trademark owner, with only a limited complaint procedure for trademark owners. We use this exogenous change in the AdWords policy as a natural experiment to explore the relationship between keyword advertising and consumer behavior.

We are interested in whether we can observe any visible change in consumer behavior in click-stream browsing data by comparing web-browsing patterns before and after the Google AdWords policy change. We use micro-data from 5.38 million records of website visits following search engine queries that contain a trademark. The data comes from Internet users in two European countries (France and Germany) and spans the period before and after the policy change. We compare the changes in browsing behavior on Google, where the policy change occurred in September 2010, to that on other search engines, where no such change occurred at that time.

With our micro-data, we are not only able to see whether a consumer used a trademark, but also how they used that trademark in their search request. Similar to various categorizations developed in previous literature (Goldman 2005; Jansen et al. 2008; Blake et al. 2014), we attempt to distinguish between two kinds of searches:

- Navigational searches, where the consumer is searching for the keyword because she is directly interested in using the search engine as a shortcut to find a specific web page such as the trademark owner's website; and

- Non-navigational searches, where the consumer is using the keyword in some other way, for example because she is interested in information about the product, in competing products, compatible components, resellers, alternative distribution channels or third-

[4]Court of Justice of the EU, Google France v. Louis Vuitton Malletier, Mar. 23, 2010, Joint Cases C-236/08 to C-238/08, ECR 2010, I-02417. For a more detailed discussion, see Section II.A.

party after-sale services; she may also be interested in ways to finance the purchase of the product; she may use the trademark as a substitute for a generic product description; or she may be very early in the purchase decision process, not being certain whether she is interested in the trademark owner's product at all.

We use various ways of distinguishing navigational and non-navigational searches from the search strings that consumers used in our data. In our data, 20 percent of searches appear to be purely navigational, while 80 percent appear non-navigational.

It is possible that the effect of the policy change differs between navigational and non-navigational searches. If a navigational searcher is exposed to ads that contain the trademark the searcher is looking for, but originate from a third party without authorization of the trademark owner, this may impede her search process, as her attention is drawn to many third-party websites in which the searcher is not interested. If, however, a non-navigational searcher is exposed to such ads, this may improve her ability to progress in her search process, as she receives more diverse information and this diverse information may encourage her to visit the trademark owner's website. As a result, the overall effect of the policy change seems ambiguous.

We develop various measures to test these predictions. In general, we find that consumers engaging in navigational searches are less likely to visit the trademark owner's website after the policy change. On the other hand, after the policy change non-navigational searches are more likely to lead consumers to visit the trademark owner's website. This is particularly the case for the less pervasive trademarks in our data. These findings indicate that search engine users are using trademarks in more subtle and varied ways than is often assumed. As a result, changes in trademark policy cannot be assumed to have a uniform effect. We explore the implications these findings have, both for trademark law and for consumer research. In particular, we argue that the keyword advertising debate should not only focus on consumer confusion, but also take the tradeoffs resulting from the ambiguous effects of

keyword advertising into account. We also propose a novel way to empirically analyze the effect of different allocations of property rights in intellectual property law.

The article proceeds as follows. Section II provides some background on U.S. and European trademark law with regard to keyword advertising, and describes the policy change Google implemented in Europe in September 2010. Section III describes the click-stream data which we are using for our study. Section IV presents our empirical results. Section V points to implications and limitations of our study and concludes.

II Legal Background

II.A Development of the Case Law

Like other intellectual property rights, the scope of trademark protection has expanded considerably over time. Traditionally, the function of trademark law was to convey the origin of a product or service. By overcoming information asymmetries between producers and consumers, trademark law was perceived as a regulatory tool to eliminate inefficiencies resulting from unraveling of markets due to asymmetric information (Akerlof 1970; Landes and Posner 1987; Economides 1988). Generally speaking, current trademark discourse grapples with the question of whether and to what extent trademark protection should be conceptualized as a property right that reaches beyond clear cases of information asymmetries. In our context, the question is whether or not trademark protection should interfere with keyword advertising.

On the one hand, trademark owners deem it unfair that other firms can benefit from the goodwill attaching to their marks by choosing the marks for keyword registration without proper authorization, and that consumers may get confused by such ads. They also criticize that search engine providers may benefit, at least indirectly, from such behavior. On the other hand, trademark law does not protect trademark owners against each and every use of

their registered marks by others. In addition, third-party use of trademarked keywords may increase transparency and competition, thereby providing substantial benefits to consumers and to society at large.

Where the Google AdWords system lies along this continuum is an open question and differs across jurisdictions.[5] In the United States, answering this question depends on (a) whether Google's use of trademarks as keywords to trigger ads is a 'use in commerce' under §45 of the Lanham Act (15 U.S.C. §1127), and (b) whether consumers are likely to be confused by such use under §32 of the Lanham Act (15 U.S.C. §1114). Since the Courts of Appeals for the Second and the Ninth Circuit have both held that the use of a trademark as a keyword to trigger ads is a 'use in commerce,'[6] the current discussion focuses on the likelihood of consumer confusion. The relevant case law is fact-dependent and still in flux. In 2012, the U.S. Court of Appeals for the Fourth Circuit reversed and remanded a summary dismissal in a trademark infringement suit against Google, holding that there was a triable issue of fact on direct and contributory trademark infringement and dilution. The court also pointed to evidence of actual consumer confusion as presented by the plaintiff and to related in-house studies by Google.[7] In 2013, the U.S. Court of Appeals for the Tenth Circuit rejected a trademark infringement claim in a keyword advertising case, finding that there was no likelihood of confusion of a sufficiently large number of consumers.[8]

In the European Union, numerous national courts had to decide (a) whether an adver-

[5]While this article focuses on the U.S. and Europe, keyword advertising is heavily debated in other jurisdictions as well. In February 2013, the High Court of Australia held that Google is not liable under Australian consumer protection laws for misleading keyword ads as Google does not create the ads "in any authorial sense," but merely operates a search engine as a means of communication between the advertisers and consumers; see Google, Inc. v. Australian Competition and Consumer Comm'n, [2013] HCA 1, para. 68, 69 (Austl.). While the case did not focus on trademark-related issues, it prompted Google to revise its keyword advertising policy for Australia and various other countries in April 2013. This policy change is not the focus of this article.

[6]Rescuecom Corp. v. Google, Inc., 562 F.3d 123, 129 (2d Cir. 2009); Network Automation, Inc. v. Advanced Systems Concepts, Inc., 638 F.3d 1137, 1144-1145 (9th Cir. 2011).

[7]Rosetta Stone Ltd. v. Google, Inc., 676 F.3d 144 (4th Cir. 2012). In October 2012, the parties settled the lawsuit.

[8]1-800 Contacts, Inc. v. Lens.com, Inv., 722 F.3d 1229 (10th Cir. 2013).

tiser can be held liable for trademark infringement if he uses a trademarked keyword, and (b) whether search engine operators can be held liable as well, either through primary or secondary liability doctrines. Different courts had reached wildly different conclusions on both issues. Courts in France and Belgium, and some courts in Germany, had ruled that the AdWords system violates trademark law or unfair competition law, on the grounds that the advertisers and/or Google are using trademarks to confuse consumers, and are free-riding on the goodwill of trademark owners. Courts in the U.K. and other courts in Germany had ruled the opposite, while decisions in Austria and the Netherlands had come out somewhere between these opposing viewpoints (Bednarz 2011; Laan 2014).

As these issues depend on the interpretation of various European Union rules – in particular the Trademark Directive 2008, the Community Trademark Regulation 2009, and the E-Commerce Directive 2000 – it was not surprising that the Court of Justice of the European Union had to provide guidance to national courts on several occasions. The first dispute which reached the Court originated in France. In February 2005, a Paris regional court found Google's AdWords system guilty of infringing Louis Vuitton's trademark. After an appeals court in Paris had upheld this decision, Google appealed to the French Cour de Cassation, which referred the case to the Court of Justice of the European Union. In March 2010, the Court decided the French Louis Vuitton case.[9]

The Court held that a producer of fake Louis Vuitton products may violate trademark law if his keyword-backed ad creates the impression that his products are actually produced, or at least authorized, by Louis Vuitton. Concerning Google's liability, the court held that Google was not using the Louis Vuitton trademark in its AdWords system in a manner covered by European trademark law. Google was merely operating a service that might enable advertisers to engage in trademark violations. Turning to secondary trademark infringement,

[9]Court of Justice of the EU, Google France v. Louis Vuitton Malletier, Mar. 23, 2010, Joint Cases C-236/08 to C-238/08, ECR 2010, I-02417.

the Court noted that Google could be shielded from liability by provisions of the E-Commerce Directive 2000. This depends on whether the Google AdWords system is a merely automatic and passive system, or whether Google plays an active role in selecting and ordering ads. The court refrained from providing a definite answer to this question, and referred the case back to the French courts. Later decisions by the Court provided more detailed guidance on consumer confusion, various functions of trademark protection, the role of trademark limitations, and the liability of advertisers as opposed to search engines.[10]

Although the Louis Vuitton decision left various legal questions unresolved (Bechtold 2011), it was heralded as a victory for Google. Google had allowed third parties to register trademarked keywords in the U.S. and Canada since 2004, in the U.K. and Ireland since 2008,[11] and in various non-European countries since 2009, but it did not allow such third-party registrations in most continental European countries. Following the Louis Vuitton decision of the Court of Justice of the European Union, Google decided to change its policy in continental Europe.

II.B Policy Change

Before the policy change, trademark owners could notify Google of their trademarks. Google then blocked these trademarks from being purchased by third-party advertisers as a keyword.[12] On September 14, 2010, Google relaxed its policy on who was allowed to purchase a trademarked keyword to trigger ads across all continental European countries. The policy

[10]Court of Justice of the EU, Eis.de GmbH v. BBY Vertriebsgesellschaft mbH, Case C-91/09, Mar. 26, 2010, ECR 2010, I-43; BergSpechte Outdoor Reisen v. Günter Guni, Case C-278/08, Mar. 25, 2010, ECR 2010, I-2517; Portakabin Ltd v. Primakabin BV, Case C-558/08, Jul 8. 2010, ECR 2010, I-6963; Interflora Inc. v. Marks & Spencer plc., Case C-323/09, Sep. 22, 2011, ECR 2011, I-8625. For later decisions by national courts, see Bednarz 2011; Laan 2014; High Court of Justice, Interflora Inc. v. Marks & Spencer plc., [2013] EWHC 1291 (Ch.) (Eng.); Bundesgerichtshof [Federal Court of Justice], 116 Gewerblicher Rechtsschutz und Urheberrecht 2014, 182 – Fleurop (Germany).

[11]High Court of Justice, Interflora Inc. v. Marks & Spencer plc., [2013] EWHC 1291, para. 100-104 (Ch.) (Eng.).

[12]See High Court of Justice, Interflora Inc. v. Marks & Spencer plc., [2013] EWHC 1291, para. 100 (Ch.) (Eng.).

change was announced as follows on August 4, 2010:

> We defended our position in a series of court cases that eventually made their way up to the European Court of Justice, which earlier this year largely upheld our position. The ECJ ruled that Google has not infringed trade mark law by allowing advertisers to bid for keywords corresponding to third party trade marks. Additionally, the court ruled that advertisers can legitimately use a third party trademark as a keyword to trigger their ads.
>
> Today, we are announcing an important change to our advertising trademark policy. A company advertising on Google in Europe will now be able to select trademarked terms as keywords. If, for example, a user types in a trademark of a television manufacturer, he could now find relevant and helpful ads from resellers, review sites and second hand dealers as well as ads from other manufacturers.
>
> This new policy goes into effect on September 14. It brings our policy in Europe into line with our policies in most countries across the world. [...]

After the policy change, Google still offered a procedure for trademark owners to complain about the use of their trademark by third parties. However, under the new policy, the chances of such complaints being upheld are more limited. In general, Google liberalized the keyword registration system and allows limited complaints by trademark owners only in cases where the core function of trademark law – to prevent consumer confusion – is affected.[13] The attractiveness of examining this policy change is that it was triggered by the timing of a court decision, rather than endogenous changes in consumer behavior or search engine strategy, making it a natural experiment.

II.C Consumer Behavior beyond Confusion

In both the United States and Europe, the legal assessment of keyword advertising has traditionally focused on consumer confusion. As pointed out in Section II.A, in the United States, a search engine's trademark liability for third-party keyword registrations depends on (a) whether the search engine's use of trademarks as keywords to trigger ads is a 'use

[13]The detailed rules are printed in Appendix A. As Google does not release data on the complaint procedure, we are unable to empirically explore the extent to which this procedure has been used before and after the policy change.

in commerce,' and (b) whether consumers are likely to be confused by such use. Courts use variations of a multi-pronged test to determine likelihood of confusion (Beebe 2006). Relevant factors include the similarity between both trademarks and goods, the strength of the senior mark, evidence of actual confusion, the marketing channels used, product quality, defendant's intent, as well as consumer sophistication and similar characteristics (McCarthy 2014, §§23:1, 24:29–24:43). In European keyword advertising cases, consumer confusion plays an important role as well. An advertiser who uses a trademarked keyword without authorization may be violating European trademark law if his keyword or product are identical or similar to the right owner's mark or product (Art. 5(1)(a), (b) Trademark Directive 2008).

Consumer confusion about source, sponsorship or affiliation is a very important aspect of keyword advertising case law in both the United States and Europe. Although vigorously debated among trademark theorists (Beebe 2004, 623; Lemley 1999, 1967; Lemley and McKenna 2010; Fhima 2011), trademark doctrine does not always require consumer confusion for establishing trademark liability.[14]

We show that an exclusive focus on issues of consumer confusion captures neither how consumers are using trademarks in their Internet search process nor what the effects of consumer behavior on trademark owners, advertisers and, potentially, general welfare are. Consumers are using trademarks in subtle and multi-faceted ways in their Internet searches. They do not only enter trademarks into search engines in order to identify the trademark

[14]Examples of trademark liability without consumer confusion include anti-dilution doctrines (15 U.S.C. §1125(c) and Art. 5(2) Trademark Directive 2008). For applications of such doctrines to keyword advertising, see Rosetta Stone Ltd. v. Google, Inc., 676 F.3d 144, 167–173 (4th. Cir. 2012); Court of Justice of the EU, Interflora Inc. v. Marks & Spencer plc., Case C-323/09, Sep. 22, 2011, ECR 2011, I-8625, §§77–78, 85–90. Concerning the "investment function" and the "advertisement function" of European trademark law as applied to keyword advertising, see Court of Justice of the EU, Interflora Inc. v. Marks & Spencer plc., Case C-323/09, Sep. 22, 2011, ECR 2011, I-8625, §§54–59, 60; Google France v. Louis Vuitton Malletier, Mar. 23, 2010, Joint Cases C-236/08 to C-238/08, ECR 2010, I-02417, §§92, 98; BergSpechte Outdoor Reisen v. Günter Guni, Case C-278/08, Mar. 25, 2010, ECR 2010, I-2517, §34; Eis.de GmbH v. BBY Vertriebsgesellschaft mbH, Case C-91/09, Mar. 26, 2010, ECR 2010, I-43, §22; Portakabin Ltd. v. Primakabin BV, Case C-558/08, Jul 8. 2010, ECR 2010, I-6963, §33.

owner's website where they can buy products or services. Rather, they may use a trademark in their search term if they are looking for general information about the product; for competitors or compatible components; for alternative distribution channels or third-party after-sale services; for ways to finance the purchase of the product; they may use the trademark as a generic shorthand for certain kinds of products; or they may not be fully certain whether and what kind of product to buy (Goldman 2005; Dogan and Lemley 2007; Franklyn and Hyman 2013; Blake et al. 2014; Gilson et al. 2014, §7A.09[2]; McCarthy 2014, §25:70.25).

Finally, many consumers use search engines repeatedly in their decision-making process. Empirical research shows that Internet searches often begin with very general ideas of what product they are looking for (Lambrecht and Tucker 2013). As the multi-stage search process continues, the search queries become increasingly specific and detailed. In the various stages of the 'buying funnel,' which ranges from attracting awareness of the consumer through her research and decision-making up to her actual product purchase, a consumer may use trademarks in Internet searches in very different ways (Rutz and Bucklin 2011). In early stages, an Internet search for a particular brand does not necessarily mean that the consumer is only or even at all interested in products sold under this brand (Goldman 2005).[15]

The great variety with which consumers are using trademarks in their search behavior indicates that a legal analysis which focuses on consumer confusion may not capture all dimensions of trademark use in search engines (Goldman 2005). This has led the U.S. Court of Appeals for the Fourth Circuit to note that keyword advertising involves many trademark uses that are "referential or nominative in nature" and that a "robotic application" of traditional likelihood-of-confusion tests is ill-suited to capture the real meaning of consumer behavior in Internet search.[16]

[15] Appendix C shows examples from our data to demonstrate how search strategies evolve during a browsing session.

[16] Rosetta Stone Ltd. v. Google, Inc., 676 F.3d 144, 154–155 (4th Cir. 2012).

Given the multi-faceted use of trademarks in Internet search, we are interested in observing actual consumer behavior in keyword advertising systems and in distilling different kinds of trademark uses from the data. We thereby hope to provide empirical evidence on dimensions of trademark use that have not been discussed in the keyword advertising debate, and to demonstrate how the effect of different allocations of intellectual property rights can be analyzed empirically.

III Data

We are interested in whether the Google AdWords policy change had any visible effect on consumer behavior. In order to address this question, we use click-stream data on Internet user browsing behavior provided to us by Nielsen Europe. Nielsen Europe tracks the online activity of a cross-European panel of a large number of users in order to provide commercial data products. Our click-stream data represents the anonymized browsing behavior of 20,149 Internet users from France and Germany who have agreed to install a data collection plug-in on their computers. This plug-in records the URL of each web page visited, together with a time stamp.[17] This data allows us to follow the exact sequence of web page visits and the amount of time spent on each page.

Our data is grouped in browsing sessions and contains searches that occurred in the months July to August 2010 and August 2011 to January 2012. We have 5,380,798 observations of browsing activity. The disconnected timespan reflects a script error that occurred with data storage and parsing at Nielsen which limited the availability of data they were able to share. Since the script error only affected the Bing searches which form the majority of our control group, we have additional data on Google searches for September 2010 which

[17]For privacy purposes, the data delivered to us included the domain name and, sometimes, an anonymized part of the URL, but not the full URL of each web page visited. This does not limit our ability to conduct the study. Also in order to protect user privacy, we do not have demographic information about the anonymous individual searchers.

we use in a supplementary robustness check that we report in Appendix D.

Each browsing session starts with a search on either Google or another search engine and follows the browsing behavior for the next live session of web browsing. Our click-stream data encompasses browsing sessions that sometimes last for several hours. For our analysis, we discard any observations of behavior which occur ten minutes after the search session was initiated. Each search session starts with a search term that includes one of the brands we identified as top brands in eight categories: automobile, airline, electronics, cell phone, fashion, hotel, online services, as well as toys and gifts. We selected the top brands according to industry-specific brand rankings (see, e.g., WPP 2011). Tables A-6 to A-12 in Appendix E show the brands we use in each category and the number of search sessions for both countries. While it would also be interesting to analyze less important brands, our focus on top brands ensures that we have a sufficient number of observations in our dataset.

Table 1 provides summary statistics at the search-session level.[18] Nearly half of all searches led the searcher to visit the trademark owner's website at some point. There are several notable imbalances. First, more of the searches in our data originate from France than from Germany. Unsurprisingly, there are also far more searches that originate from Google than from other search engines. The majority of other searches that we observe were performed on Bing (88.6%). The remaining searches originated from Yahoo! and MSN.

One crucial question is the extent to which policies on these other search engines remained static. A challenge for researchers is that because these alternative search engines are less used than Google, there is less data to use to establish the baseline. Another less obvious problem is that there is less reporting surrounding non-Google search engine policy changes. Another complication is that, although we study changes in the Google policy that applied identically to France and Germany, Bing actually pursued two separate policies in these

[18]For the last three variables reported in Table 1, we have a lower number of observations than for the other variables. They are contingent on consumers visiting the trademark owner's website, which 42 percent of all consumers in our data do within the 10-minutes time window analyzed by us.

Table 1: Browsing Session Level Summary Statistics

	Mean	*Std Dev*	*Min*	*Max*	*Observations*
Decision time post-search	7.09	3.21	0	10	73376
Google	0.97	0.18	0	1	73376
Visit TM site	0.42	0.49	0	1	73376
# Visits TM site	2.74	5.27	0	76	73376
# Searches	1.93	1.60	1	22	73376
Germany	0.44	0.50	0	1	73376
France	0.56	0.50	0	1	73376
Search not exact match to trademark	0.80	0.40	0	1	73376
# Words in search	3.30	2.08	1	47	73376
Levenshtein distance	14.2	13.1	0	242	73376
Searched after TM site	0.0093	0.096	0	1	30807
# Sites before TM site	11.0	25.3	1	514	30807
# Searches before TM site	1.30	0.85	1	16	30807

countries reflecting different partnerships. At that time, Bing sold paid search ads via the Yahoo! network in Germany. As a consequence, it did not investigate complaints about the use of trademarks as keywords during the period we study. In France, Bing sold its paid search ads directly. As of January 2013, its Intellectual Property Guidelines reported:

> [...] for France, Republic of Ireland, Italy, Singapore, and the United Kingdom only, Microsoft will also investigate a complaint about trademark infringement in keyword use after it receives all required information via the Intellectual Property Complaint Form. Advertisers may not bid on keywords, or use in the content of ads, any term whose use would infringe the trademark of any third party or otherwise be unlawful or in violation of the rights of any third party.[19]

This means that our control group has a divided set of trademark policies. Theoretically, this should not matter if we think of the control as simply capturing basic changes that occurred over time in how consumers searched. However, since this does restrict clean interpretation of the coefficients, we also re-estimate our model for each set of countries with the different baseline trademark policies as a control in a robustness check.

A related concern is that Bing changed its policies at the same time, perhaps in response

[19]Today's Intellectual Property Guidelines of Bing differ slightly. They are available at `http://advertise.bingads.microsoft.com/en-us/editorial-intellectual-property-guidelines`.

to the Google change in policy. To investigate this we examined whether the number of searches on Bing that ended in the user clicking on a paid search changed over the period. We found no statistically significant difference (t=0.45, p=0.65).[20] We also saw no change in the amount of time users took to make a decision (t=1.32, p=0.1838) after searching suggesting that there were no large changes in the navigability of the Bing search engine in this period. We also checked that in the period we studied, there was no change in the nature of searches across the population which could provide alternative explanations of our results, for example because of an evolving autocorrect feature. We saw no change in the amount of words that consumers were using for their searches (t=0.82, p=0.41).

In general, the session data reveals the complexity of many searches. They often involve numerous trademark terms, can last many hours[21] and potentially cover hundreds of websites. This is exemplified by Table A-1 in Appendix B, which provides a snapshot of the start of a typical search session.

IV Empirical Analysis

IV.A Aggregate Analysis

We are interested in whether we can distill from our data any signs that consumer behavior has been affected by the policy change in the Google AdWords system. Our analysis compares the changes in browsing behavior on Google, where the policy change occurred in September 2010, to that on other search engines, where no such change occurred at that time.

Given the novelty of our data, the key challenge is to define dependent variables which

[20] We also checked with sources at Microsoft, and there was no change in advertising policies in Germany in the period we study, except for those pertaining to online gambling. See also the discussion in High Court of Justice, Interflora Inc. v. Marks & Spencer plc., [2013] EWHC 1291, para. 112 (Ch.) (Eng.), with regard to Bing's keyword advertising policy in the United Kingdom.

[21] As mentioned above, we only look at the first ten minutes of a search session in our data analysis.

adequately capture important dimensions of consumer behavior. Our major focus in our empirical analysis is a dependent variable which captures whether a consumer, after having entered her search request to the search engine, ever visits the trademark owner's website. This is recorded by an indicator variable equal to one if the searcher ever at some point visits the trademark owner's website within the 10-minute time frame of our analysis. The idea is that a searcher who is looking for a particular trademark may find it easier or harder or more desirable or less desirable, depending on the design of the search engine's advertising system, to identify and proceed to the website of the trademark owner.

While this dependent variable may not be perfect, it seems a first-order measure of trademark owners' concerns and of whether consumer behavior changed after Google's policy change in September 2010. After all, the majority of concerns expressed by trademark owners is that they will lose traffic from consumers, if consumers are redirected to other websites due to extended keyword advertising by third parties. Such concerns may be less severe given that a trademark owner may also benefit indirectly from consumers visiting a third-party website, if the consumer then buys the trademark owner's product from the third-party website. While our dependent variable does not allow us to explore such effects in detail, we are able to provide a rough quantification of the concerns expressed by trademark owners.

We do not claim to be presenting a method which fully captures whether consumers are more or less confused about the origin of an Internet ad. A full legal assessment of consumer confusion would involve an analysis of the text of the ad, the similarity between the products or services in question, and many other factors. Rather, we are presenting a method for distilling various aspects of consumer behavior from a novel fine-grained dataset which may illuminate aspects of trademarks discourse not focused on before.

We use a straightforward difference-in-difference specification. For person i using search engine k who searches for trademark j in country c at time t:

$$VisitTMSite_{ijkct} = \beta_1 TriggersAllowed_t \times Google_k + \beta_2 TriggersAllowed_t + \beta_3 Google_k + month_t + \gamma_c + \alpha_j + \epsilon_{ijk}$$

Our key variable of interest is $TriggersAllowed \times Google$ which captures the effect of the policy change on Google. *Google* captures the baseline difference in search behavior between Google and other search engines. $TriggersAllowed$ captures whether the search took place after the change of the Google keyword advertising policy. We also include an extensive series of vectors of controls, including binary indicators for each of the trademarks, countries, and months in our data. The inclusion of month-fixed effects means that our controls are collinear with the main effect of $TriggersAllowed$. Hence, we do not report the coefficient for this variable.

We estimate this specification using Ordinary Least Squares in order to facilitate interpretation of the interaction term (Ai and Norton 2003), but also later show robustness to functional form specification that takes account of the fact that this is a discrete choice.

Table 2 reports our initial results in Column (1). The key variable $TriggersAllowed \times$ *Google* is not precisely estimated. This suggests that, on average, the policy did not have a precisely measurable effect. The estimated coefficients for *Google* suggest that, relative to the control group of searches on other search engines, searches on Google appear to be consistently associated with fewer visits to the trademark owner's site and more searches and activity before a visit to the trademark owner's site even before the policy change. The estimated coefficient for *Germany* suggests that, relative to France, searches originating in Germany are less likely to lead to a trademark owner's site and also more likely to engage in multiple searches prior to a visit to a trademark owner's site. This may reflect differences with regard to national characteristics relating to the search for products.

IV.B Distinguishing Between Navigational and Non-Navigational Search

Column (1) of Table 2 suggests that there was no large measurable average effect that can be traced in our data to the change in Google's policy. One possible interpretation is that the change in policy did not affect consumer behavior. The other interpretation is that the

Table 2: Year vs. Year Comparison

	(1)	*(2)*	*(3)*	*(4)*	*(5)*
Triggers allowed × Google	0.031	-0.092***	-0.071**	-0.071**	-0.024
	(0.031)	(0.018)	(0.031)	(0.031)	(0.025)
Triggers allowed × Google × not exact match		0.147***			
		(0.034)			
Triggers allowed × Google × number words			0.028***		
			(0.009)		
Triggers allowed × Google × change words				0.028***	
				(0.009)	
Triggers allowed × Google × Levenshtein					0.003**
					(0.001)
Google	-0.094**	0.042***	-0.023	-0.023	-0.057***
	(0.047)	(0.016)	(0.026)	(0.026)	(0.021)
Germany	-0.107***	-0.055**	-0.097***	-0.097***	-0.092***
	(0.003)	(0.027)	(0.026)	(0.026)	(0.026)
Not exact match		-0.267***			
		(0.030)			
Triggers allowed × not exact match		-0.127***			
		(0.034)			
Google × not exact match		-0.170***			
		(0.030)			
Number words			-0.033***		
			(0.007)		
Triggers allowed × number words			-0.016*		
			(0.009)		
Google × number words			-0.020***		
			(0.007)		
Change words				-0.032***	
				(0.007)	
Triggers allowed × change words				-0.016*	
				(0.009)	
Google × change words				-0.020***	
				(0.007)	
Levenshtein					-0.005***
					(0.001)
Triggers allowed × Levenshtein					-0.002
					(0.001)
Google × Levenshtein					-0.002
					(0.001)
Trademark controls	Yes	Yes	Yes	Yes	Yes
Month controls	Yes	Yes	Yes	Yes	Yes
Observations	73376	73376	73376	73376	73376
R^2	0.233	0.317	0.263	0.263	0.256

NOTE: Dependent variable is whether or not the user ultimately visited the trademark owner's website. Ordinary least squares. Standard errors clustered at the trademark level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

policy had a mixture of effects on different types, which balanced each other out.

Imagine a consumer who wants to visit a trademark owner's website and simply is using the search engine to find out the correct URL. When such a consumer enters the trademarked product name into the search engine, she is looking for a website maintained or authorized by the trademark owner. For such a consumer engaging in a navigational search, allowing third-party use of trademarked keywords may make her search harder, as her attention is potentially drawn to many websites which are not maintained or authorized by the trademark owner. As a result, a keyword policy which allows third-party registrations of trademarked keywords may impede navigational search. This is the potential negative effect trademark owners are worried about.

On the other hand, imagine a consumer who is not necessarily looking to navigate to the trademark owner's website because she is perhaps at an earlier stage in her purchase decision process or who has already bought the product. At this different cognitive stage of ad processing (Barry and Howard 1990), she may react differently to a consumer just doing a navigational search. Such a non-navigational consumer may be looking for more information about product features and compatibilities; she may be looking for alternative distribution channels or post-sale independent repair and spare part services; she may be looking for competing products or for ways to finance the purchase of the product; she may use the trademark in her search request as a substitute for a generic product description; or she may not be fully certain what kind of product she eventually wants to buy. For such a consumer engaging in a non-navigational search, third-party advertising may provide additional helpful information. The sponsored link auction operated by the search engine may provide the consumer with information about the relative quality of ads sponsored by a trademark owner and his competitors (Athey and Ellison 2011).[22] By updating the

[22]Furthermore, consumers engaging in non-navigational searches may create positive externalities: Their search for competing products or related services can contribute to an increase in price competition. This may, indirectly, also benefit trademark owners.

consumer's information set, third-party ads may affect her decision about which website to visit. As a result, a consumer engaging in a non-navigational search may actually benefit from the more diverse information being presented to her if third-party use of trademarked keywords is allowed, because she may be able to find competing products or services more easily, or because it may assist her in identifying the trademark owner's product or service as her own favorite.

The effect of keyword advertising policy changes on trademark owners may therefore vary alongside these different consumer behaviors. On the one hand, trademark owners may benefit from easier navigational searches under a strict keyword policy which does not allow third-party use of trademarked keywords. On the other hand, trademark owners may lose visits from non-navigational searchers under such policy, who otherwise could be prompted to visit the trademark owner's website because of the additional informative advertising about the various external sites that offer associated products. As a result of these counteracting effects, the overall effect of a keyword advertising policy change is ambiguous.

We use various ways to distinguish between navigational and non-navigational searches in our data, in order to measure the potentially heterogeneous effect of a policy change on both kinds of searches. Given that we have to categorize 93,878 search terms in our data, we are taking advantage of various automated ways to distinguish navigational and non-navigational searches. Table 3 provides an overview of the various approaches we use in the subsequent columns of Table 2.

Table 3: Approaches to Distinguish Navigational from Non-Navigational Searches

Distinction	*Navigational*	*Non-navigational*
Exact match	iPhone	iPhone battery repair Paris
Number of words	Ibis hotel	Traveler reviews for Ibis hotel in Amsterdam
Change in number of words	Barbie → Barbie doll	Barbie → Barbie working conditions workers China
Levenshtein distance	Blackberry → Blackberry phone	Blackberry → Blackberry curve 8520 is unable to connect to internet due to wi fi

One way to distinguish navigational from non-navigational searches is to divide searches explicitly according to whether they used the trademark alone, or the trademark in conjunction with other words (Row 1 of Table 3). The idea is that this will allow identification of a navigational versus non-navigational effect because consumers who are using the search engine as a shortcut to reach a trademark owner's website are more likely to just use the trademark alone to navigate as a shortcut. Column (2) of Table 2 therefore expands our analysis to stratify the results according to whether someone searched using the precise trademark, or the trademark together with other words. The size of the effect suggests that after the policy change, there was a 9.2 percent decrease in consumers visiting the trademark owners' websites who used a search phrase that exactly matched the trademark. However, consumers who were searching using the trademark alongside other words were more likely to reach the trademark owners' websites in 14.7 percent of all browsing sessions. This is an increase of 5.5 percent in comparison to navigational searches.[23] For the entire time period we observe, 87% of navigational searches reach the trademark owner's website, while only 31% of non-navigational searches reach such website within the 10-minute time frame of our analysis. Our interpretation of these results is that we observe heterogeneity in treatment effects because the policy change had differential effects on searches that were navigational and searches that were using the trademark in a non-navigational manner.

The second approach we took involves stratifying our data by the number of words used in the keyword search. For example, 'Ibis Hotel' would qualify as two words, while a search for 'Traveler reviews for Ibis Hotel in Amsterdam' would count as seven words (Row 2 of Table 3). The basic idea underlying this stratification is that shorter searches containing fewer words are more likely to represent attempts to navigate to the trademark owner's website, whereas searches with more words are more likely to use a search term in a non-navigational

[23]These numbers indicate relative changes, compared to the average number of consumers visiting the trademark owners' websites over our entire data period.

manner.

Column (3) of Table 2 reports the results of this specification. The negative coefficient on $TriggersAllowed \times Google$ suggests that a consumer using a trademark in her search is less likely to visit the trademark owner's website if she was searching on Google after the change in Google's policy. However, the positive coefficient on $TriggersAllowed \times Google \times NumberWords$ suggests that this is moderated by the length of the string of words that was used for the search. Indeed, the relative magnitudes of the two point estimates suggest that the negative effect of the policy change was reversed for instances where the searcher used more than three words. Also of interest is the baseline negative effect of $NumberWords$. This suggests that, in general, searches that contain fewer words are less likely to lead the searcher to the trademark owner's website.

We next attempt to identify non-navigational searches by looking at cases in which searchers start their search session with a brief search, but add more contextual words to their search over time. We measure this by looking at the change in the number of words that a searcher uses during her search session. Row 3 of Table 3 provides an example. The idea is that the more the search term changes during a search session, the less likely it is that a searcher was simply using the search engine as a shortcut to reach a trademark owner's website. Instead it seems more likely she was trying to find out information which requires increasing context. As shown in Table A-2 in Appendix C, searches can often evolve from an initial use of a trademark as the user refines her search. Column (4) of Table 2 reports the results. Similar to our other specifications using other proxies for non-navigational search, the results suggest that the more a searcher changes her search term during a search session, the more likely it is that she will visit the trademark owner's website after the policy change on Google.

Finally, a more technical way to capture this idea of evolving searches is to use the Levenshtein distance to determine the distance between a searcher's baseline search term

and her other search terms in the search trail, conditional on the same trademark being present in the search string. Levenshtein distance, or edit distance, is the smallest number of edits required to make one string match a second string (Levenshtein 1966). The idea is that the larger the distance between the baseline search and the follow-up refined searches is, the more likely the searcher is engaged in a non-navigational search since she is less likely to refine her search extensively if she only wants to use the search engine as a shortcut. Row 4 of Table 3 provides an example. Column (5) of Table 2 reports the results. They are less precisely estimated, but their direction echoes our earlier findings.

Neither of the approaches to distinguish navigational from non-navigational searches works perfectly. We cannot exclude, for example, that we treat some searches as navigational although they are in fact non-navigational. An example would be a consumer who enters "iphone" into a search engine, but uses the brand as a generic shortcut for smart phone. Another example would be a search session which starts with a navigational intent, but develops into a non-navigational search over time. We should emphasize that we take the conceptual distinction between navigational and non-navigational users from the literature rather than deriving it from our data. This reduces concerns that our results are somewhat tautologous and an artefact of the interaction between the categorization and our data. Taken together, our findings provide an informative picture indicating that a large number of searches for trademarks are non-navigational, and that the effect of the policy change depends on the kind of search performed.

IV.C Robustness Checks

We followed up this analysis with various robustness checks for our finding that the Google policy change was associated with a shift in behavior towards the likelihood of visiting a

trademark owner's website. Table 4 reports the results.[24] One concern is that our results are affected by search engine switching and other selection problems. Therefore, we are interested in whether the heterogeneous treatment effects can only be observed when looking at the data in the aggregate or also when tracing individual users over time. Column (1) shows that our main result (from Column (2) of Table 2) holds when introducing user-level fixed effects which take advantage of the fact that some of the users in our data made multiple searches using different trademark terms before and after the policy change.

Another concern is whether our results are being driven by a particular set of circumstances in either Germany or France. Or, alternatively, the fact that the baseline trademark policies of Bing in each of these countries was different (see Section III), might affect or distort our results. Our analysis is reported separately for both of these countries in Columns (2) and (3). The key interaction is in the same direction in both countries, though the measured effect of the policy is higher in Germany which may reflect the different baseline policies in these two countries. In Column (4), we report results that show estimates from a logit model that reflects the binary nature of the dependent variable. Again, the results are similar to before. They are also robust when we apply the Ai–Norton correction to this logit estimate (Ai and Norton 2003).

We then turn to consider different timing assumptions in Table 5: Columns (1)-(3) of Table 5 present results where we use a finer time window than ten minutes to see whether a user reaches a trademark owner's website. In each case, we explore whether the user reaches the trademark owner's website in increasingly broad time windows. The fact that the coefficient on the main interaction effect is positive and significant when we look at just a six-second time window suggests that the measured effect captures immediate navigation to the trademark owner's website. However, the increase in size and significance of the effect

[24]We also checked whether our findings are driven by some searchers who visited a lot of websites, as indicated by the maximum values in Table 1. Our findings are robust to dropping extreme observations.

Table 4: Year vs. Year Comparison: Robustness Checks for Interactions

	Fixed Effects	*Germany*	*France*	*Logit*
	(1)	*(2)*	*(3)*	*(4)*
Triggers allowed × Google	-0.114***	-0.211**	-0.068***	-1.388***
	(0.039)	(0.083)	(0.021)	(0.375)
Triggers allowed × Google × not exact match	0.259***	0.228**	0.144***	1.659***
	(0.060)	(0.100)	(0.050)	(0.422)
Not exact match	-0.201***	-0.214*	-0.282***	-2.022***
	(0.051)	(0.121)	(0.091)	(0.430)
Triggers allowed × not exact match	-0.227***	-0.197*	-0.117**	-1.239***
	(0.059)	(0.106)	(0.050)	(0.444)
Google	0.028	0.083	0.039*	0.168
	(0.027)	(0.062)	(0.023)	(0.288)
Google × not exact match	-0.204***	-0.179*	-0.188***	-0.816**
	(0.051)	(0.099)	(0.065)	(0.336)
Trademark controls	Yes	Yes	Yes	Yes
Month controls	Yes	Yes	Yes	Yes
Observations	46355	32251	41125	73272
R^2	0.291	0.239	0.344	

NOTE: Dependent variable is whether the searcher visits the trademark owner's website. Ordinary least squares except in Column (4) where logit results are presented. Standard errors clustered at the trademark level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

when we move to a one minute window suggests that it also reflects cases where the consumer hesitates in her search.

Another dimension of the timing question is what happens after a user has visited the trademark owner's website. Column (4) of Table 5 captures this dimension. We measure whether a searcher has consulted a search engine after having visited the trademark owner's website, conditional on the trademark still being part of the search string. The idea is that a searcher who has to consult a search engine several times after visiting the trademark owner's website is more likely to be a non-navigational than a navigational searcher.[25]

Column (4) indicates that, while the chances that a navigational searcher visits the trademark owner's website have decreased after the policy change, she is – compared to her behavior before the policy change – also consulting search engines less often after having visited the trademark owner's website. One speculative interpretation of this finding would

[25]Table A-3 in Appendix C provides an example of a search session before and after visiting a trademark owner's website.

be that the level of confidence navigational searchers have in visiting the trademark owner's website could have increased after the policy change. After the change, a navigational searcher may be first distracted by more diverse information, including third-party keyword ads. Once she has filtered this information, however, she may be more confident that the trademark owner's website is actually the website she has been looking for.

We also analyze the time searchers spend on the trademark owner's website if they visit the site. Column (5) of Table 5 shows that, after the policy change, navigational searchers spend less time browsing on the trademark owner's website. However, non-navigational searchers, whose number is considerably large in our sample, spend more time on the trademark owner's website.

Table 5: Year vs. Year Comparison: Robustness Checks for Timing

	Time Window to Reach TM Site			*Alt Dep Var*	
	(1)	*(2)*	*(3)*	*(4)*	*(5)*
	<6 sec reach TM site	*<1 min reach TM site*	*<5 min reach TM site*	*Searched after TM site*	*Time on TM site*
Triggers allowed × Google	-0.089**	-0.106***	-0.085***	-0.019	-1.752*
	(0.039)	(0.039)	(0.025)	(0.012)	(0.918)
Triggers allowed × Google × not exact match	0.152**	0.166***	0.115**	0.041***	2.399*
	(0.071)	(0.058)	(0.049)	(0.012)	(1.327)
Not exact match	-0.257***	-0.247**	-0.285***	0.055**	-0.486
	(0.093)	(0.099)	(0.094)	(0.028)	(0.962)
Triggers allowed × Not exact match	-0.045	-0.156***	-0.095*	-0.039***	-2.512**
	(0.075)	(0.058)	(0.050)	(0.011)	(1.255)
Google	0.040	0.042	0.025	-0.012	0.673
	(0.048)	(0.036)	(0.025)	(0.019)	(0.907)
Google × not exact match	-0.174**	-0.190**	-0.143**	-0.056*	-0.805
	(0.077)	(0.078)	(0.071)	(0.029)	(1.074)
Trademark controls	Yes	Yes	Yes	Yes	Yes
Month controls	Yes	Yes	Yes	Yes	Yes
Observations	46355	46355	46355	20328	20328
R^2	0.341	0.378	0.356	0.027	0.025

NOTE: Dependent variable is whether the searcher visits the trademark owner's website in different time intervals in Columns (1)-(3). In Column (4), the dependent variable is a binary indicator for whether the consumer searched again after reaching the trademark owner's website. In Column (5), the dependent variable is the time spent (minutes) on the trademark owner's website. Ordinary least squares. Standard errors clustered at the trademark level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Finally, we analyze whether our findings depend on the prevalence of the trademark. One potential concern with our study is that we focus on top brands. While this ensures that we have a sufficient number of observations for each trademark in our dataset, it impedes our ability to generalize our findings to less popular trademarks. It could be, however, that the display of third-party ads has a stronger effect on less popular brands, as consumers need more information on these brands and the affiliated products. To address this concern, we rank the trademarks analyzed according to how often users search for them in our dataset. This enables us to test whether our heterogeneity finding varies with trademark popularity. Table 6 reports the results. Columns (1) and (2) of the table shows that the positive effect of non-navigational users on visits of the trademark owners' website is inversely related to the popularity of the trademark: The less popular a trademark becomes, the stronger the effect is. This finding also relates to Blake et al. (2014) whose study suggests that keyword advertising may be less effective for well-known brands. We also take advantage of the fact that the popularity of brands may differ between Germany and France, and allow the brand ranking measure to vary by country in Columns (3) and (4) of Table 6. The results confirm the findings of Columns (1) and (2).

Table 6: Year vs. Year Comparison: Breaking Results Down by Volume of Searches on a Trademark

	Low-use trademark	*High-use trademark*	*Low-use trademark (country)*	*High-use trademark (country)*
	(1)	*(2)*	*(3)*	*(4)*
Triggers allowed × Google	-0.107***	-0.093**	-0.106***	-0.098***
	(0.029)	(0.030)	(0.031)	(0.028)
Triggers allowed × not exact match × Google	0.224***	0.085	0.258***	0.057
	(0.075)	(0.058)	(0.070)	(0.058)
Not exact match	-0.263**	-0.262**	-0.228**	-0.300**
	(0.117)	(0.113)	(0.114)	(0.104)
Triggers allowed × exact match	-0.199**	-0.069	-0.240***	-0.030
	(0.078)	(0.061)	(0.071)	(0.059)
Google	-0.005	0.091**	0.001	0.080**
	(0.030)	(0.036)	(0.031)	(0.032)
Not exact match × Google	-0.176*	-0.186**	-0.219**	-0.135*
	(0.104)	(0.074)	(0.099)	(0.071)
Trademark controls	Yes	Yes	Yes	Yes
Month controls	Yes	Yes	Yes	Yes
Observations	37864	35512	37530	35846
R^2	0.296	0.322	0.311	0.311

NOTE: Dependent variable is whether the searcher visits the trademark owner's website. Ordinary least squares. Standard errors clustered at the trademark level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

V Conclusion

V.A Findings

Trademark law is rooted in the belief that the granting of property rights is necessary in order to overcome information asymmetries and other market failures in consumer markets. While trademark research has always been interested in consumers' reactions to various trademark regimes, the law usually had to resort to indirect measurements of consumer behavior. With increasing digitization and the ever-growing population of consumers on the Internet, the situation has changed significantly. Fine-grained data on consumer behavior has become available, ready for data-mining and analysis by intellectual property as well as law & economics researchers.

In the trademark context, keyword-based advertising systems are a useful application of this kind of research, as click-stream data on Internet browsing provide large amounts of fine-grained data that inform us about one of the most contentious debates in current trademark jurisprudence. In this article, we explore a novel method to measure consumer behavior in online search. We shed some light on the effect of a liberal trademark policy on browsing behavior in keyword advertising systems. More generally, we demonstrate how click-stream data can be used to empirically assess the effect of different allocations of property rights in intellectual property law.

We present arguments why a change in keyword advertising policies may have different effects on navigational versus non-navigational searches. Search engine users who search for a trademark because they are directly interested in visiting the trademark owner's website may fare better under a strict keyword advertising policy which does not allow third-party use of trademarked keywords. However, search engine users who are searching for trademarks in order to find out more about alternative distribution channels, independent repair services or competing products, or who are at a very early stage of the preference formation

process, may fare better under a liberal keyword policy, as they benefit from an increase in product information and price competition. Providing non-navigational searchers with more information from various sources may facilitate their search for competing products; or it may assist them to better focus their attention on the trademark owner's website (see Chiou and Tucker 2012). Trademark owners may benefit from easier navigational searches under a strict keyword policy. However, they may receive fewer visits from non-navigational searchers who may be more likely to seek out the trademark owner's website if exposed initially to informative advertising about the various external sites that offer associated products. As a result, the overall effect of keyword advertising policies seems ambiguous.

Our data allows us to identify the heterogeneous effect the European Google AdWords policy change in September 2010 had on browsing behavior. Our findings indicate that, while navigational searches are less likely to lead to visits to the trademark owner's website after the policy change (decreasing by 9.2 percent), non-navigational searches are more likely to lead the user to the trademark owner's website in 14.7 percent of all browsing sessions. This is an increase of 5.5 percent in comparison to navigational searches. This is particularly the case for the less pervasive trademarks in our data.

V.B Implications

This enables us to reflect on the overall relationship between trademark protection and keyword advertising. In a world in which control rights over keyword advertising are fully allocated to trademark owners, navigational searches are more likely to lead to the trademark owner's website, compared to a world in which such control rights are allocated, at least in part, to third parties. However, this increase in navigational search effectiveness is accompanied and, potentially, even counterweighted by a decrease in non-navigational searchers reaching the trademark owner's website. Also, search effectiveness may not be increased for all navigational searchers under a strict keyword advertising policy.

Consider the example where a consumer searches for "Samsung" because she wants to buy a Samsung phone. If she is exposed to third-party ads from independent distributors, clicks on one of these ads, compares the Samsung phone with competing offers and then buys the Samsung phone from the independent distributor's website, she sticks to her original plan to buy a Samsung phone while never visiting the Samsung website. Although we observe in our data that this consumer has never visited the trademark owner's website, such observation is not indicative of any confusion or diversion of attention. We find that, after the policy change, it is harder for navigational searchers to reach the trademark owner's website. The finding must be interpreted with this example in mind. Not every visit which trademark owners lose from navigational users after the policy change leads to lost profits or lost consumer attention. While we are unable to provide any detailed quantification, our findings provide an upper bound to potential negative effects of the policy change on trademark owners: They only suffer from negative consequences caused by changing browsing behavior of a sub-class of navigational users. In our data, only 20 percent of searches appear to be purely navigational. Among those 20 percent, an unknown magnitude of searches does not have negative effects on trademark owners.[26]

For trademark owners, this means that a keyword advertising policy which does not allow third-party use of trademarked keyword is not necessarily better, as trademark owners may lose traffic from non-navigational searchers and the negative effects they suffer from navigational searchers may be limited. For search engine users, the effect of a strict keyword advertising policy depends on whether the search is a navigational or non-navigational one. While a strict keyword advertising policy provides some benefits to trademark owners and some consumers, a liberal policy may benefit third party advertisers, some consumers, and,

[26]Our analysis is thereby in line with 1-800 Contacts, Inc. v. Lens.com, Inc., 722 F.3d 1229, 1244 (10th Cir. 2013), in which the U.S. Court of Appeals for the Tenth Circuit rejected an initial-interest confusion claim by noting that the empirically observed click-through rate on Google ads puts an upper bound to how often an initial-interest confusion potentially occurred.

indirectly, some trademark owners.

Our article provides data to shed some light on a tradeoff that has been under-represented in the current debate on keyword advertising. Our analysis indicates that, by focusing on consumer confusion, the trademark discussion does not fully capture the multi-faceted ways in which search engine users are using trademarks today. A close analysis of the tradeoffs resulting from the counteracting effects seems warranted. This is not only of particular importance as questions of consumer confusion are likely to be less important for non-navigational searchers, who represent a significant portion of consumers in our data. It is also timely as trademark courts on both sides of the Atlantic are willing to refrain from a mechanical application of likelihood-of-confusion tests[27] and call for proof of changes in the economic behavior of consumers.[28] Our article presents an approach how such analysis can be performed in trademark cases, thereby also extending the methodological toolbox available in trademark litigation cases.[29]

V.C Limitations

Some limitations of our study should be mentioned. First, while our data allows us to check whether a navigational searcher has found the trademark owner's website, our interpretation of non-navigational search behavior is more limited. We only identify whether a non-navigational searcher reaches the trademark owner's website or not within the 10-minute time frame of our analysis. However, we do not measure whether such a searcher finds the information she is actually looking for, since this would require stated intent data we do not

[27]Rosetta Stone Ltd. v. Google, Inc., 676 F.3d 144, 154–155 (4th Cir. 2012).

[28]Court of Justice of the EU, Intel Corp. v. CPM United Kingdom Ltd., Case C-252/07, Nov. 27, 2008, ECR 2008, I-8823, §77; Environmental Manufacturing LLP v. OHIM, Case C-383/12 P, Nov. 14, 2013, §§34–43.

[29]Compared to the ad impression, click-through, eye-tracking heat map and aggregate browsing data used by the U.S. Court of Appeals for the Tenth Circuit and the British High Court of Justice in 1-800 Contacts, Inc. v. Lens.com, Inc., 722 F.3d 1229, 1244 (10th Cir. 2013), and [2013] EWHC 1291 (Ch.) (Eng.), our data is richer in that it is real-world observational data on the individual user level which captures individual browsing behavior over time.

have access to. We also cannot observe from the data to what extent trademark owners care about visits from non-navigational searchers. This may depend on the type of product as well as the structure of a trademark owner's distribution channel and the market the trademark owner is operating in. Second, while we can identify heterogeneous effects of the policy change in our data, our ability to quantify these effects in an economic sense is more limited. Third, we believe the distinction between navigational and non-navigational search adds an important dimension to the policy debate on keyword advertising, but our article should not be understood as an attempt to provide a definite answer to the question of whether or not keyword advertising is a violation of U.S. or European trademark law. In particular, we cannot test whether consumers are confused by third-party keyword advertising. Determining likelihood of confusion is "an inherently factual issue that depends on the facts and circumstances in each case."[30] It requires an analysis of the actual ad text,[31] which we do not observe in our data. Fourth, our analysis does not differentiate between various types of trademarks or industries, to ensure that we have a sufficient number of observations in our dataset. Fifth, while we have information on the official Google AdWords policy, we do not observe to what extent trademark owners have opposed to their trademarks being used as keywords by third parties and filed complaints either before or after the policy change. Finally, we do neither observe potential licensing deals between trademark owners and third parties nor have information on how bidding behavior by advertisers evolved over time.

Nevertheless, the article presents a novel approach to empirically assess the effect of different allocations of property rights in intellectual property law. It points to a heterogeneity in the effect of the Google AdWords policy change on consumer behavior that has not yet

[30]Rosetta Stone Ltd. v. Google, Inc., 676 F.3d 144, 153 (4th Cir. 2012); see also Court of Justice of the EU, Sabèl BV v. Puma AG, Case C-251/95, Nov. 11, 1997, ECR 1997, I-6191, §22.

[31]Network Automation, Inc. v. Advanced Sys. Concepts, Inc., 638 F.3d 1137, 1154 (9th Cir. 2011); 1-800 Contacts, Inc. v. Lens.com, Inc., 722 F.34d 1229, 1245 (10th Cir. 2013); Court of Justice of the EU, Google France v. Louis Vuitton Malletier, Mar. 23, 2010, Joint Cases C-236/08 to C-238/08, ECR 2010, I-02417, §§83–84; BergSpechte Outdoor Reisen v. Günter Guni, Case C-278/08, Mar. 25, 2010, ECR 2010, I-2517, §39; Eis.de GmbH v. BBY Vertriebsgesellschaft mbH, Case C-91/09, Mar. 26, 2010, ECR 2010, I-43, §24.

received proper attention in trademark discourse. It is this heterogeneity, the resulting trade-offs and the underlying allocation of property rights on which the keyword advertising debate should focus.

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Appendix

A Complaints Procedure

After Google changed its European keyword advertising policy in September 2010, it still offers a procedure for trademark owners to complain about the use of their trademark by third parties. The requirements for such complaints were explained by Google as follows:

> Google will no longer prevent advertisers from selecting a third party's trademark as a keyword. However, in response to a complaint made under our European policy, we will do a limited investigation as to whether a keyword in combination with particular ad text is confusing as to the origin of the advertised goods and services. Under this policy, we will permit certain ads, provided that they are not confusing as described above. Some examples include, but are not limited to, the following:
>
> - ads using a trademarked term in a descriptive or generic way, such as not in reference to the term as a trademark
> - ads for competing products or services
> - ads for informational sites about a product or service corresponding to the trademark
> - ads for resale of the trademarked goods or services
> - ads for the sale of components, replacement parts, or compatible products corresponding to a trademark.

B Data Snapshot

Table A-1 provides a snapshot of the start of a typical search session. In addition to the data displayed, we also have timestamp information about when, to the second, each stage of the search took place.

C Evolution of Search Terms

Table A-2 shows the beginning of two browsing sessions from out data to demonstrate how search terms evolve during browsing sessions. Table A-3 shows an example how a search

Table A-1: Snapshot of the Data

ID	*Base*	*URL*	*Trademark*	*Exact search term*	*Paid*	*Date*
13	google.de	www.google.de/search	epson	epson v300 photo	No	02aug2010
13	google.de	www.google.de/search				02aug2010
13	google.de	www.google.de/search	epson	scanner epson	No	02aug2010
13	epson.de	www.epson.de				02aug2010
13	epson-store.de	www.epson-store.de				02aug2010
13	epson-store.de	www.epson-store.de				02aug2010
13	google.de	www.google.de/search	epson	epson v300 und v30	No	02aug2010
13	google.de	www.google.de/search	epson	epson v300 und v30	No	02aug2010
13	google.de	www.google.de/search	epson	epson v300 und v30	No	02aug2010
13	epson.de	www.typo3.epson.de/index.php				02aug2010
13	epson-ontop.de	www.epson-ontop.de				02aug2010
13	google.de	www.google.de/search	epson	epson v300 und v30	No	02aug2010
13	google.de	www.google.de/images				02aug2010
13	google.de	www.google.de/images	epson	epson v300 und v30 preis	No	02aug2010
13	google.de	www.google.de/search				02aug2010
13	google.de	www.google.de/search	epson	epson v300 und v30 preis	No	02aug2010
13	ebay.de	shop.ebay.de/i.html				02aug2010
13	google.de	www.google.de/search	espon	epson v300 und v30 preis	No	02aug2010
13	google.de	www.google.de/search	epson	epson v300 und v30 preis	No	02aug2010
13	google.de	www.google.de/search	epson	epson v300 und v30 preis	No	02aug2010
13	google.de	www.google.de/search	epson	epson v300 und v30 preis	No	02aug2010
13	ciao.de	www.ciao.de/Epson_Perfection_V30__8036656				02aug2010
13	google.de	www.google.de/search	epson	epson v300 und v30 preis	No	02aug2010
13	kioskea.net	de.kioskea.net/guide/1201766-epson-perfection-v30				02aug2010
13	google.de	www.google.de/search	epson	epson v300 und v30 preis	No	02aug2010
13	dooyoo.de	www.dooyoo.de/scanner/epson/flachbettscanner				02aug2010
13	dooyoo.de	www.doyoo.de/scanner/epson/flachbettstanner/ra				02aug2010
13	c-nw.de	www.c-nw.de/magento/catalogsearch/result/index				02aug2010

session evolves after a searcher has reached the trademark owner's website.

Table A-2: Evolution of Search Terms in a Browsing Session: Two Examples

Browsing session 1	*Browsing session 2*
blackberry curve 8520 is unable to connect to internet due to wi fi	blackberry storm 2 9520 pay as you go
blackberry hotspot browser	blackberry storm 2 vs blackberry bold 9700
blackberry curve 8520 left comfort button keyboard lock	blackberry storm 2 9550
blackberry curve 8520 purchased parts	blackberry storm 2 pay as you go
blackberry curve 8520 1and 1	cheap blackberry storm 2
blackberry internet service no connection	
blackberry curve 8520 is unable to connect to internet due to wi fi	
purchased parts blackverry curve 8520	
blackverry error message 100	
blackberry curve 8520 left comfort button keyboard lock	

D Robustness Check: A Shorter Time Window

One potential caveat with our data analysis in Table 2 is that we assume that the coefficient $TriggersAllowed \times Google$ captures only the effect of the change in trademark policy relative to the other search engines. However, we contrast behavior from right before the policy change with data a year after the policy change. While the Bing trademark policy has remained constant during this time (see Section III), there is the potential for other events to have happened – for example, a significant change in the nature of Google's search algorithm

Table A-3: Example of a Browsing Session after Visiting the Trademark Owner's Website

Start of URL	*Search term*
www.google.fr/search	sony ericsson
www.sonyericsson.com/cws/home	
www.sonyericsson.com/cws/products/accessories/overview/dcu-60	
www.google.fr/search	cable sony dcu 60
www.priceminister.com/offer/buy/47420849/Accessoire-Ericsson-Cable-Usb-Dcu-60-Sony-Ericsson-Pour-Sony-Ericsson-W810i-Cables-data.html	
www.google.fr/search	(search term did not include sony)
www.sonyericsson.com/cws/products/accessories/overview/dcu-60	
www.sonyericsson.com/cws/products/accessories/compatiblephones/dcu-60	
www.sonyericsson.com/cws/products/mobilephones/overview/hazel	
www.sonyericsson.com/cws/products/mobilephones/features/hazel	
www.sonyericsson.com/cws/products/accessories/specifications/dcu-60	
www.google.fr/search	sony ericsson dcu60
www.rueducommerce.fr/Telephonie/Accessoire-Telephone/Cable-Data/SONY-ERICSSON/5434-DCU-60-Cable-Data-SONY-ERICSSON.htm	
www.google.fr/search	sony ericsson dcu60
www.priceminister.com/offer/buy/16380272/Cable-Data-Usb-Sony-Ericsson-Dcu-60-Cables-data.html	
www.google.fr/search	sony ericsson dcu60
www.acheter-moins-cher.com/asp/produit100_rwt_p_123752.htm	
www.google.fr/search	sony ericsson dcu60
www.fnac.com/Sony-Ericsson-cable-USB-DCU-60/a1852331/w-4	
www.google.fr/search	sony ericsson dcu60
www.inmac-wstore.com/produits/sony-ericsson-dcu-60—cable-de-donnees-de-telephone-portable-4008153.aspx	
www.google.fr/search	sony ericsson dcu60
www.pixmania.com/fr/fr/292463/art/sony-ericsson/cable-usb-dcu-60.html	
www.google.fr/search	sony ericsson dcu60
www.cordonweb.com/accessoire-01SEMCAB0010-SONY_ERICSSON-K750-CABLES_DE_TRANSFERT_DATA.html	
www.google.fr/search	sony ericsson cable usb dcu 60
www.priceminister.com/offer/buy/17326560/Accessoire-Ericsson-Cable-Usb-Dcu-60-Sony-Ericsson-Pour-Sony-Ericsson-W900i-Cables-data.html	

– that could provide an alternative explanation of our results. In addition, the market share of Google is very high in European search markets, which limits the size of our control group. Therefore, as a complement to our main analysis, we take advantage of the fact we do have data on Google searches for September 2010 and use a regression discontinuity approach. As described by Ho and Rubin 2011, the idea of this approach is that, with a narrow enough window of time, there is likely to be no unrelated contemporaneous shock which could otherwise affect the results.

Similar to Busse et al. 2006, we use a narrow period of four weeks around the policy change (two weeks on either side) and repeat our analysis. We use a straight-forward single-difference specification. For person i who searches for trademark j in country c at time t:

$$VisitTMSite_{ijct} = \beta_1 TriggersAllowed_t + month_t + \gamma_c + \alpha_j + \epsilon_{ij}$$

Table A-4 reports the results for the parallel specification to Table 2. Here we find a negative effect from the policy on visits to the trademark owner's website. The subsequent columns echo our earlier analysis where we use proxies to distinguish between navigational and non-navigational searches. The results are less precisely estimated than our earlier findings, and the effect sizes are smaller. This could partially be related to advertisers

taking more time to react than the two weeks after the policy change that we analyze with the regression discontinuity approach. However, the direction of the effects echo our earlier findings.

Table A-4: Results for One-month Narrow Window

	(1)	*(2)*	*(3)*	*(4)*	*(5)*
Triggers allowed	-0.014***	-0.022***	-0.036***	-0.035***	-0.020***
	(0.003)	(0.004)	(0.007)	(0.007)	(0.005)
Triggers allowed × not exact match		0.009			
		(0.006)			
Triggers allowed × number words			0.006***		
			(0.002)		
Triggers allowed × change words				0.006***	
				(0.002)	
Triggers allowed × Levenshtein					0.000
					(0.000)
Germany	-0.074***	-0.051***	-0.073***	-0.073***	-0.064***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Not exact match		-0.438***			
		(0.005)			
Number words			-0.053***		
			(0.002)		
Change words				-0.052***	
				(0.002)	
Levenshtein					-0.007***
					(0.000)
Constant	0.436***	0.789***	0.613***	0.611***	0.535***
	(0.013)	(0.012)	(0.014)	(0.014)	(0.013)
Trademark controls	Yes	Yes	Yes	Yes	Yes
Observations	108280	108280	108280	108280	108280
R^2	0.215	0.304	0.249	0.248	0.241

NOTE: Dependent variable is whether or not the user ultimately visited the trademark owner's website. Ordinary least squares. Standard errors clustered at the trademark level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

E Trademarks Analyzed in the Study

Table A-5: Distribution of Trademark Searches in Airline Category

	France	*Germany*	*Total*
Air Berlin	22	240	262
Air France	1223	19	1242
American Airlines	26	11	37
British Airways	59	18	77
Cathay Pacific	16	4	20
Delta Airlines	16	18	34
Easyjet	666	98	764
Emirates Airlines	12	4	16
Lufthansa	85	327	412
Ryanair	610	214	824
Singapore Airlines	19	23	42
United Airlines	11	9	20
Total	2765	985	3750

Table A-6: Distribution of Trademark Searches in Auto Category

	France	*Germany*	*Total*
Audi	588	799	1387
BMW	651	962	1613
Citroen	1072	172	1244
Fiat	430	283	713
Ford	811	718	1529
Mercedes	438	684	1122
Peugeot	1524	299	1823
Renault	1605	396	2001
Toyota	493	223	716
Volkswagen	411	128	539
Total	8023	4664	12687

Table A-7: Distribution of Trademark Searches in Cell Phone Category

	France	*Germany*	*Total*
LG	1040	1254	2294
Nokia	1020	1674	2694
O2	47	1049	1096
Samsung	3442	3730	7172
TMobile	1	320	321
Total	5550	8027	13577

Table A-8: Distribution of Trademark Searches in Electronics Category

	France	*Germany*	*Total*
Blackberry	859	335	1194
Canon	1014	783	1797
Casio	148	256	404
Dell	597	320	917
Electrolux	216	49	265
Epson	437	313	750
HP	1739	1152	2891
iPhone	2667	2088	4755
iPod	657	745	1402
Lenovo	82	195	277
Microsoft	820	846	1666
Motorola	233	365	598
Nintendo	387	596	983
Playstation	167	394	561
Sony	1672	1961	3633
Wii	1236	751	1987
xBox	630	778	1408
Total	13561	11927	25488

Table A-9: Distribution of Trademark Searches in Fashion Category

	France	*Germany*	*Total*
Adidas	444	638	1082
Chanel	215	109	324
Esprit	524	379	903
Gillette	45	36	81
Hermes	170	792	962
Hugo Boss	62	92	154
Nike	526	499	1025
Omega	94	110	204
Oreal	39	6	45
Ralph Lauren	90	55	145
Reebok	108	48	156
Revlon	20	11	31
Total	2337	2775	5112

Table A-10: Distribution of Trademark Searches in Hotel Category

	France	*Germany*	*Total*
Best Western	176	130	306
Hilton	151	115	266
Holiday Inn	59	73	132
Ibis	505	102	607
Novotel	219	48	267
Total	1110	468	1578

Table A-11: Distribution of Trademark Searches in Online Category

	France	*Germany*	*Total*
CNN	39	24	63
ESPN	32	13	45
Expedia	165	114	279
Lastminute	179	103	282
MSN	2225	821	3046
Opodo	330	85	415
Orbitz	1	1	2
Reuters	32	9	41
Yahoo	2473	743	3216
Total	5476	1913	7389

Table A-12: Distribution of Trademark Searches in Toys and Gifts Category

	France	*Germany*	*Total*
Barbie	343	182	525
Disney	1006	281	1287
Interflora	91	32	123
Lego	527	757	1284
Playmobil	336	240	576
Total	2303	1492	3795