Online Pornography Seeking Behaviors

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Abstract

Given the prevalence of online pornography and the ease with which this content can be accessed using internet search engines, it is important to understand different ways to measure online pornography seeking behaviors. Research that has used self-report data to analyze online pornography searches and behavior is discussed and the limitations of this methodology are outlined. An alternative approach, which samples a portion of Google web searches in order to determine how many searches for specific keywords have been conducted in a given time period, is then presented as a useful method for assessing this behavior. Using this method, the changes in pornographic keyword searches across the last eight years are discussed along with how pornographic searches change across a given week. Finally, research is presented in order to demonstrate how this methodology can be used to examine various psychological and social theories.

Introduction

Pornography is available via a variety of media, including books, magazines, film, and video. Currently, one of the most prevalent means of distributing pornography is the internet. In 2006, the revenues from online pornography were nearly $5 billion

(Ropelato, 2006). By simply typing a few keywords into a search engine (e.g., Google), it is extremely easy to search for pornography on the internet. It is so easy that it has been speculated that every second, 372 individuals are typing pornographic keywords into a search engine. Altogether, it is estimated that up to 25% of all internet search engine requests are for pornography (Ropelato, 2006).

Approximately 13% of the US population regularly views internet pornography and the majority of these individuals (75%) are men (Ropelato, 2006).   Theorists and researchers suggest that this interest in pornography can be attributed to men's evolved interest in sexual variety and multiple partners (c.f., Mosher, 1988; Malamuth, 1996). As noted by Symons (1979), men tend to fantasize about a place where, "sex is sheer lust and physical gratification, devoid of more tender feelings and encumbering relationships, in which women are always aroused, or at least easily arousable, and ultimately are always willing" (p. 171). In other words, men may have evolved a desire to have sex with multiple women who are uninterested in commitment. Online pornography provides men with a multitude of physically attractive "virtual" partners, which help provide physical gratification without commitment (Malamuth, 1996).

Given the expansion in internet pornography as a business and the vast number of individuals who engage in internet pornography use, it is important for researchers to understand different ways to assess this behavior. Past research examining traditional media pornography consumption (e.g., pornographic magazines, movies, etc.) has relied almost exclusively on self-report assessments. Unfortunately, assessing changes in pornography consumption across time using these self-reports has proven difficult. Data presented by the Attorney General's Commission on Pornography, which

combined survey data from 1970 and 1985 on pornography consumption, found that in 1970 20% of individuals indicated they read a pornographic magazine whereas in 1985 this number increased to 67% (U.S. Department of Justice, 1986). However, in 1970 15% reported seeing a pornographic movie whereas in 1985 this dropped to 7%. Although such results are interesting, the exact meaning of them is somewhat unclear. First, not only did these studies utilize samples which were drawing from different populations, but these studies also worded the questions about pornography consumption differently (Brown & Bryant, 1989; Smith, 1987). For example, in 1970 participants were asked about the purchase of sexually explicit magazines in the "past year" whereas in 1985 they were asked if a purchase for such material had "ever" occurred. It would be much more informative if researchers were able to examine changes in pornography consumption across time using a standard methodology.

Even when online pornography consumption is examined, researchers still frequently relay on self-reports. In these studies, researchers simply ask participants how much they utilize online pornography (e.g., "In the past three months, how many times have you visited computer porn internet sites?"; c.f., Twohig, Crosby, & Cox, 2009; Grubbs, et al., 2010).   Results from such research suggest a wide range of negative outcomes for individuals who frequently view online pornography, including depression, isolation and damaged relationships (c.f., Schneider, 2000; Twohig, Crosby, & Cox, 2009).

Although research using self-report assessments of online pornography use and searching behaviors has provided important insight into the psychology of online pornography, it is methodologically limited. Self-reports are susceptible to self-

enhancement and self-deception errors (John & Robins, 1993). When relations are found between self-report measures of pornography and other self-report variables (e.g., depression) it is difficult to untangle whether this effect is due to a sustentative relationship or some variety of method variance (Funder, 1999). Most importantly, self-report data is limited because, in the end, researchers are not interested in predicting merely what a person says he or she does; researchers are interested in understanding what people actually do.

Instead of asking individuals about their online pornography behaviors, researchers have also examined the keyword searches individuals use to find pornography.   Keywords are the words individuals enter into various search engines in order to find something online. For example, a person might type in the word "porn" or "sex" into the Google search engine when attempting to find pornography. Given the multitude of keyword searches for pornography (Ropelato, 2006), such a method provides researchers with an extremely large data set they can utilize to examine various hypotheses. One useful resource for researchers interested in examining online pornography key word searchers (or any keyword search) is Google Trends.

Google Trends and Online Searches

Although it is not possible to know exactly who is typing a specific keyword into a search engine, Google Trends supplies weekly and daily reports on the volume of queries related to various topics. Through recording user's IP addresses, Google Trends provides a "snap shot" of what is on the public's mind in a particular geographic area at different points in time (Google, 2009). Google Trends supplies this information by sampling a portion of Google web searches to determine how many searches for

specific keywords have been conducted in a given time period (daily, weekly, monthly) relative to the average number of searches on Google for those keywords over a given time period. Although Google Trends does not supply the raw number of searches that occurred, the information it provides allows for the computation of a Relative Search Volume Index (RSVI). This value represents the percent increase of searches for a set of keywords relative to the norm (Google, 2009; Markey & Markey, 2010; 2011). The interpretation of a RSVI is fairly straightforward. A RSVI score of 0% indicates the search volume for a given keyword was equivalent to the norm in a given time period. A RSVI score of 2% indicates that the search volume for a given keyword was 2% higher than the norm, and a RSVI score of -2% indicates the search volume for a keyword was 2% lower than the norm in a given time period.

Such changes in RSVIs provide insight into what is on a particular geographic areas' collective mind at any given moment. For example, every year a multitude of individuals make New Year's resolutions to lose weight or go on a diet (Dingfelder, 2004). Consistent with this notion, Figure 1 displays the monthly RSVI for the keyword "diet" since 2009 for individuals located in the United States. As can be seen in this figure, in January there is a predictable 20% increase in searches for this keyword.
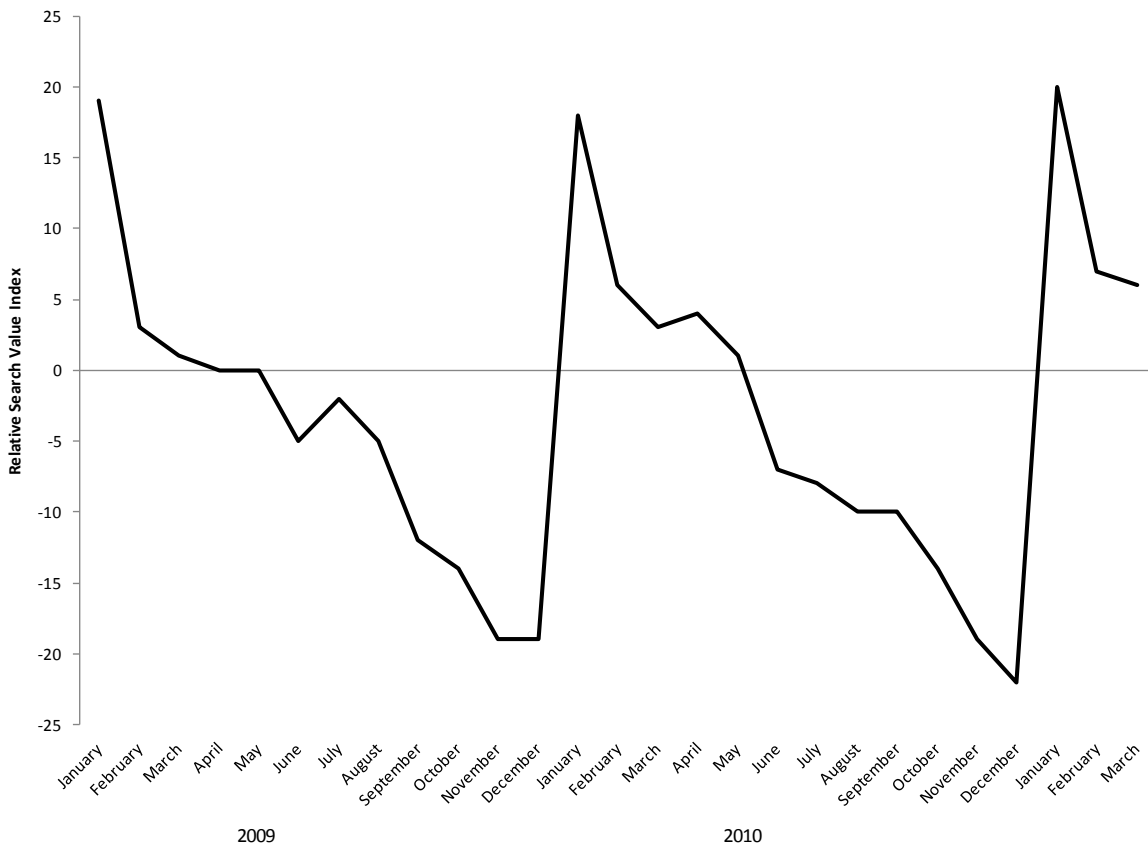
Figure 1. "Diet" keyword searches between 2009 and 2011.

Perhaps equally as interesting (or distressing), there is a drastic decrease in this

keyword search from this time point until the next year begins, starting the cycle all over

again. In a similar manner, Figure 2 displays the RSVIs for the keywords "earthquake"

and "nuclear" from March 9th to March 15th, 2011 for individuals located in the United

States. After a 9.0 magnitude earthquake struck Japan on March 11th, there was an

800% increase in the search for the term "earthquake." Additionally, starting on March

12th, as concerns over nuclear reactors in Japan started to mount, there was a 400%

linear increase in the search term "nuclear." These examples clearly demonstrate how

a RSVI can be used to provide insight into what is on the public's mind in a particular geographic area at different points in time.
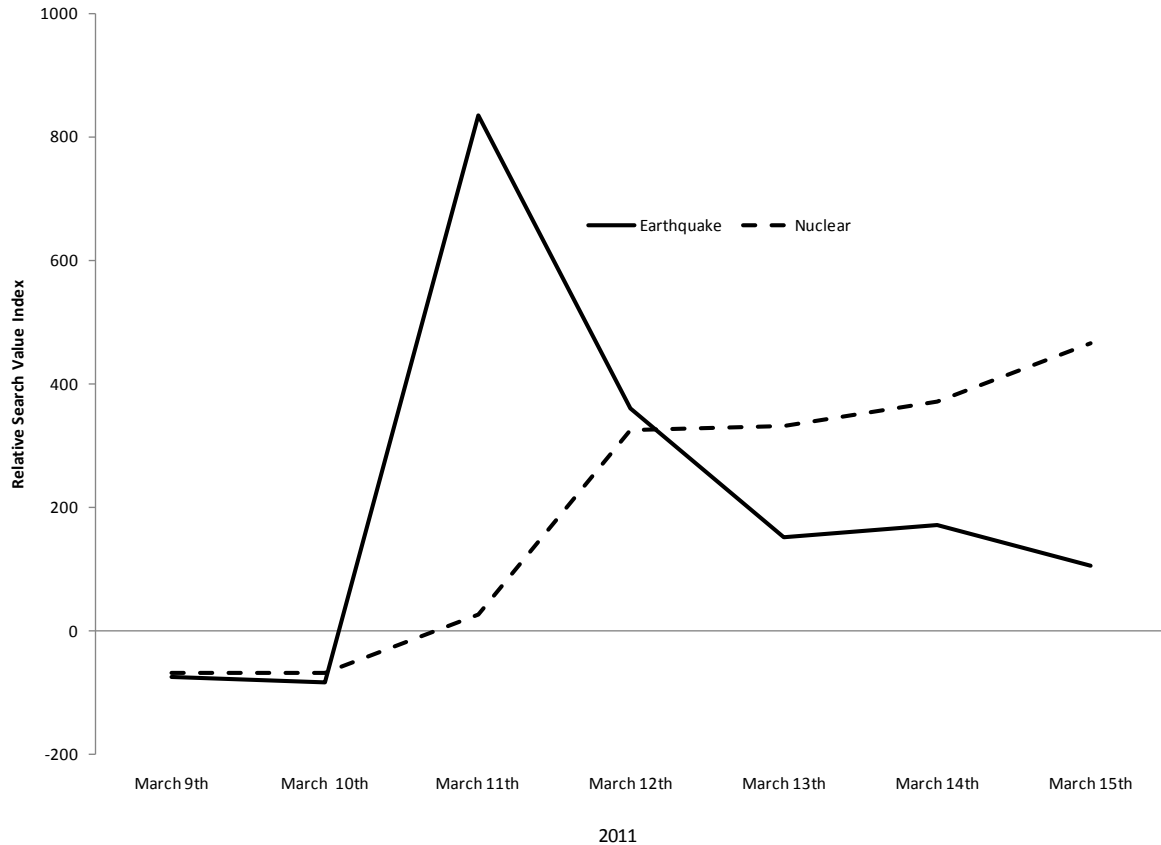

Figure 2. "Earthquake" and "Nuclear" keyword searches before and after a 9.0 magnitude earthquake struck Japan on March 11, 2011.

Google Trends and Pornography Searches

Just as it is possible to examine changes in online searches for the keywords "dieting" and "earthquake" using Google Trends, it is also possible to use this methodology to examine online pornography seeking behaviors without relying on self-report information. In addition to providing the RSVIs of single keywords, Google Trends also allows users to examine the RSVI of multiple keywords. In other words,

when examining the RSVI of pornography searches, researchers can examine the RSVI of individuals using the keywords "porn," "xvideos," or "xxx."   Such an analysis is typically preferable to a single keyword search because it provides greater breadth and generalizability to various words that might be used to seek out pornography online.

In order to determine which keywords individuals tend to use to find pornography, Markey and Markey (2010; 2011) employed the internet service WordTracker. By compiling data from millions of searches each week, WordTracker is able to identify the top keywords individuals tend to use to find pornography (WordTracker, 2009). This is done by first providing WordTracker with a seed word relevant to pornography. For example, the word "porn" can be used. WordTracker then searches the top 100 websites that rank highest on search engines for the term "porn" and extracts additional keywords utilized by these sites. From this analysis, the 10 most frequently occurring, non-domain specific, pornography keywords (e.g., "xvideos," "porn," "xxx," etc.) were selected.

Using this information, Figure 3 displays the weekly RSVI for the set of pornographic keywords from January 2004 (the earliest data available from Google Trends) until March 2011. As seen in this figure, there has been a general increase in the use of Google to search for pornographic keywords across this time period (r = .92).
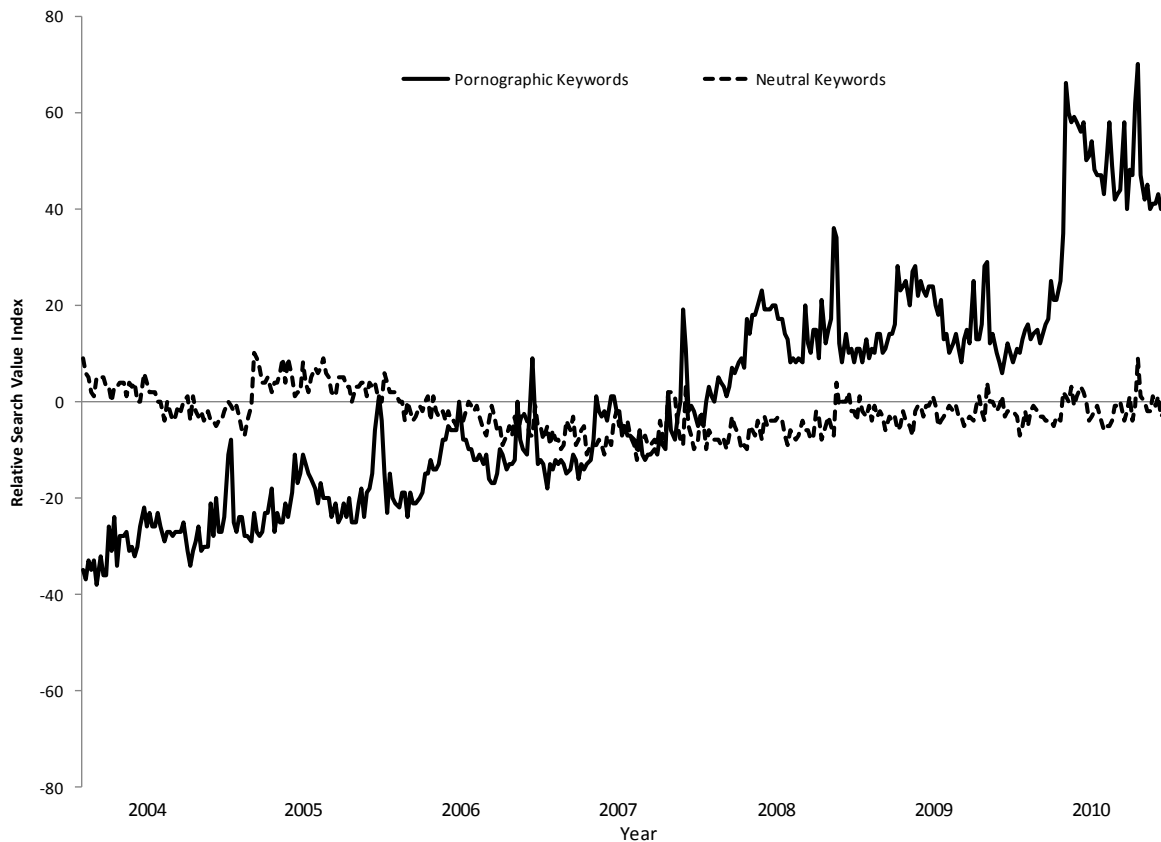
Figure 3. Pornographic and neutral keyword searches from 2004 to 2011.

Although this result suggests individuals are searching for pornography more frequently

today than in the past, it is unclear if this trend is unique for pornographic keywords or if

it simply reflects a general increase in individuals use of Google to search for any

keyword since 2004. In order to examine this possibility a 10 item set of "neutral"

keywords was created. These keywords were selected by randomly selecting 10

keywords from a list of the 200 most frequently searched keywords which were non-

domain specific and not related to pornography (e.g., dog, recipe, etc.). Figure 3

visually demonstrates that the linear increase in pornography searching did not occur

for the neutral keywords (r = -.28). Such results suggest that over time, pornography

keyword searches have increased at a greater rate than the rate observed in neutral keyword searches.

Google Trends can also be employed for examining observed changes in pornography seeking behaviors for each day of the week. By computing the RSVI value of pornography and neutral keywords each day during the past year (2010), it is possible to compute the mean RSVI value for each day of the week. As shown in Figure 4, pornography seeking behavior significantly increased during the weekend (a 20% increase). Additionally, the null result for the control words suggests that this finding does not simply reflect an increase in web searches during this time period.
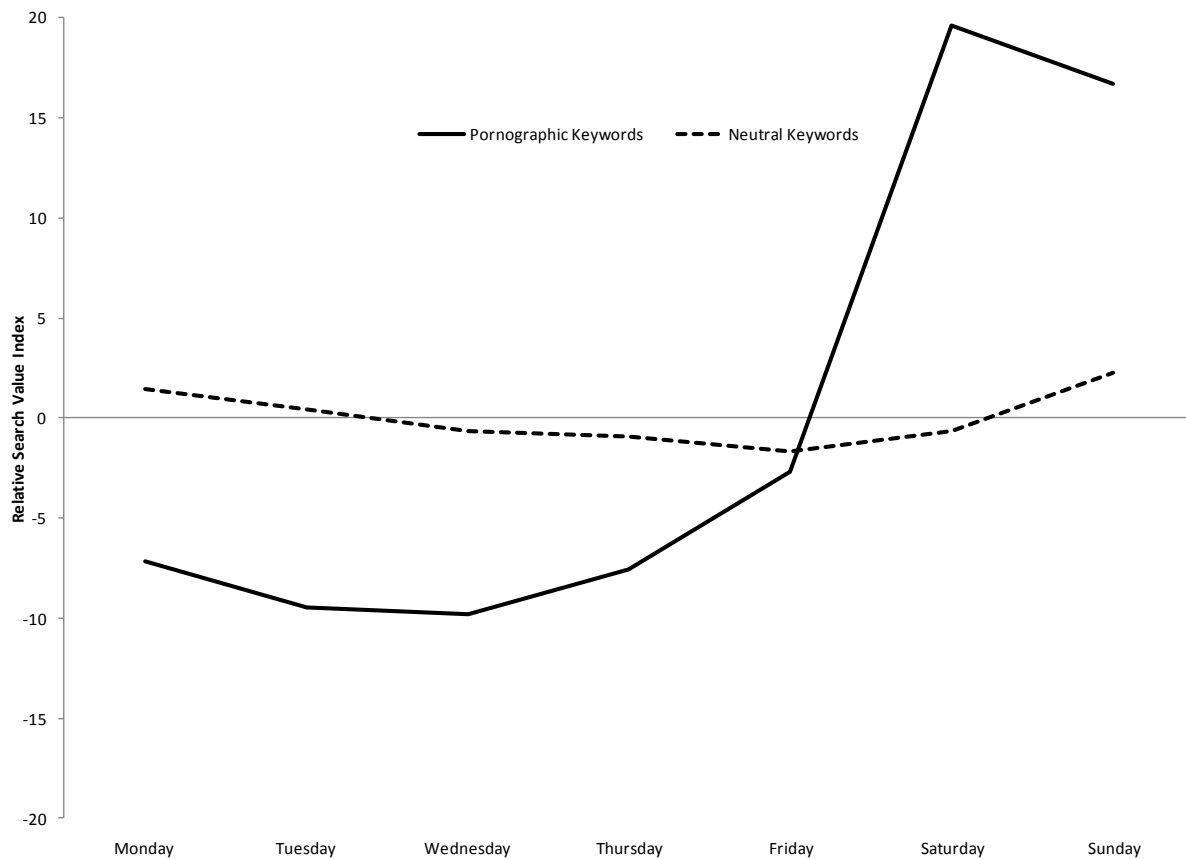

Figure 4. Mean pornographic and neutral keyword searches for each day of the week during 2010.

 Most likely this result occurs simply because individuals have more free time on Saturday and Sunday than during week days to engage in this activity. Although such descriptive information is interesting, the real value of using Google Trends lies in the enormous wealth of data it provides, which can be used to examine various scientific theories and hypotheses. In the next section one such example is discussed.

Example Study: The Challenge Hypothesis and Online Pornography

The Challenge Hypothesis predicts that testosterone levels rise during competition (Wingfield, Hegner, Dufty, & Ball, 1990). Interestingly, individuals do not even have to be directly involved in a competition for their testosterone levels to be affected; spectators can experience similar changes in testosterone levels. Past research has found that fans watching their favorite soccer or basketball teams tend to have higher levels of testosterone if their team wins the competition than if their team loses the competition (Bernhard, et al., 1998). More recently, Stanton and colleagues (2009) found that following the 2008 United States presidential election, men who voted for the winning candidate (Barack Obama) had higher testosterone levels after the election than men who voted for a losing candidate. Given the links between vicariously winning a competition and increases in testosterone (Bernhard, et al., 1998; Stanton, et al., 2009) and testosterone and sexual behaviors (Archer, 2006; van Anders & Watson, 2006), it seems likely that individuals who vicariously win a competition will express more interest in sexual behavior and therefore seek out pornography more than men who lose a competition.

In order to examine this prediction derived from the Challenge Hypothesis,

Markey and Markey (2010; 2011) conducted a series of studies to investigate whether or not this predicted pattern of pornography seeking behaviors occurred in response to political elections (e.g., both presidential and midterm elections). Specifically, it was expected that the week after the 2006 and 2008 elections, when democrats had a clear victory, searches for pornography in Blue states (Democratic voting states) would produce higher RSVIs than searches in Red states (Republican voting states). Conversely, after the 2004 and 2010 elections, when Republicans had a clear victory, RSVIs for pornography would be greater in Red states than Blue states. Specific details about these studies, methodology, and statistical analyses can be found in Markey and Markey (2010; 2011).

Figure 5 displays the RSVI difference value (i.e., the mean Blue State RSVI minus the mean Red State RSVI) for the week after the election, including the Election Day itself, for the 2004 and 2008 presidential elections and the 2006 and 2010 midterm elections. Therefore, a positive RSVI difference value indicates Blue States had relatively high RSVIs for pornography, a negative value indicates Red States had high RSVIs, and a zero indicates Red and Blue states RSVIs for pornography were equivalent. Consistent with predictions derived from the Challenge hypothesis, the RSVI for pornography was greater in Blue States than Red States following the 2006 and 2008 elections (Democratic victories), while this pattern reversed following the 2004 and 2010 elections (Republican victories). To make sure that this pattern was not a result of simply more internet activity in the "winning" states, a subsequent analysis found no difference in neutral word RSVIs between Red and Blue states after the elections (see Figure 5).
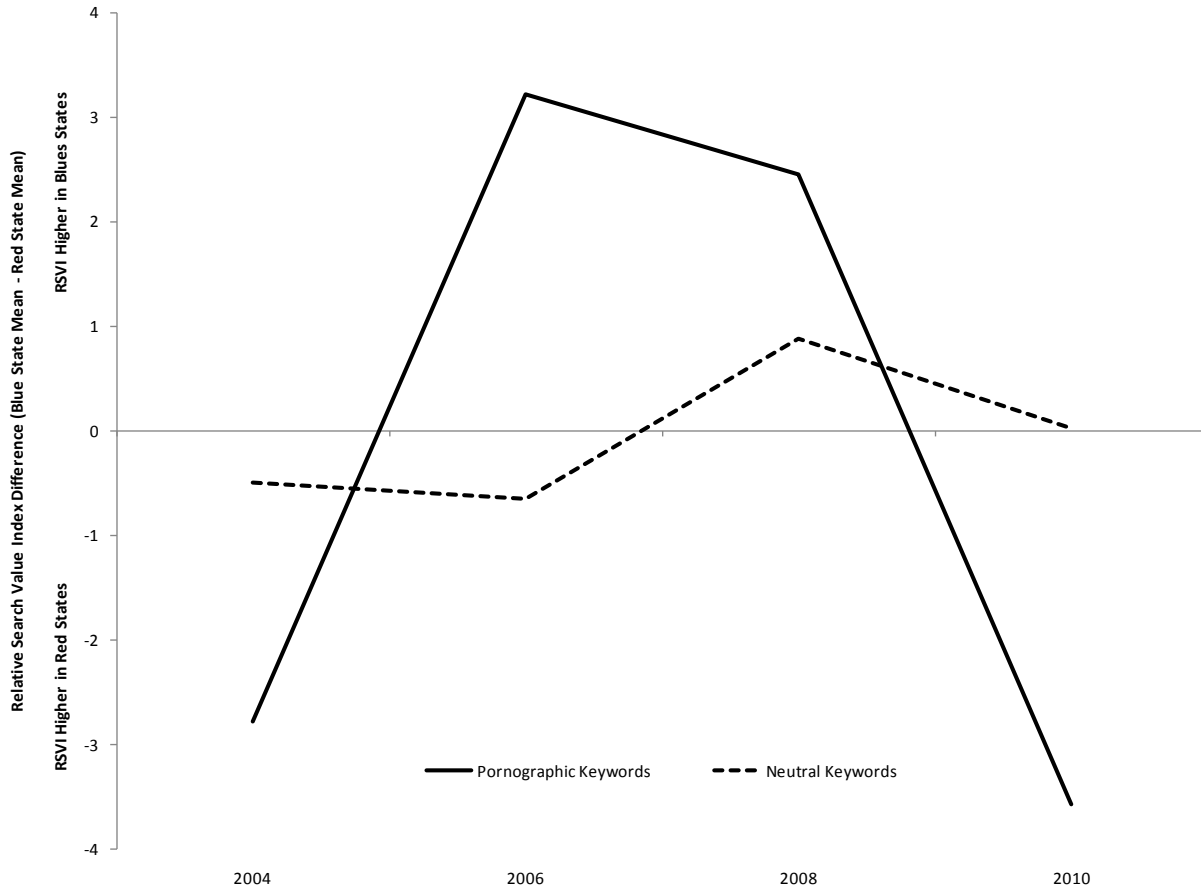
Figure 5. Relative search value differences between Red and Blue States for pornographic and neutral keywords after the 2004, 2006, 2008, and 2010 political elections.

It is important to note that the actual RSVI differences between Red and Blue states for each election cycle, although significant, were small (-2.79%, 3.22%, 2.45%, and -3.58%, respectively). Although such differences are nowhere near the massive 800% change following the Japanese earthquake in March, 2011, given the large number of daily searches for pornography, (Ropelato, 2006) these minor differences likely represent thousands, if not millions of actual internet searches for pornography. Such a finding reminds us that while we often like to believe that our sexual desires are

consciously determined, complex interactions likely occur between the events in our day-to-day lives and our hormones that encourage or discourage the likelihood of engaging in sexual behaviors with another person or in the virtual world provided by the internet. Taken together, these studies provide a useful example of how online pornography searches can be used to examine various theories and hypotheses that have traditionally been examined in a laboratory setting or via self report.

Conclusions and Future Research Directions

There are three major advantages of using Google trends to examine changes in online pornography searches. First, it avoids many of the issues and limitations associated with the use of self-report data (John & Robins, 1993; Funder, 1999). Second, it provides an extremely large database derived from millions of searches using the most popular search engine (Google) which can be examined at different time points and different geographic locations. Finally, it is free. All of the data collected by Google and accessed via Google Trends is freely available for educational and research purposes (Google, 2009).

Of course, there are important limitations to be kept in mind when using Google Trends to examine pornography searches. Other than an individual geographic location, Google Trends does not supply specific information regarding the individual who searched for a given keyword. Additionally, because the data supplied are only available at the aggregate level, some caution is warranted when using this data to predict the behavior of individuals (c.f., Simpson's paradox; Wagner, 1982). Additionally, although the RSVI allows for examination of the relative change in online searches, Google does not supply the raw number of times a term was searched for in

a given time period. Finally, examining keyword RSVIs across cultures and time needs to be done with some caution as changing cultural and societal issues (Attwood, 2002) are likely related to the types of keywords individuals use to find certain subjects.

Given the prevalence of internet use, Google Trends allows for a large scale sampling of various topics that people might be thinking about and interested in examining. Researchers at Google Labs have used this methodology to track interest in H1N1 (i.e., the "swine flu") keywords in order to predict potential locations where there might be a flu outbreak (Google, 2010). Recent research has even found a link between the keywords "suicide" and "depression" suggesting such internet search activity could be used to predict self-injury and suicide attempts (McCarthy, 2009). In a similar manner, this chapter demonstrates how researchers can use this methodology to examine online pornography searching behaviors. Future researchers utilizing this method will soon realize that Google Trends provides a quick and inexpensive means of examining extremely large samples of data collected since 2004.

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