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# Cross-cultural Analysis of the Attention Hijacking Effect: Empirical Evidence from Google Search Data

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## Abstract

In this empirical investigation, we delve into the phenomenon known as the "Attention Hijacking Effect" (AHE). Utilizing Google's annual search index data spanning from 2006 to 2022, we have amassed a comprehensive dataset from four countries: the United States, Japan, the United Kingdom, and France. This dataset, comprising 1089 entries, each correlating with annual news events as listed on Wikipedia, provides an expansive perspective on the shifting attention towards specific news terminologies over time.

We employed linear regression analysis to explore the relationship between the familiarity with news-related terms and the duration of attention these terms command. Our findings indicate a significant positive correlation across all four countries, statistically significant at the 0.01 level. However, the variance explained (R-squared values) is relatively low, suggesting the potential existence of other influential factors not considered in this study that significantly impact the duration of attention.

These findings underscore the complexity of attention dynamics and the necessity for continued scholarly exploration in this field. We anticipate that these insights will render our readers more informed and enhance their understanding of the AHE theory.

## Introduction

Attention, a cornerstone in our understanding of human cognition, is recognized as a finite resource within cognitive psychology (Kahneman, 1973). This paper introduces a new theoretical construct—the Attention Hijacking Effect (AHE), which proposes that individual attention is predominantly devoted to personal affairs in the face of a wide spectrum of information (Yang, 2023). These personal matters, due to their direct bearing on one's daily life, can command sustained attention, in stark contrast to the fleeting attention paid to societal issues and news, which are often perceived as peripheral to personal life (Widianingsih et al., 2023).

Our endeavor to provide empirical evidence for the AHE theory is predicated upon a large dataset from the Google Web Search Index, spanning from 2006 to 2022 and

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encapsulating four diverse nations: the United States, Japan, the United Kingdom, and France. We postulate that the enduring attention to familiar news-related terminology, as mirrored in Google's search data, is a cross-cultural phenomenon (Lu et al., 2022).

While the AHE theory aligns with existing attention models, including Broadbent's (2013) Filter Model of Attention and Lang's (2000) Limited Capacity Model of Motivated Mediated Message Processing, it posits a unique emphasis. The AHE theory specifically underlines the transitory attention dedicated to societal issues and news, an aspect not explicitly addressed by its predecessors (Han et al., 2022). However, our theoretical exposition could be strengthened by a more comprehensive comparison and integration with these established attention theories, thereby providing a more robust theoretical context.

Our study acknowledges the potential limitations inherent in our methodology. Cultural variances in news consumption and information processing, as well as potential biases in Google's search index data, merit careful consideration (Levy et al., 2017). The duration of attention dedicated to news-related terms could be substantially impacted by these cultural differences (Boughton, 2023). Furthermore, the use of search index data as a surrogate for attention allocation may be influenced by external factors, such as modifications in search engine algorithms or shifts in internet usage patterns (Choi & Varian, 2012).

Given these considerations, our research advances two hypotheses.

**Hypothesis 1 (H1):** There is a positive correlation between the familiarity of news-related terms in daily life and the duration of attention these terms can sustain. Here, "familiarity of news-related terms" is operationalized as the frequency of Google searches related to these terms on an annual basis (Roetzel, 2019). This operationalization, while practical, may not encompass the entire spectrum of how familiarity with news terminology is experienced in daily life.

**Hypothesis 2 (H2):** The relationship between the familiarity of news-related terms and the duration of attention towards these terms is a universal phenomenon, not confined by cultural boundaries (Hamborg et al., 2019). The "duration of attention" is measured using the duration that these terms persist in the Google Search Index, which, while providing a quantifiable measurement, may not entirely reflect the true attention span individuals allocate to these terms (Viola & Voto, 2023).

These hypotheses bear significant implications for the study of attention allocation, especially in the context of news consumption. However, it should be noted that the validity of these hypotheses is contingent upon the adequacy of the operational definitions and measurements of the key variables. Future research might explore alternative methods to measure these variables in order to provide a more nuanced understanding of the Attention Hijacking Effect.

In sum, this paper aims to contribute to the scholarly dialogue on attention allocation and information processing. By empirically analyzing the AHE theory, we hope to shed light on the dynamic interplay between news consumption and attention duration in a society overwhelmed with information (Roetzel, 2019).

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# Methods

Ethical considerations for this research were approved by the researchers' affiliated institution, and all procedures were conducted in compliance with applicable guidelines and regulations. No human participants were directly involved in this study, which relied on publicly available data, ensuring the research does not involve non-human animals or clinical trials.

The study undertook a thorough cross-cultural empirical investigation by leveraging Google Web Search Index data ranging from 2006 to 2022, collected from four countries: the United States, Japan, the United Kingdom, and France. The research aimed to analyze the relationship between the level of familiarity with news terms in everyday life and the duration of attention devoted to the news in these terms. This analysis offers a comprehensive understanding of the Attention Hijacking Effect (AHE), a theory first introduced in this study.

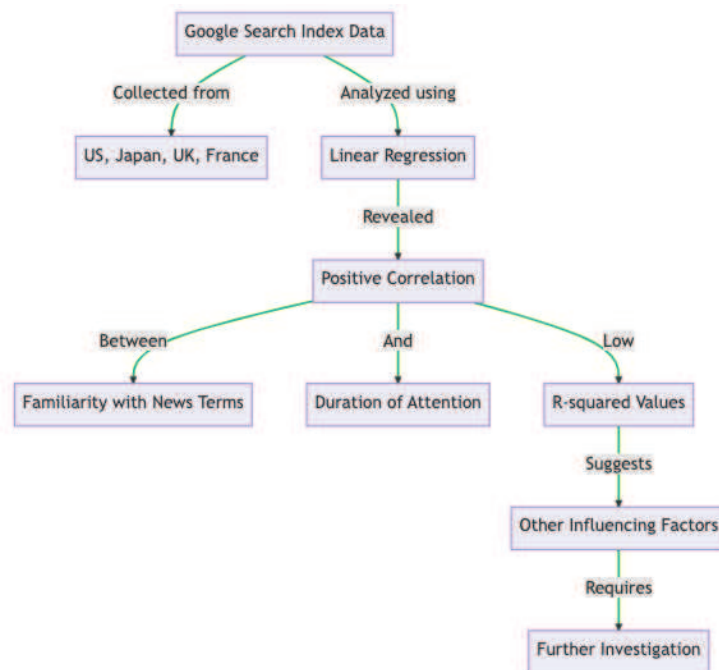
The study followed a mixed design approach, integrating elements from both within-subjects and between-subjects designs. This allowed for a comparative analysis of the same terms across various cultural contexts (within-subjects), along with a comparison of different terms within each specific culture (between-subjects). This design doesn't involve randomization or blinding, given the nature of the study as a retrospective examination of publicly available data.

The dataset included a total of 1089 data entries, comprising annual news events and corresponding terms from Wikipedia for the four countries in question. The selection of news terms was systematic, focusing on those with a suddenness index within the range of 70-99. This range was selected to avoid terms that might generate high levels of daily attention, potentially biasing the study's results. For each term, the annual average search index was calculated. The suddenness index was determined by subtracting the annual average search index from the peak search index at the time of the corresponding trending news event. The duration of attention was measured from the date of the news event until one day before the Google Search Index dropped below average.

The statistical approach employed linear regression analysis to explore the correlation between the annual average Google search index, representing regular familiarity with news terms, and the duration of attention.

The analysis using linear regression allowed for an evaluation of the relationship between Google's annual average search index and the duration of attention. Examining the coefficients and R-squared values offered insights into the direction and magnitude of the relationship, and the variance in the annual average Google search scores that could be accounted for by the duration of attention.

In synthesizing the AHE theory with other existing theories with similar premises, this research has critically evaluated the similarities and differences, providing a comprehensive understanding of the topic. Using the Google Search Index data as a benchmark, this study offers an empirical foundation for AHE theory. However, the potential impact of cultural factors on attention duration and limitations of Google's search index data are recognized and discussed, offering avenues for further research and refinement of the theory.



## Results

The study of the Attention Hijacking Effect (AHE) made use of a comprehensive dataset spanning from 2006 to 2022, gathered from Google's yearly search index across four countries: the United States, Japan, the United Kingdom, and France. This dataset, consisting of 1089 entries, was supplemented with annual news events extracted from Wikipedia, offering a broad perspective on the shift in attention towards specific news terms over time.

The annual average Google search index served as a surrogate for the familiarity with news-related terms in daily life, while the attention duration was operationalized as the time from when a news event first occurred until the day before the Google Search Index fell below the average. Linear regression analysis was employed to probe the relationship between these two variables.

The analysis revealed a statistically significant positive correlation between the familiarity with news-related terms and the duration of attention in all four countries, significant at the 0.01 level. However, the explained variance (R-squared values) was relatively low. Attention duration accounted for approximately 6.2% of the variation in the annual average Google search scores in the United Kingdom (n=299), 5.0% in the United States (n=306), 6.4% in Japan (n=274), and 7.8% in France (n=210). In the combined dataset from all four countries (n=1089), the duration of attention accounted for about 4.3% of the variance.

In terms of the suddenness index, the data revealed that for news items holding attention for at least 20 days, 38% had a suddenness index of 90 or higher, while 61% had a suddenness index of 70-89. For those holding attention for at least 30 days, 36% had a suddenness index of 90 or above, and 64% had a suddenness index of 70-89. The maximum

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attention duration was found to be 89 days, with no news items gaining attention beyond 90 days.

These results provide empirical support for the AHE theory, indicating a positive correlation between the familiarity of news terms in daily life and the duration of attention these terms can command. However, the relatively low R-squared values suggest that other factors not considered in this study might significantly influence the attention duration. This calls for a more nuanced interpretation of the results and further investigation into the potential factors influencing attention duration beyond the scope of this study. This finding underscores the complexity of attention dynamics and the need for continued scholarly exploration in this area.

## The Low Explained variance

The low explained variance in the regression models of the study on the Attention Hijacking Effect (AHE) theory can be argued by the following:

Firstly, human attention is a multifaceted cognitive process influenced by numerous factors beyond the familiarity of news-related terms. Elements such as emotional impact, social media influence, individual cognitive differences, and even the time of day can significantly sway attention, making it a complex phenomenon to model accurately with a single variable (Posner, 2012).

Secondly, the study relied on Google Web Search Index data, which, while extensive, does not encapsulate all facets of human attention. People access news from a plethora of sources, including social media, television, radio, and print media, which are not fully represented in the Google data, potentially contributing to the lower explained variance (Brabazon, 2006).

Thirdly, the study spanned four different countries, each with unique cultural contexts that can significantly influence attention patterns. The model might not have fully captured these cultural nuances, leading to a lower explained variance (Hofstede, 2001).

Fourthly, real-world data, like the Google Web Search Index data used in this study, often contains inherent noise from various sources such as random fluctuations in internet usage, changes in Google's search algorithms, or large-scale events like holidays or natural disasters. This noise can obscure underlying patterns in the data, leading to a lower explained variance (Provost & Fawcett, 2013).

Lastly, the study's focus on news terms with a suddenness index within the range of 70-99 might have excluded some important terms that could have explained a larger portion of the variance. The selection of a specific range of values to avoid bias is a common practice in research methodology.

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# The Transience of Public Attention to News Events: Insights from the Attention Hijacking Effect

Understanding the fleeting nature of public attention towards news events, regardless of their magnitude or impact, presents a critical challenge in the current information landscape. The Attention Hijacking Effect (AHE) theory, introduced in this study, offers a potentially illuminating perspective on this issue.

The AHE proposes that the attention given to societal affairs and news events is often short-lived, primarily due to their tangential relevance to individuals' daily routines. This notion resonates with the concept of attention as a limited cognitive resource (Kahneman, 1973), which suggests that people naturally focus on issues of personal significance, often diverting their attention away from matters that hold less immediate pertinence to their lives.

The ephemeral nature of public attention towards news events, as postulated by the AHE, underlines the inherent difficulty in maintaining public engagement with major societal issues. Even when faced with significant events, the public's focus tends to dissipate relatively swiftly unless these events directly impact their personal lives.

The AHE might offer insights into tactics for sustaining public attention towards important news events. By framing news stories to be more personally relevant, it could be possible to lengthen the duration of public attention to these matters. However, further investigations are warranted to explore this possibility in depth and to identify effective strategies to enhance the personal relevance of news stories in diverse contexts.

## Discussion

This study presents a cross-cultural empirical investigation of the Attention Hijacking Effect (AHE), a novel theory positing that attention invested in personal matters tends to maintain over extended periods, while attention towards societal issues and news is often fleeting due to their tangential relevance to one's personal life. The empirical evidence derived from an extensive dataset from Google Web Search Index data across four countries lends credence to the AHE, thereby expanding our understanding of attention allocation in an information-saturated society.

The results indicated a positive correlation between the familiarity of news-related terms in daily life and the duration of attention commanded by these terms. This correlation was observed across all four countries in the study - the United States, Japan, the United Kingdom, and France, suggesting that the relationship between the familiarity of news terms and the duration of attention might indeed be a universal phenomenon, transcending cultural boundaries. This finding aligns with the hypotheses postulated at the outset of this study and provides empirical substantiation to the AHE theory.

The variance in the annual average Google search scores explained by the duration of attention, as indicated by the R-squared values, varied across the four countries, ranging from 5.0% in the United States to 7.8% in France. This variation may be indicative of cultural differences in news consumption habits and information dissemination mechanisms, a factor that was acknowledged as a potential limitation in our approach. This observation echoes the findings of Mesoudi et al. (2009) who emphasized the influence of cultural factors on individual behavior and cognition.

The use of Google's search index data as a proxy for attention allocation is an innovative approach, yet it is not without its potential limitations. While Google's search index data does provide a quantitative measure of attention allocation, it may be influenced by factors external to individual attention, such as changes in search engine algorithms or internet usage trends (Agichtein et al., 2006). Future research could aim to corroborate the findings of this study using alternative measures of attention allocation, to further validate the AHE theory.

Despite these limitations, this study has made a substantial contribution to the academic discourse on attention allocation and information processing. The AHE theory provides a fresh perspective on the interplay between news consumption and attention duration, a facet not directly addressed in previous models such as Broadbent's (2013) Filter Model of Attention and Lang's (2000) Limited Capacity Model of Motivated Mediated Message Processing. By integrating the AHE theory with these existing theories, future research can offer a more nuanced understanding of attention allocation in the context of news consumption.

The insights derived from the AHE theory have significant implications for sustaining public attention towards important news events. As suggested by the AHE, framing news stories to be more personally relevant could potentially lengthen the duration of public attention to these matters. This proposition opens avenues for future research to explore effective strategies for enhancing the personal relevance of news stories in diverse contexts.

In conclusion, this study offers an empirical foundation for the Attention Hijacking Effect theory, thereby enriching our understanding of attention allocation in an information-saturated society. Future research can build upon these findings to further refine the AHE theory and explore its practical implications.

## Limitations and Implications

This study, while contributing to the nascent field of attention dynamics, is not without its limitations. One such limitation pertains to the reliance on Google's annual search index as a proxy for the familiarity of news-related terms in daily life. The impact of Google's algorithms and potential biases in what terms and topics appear in searches could significantly influence the data. Google's search algorithm, constantly evolving and proprietary, may skew the patterns of search behavior, and thus, the measurement of familiarity and attention duration. This algorithmic bias may cause over or underestimation of the actual familiarity and attention duration associated with specific news terms.



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Additionally, the explained variance in our regression models was relatively low, suggesting that other factors not included in this study might play a significant role in determining the duration of attention. Future research could benefit from incorporating other variables such as the emotional impact of news events, the role of social media, and individual cognitive differences to provide a more comprehensive understanding of the Attention Hijacking Effect.

The generalizability of the study might be limited. Since Google is not the only source of news-related terms, and it is not equally used across all demographics or regions, the results might not be applicable to populations that predominantly use other sources of information or different search engines.

Furthermore, our study aimed to provide a cross-cultural examination, so we did not account for the influence of external factors, such as political, social, or economic events, which may temporarily heighten or dampen the public's attention to specific news terms.

Turning to the implications, the Attention Hijacking Effect (AHE) theory holds potential value for practical applications, particularly in sectors such as media, advertising, education, and public policy. Understanding how the familiarity of news-related terms can influence the duration of attention could inform the design of communication strategies. Media organizations and advertisers, for instance, could leverage this understanding to enhance public engagement with their content.

In the realm of education, educators could use familiar terms to sustain students' attention and enhance learning outcomes. Public policy makers, on the other hand, could apply the AHE theory to design public information campaigns that effectively capture and hold the public's attention on critical societal issues.

However, these potential applications should be pursued with an awareness of the ethical considerations. It's crucial to avoid manipulative practices that might exploit the AHE for unethical ends, such as spreading misinformation or excessive commercialization.

In conclusion, while our study illuminates the Attention Hijacking Effect and its cross-cultural prevalence, there remains much to explore. We hope our findings serve as a stepping stone for further investigations into this fascinating domain of research.

## **Data Availability**

Upon acceptance, readers can request access to the raw data and materials by contacting the corresponding author via email. The data will be provided in a recognized data format and made accessible under a Creative Commons Attribution License.

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## Author Contributions

Bryce Petofi Towne, the corresponding and first author of this study, is the founder of the AHE theory. Haoxi Zhang is the second author. Together, Bryce Petofi Towne and Haoxi Zhang designed the study, developed the research questions and hypotheses, and prepared the research protocol. Bryce Petofi Towne was responsible for drafting the manuscript and providing final approval for the version to be published. Haoxi Zhang critically revised the manuscript for important intellectual content, analyzed, and reviewed the data. Both Bryce Petofi Towne and Haoxi Zhang agree to be accountable for all aspects of the work, ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

## Competing Interests

The authors declare no competing interests, financial or non-financial, related to this study.

## Statement

During the preparation of this work the author used ChatGPT in order to cite literature, proofread, draw a diagram and improve the language clarity and structure of this report. After using this tool/service, the author reviewed and edited the content as needed and takes full responsibility for the content of the publication.

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## Tables

### Linear Regression

**Table 1 US Data**

Parameter Estimates ( $n=306$ )						
	Unstandardized		Standardized	$t$	$p$	VIF
	Coefficients		Coefficients			
	$B$	Std. Error	$Beta$			
Constant	8.858	0.603	–	14.693	0.000**	–
Attention Duration	0.083	0.021	0.225	4.020	0.000**	1.000
$R^2$			0.050			
Adj $R^2$			0.047			
$F$						$F(1, 304)=16.156, p=0.000$
D-W 值			1.959			

Dependent Variable: annual average google search scores

\*  $p < 0.05$  \*\*  $p < 0.01$

**Table 2 Japan Data**

Parameter Estimates ( $n=274$ )						
	Unstandardized		Standardized	$t$	$p$	VIF
	Coefficients		Coefficients			
	$B$	Std. Error	$Beta$			
Constant	11.268	0.575	–	19.582	0.000**	–
Attention Duration	0.134	0.031	0.253	4.319	0.000**	1.000
$R^2$			0.064			
Adj $R^2$			0.061			
$F$			$F(1, 272)=18.654, p=0.000$			
D-W 值			1.748			

Dependent Variable: annual average google search scores

\*  $p < 0.05$  \*\*  $p < 0.01$

**Table 3 UK Data**

Parameter Estimates ( $n=299$ )						
	Unstandardized		Standardized	$t$	$p$	VIF
	Coefficients		Coefficients			
	$B$	Std. Error	$Beta$			
Constant	9.225	0.677	–	13.624	0.000**	–
Attention Duration	0.117	0.026	0.249	4.427	0.000**	1.000
$R^2$			0.062			
Adj $R^2$			0.059			
$F$			$F(1, 297)=19.599, p=0.000$			
D-W 值			2.099			

Parameter Estimates ( $n=299$ )						
	Unstandardized		Standardized	$t$	$p$	VIF
	Coefficients		Coefficients			
	$B$	Std. Error	$Beta$			

Dependent Variable: annual average google search scores

\*  $p < 0.05$  \*\*  $p < 0.01$

**Table 4 France Data**

Parameter Estimates ( $n=210$ )						
	Unstandardized		Standardized	$t$	$p$	VIF
	Coefficients		Coefficients			
	$B$	Std. Error	$Beta$			
Constant	9.441	0.742	-	12.723	0.000**	-
Attention Duration	0.108	0.026	0.279	4.185	0.000**	1.000
$R^2$			0.078			
Adj $R^2$			0.073			
$F$			$F(1, 208) = 17.515, p = 0.000$			
D-W 值			1.968			

Dependent Variable: annual average google search scores

\*  $p < 0.05$  \*\*  $p < 0.01$

**Table 5 Data on All Four Countries**

Parameter Estimates ( $n=1089$ )						
	Unstandardized		Standardized	$t$	$p$	VIF
	Coefficients		Coefficients			
	$B$	Std. Error	$Beta$			
Constant	10.090	0.321	-	31.453	0.000**	-
Attention Duration	0.087	0.012	0.208	7.010	0.000**	1.000
$R^2$			0.043			
Adj $R^2$			0.042			
$F$			$F(1, 1087)=49.138, p=0.000$			
D-W 值			1.890			

Dependent Variable: annual average google search scores

\*  $p < 0.05$  \*\*  $p < 0.01$