

A demo of Google Inject

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Abstract. We present a demo of *Google Inject*, a technology-mediated nudge aimed at increasing users' engagement with fact-checks by injecting fact-checking articles, relevant to one's query, at the top of Google search results. We elaborate on the problem that *Google Inject* aims to address, the design and development of the tool, and our ongoing and future empirical work to test its effectiveness in changing individuals' behaviors.

Keywords: Online Misinformation · Nudging · Fact-Checking.

1 Introduction

Fact-checking, defined as the *task of assessing the truthfulness of claims made by public figures such as politicians and pundits* [20], has emerged as a principal component of news reporting over the last decade [10]. Digital outlets, such as PolitiFact, Snopes.com, and FactCheck.org, have received considerable attention, while reports have identified over 400 active fact-check organizations verifying claims in more than 100 countries and 69 languages [18].

Prior studies have suggested that fact-checking can hold public figures accountable, and educate the public while correcting false claims; fact-checkers deeming a statement as false causes a 9.5% reduction in the probability that a political figure repeats the claim [11], while implementation intentions interventions (*i.e.*, an "*if-then*" plan of fact-checking a story before sharing it on social media: "*If I want to share a story on social media, then I will check its validity on Snopes.com.*"), alongside educational ones (*i.e.*, informing users about fake news, and strategies for verifying information credibility), can significantly boost fact-checking behavior (*e.g.*, validating a story through a fact-checking site) [2].

Despite the prevalence of fact-checking organizations, interaction with fact-checks is limited. Evidence suggests that users are unfamiliar with the work of fact-checking sites and fact-checkers, such sites are rarely visited, a limited number of people share fact-checks, and when they do so, they serve particular purposes (*i.e.*, political reasons) [16]. In a recent study, only about one in ten individuals reported using fact-checking services, and to verify claims made during pre-election periods [10].

Recent attempts have concentrated on facilitating the search for relevant fact-checks - *making the task less daunting* - by bringing fact-checks together, from diverse sources and formats, in particular spaces. As a case in point, *Google Fact Check Explorer* provides an easy search interface for fact-check search and retrieval [22], while *MisinfoMe* taps into a dataset of (approximately) 100,000 fact-checking reviews of claims, from 86 registered fact-checkers, to highlight tweets that point to reliable or unreliable sources and content [12].

Nonetheless, even if all fact-checks can be easily accessible through a single search engine, several behavioral barriers may arise, as users need to pause their ongoing task (*e.g.*, reading through a news piece) and initiate a new fact-checking inquiry on their own volition. This, in turn, may result in *behavioral inertia* as the new fact-checking task will impose increased cognitive load and, possibly, even derail users' former, primary (reading) task [15].

2 Google Inject

Google Inject (see Figure 1) aims at increasing users' engagement with fact-checks by injecting fact-checking articles, relevant to one's query, at the top of the Google search results page. *Google Inject* was one of 21 concepts that came out of a workshop that aimed at exploring the design space of technology-mediated nudges against misinformation [9]. *Nudges*, defined as "*any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any option or significantly changing their economic incentive*" [19], exploit knowledge around cognitive biases (*i.e.*, systematic ways in which people err), to guide the design of, among others, digital information consumption environments. While empirical evidence on their effectiveness for mitigating misinformation is limited, early studies have shown promise (*i.e.*, see [7] for a review of digital behavioral interventions against misinformation). For instance, a social norms nudge (*i.e.*, reminding users of others' online behavior), was found to reduce users' likelihood of sharing noncredible articles within their social network [1].

Google Inject was designed as a *transparent* (*i.e.*, clearly conveying its purpose and means of behavior change) and *Type 2* (*i.e.*, targeting reflective cognitive processing) nudge, presenting *multiple viewpoints* to tackle users' *confirmation bias* (*i.e.*, individuals' tendency to interpret new evidence as a confirmation of their existing beliefs), and promote more critical content consumption while browsing search results (see [8] for an elaboration on the design and evaluation of Google Inject).

By integrating articles from fact-checking organizations and sites directly into search results, *Google Inject* provides an opportunity for *situated learning* [5]. This approach may boost interaction with fact-checking content, even among users who lack prior awareness or positive attitudes toward fact-checking, potentially bypassing such stages for engagement [9,8].

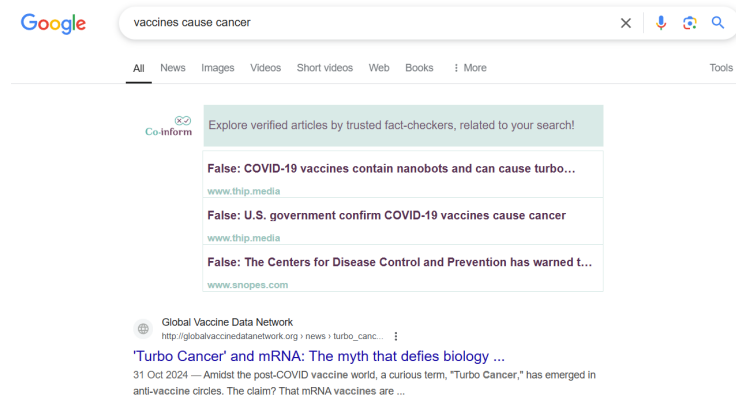


Fig. 1. An instance of *Google Inject* presenting three fact-check articles relevant to a user’s query “*vaccines cause cancer*”.

3 Implementation

Google Inject is developed on JavaScript, as a Google Chrome browser plugin. Using one’s Google search query, it retrieves relevant fact-checks from a repository containing the most recent *ClaimReview* dataset: a collection of false claims and their corresponding fact-checks, issued by at least 70 registered fact-checking organizations that are signatories of the International Fact-Checking Network, from over 32 countries and spanning 23 languages [12,13,4]. *ClaimReview* is a standardized way to markup fact-checks (*e.g.*, who made the false claim, what the claim was, the fact-check verdict, the fact-checking organization, the link pointing to the fact-check verdict, the validation rating, etc.), so search engines and other digital platforms can swiftly recognize and display verified fact-checking information [12]. If relevant articles are found within the dataset, debunking false claims in English, *Google Inject* inserts them within the Google search engine results page, attempting to dispel misinformative narratives.

4 Future work

In a study currently under review [8], we have explored how different design variations of *Google Inject*, as a result of manipulating four design variables (*i.e.*, the number of fact-checking articles injected, their positioning, concealment and seamlessness), affected *users’ experience and proximal behaviors* (*e.g.*, visual attention, article selection, and nudge preference). In a controlled laboratory environment, 21 participants were sequentially exposed to each variation of the *Google Inject* nudge. For each variation, they were presented with a pre-formed query related to a vaccination-oriented topic and were then asked to select the search item they deemed most suitable and relevant. The search results included

articles from the nudge design variation and standard Google search results. Preliminary findings revealed significant variation in engagement with recommended nudge articles across different *Google Inject* interventions. For instance, when nudge articles were seamlessly integrated into the first position of search results, they accounted for 57% of selections, with some participants raising concerns about being coerced or manipulated into engaging with such articles and others praising seamless integration for boosting engagement with fact-check articles [8]. In contrast, when the nudge articles were hidden and only revealed after user interaction, no selections were detected, with most of the participants expressing concern that hiding mechanisms make fact-check articles easy to overlook and ignore [8].

Our future work will examine whether *Google Inject* influences *biases and beliefs*, particularly in the context of vaccine hesitancy. Prior studies have indicated that psychological antecedents, such as confidence, complacency, constraints, calculation of risk and collective responsibility, are significant predictors of vaccine hesitancy, often surpassing demographic variables in their predictive power. [6]. Online misinformation has been shown to affect these psychological antecedents and, in turn, increase vaccine hesitancy. For example, exposure to vaccine-related misinformation and conspiracy theories can negatively impact confidence in vaccines, hence boosting vaccine hesitancy [14,21,3]. Likewise, misinformation can increase complacency, with individuals perceiving a lower risk of contracting vaccine-preventable diseases, hence lowering their intention to get vaccinated [17]. All in all, by examining how *Google Inject* may impact these antecedents through fact-checking, our future work intends to determine whether we can effectively reduce vaccine hesitancy.

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