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GOOGLE-INDUCED CONFIDENCE IN DECISION SKILLS CHANGES EXPERIENCES: A SELF-FULFILLING PROPHECY

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Abstract

The Internet is the ultimate memory entity, storing unimaginable amounts of information and capable of retrieving target pieces in less than a second. Thanks to tools like Google, resorting to this entity when trying to remember or learn facts has become as natural for people as eating when feeling hungry. Recent evidence suggests that embracing the Internet as a memory resource deregulates metacognition because people conflate knowledge accessed online with their own. The current research shows that this conflation entails a "feeling of already knowing" that, in consumer contexts, leads to overconfidence in decision skills. Most importantly, and contrasting with the common view of overconfidence as a trap, this research proposes that, albeit illusory, Google-induced choice confidence (the belief that the chosen option is superior to the dismissed ones) gives rise to affective expectations that spill over into subjective experiences. In essence, the Internet entails a self-fulfilling prophecy where it misguides people into believing that they made an objectively optimal decision but also leads them to have subjectively better experiences as the outcome of that decision.

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INTRODUCTION

What we see and hear on the screen is part of who we become.
Fred McFeely Rogers (or simply Mister Rogers)

"Asking" Google has become an automatic reaction when people experience doubt (Sparrow & Chatman, 2013; Ferguson, McLean, & Risko, 2015). Not surprisingly, by August 2018, Google alone had processed over 1,241,900,000,000 searches in the year (Google Search Statistics, 2018) – based on Google's share of online search around the same period (Net Marketshare, 2018), it is estimated that over 1,655,866,666,667 online searches had been processed by then if we take other search tools into account.

This incredible reliance on the Internet and tools like Google is not unjustified. The Internet is the ultimate memory machine and Google bridges our memory needs to this machine's powers. Although cognitive offloading is not a new strategy to overcome the human biological limitations of knowledge storage (Risko & Gilbert, 2016), the Internet expands the capacity and the use of external memory aids to unprecedented levels (Ward, 2013a).

As it happens when unparalleled phenomena evolve to the point where they are impossible to ignore, researchers and thinkers have started to debate where the ubiquitous dependence of our society on the Internet is heading, and opinions are divided. For instance, responding to a survey with technology experts, MIT's Micah Altman showed enthusiasm with the broad and democratic access to useful information that the Internet has enabled (Anderson & Lee, 2018). On the other hand, in the same survey, author Nicholas Carr (see Carr, 2008; 2010) expressed increasing concerns and emphasized potential cognitive impairments associated with the heavy use of the

Internet and devices that keep us connected, including phenomena related to memory and analytical and problem-solving skills.

Indeed, along the lines of Nicholas Carr's perspective, there are now reasons to believe that when we embrace the Internet as a cognitive expansion of our own cognitive capacities, our human brains respond in unanticipated ways (Sparrow & Chatman, 2013; Ward, 2013a; Wegner & Ward, 2013). More and more, research provides evidence of such responses. For instance, it has been shown that using computers to learn new facts stimulates storing location knowledge (e.g., where the fact can be found in the computer) in memory, but reduces the capacity to remember the facts that should have been learned (Sparrow et al., 2011). At the same time, when processing written information presented on a screen (vs. on paper), people seem to overestimate how much they learned (Ackerman & Goldsmith, 2011). In a similar vein, research shows that when a product is presented along with large amounts of related information, reminders of the availability of that information online makes consumers rely more on their own capacity to remember it and have stronger purchase intentions (Bhargave, Mantonakis, & White, 2016).

As implied in the examples above, a specially interesting category of outcomes that seems to emerge from the partnership between our human brains and the Internet consists in metacognitive errors. In particular, the overestimation of how much we (with our human brains) know, retain, and can achieve. Recent studies implicate our pervasive habit of Internet search in problems of metacognitive regulation. Pioneer research in this area shows that accessing facts on Google inflates cognitive self-esteem, boosting people's reliance on their transactive memory, intelligence, and internal memory capacities (Ward, 2013b). Relatedly, studies conducted in parallel to the present research suggest that when using Google to access study materials, people tend to stop

the studying session prematurely – because Internet search inflates their self-assessed expertise in the subject matter – while also not retaining the information from those materials (Fisher, Smiley, & Grillo, 2018).

The current research turns attention to Google-induced metacognitive errors in a consumer context. Reports indicate that in certain categories (travel, beauty, and electronics), nearly 60% of consumers look for information online before their purchase decisions (Nielsen, 2016). The increasing prevalence of Internet search in consumer learning and decision processes has been clearly noticed in marketing research (e.g., Jerath, Ma, & Park, 2014; Johnson, Moe, Fader, Bellman, & Lohse, 2004; Mathwick & Rigdon, 2004). Predominantly, researchers in this area tend to focus on how consumers engage in search activities online to assist their decision process. However, searching the Internet for topics of our interest and pursuing and consuming objects and experiences related to these topics are things that people do parallel to each other, without search activities being necessarily intended to inform decisions. Here, I focus on distinctive consequences of using Internet search to learn facts that pertain to the same domain of a future personal decision, in particular how this use of the Internet can change the way consumers feel about and experience the outcome of their choices.

As a starting point, I propose that among the cognitive skills that are magnified in our self-perception due to access to knowledge through online search, there are skills used in decision-making settings (Study 1). Because of this, decision-makers under the influence of Google effects have an inflated confidence in their capacity to make high-quality decisions (Studies 2 and 3). This miscalibrated confidence leads to the overestimation of the quality of their choices (Studies 4 and 5). The dangers of overconfidence in decision skills and choice quality are discussed, but focus is driven to a possibly desirable downstream consequence. The positive estimations of choice

quality implie that there are positive expectations about choice outcomes. Based on this implication, I propose that when people make experiential choices[1], their subjective experience can be embellished by their expectations about the selected option, even when these expectations stem from a positive illusion such as overconfidence in decision abilities driven by Google effects (also Studies 4 and 5). In essence, this research shows that when Google induces miscalibration, it entails a self-fulfilling prophecy where people's misguided beliefs that they are capable of choosing objectively superior options lead them to have subjectively better experiences with the outcomes of their choices.

Five experiments illuminate the process of this self-fulfilling prophecy, from how Google inflates confidence in decision abilities to the downstream influence on enjoyment of personal experiences. The first set of experiments explored the effect of Google on self-perceived decision abilities. These studies make an important contribution to empirical research on Google effects and metacognition not only by revealing the Google-induced miscalibration of decision skills, but also by examining consequences in experiential choices, which depart from the factual nature of previous cognitive tasks used to explore metacognitive errors due to Internet search (Fisher, Goddu, & Keil, 2015; Ward, 2013b) in the sense that they involve subjective outcomes (i.e., there is no objectively right or wrong answer – or, in this case, decision). Moreover, a unique demonstration of the mechanism of Google-induced overconfidence is presented in two experiments of this initial set.

The second set of studies highlights experiential consequences of the miscalibration of decision skills. The two experiments in this set combine the findings of the previous

[1] The term "experiential choices" is used here to refer to contexts where people choose among options of personal experiences, as opposed to material possessions or intangible instrumental products (e.g., financial products, insurance plans). This is not the same use of the term that appears in Choi and Fishbach's (2011) research and related works.

three studies with prior research on the influence of affective expectations on feelings about and perceptions of personal experiences. Previous research has shown that external information can alter expectations about an upcoming event and these expectations color how the event is subjectively experienced (Klaaren, Hodges, & Wilson, 1994). The studies presented here reveal that internal information related to beliefs about one's own capacity to make optimal decisions can alter expectations as well and, consequently, change subjective experiences. Specifically, the experimental manipualtions in these studies miscalibrated such beliefs with Google search tasks, eliciting beliefs about choice quality based on self-assessed decision skills. Together, the five experiments walk us through the self-fulfilling prophecy of Google-induced decision confidence.

RESEARCH BACKGROUND I: VIRTUAL CONFIDENCE IN DECISION SKILLS

Evolutionarily, humans managed to navigate through ways of life and social organization that increasingly rewarded knowledge and access to information despite natural limitations of the human brain by resorting to external memory resources. Everyday examples of such resources are objects and devices like shopping lists, memos, notebooks, timers, and calendars (Harris, 1982). Another important category of external resources are other human beings. As social animals, people learned to coordinate responsibility over knowledge in different domains with human memory partners. In these networks, some people become experts in certain domains (e.g., Ward & Lynch, Jr., 2018) and, thus, release others from the burdens of mastering that knowledge and enable them to become experts in other areas. The memory systems where information is spread across internal and several external memory resources are what Daniel Wegner (1987) defined as transactive memory.

While transactive memory is an old cognitive solution, and numerous technologies have assisted the use of external memory in these systems since humans started painting cave walls to document their existence, it has never encountered such an impactful force like the Internet, with its unparalleled capacity to store and retrieve information through a single touch point: Google. Understandably, the Internet overrides old devices and human memory partners, becoming the ultimate memory solution (Ward, 2013a; 2013b; Wegner & Ward, 2013). Perhaps even our own internal memory is subject to be overthrown – since relying on information from the Internet seems to reduce our capacity to retain that information (Fisher et al., 2018; Sparrow et al., 2011).

Interestingly, we seem to be largely unaware of the proportions of our reliance on knowledge that comes from the Internet (instead of our brains). In fact, we seem to

experience accessing knowledge through online search as if were accessing it within ourselves. Studies pointing to this direction found that participants who used Google to confirm answers to trivia questions (vs. thought of the answer without any external aid) made more optimistic predictions of their capacity to answer a completely new set of trivia questions without using Google, as if they simply knew answers to that kind of question (Ward, 2013b). Ostensibly, when we use tools like Google, our minds fail to accurately distinguish the new information found online from things we already know.

There are a number of interconnected factors that potentially explain why this might happen. One such factor is our intense use of devices that allow us to search the Internet at will. Similar to how a person who automatically puts the same hat on the head when wakes up and wears it all the time has a self-extension relationship with that hat, most of us have become so connected to the Internet and to devices that allow us to go (or stay) online that they just feel like part of who we are.

Another factor relates to how our minds process information about external sources. In typical forms of transactive memory, the divides between internally- and externally-stored information are made clear by detectible cues of the external source that help us keep track of the exogenous nature of new information. Sometimes, a physical component serves as one such cue: the shape of an object or the body of a person can be recognized as a tangible representation of the external source. In the case of human memory partners and oral sharing of knowledge, the voice of the other person can also help clarify where the information is coming from. In other cases, information might be retrieved from an object that requires actions such as moving to its location and spending time and energy to use it. The efforts to find the desired information serve as reminders that this information could not be retrieved from internal memory.

Internet search seems to make the cues of the presence of the external source less explicit. The physical component associated with access to information online (e.g., the laptop, the tablet, the smartphone) is usually one we can associate with our internal memory just as much as with external sources. We offload into computers, tablets, and smartphones things that are the product of our own thoughts and that we indeed remembered (as when we write something for school or work, prepare an email, or communicate with friends). Online searching often leads to written information, so there are no voice cues that help highlight its exogenous nature. The physical efforts to reach these devices are considerably reduced as well, since we increasingly tend to have computers and tablets close at hand and smartphones in our pockets.

A third factor is the influence of the speed and the ease with which information can be retrieved online. Because Google is extremely fast and simple to operate, it reveals the target information faster than the mind can process the cues mentioned above and searches in our own memory can reveal whether the information is stored internally or not. This idea has been explored in contexts of general knowledge by comparing cognitive self-esteem of participants who used a normal version of Google to access trivia knowledge with participants who used a slow version of Google (that took longer to show the results) and participants who did not use any search tool (Ward, 2013b). Only the normal version of Google inflated cognitive self-esteem. Thus, the absence or presence of certain facts in internal memory can be recognized even when they are being verified through Internet search, as long the processing of cues of the external source and internal search can be completed, making us aware of our knowledge of the the target facts (or lack thereof).

All these forces related to online search obfuscate the divides between our human mind and the “hive mind” that the Internet has become (Sparrow & Chatman, 2013). Is

it the Internet that can provide answers that fast or is it me? Is this particular piece of information stored in the "cloud" or was it in my head all along? Could I have come up this answer or can it only be formulated by an expert and given to me by Google? (As Studies 2 and 3 suggest) these are the kinds of question that we are NOT asking ourselves. Instead, because our minds are not proficient in keeping track of what we are learning from Google and what we already know, we misattribute knowledge from the Internet to ourselves. As this misattribution occurs, it follows that Internet search makes us feel as if new information was something we actually knew all along and it simply was not on the top of our head when we first thought of the question that led us to search online in the first place.

Initial studies exploring miscalibration driven by the Internet have shown that after accessing trivia facts using an online search tool, participants became overconfident in their knowledge of other trivia facts (Ward, 2013b). Theoretically, a key factor behind this overconfidence should be the misguided sensation of familiarity with new information revealed by Google that arises from knowledge misattribution. The first series of studies presented here (in particular, Studies 2 and 3) explored how this feeling of already knowing new information builds extra confidence in decision-making abilities.

Conceptually, the question of whether Internet-induced miscalibration can affect decision tasks does not have a clear answer. On the one hand, a decision task might resemble answering factual questions in the sense that analogously to the right answer, there is a supposedly best option (i.e., the "right choice"). From this point of view, one might expect the findings from the trivia knowledge experiments mentioned above to plainly transfer to decision contexts. However, some distinctive aspects of decision tasks bring this expectation into question.

One such aspect is the fact that personal decisions have consequences with which the individual has to deal after the decision was made. This forward-looking perspective imposed by tasks involving personal decisions might motivate people to engage in the reviewing of the criteria and the rationale of the decision process. In turn, the internal revisions of the decision process might illuminate people's actual aptitude to make the decision.

In addition to this – and particularly relevant to the present research –, not all decision contexts involve an objectively superior alternative (i.e., an objectively "right choice"). As it will be discussed in greater detail later, experiential choices entail subjective outcomes that can be influenced by numerous factors and cannot be argued to be universally and factually better or worse.

In this sense, selecting among experiences is substantially different from identifying the factual truth, as in trivia knowledge tests. Instead, the context of experiential choices might hold a closer resemblance to a study where the factual knowledge test was replaced with an autobiographical knowledge assessment (e.g., "How is your town different from other parts of the country?," "What is the relationship between the classes you chose during freshman year of high school and your current career?" – Fisher et al., 2015 – Experiment 3). Similar to the outcomes of experiential choices, the answers to these questions are personal, cannot be factually checked online, and can be largely a matter of perception. They might vary according to a number of factors and even change through time, and they still can be considered the "right answer." Participants of this study completed an Internet search task involving explanatory answers to factual questions that miscalibrated self-assessed abilities to provide new factual explanations in other studies, but there were no Google effects on self-perceived capacity to answer the autobiographical questions.

In sum, the consequential and subjective nature of the outcomes of experiential choices make decision-making contexts (involving experiences) substantially different from the general knowledge settings in which Google-induced miscalibration has been observed in the past. So what is behind the hypothesis that Internet search inflates confidence in decision skills?

The basic idea is that the feeling of already knowing facts that pertain to a given domain where people make personal decisions (e.g., financial investments, travel and tourism, movies) increases subjective knowledge in that domain (Alba & Hutchinson, 1987; 2000). This happens because knowledge self-assessment involves a process that can be tricked by illusions of knowledge. Knowledge assessments rely on judgment cues of topical (and not necessarily objectively verifiable) information stored in internal memory and prior experiences in the domain of the decision (Park, Mothersbaugh, & Feick, 1994). The feeling of already knowing new information triggered by Internet search might delude the metacognitve evaluation into overestimating the presence of relevant information in internal memory and relax internal search during the formation of the assessment. Potentially, Google contributes to the maintenance of this illusion by also cueing easy retrievability of information (e.g., Bhargave et al., 2016). The illusory feeling that new knowledge is old knowledge also implies a sense of familiarity that can misinform the scanning for cues of prior experience. This might be a particularly easy misconception to be formed to the extent that the decision domain is one in which the individual is likely to have some prior experiences. Thus, completely unfamiliar contexts could impose a boundary to Google-induced inflation of subjective knowledge.

High subjective knowledge leads to greater reliance on one's own judgments about the options in a consideration-set (Raju, Lonial, & Mangold, 1995). To the extent that people are under the influence of a boosted sense of mastery because of stimuli such as

Internet search, they feel more capable of telling good from bad among choice alternatives and trust their own judgments more, as if they were expert decision makers. Because people are naturally bad at recognizing incomplete knowledge in their own internal structures (Collins, Warrock, Aiello, & Miller, 1975), the actual amount of knowledge stored in memory that is relevant to form judgments about their choice alternatives tends not to be stressed during the decision process (otherwise, the process could shed light on knowledge gaps and reduce miscalibration). Instead, the (sometimes limited) knowledge that is accessed during this process is likely to be regarded as complete and of high quality.

In conclusion, although there are substantial differences between decision contexts (especially those involving personal experience options) and previous settings where metacognitive errors produced by Internet search were observed, because knowledge misattribution – ergo, Google-induced feelings of already knowing new information – is a key driving force of these errors, they should be reflected in self-perceived decision abilities as well. On the next sections, three experiments exploring how using Google affects confidence in decision-making abilities are described. Following this series of experiments, it will be argued (in "RESEARCH BACKGROUND II: THE SELF-FULFILLING PROPHECY OF GOOGLE-INDUCED DECISION CONFIDENCE") that the "virtual confidence" elicited by Google has a self-fulfilling influence on the experiences people have with the outcomes of their choices. The last series of experiments will address this hypothesis.

Datasets are available at the Open Science Framework (OSF): https://osf.io/ycfba/?view_only=5ec595fe81cb4470b69d9cd67658fb76.

OVERVIEW OF STUDIES

The phenomenon of changes in subjective experiences induced by simply searching for facts on the Internet arises through a chain of effects that begins with the conflation of knowledge accessed through Google with internal knowledge (as outlined in the previous section) and culminates in expectations adultered by miscalibrated confidence spilling over into subjective experiences. To better understand this process, two sets of experiments were conducted, each focusing on a different part of the chain.

The first set of experiments (presented next) dissected the process through which Internet search inflates confidence in decision skills. These studies used the context of travel and tourism – i.e., participants searched the Internet for travel-related facts (vs. accessed them through other means) and considered travel-related decisions while assessing their skills. The choice of this context (as well as the context used in the second set of experiments, movies) took into account the possibility that decision tasks involving unfamiliar domains might restrain distortions in knowledge assessment. Even though many participants might have never traveled abroad, they are likely to have some experience traveling to new places and the concept of visiting another country should not sound outlandish.

The first experiment focused on establishing that accessing information through online search affects some dimensions of consumer self-confidence, in particular consumers' perceptions of their consideration-set formation abilities, but does not increase confidence to do things that are less knowledge-based (e.g., making demands to agents in the marketplace). The second and the third experiments both explored the role of the "feeling of already knowing" as a driver of Google-induced extra confidence in decision abilities. In doing so, the second study tested if this driver is unique to the use of tools like Google and not just to search efforts (i.e., with or without Google).

Between the first (Studies 1-3) and the second set of experiments (Studies 4 and 5) – which focused on the second leg of the chain of effects –, another conceptual section is presented, building on the findings of the first set of studies and preparing the ground for the subsequent experiments. To investigate Google effects on subjective experiences, it was necessary to incorporate some content to be experienced by participants as part of the experiments. Because it was not possible to provide a travel experience to all participants, a more affordable consumer context was adopted. Studies 4 and 5 induced confidence in decision abilities through the search for facts and concepts related to movies and provided participants with the opportunity to watch a short animated film during the experimental session. Similar to traveling abroad, animated films is a domain that should not be strange and unfamiliar to most people. Study 4 focused on illuminating the roles of the belief in choice superiority and inferences about choice outcomes on how Internet search affects experience enjoyment. Study 5 attempted to replicate Study 4 and show what happens when people under the influence of Google experience content that they did not have the opportunity to choose (and was randomly selected for them).

STUDY 1: GOOGLE BOOSTS CONSUMER SELF-CONFIDENCE

As a starting point for the empirical examination of Google-induced overconfidence in decision skills, Study 1 used an already validated instrument to measure consumer self-confidence. This instrument was adapted from Bearden et al., (2001), who conceptualized consumer self-confidence as "the extent to which the individual feels capable and assured with respect to his or her marketplace decisions and behaviors." (p. 122). In their model, consumer self-confidence involves six dimensions. Four of them explicitly pertain to the decision-making process. The other two reflect self-protection skills that are relevant in consumer settings.

The four decision-related dimensions of consumer self-confidence are (1) acquisition of information, (2) consideration-set formation, (3) personal outcomes, and (4) social outcomes. Acquisition of information reflects consumers' confidence in their capacity to obtain relevant information to support decision-making. Consideration-set formation skills are abilities to identify the best options in a set of alternatives available. The personal outcomes dimension reflects one's confidence that her/his choices in the marketplace will produce personally gratifying outcomes. The social outcomes dimension reflects expectations about the reactions of others to the one's decisions as a consumer.

The two self-protection-related dimensions of the model are (5) persuasion knowledge and (6) marketplace interfaces. The former involves skills that help avoid the pitfalls of becoming a victim of manipulative behavior by market agents. The latter refers to skills that help express relevant thoughts and take actions in interactions with agents in market environments.

Examining self-confidence as a multidimensional construct allows exploring the breath of Google effects on confidence and understand the boundaries of the influence of Internet search within its conceptual domain. Anticipating that the impact of the Google stimulus will not be widespread across consumer self-confidence, three dimensions are of special interest in this study: acquisition of information, consideration-set formation, and personal outcomes.

Bearden et al.'s acquisition of information measure essentially tailors transactive memory skills – the ability to find and access external knowledge – to consumer decision contexts. It should, therefore, mirror results found in previous research that examined how Internet search affects perceived transactive memory skills. Specifically, in the context of general knowledge, studies have found that searching the Internet increased people's self-esteem with respect to such skills (Ward, 2013b). Worth pointing out, the procedure of the experimental manipulation in these previous studies was substantially different from the procedure of the current experiment in two aspects (besides its focus on consumer decision contexts instead of general knowledge). First, the current study equalizes exposure to information across experimental conditions (the one that involves Google search vs. the one that does not), changing only how information is accessed by participants in each condition, whereas the previous studies that unveiled altered perceived transactive memory skills due to the use Google compared online search to internal memory search. Thus, for half the participants (the *internal search* condition), exposure to information was idiosyncratic and depended on what answers each one of them could remember. Second, the current study exposes participants to information in the form of articles that explain a certain topic, whereas previous Google effects on transactive memory perceptions were shown in studies where the information presented (or asked) to participants consisted in a straightforward

answer (i.e., a specific fact that could presented as a short-term or a number). Replicating the Google effect on perceptions of transactive memory skills (herein observed in the form of perceived abilities to acquire information in consumer contexts) despite these procedural differences validates the current approach as a method to investigate other Google-induced distortions in self-assessed cognitive skills – such as skills to identify superior options among a number of alternatives (Studies 1, 2 and 3) –, mechanistic factors behind these distortions – such as the feeling of already knowing information found online (Studies 2 and 3) –, and their downstream consequences – including inflated choice confidence, positive choice evaluations and expectations, and enhancement of subjective experiences (Studies 4 and 5).

The special interest in the other two dimensions, perceptions of consideration-set formation skills and personal outcomes, does not involve these methodological nature and validation benefits. These dimensions of consumer-self confidence are highlighted here because, of the six dimensions, these are the ones most closely connected to the hypothesis of the inflation of confidence in decision abilities at a conceptual level.

The effect of Internet search on perceived consideration-set formation skills is particularly relevant because it suggests that Google makes people feel better qualified to examine and evaluate the options they can choose from in personal decision settings. An effect of Internet search on assessments of personal outcomes of personal decisions implies that Google makes people more self-assured of their choices, precluding the downstream consequences of inflated confidence in decision skills that are explored later in this research (regarding how choices are assessed and experienced).

Google effects on perceived social outcomes of decisions, self-assessed persuasion knowledge, and abilities that are relevant in market interfaces suggest that online search can produce a more generalized positive sense of one's capacity to navigate through

consumer contexts successfully. However, the idea that online search engenders metacognitive errors due to the conflation of the performance of the search engine and one's own cognitive knowledge and capacity to remember facts and formulate responses does not accommodate the prediction that these other dimensions can be miscalibrated by Internet search. If the conflation of knowledge and the consequent feeling of already knowing online information are the fundamental driving forces of Google-induced confidence inflation, the dimensions of confidence that are subject to the effect must be tied to the use of descriptive knowledge (Fisher et al., 2015) and cognitive skills that compete with the Internet (Ward, 2013b). Basically, the Internet is expected to inflate confidence to execute rather knowledge-based tasks.

The social outcomes dimension of consumer self-confidence involves less reliance on one's own cognitive skills and more on the behavior of others. The dimensions of persuasion knowledge and marketing interfaces not only involve a greater reliance on the behavior of others as well but also add social skills perceptions and, particularly in the case of the latter, elements of self-determination to the set factors influencing confident behavior. In essence, to the extent that an action (e.g., impress others, deal with persuasion agents, speak up to ensure appropriate services) capitalizes more on external factors (e.g., others' reactions) and other kinds of skills (e.g., social skills), it is rather unlikely that online search will exert some systematic influence on confidence to execute this action.

Lastly, it also worth pointing out that using Bearden et al.'s instrument to assess the influence of online search on self-confidence provides a conservative test for Google-induced overconfidence. This instrument stimulates the respondent to think about their global experience as a consumer and, thus, measures *global* self-assessments of skills that are relevant in consumer contexts, and not perceptions of *situational outcomes* of

the use of such skills. Thinking globally might wash away Google-induced overconfidence because of other cues, related to past experiences, being retrieved from internal memory to help the respondent form the assessments of her or his own skills.

Method

Participants and design

Participants (N = 151) were recruited on Amazon's Mechanical Turk to participate in a study on Qualtrics. The experiment followed a single-factor design with two levels: *no search* vs. *online search*.

Procedure

Study 1 involved two phases. Phase 1 was an information exposure, or learning, section. This phase was used to induce the Google effect. In Phase 2, the outcome measures were collected. Both phases are described in greater detail below.

Phase 1. Participants were told they would first learn about selected travel-related topics on the pretext that reading about these topics would aid them in a challenge later in the study. They were randomly assigned to a search condition before being presented with these topics. All participants had access to the same information, but how they accessed the information was conditioned on their experimental group.

Five topics that resemble information people search online while preparing to travel to another country (e.g., "How to avoid credit card and ATM fees while traveling abroad?") were used in the experimental manipulation. All topics were framed as questions. All topics of this and the other studies are available and pretest information

are provided in Appendix A. Throughout Phase 1, participants were exposed to a total of three topics that were randomly selected for them.

Topics were randomly presented one at a time (i.e., one per page). For each topic, participants in the *no search* condition received a related article to read on their computer screens. Participants in the *online search* condition were provided with instructions to search online for a specific website and read the information about the topic on the webpage (see Appendix B for the webpage of each topic). To make sure participants performed the search, they were required to copy the URL of each page they visited and paste it on a specific space on the page of the study. Searching the websites on Google would lead to pages where participants would find the same articles provided to the *no search* group. Topics and their respective articles were selected so that the target pages would appear among the top links of the results from Google when the exact questions presented as topics were typed into the search box. To avoid an uneven influence of knowledge of the source and website credibility, participants in the *no search* group were informed of the website that served as the source of each text they read.

Phase 2. After learning about three topics, participants advanced to Phase 2. In this section, they completed a questionnaire with items from Bearden et al.'s consumer self-confidence scale. The order of items was randomized. Lastly, participants completed a series of personal questions and were thanked and debriefed.

Measures

Items from Bearden et al.'s (2001) consumer self-confidence measure were reworded to adapt to the context of tourism and travel. All items are available in Appendix C, along with the respective reliability coefficients. Responses were recorded

on 7-point scales ranging from 1 = *Strongly agree* to 7 = *Strongly disagree*. For the analyses, items in each dimension were averaged into a single score of the respective dimension. Also, all items were averaged to form an overarching score of consumer self-confidence.

Results

Figure 1 shows group means and standard errors across all dimensions of Bearden et al.'s consumer self-confidence model and the overall construct of consumer self-confidence (CSC). Table 1 details these results providing the tests for differences across *search* conditions and respective effect sizes.

The analysis revealed a significant difference in self-assessed acquisition of information skills (AI). Based on what was outlined above, this result mirrors previous findings in the context of general knowledge where online search inflated people's estimations of their own transactive memory abilities (Ward, 2013b).

Results also showed that after accessing travel-related information through online search, participants made more positive assessments of their consideration-set formation capacity (CSF). As aforementioned, this dimension of self-confidence maps directly to decision skills. Therefore, this result supports my central thesis that Google-induced distortions of self-perceived cognitive skills include perceived abilities to make personal decisions.

Surprisingly, no influence of online search was observed when examining the third dimension of consumer self-confidence that was highlighted in the introduction of this study, perceived personal outcomes of one's own decisions (PO).

Overall, results did not reveal significant effects of accessing information through online search when other dimensions of consumer self-confidence were examined (see

Table 1). There was, however, the unexpected exception of a marginally significant effect of Internet search on self-assessed persuasion knowledge.

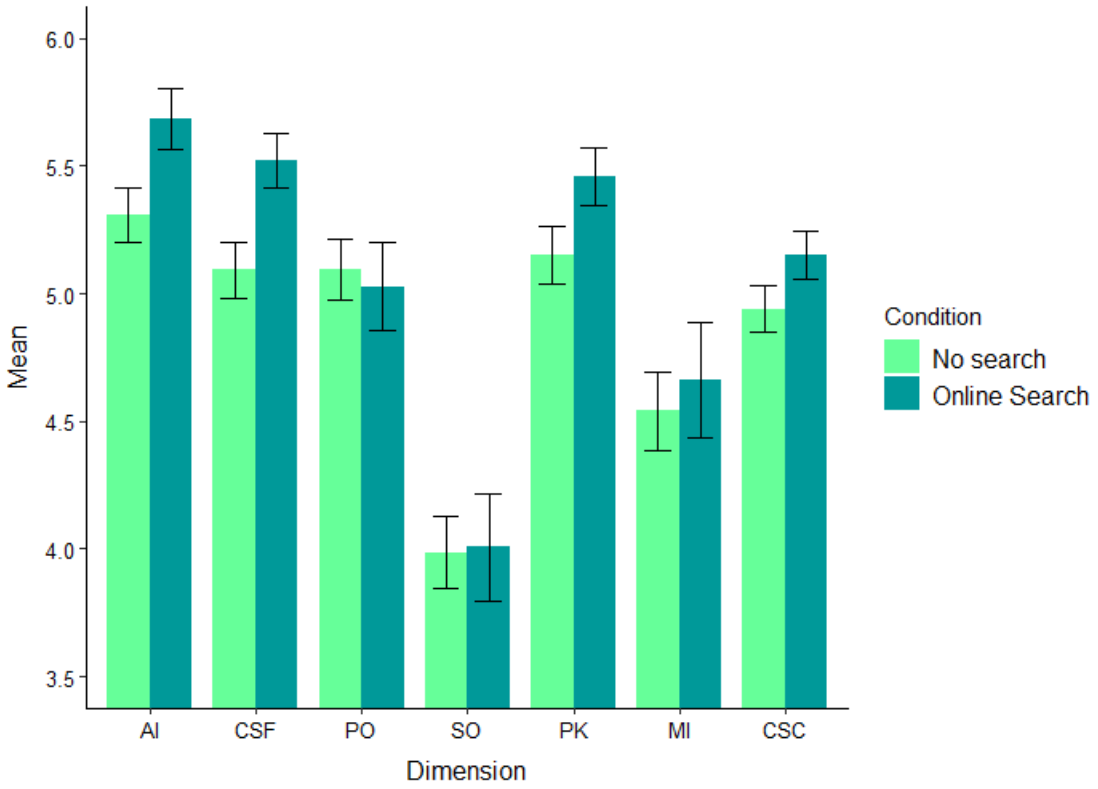

Figure 1. Means and ± SEM of each dimension and the overarching construct of consumer self-confidence across *search* conditions. AI = acquisition of information; CSF = consideration-set formation; PO = personal outcomes; SO = social outcomes; PK = persuasion knowledge; MI = market interfaces; CSC = consumer self-confidence.

Table 1. Means and standard deviations of each dimension and the overarching construct of consumer self-confidence across search conditions, tests of mean-differences, and effect sizes.

Dimension	No Search	Online Search	Test	Cohen's *d*
AI	*M* = 5.31, *SD* = 1.05	*M* = 5.68, *SD* = 0.88	*t*(149) = 2.26, *p* =.025, 95% CI = [0.05, 0.91]	0.38
CSF	*M* = 5.09, *SD* = 1.06	*M* = 5.52, *SD* = 0.81	*t*(149) = 2.62, *p* =.010, 95% CI = [0.11, 0.75]	0.45
PO	*M* = 5.09, *SD* = 1.16	*M* = 5.03, *SD* = 1.28	*t*(149) = 0.32, *p* =.753, 95% CI = [-0.34, 0.47]	0.05
SO	*M* = 3.99, *SD* = 1.37	*M* = 4.01, *SD* = 1.56	*t*(149) = 0.08, *p* =.93, 95% CI = [-0.50, 0.46]	0.01
PK	*M* = 5.15, *SD* = 1.08	*M* = 5.46, *SD* = 0.83	*t*(149) = 1.83, *p* =.069, 95% CI = [-0.02, 0.64]	0.32
MI	*M* = 4.54, *SD* = 1.51	*M* = 4.66, *SD* = 1.70	*t*(149) = 0.46, *p* =.650, 95% CI = [-0.41, 0.65]	0.07
CSC	*M* = 4.94, *SD* = 0.89	*M* = 4.66, *SD* = 0.88	*t*(149) = 1.51, *p* =.133, 95% CI = [-0.06, 0.49]	0.26

Note: AI = acquisition of information; CSF = consideration-set formation; PO = personal outcomes; SO = social outcomes; PK = persuasion knowledge; MI = market interfaces; CSC = consumer self-confidence.

Discussion

Study 1 makes three important contributions. First, it validates the procedural approach of the experimental manipulation. Despite substantial differences in the information exposure procedure used in Study 1 relative to the procedure used in previous research and the fact that Study 1 focused on a consumer context (using a measure tailored for this context), the experiment replicated effects of online search on self-assessments of transactive memory abilities. This replication support that the materials employed as experimental stimuli in Study 1 produce the same class of effects

on metacognition revealed through the general knowledge studies that showed distorted self-assessments of cognitive skills in the past.

Second, Study 1 suggests that Google effects are limited to specific dimensions of consumer self-confidence. In particular, Internet search did not influence the dimensions of social outcomes and market interfaces. This was an expected result because these dimensions involve proportionally less knowledge-based skills and rely more on reactions of others (social outcomes) and on a combination of social skills and self-determination (market interfaces). Unexpectedly, there was a positive effect of Internet search on participants' perceptions of their persuasion knowledge. This effect was not hypothesized, but it is possible that, to the extent that people feel more confident in their decision-making skills, they feel more immune to the influence of persuasive agents on their decision processes and more capable of protecting themselves against manipulative attempts.

The third contribution is the evidence that confidence in decision-making abilities is one of the affected dimensions, as observed in the effect of online search on consideration-set formation skills. This finding serves as a foundation to the remainder of the studies in this research.

It was expected that the influence of the Internet on decision confidence would be further observed in the effect of online search on participants' perceptions of the personal outcomes of their decisions. However, this effect was not observed in my results. It is possible that the test failed to capture an effect due to the framing of the items used to measure this dimension. As discussed in the introduction of this study, all items used to measure the outcome variables require, to some extent, global assessments from the respondent. However, one could make a stronger case for this particular dimension compared to the other highlighted dimensions of the model (namely,

acquisition of information and consideration-set formation skills). Specifically, the items measuring the other dimensions are more easily interpreted as statements about one's current state – e.g., "I know where to find…" (from the acquisition of information dimension) and "I am confident about…" (from the consideration-set formation dimension) are more easily interpreted as "*Right now*, I know where to find…" and "I *am feeling* confident about…", respectively. In turn, the items used to measure the dimension of personal outcomes perceptions all include adverbs that explicitly stimulate the respondent to think globally (e.g., "often"). This feature of this dimension of consumer self-confidence might have impinged on the capacity of the study to demonstrate increases in people's self-assurance with respect to personal outcomes of their choices because such confidence might be only reflected as a current state. Studies 4 and 5 provide a better test to address the influence of the Internet on confidence in outcomes of personal decisions.

STUDY 2: GOOGLE-INDUCED KNOWLEDGE MISATTRIBUTION *DRIVES* CONFIDENCE

Study 2 was designed with three purposes. First, it aimed to examine Google-induced confidence in decision skills by having participants forecasting their performance in a subsequent decision task. Engaging in thinking of a specific upcoming decision task is a less conservative approach compared to the consumer self-confidence instrument used in Study 1, but most likely better represents how Google effects on confidence play out in daily contexts. Moreover, this approach should reduce the noise from previous decision experiences that might have factored into self-assessments in Study 1.

The second purpose was to rule out pure search effects and highlight the role of the search engine in Google-induced confidence. An important limitation of Study 1 and previous investigations of Google effects on self-assessed cognitive skills is that online search was either compared to no search (e.g. Fisher et al., 2015, 2018; Ward et al., 2018) or internal search (Ward, 2013b). Because of this, one could argue that these studies show consequences of searching for information, but do not disentangle the effect of performing the search from the effect of using an online search engine to do so. To address pure search effects, a *manual search* condition, where participants would engage in information search without Google or any other online search engine, was included in the experimental design.

The third purpose was to explore the role of the feeling of already knoweing the stems from knowledge misattribution. The knowledge misattribution hypothesis suggests that Internet search can (almost) uniquely produce this feeling, which acts as a mediating factor boosting confidence in decision-making (and other cognitive) skills.

With this hypothesis in mind, Study 2 was designed to allow a mediation analysis (Hayes, 2013) where the feeling of already knowing new information is modeled as a mediator of the relationship between Internet search and confidence.

Method

Participants and design

Undergraduate students (N = 121) participated in the experiment as part of a series of computer-based studies conducted in a behavioral laboratory at McCombs School of Business (University of Texas at Austin) in exchange for course credits. The design of the experiment involved one factor with three levels: *No search* vs. *Manual search* vs. *Online search*.

Procedure

Study 2 had the same two-phase structure as Study 1. However, the materials used in each phase were modified.

Phase 1. The presentation of the task was similar to Study 1. Before receiving the topics that should be learned during Phase 1, participants were randomly assigned to one of the three *search* conditions. All participants received five random travel-related topics, one per page. These were not the same topics used in Study 1. The five topics to which participants were exposed in this experimental induction were selected from a pool containing ten topics used only in Study 2 (see Appendix A). An important feature of these topics is that, when typed into the search box, Google would provide a quick answer, or a featured snippet, in the "Answer Box" on the top of the results page (see

Figure 2 for an example). Thus, instead of reading full articles, all participants of Study 2 read quick answers from Google.

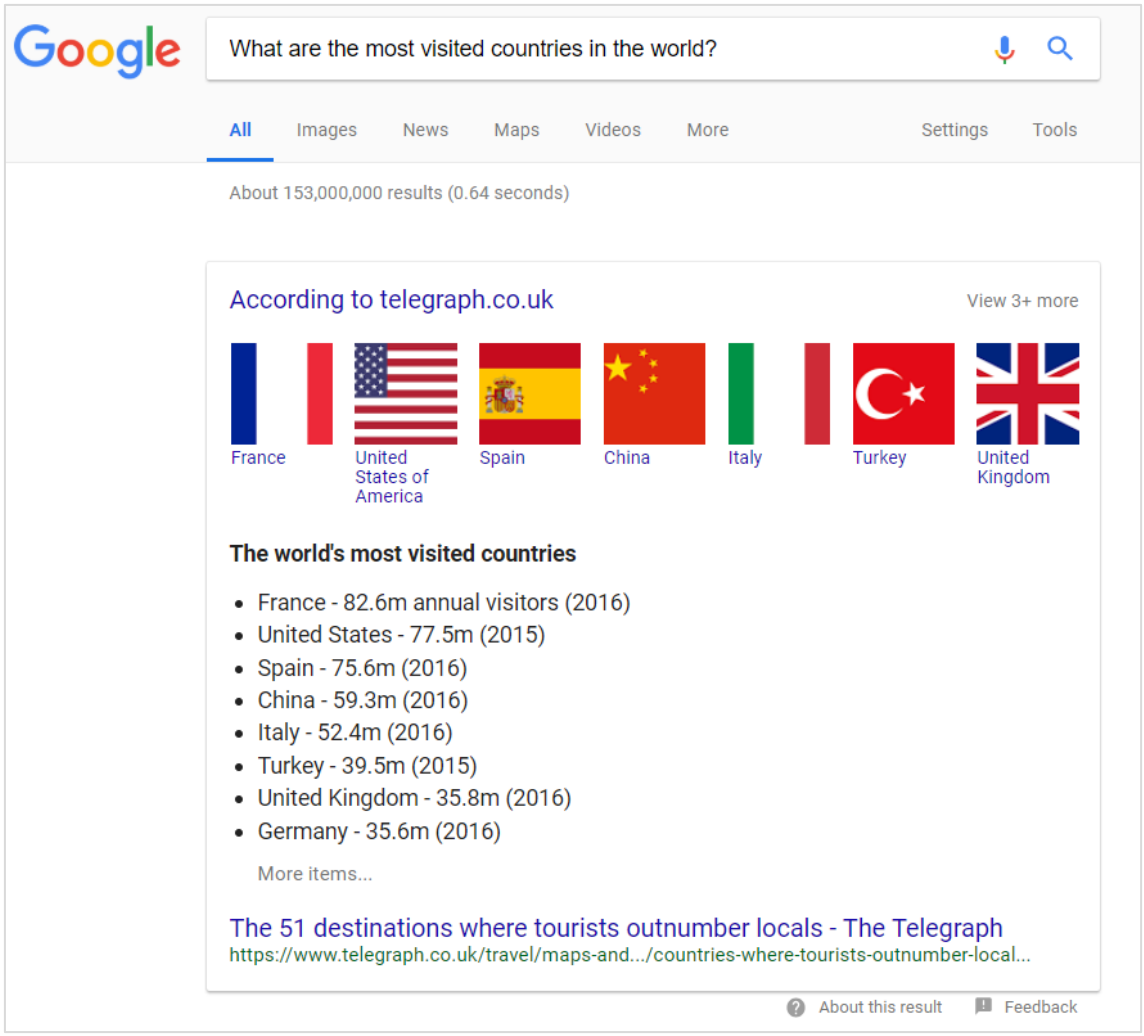

Figure 2. Example of the "Answer Box" on Google's results page when one of the topics of the stimulus was used as the search term.

In the *no search* condition, along with each topic, participants received the respective quick answer (extracted from Google) on the page of the study and did not have to carry out any information search. In the *manual search* condition, participants received the same answer on their computer screens, but each answer was provided along with 19 other travel-related Google snippets that were irrelevant to the specific

topic of the page – these snippets were extracted from results of Google searches using other travel-related topics. Each piece of information on the page was numbered from 1 to 20. The topic would appear on the top of the screen, followed by instructions to scroll through the page to find the relevant information. These instructions contained the number of the target answer (always above 10 to ensure that the answer would not be on the top of the page because such location would release participants from carrying out the manual search). The purpose of specifying the number of the target piece of information was to avoid uncertainty of the answer and search fatigue due to effortful examination of all the information on the page while attempting to identify the relevant piece. In the *online search* condition, along with each topic, participants received instructions to find the relevant information online and a link that would open Google on a new window. Specifically, instructions said that reading the information in the "Answer Box" was sufficient for the study. Thus, as in the *manual search* condition, uncertainty of the answer and the process of examining several pieces of information during the search process was avoided. Moreover, these cautions concerning both *search* conditions approximate the information search experience of participants in these conditions to the experience of participants in the *no search* condition, who would not deal with answer uncertainty or invest effort in information search because their task involved only passively receiving the relevant information on the computer screen.

Phase 2. After completing Phase 1, participants advanced to Phase 2, described as a quiz section. Participants completed the measures of confidence in decision-making abilities and knowledge misattribution in anticipation of the quiz. Then it was revealed that there was no actual quiz and participants completed a final set of personal questions and were thanked and debriefed.

Measures

To assess knowledge misattribution, participants reported their feeling of already knowing the material they read during Phase 1. Specifically, participants expressed the extent to which they agreed with the following statement, "I feel like I already knew much of what the topics in the learning section said, although I wouldn't necessarily remember details right away" (7-point scale, 1 = *Strongly disagree*, 7 = *Strongly agree*).

The measure of confidence in decision-making abilities focused on participants' assessments of their capacity to identify the superior option in a set of similar alternatives. In the beginning of Phase 2, participants were told that this part of the study consisted in a travel-related quiz. In the description of the quiz, they read the following prompt:

> *In one section of the quiz, you will be presented with travel itineraries, all involving the same destinations. We surveyed people who have followed each itinerary and found that one of them is the best itinerary (people who followed that itinerary were more satisfied with the trip than people who followed any of the other itineraries). You will be asked to use your abilities to assess travel plans and choose one of the itineraries as if you would take the trip and follow it yourself.*

The prompt was followed by the question, "How likely do you think you will choose the best itinerary?" Responses were recorded on a 7-point scale ranging from 1 = *Very unlikely* to 7 = *Very likely*.

Results

Results of an ANOVA suggested that participants' feeling of already knowing the information presented during Phase 1 was significantly different across conditions, $F(2, 118) = 3.12$, $p = .048$, $\eta^2 = .05$. Planned comparisons suggested that levels of knowledge misattribution were higher in the *online search* group (M = 4.40, SD = 1.51) compared to the other conditions, $t(118) = 2.07$, $p = .040$. Results indicated no statistically significant differences in knowledge misattribution between the *no search* group ($M = 4.00$, $SD = 1.51$) and the *manual search* group ($M = 3.56$, $SD = 1.51$), $t(118) = 1.38$, $p = .171$. Results are represented in Figure 3.

Challenging expectations, an ANOVA examining the effect of the experimental condition on confidence did not reveal significant results, $F(2, 118) = 0.09$, $p = .91$. Based on Figure 4, it can be inferred that the null result is not due to lack of statistical power of the study because the levels of confidence across groups did not trend towards the expected direction (i.e., higher levels in the *online search* group). A possible explanation then is that there were different sources of confidence across groups. The *no search* group experienced the "friendliest" task during Phase 1 compared to the other groups, as they passively received precise information in the simple format of a short answer. It is possible that this "friendly" experience led the *no search* group to singularly form the expectation of a "friendly" task during Phase 2, elevating their confidence in doing anything that would be required of them. In turn, the *manual search* group was exposed to more travel-related information than the other groups because they scrolled through the page while searching the relevant information. Numbering all pieces of information on the page and providing the number of the relevant piece were efforts employed in an attempt to diminish exposition to additional information.

However, given that the extra, irrelevant information was formatted as quick answers too, it is possible that participants processed a considerable amount of it in addition to the target information. In this case, having learned more during the first phase of the experiment could have matched their confidence regarding the tasks of the second phase with that of the other groups. Another explanation is that the *manual search* task stimulated greater attention while processing new information and this extra attention improved their encoding of new information during Phase 1. In this case, their confidence matched with the other groups not due to having learned more, but to having learned better.

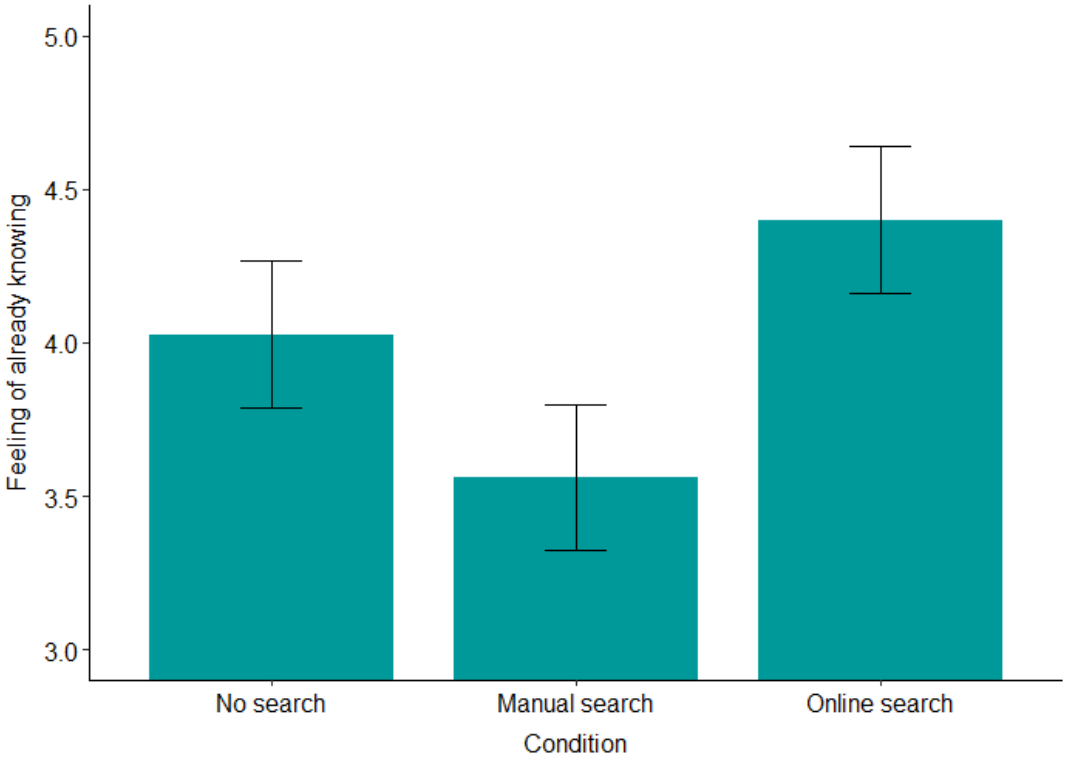

Figure 3. Means and ± SEM of the feeling of already knowing (knowledge misattribution) across *search* conditions in Study 2.

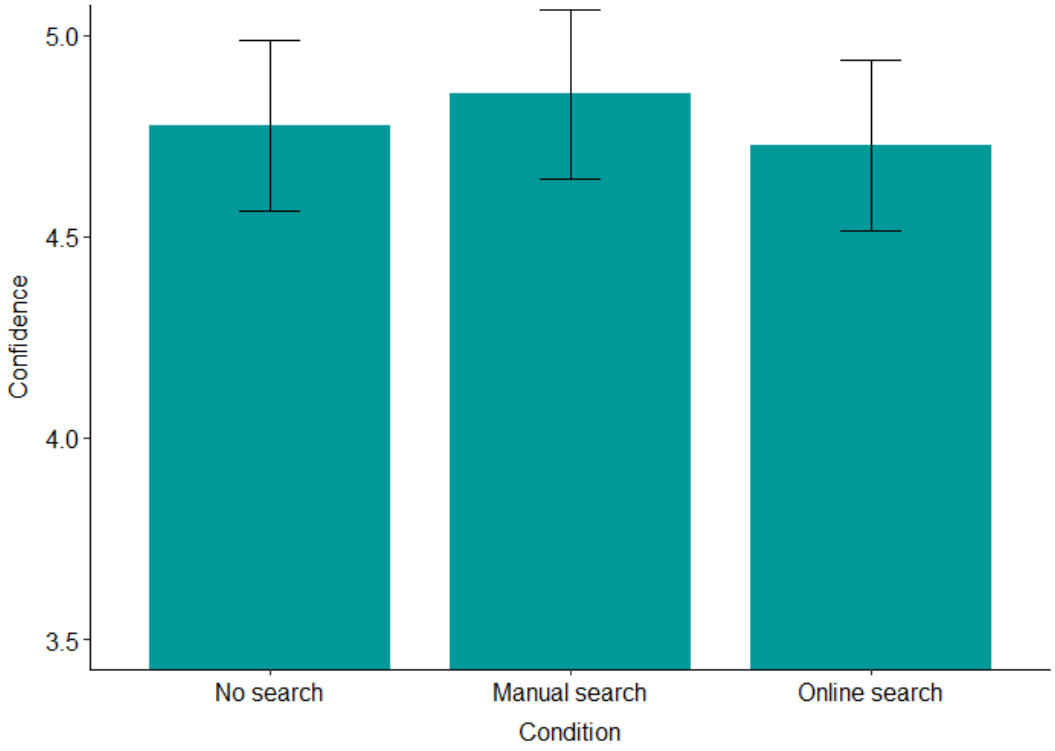

Figure 4. Means and ± SEM of confidence (in decision-making abilities) across *search* conditions in Study 2.

The speculative explanations outlined above exemplify how different factors, particular to each experimental condition, might have contributed to equalize levels of confidence across groups. Alas, these explanations are not testable here. However, the theoretical account of Google effects on decision confidence proposes knowledge misattribution as a distinctive mechanistic factor of Google-induced boosts in confidence. Thus, the *online search* group is the only experimental group that should have their levels of confidence driven, at least in part, by the feeling of already knowing. According to this premise, examining the mediating role of knowledge misattribution in the relationship between the experimental conditions and participants' confidence (Figure 5) should help disentangle Google-induced confidence from confidence driven by other factors in the *no search* and the *manual search* conditions.

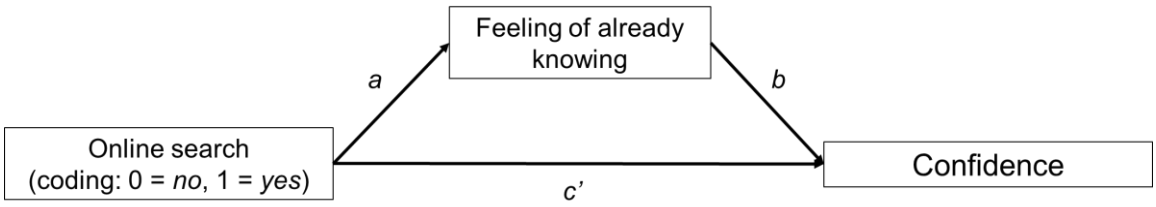

Figure 5. Mediation model used to examine the role of the feeling of already knowing (knowledge misattribution) in Google-induced overconfidence in decision skills in Studies 2[2] and 3.

Results of the path analysis of the mediation model are shown in Table 2. Supporting the hypothesis that confidence levels in the *online search* group were a consequence of knowledge misattribution, the mediation analysis revealed a significant indirect effect of Internet search on confidence mediated by participants' feeling of already knowing, $b = 0.18$, BCa bootstrap 95% CI with 10,000 samples= [0.02, 0.40].

Table 2. Results of the path analysis in Study 2: unstandardized coefficients, standard errors, test statistics, and Pearson correlations.

Path	*b*	*SE*	Test	*r*
a	0.61	0.29	95% CI = [0.03, 1.19], $t(119) = 2.08$, $p = .040$	.19
b	0.29	0.08	95% CI = [0.14, 0.44], $t(118) = 3.83$, $p < .001$	.33
c'	-0.27	0.25	95% CI = [-0.76, 0.22], $t(118) = 1.08$, $p = .284$	-.10

Note: Based on the mediation model in Figure 5.

[2] In the coding of the *search* condition, *no search* and *manual search* are comprised in the *no online search* level, coded as 0.

Discussion

Evidence from Study 2 supports the idea that accessing new information through Google creates the sensation that the information found online is not new, but something that was stored in internal memory all along – i.e., people misattribute external knowledge (from the Internet) to themselves. Results suggested that this knowledge misattribution is not a general feature of information search, but rather a particular consequence of using an online search tool. Even though confidence in decision skills was the same across the three *search* conditions, levels of confidence in the *online search* group outstandingly stemmed from this misattribution.

Study 2 successfully illuminated the process through which online search influences confidence in decision abilities, but was unsuccessful in the attempt to single out inflated confidence due Internet search. I speculate that uncontrolled factors related to the *no search* and the *manual search* conditions equalized confidence across all experimental conditions. Study 3 attempts to disentangle Google-induced boosts in confidence using the experiment procedure adopted in Study 1 and provide additional support to the proposed process behind Google effects on confidence.

STUDY 3: GOOGLE-INDUCED KNOWLEDGE MISATTRIBUTION *INFLATES* CONFIDENCE

Study 3 combined the materials used to manipulate access to information in Study 1 with the measures of knowledge misattribution and confidence used in Study 2. One of the purposes of this study was to provide further support to the mechanistic process unveiled in Study 2. It is possible that exposing participants to information in the form of quick answers contributed to effects on knowledge misattribution because of the simplistic format in which answers were presented. It is easier to formulate simplistic than deeper, detailed answers, so it may be easier to misattribute information in the form of a snippet to one's own knowledge than information in the form a more detailed text. When people read full articles instead of quick answers, the complexity involved in and the effort demanded when processing the information might shed light on the divide between internal and external knowledge. If this happens, the use of full articles for the information exposure procedure of Study 3 should not be successful in finding evidence of the mediating role of knowledge misattribution. On the other hand, empirical support for the mediation using full articles attests to the resilience of the mechanism to the format of the information.

Another plausible perspective is that, in Study 2, the quick answer format facilitated knowledge misattribution among participants who did not search the Internet, diminishing the effect of online search. In this case, unless the full article format helps recognize online information and internally held information, exposing people to full articles should increase differences in knowledge misattribution between those who accessed them through Google and those who did not.

Another purpose of Study 3 was to bring out the inflated confidence of participants in the *online search* group. In Study 2, a possible driver of confidence in the *no search* group was inferred "friendliness" of tasks in Phase 2 due to participants' experience with the learning task of Phase 1. Switching from information in the form of quick answers to information in the form of full articles should reduce tendencies to make such an inference because full articles are a more complex form of information presentation.

No *manual search* condition was included in Study 2 for two reasons. First, although using full articles for the irrelevant information participants would have to deal with during the process of finding the target piece could help avoid the processing of additional information, it would increase the amount of content presented to the *manual search* group. This could overwhelm or stress participants and, consequently, lead to disengagement with the task. Second, if there is an "extra attention" benefit in *manual search* that improves information encoding, unless overwhelm or fatigue impinge on attention, manual search is most likely to always equalize levels of confidence. Unlike Google-induced confidence, this confidence is not illusory. However, testing this difference in confidence calibration requires an objective test of decision skills. This is doable in contexts where decisions have objectively assessable outcomes (e.g., financial decisions), but not in the context of personal experiential choices (e.g., places to travel).

In addition to these considerations, Study 2 suggests not only that manual search does not lead to increases in confidence driven by knowledge misattribution, but also that knowledge misattribution after no search and after manual search are not statistically different. Considering that Study 3 focuses on the same mechanistic process as Study 2, there is no reason to expect that results at the process level (i.e., Figure 5)

would be different if a *manual search* condition was added to the design or replaced the *no search* condition.

Method

Participants and design

Participants (N = 143) were again recruited on Amazon's Mechanical Turk and completed the study on Qualtrics. The experiment followed a single-factor design with two levels: *no search* vs. *online search*.

Procedure and measures

The same two-phase structure used in the previous studies was employed in Study 3.

Phase 1. The learning phase of Study 3 used the same materials used for the experimental manipulation in Study 1.

Phase 2. As in the previous study, participants were led to believe that the second part of the study consisted of a quiz. The same approach to measure knowledge misattribution and confidence adopted in Phase 2 of Study 2 was used in Phase 2 of Study 3.

Results

Even though participants were exposed to information in a longer and more complete format than the format used in the experimental induction of Study 2, the results again provided evidence of knowledge misattribution. The *online search* group reported greater levels of the feeling of already knowing the information in Phase 1 (*M*

= 4.48, *SD* = 1.56) than the *no search* group (*M* = 3.73, *SD* = 1.70), *t*(141) = 2.64, 95% CI = [0.19, 1.31], *p* = .009, *d* = 0.46. The difference between the experimental conditions is depicted in Figure 6.

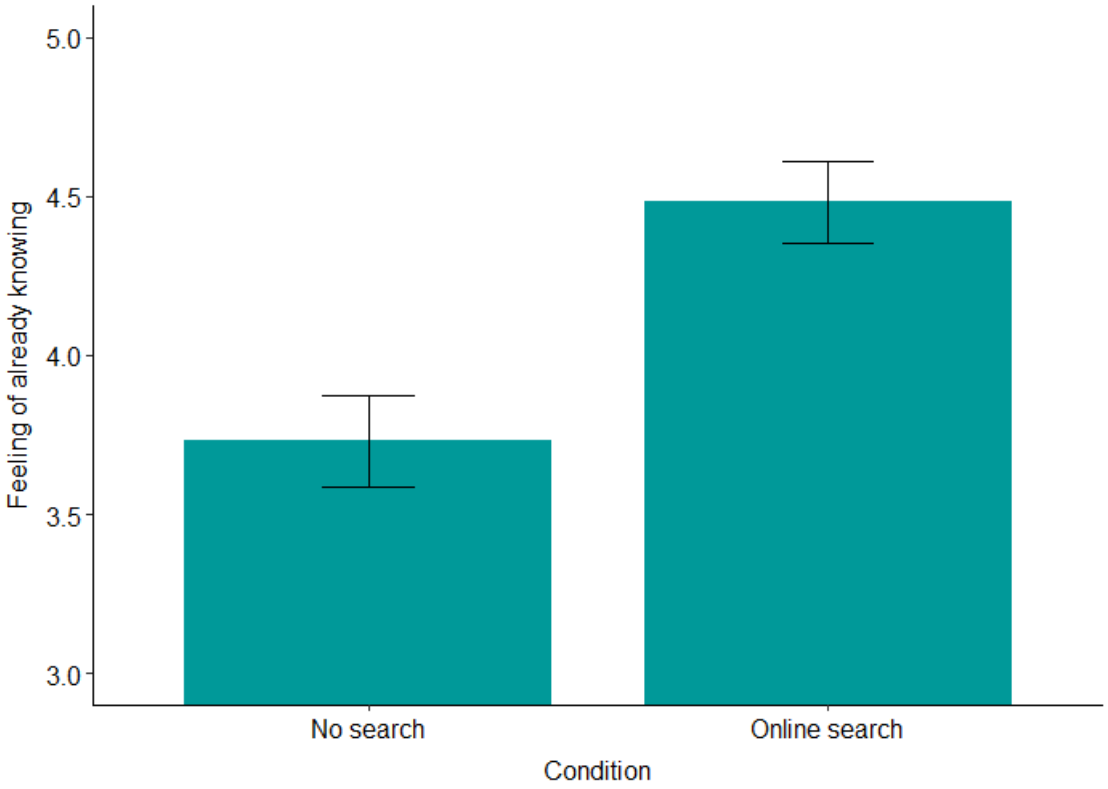

Figure 6. Means and ± SEM of the feeling of already knowing (knowledge misattribution) across *search* conditions in Study 3.

In addition to differences in participants' feeling of already knowing depending on the method of information access, the *online search* group was more confident in their capacity to select the superior travel itinerary (*M* = 5.19, *SD* = 1.05) than the *no search* group (*M* = 4.81, *SD* = 1.11), *t*(141) = 2.01, 95% CI = [0.01, 0.75], *p* = .046, *d* = 0.35 (Figure 7). Thus, unlike the previous study, the current experiment successfully singled

out Google-induced inflation of confidence in decision-making abilities. Next, the mechanistic process behind this rise in confidence is examined.

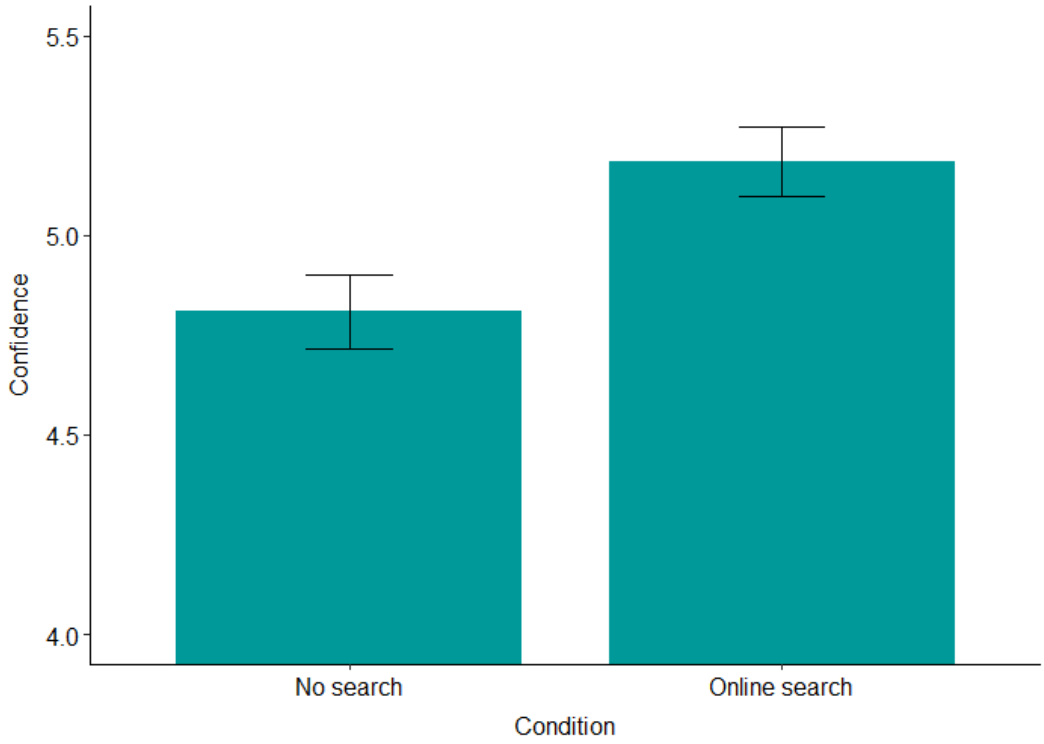

Figure 7. Means and ± SEM of confidence (in decision-making abilities) across *search* conditions in Study 3.

A mediation analysis was conducted to examine the contribution of Google-induced knowledge misattribution to the levels of confidence among participants who accessed the travel-related information through online search. The model used for this analysis was the same mediation model used in Study 2 (Figure 5). Thus, results should (and did) replicate the mediation analysis conducted in the previous study. Table 3. *Results of the path analysis in Study 3: unstandardized coefficients, standard errors, test statistics, and Pearson correlations.* displays the results of the path analysis.

Supporting the proposed role of knowledge misattribution as a driver in the mechanistic process of Google-induced confidence in decision skills, results once more revealed that the feeling of already knowing information found on the Internet mediated the effect of online search on confidence in decision skills, $b = 0.09$, BCa bootstrap 95% CI with 10,000 samples= [0.01, 0.26].

Table 3. Results of the path analysis in Study 3: unstandardized coefficients, standard errors, test statistics, and Pearson correlations.

Path	*b*	*SE*	Test	*r*
a	0.75	0.17	95% CI = [0.19, 1.31], $t(141) = 2.64$, $p = .009$	.22
b	0.12	0.05	95% CI = [0.02, 0.23], $t(141) = 2.28$, $p = .024$	.19
c'	0.28	0.19	95% CI = [-0.09, 0.66], $t(141) = 1.50$, $p = .137$	.13

Note: Based on the mediation model in Figure 5.

Discussion

The current experiment shows that the knowledge misattribution phenomenon is not confined to the use of information in the form of quick answers and can arise even when people access full articles on websites, as long accessing these articles involves searching the Internet. As in the case of quick answers, the feeling of already knowing new information was shown to drive confidence in decision skills. Importantly, since the materials used to expose participants to new information in Study 3 avoided uncontrolled factors that, in the Study 2, could have equalized the confidence of the *no search* group with the confidence of the *online search* group, the current study successfully exposed that Internet search engenders inflated levels of confidence to perform the decision task.

This initial set of experiments (Studies 1-3) demonstrate that decision-making is one type of task that can be impacted by Google effects on metacognition. Decision skills include cognitive capacities (e.g., identifying superior options) that are distorted in people's assessment of their own cognitive abilities. These distortions emerge because searching the Internet does not feel so much like accessing information from an external source as when the same information is explicitly provided to us by an external entity (e.g., the *no search* conditions) or accessing it requires the manual effort of going through information storage materials (as emulated by the *manual search* condition in Study 2).

Alas, there are limitations to this initial set of studies and conceptual pieces need to be further explored for a more complete picture of the phenomenon of Google-induced overconfidence in decision abilities. Some of these limitations and pieces are outlined in the "GENERAL DISCUSSION" section and proposed as avenues for future research. Importantly, Studies 1-3 achieved the goal of empirically establishing that Internet search brings about metacognitive miscalibrations that change how we perceive our capacity to make personal decisions. With this foundation, the remainder of this research focuses on the demonstration of a downstream consequence of Google effects on decision confidence in the context of experiential choices.

RESEARCH BACKGROUND II: THE SELF-FULFILLING PROPHECY OF GOOGLE-INDUCED DECISION CONFIDENCE

At an initial glance, the idea of Google-induced extra confidence in decision-making abilities might be worrisome. This concern could stem from the combination of two factors. First, the fact that, increasingly, our society incorporates the Internet and its search engines as seamless components of the daily life makes escaping from the influence of the Internet harder and costlier. It is true that not all Google search will lead to cognitive miscalibrations like inflated confidence in decision skills. For instance, when the question prompting the search is either extremely easy or extremely difficult to answer, Internet search does not increase cognitive self-esteem (Ward, 2013b). Similarly, recent experiments show that experts are less likely to become victims of Google-induced distorted perceptions of skills involved in making some kinds of decisions (Ward et al., 2018). However, considering how intensely tools like Google are relied upon, there are high chances that search queries that entail cognitive miscalibrations happen on a daily basis, as part of the mounting Internet searches that are processed every day. Basically, even though we do not suffer metacognitive distortions every single time we use Google, we use Google so much that it is likely that these distortions will arise at some point in any given day.

Second, overconfidence carries with it a number of disadvantages and undesirable consequences. For instance, overconfidence has been associated with causes of wars (Johnson, 2004). Positive illusions of this kind have also been considered as one of the roots of recklessness in dealing with environmental problems because they entail misleading optimism with respect to chances to avoid or solve environmental degradation (Johnson & Levin, 2009). In the context of negotiations between managers and union representatives, there is evidence that overconfident managers display less

concessionary behavior and make less successful deals (Neale & Bazerman, 1985). Even major financial crises have been associated with the widespread overconfident behavior of key actors of the financial sector (Akerlof & Shiller, 2009).

Previous research has also focused on contexts of personal decisions, often portraying overconfidence as a cognitive trap for decision makers (e.g., Hammond, Keeney, & Raiffa, 1998). Research on investor behavior provides concise arguments for this view: overconfident investors trade excessively but have reduced returns (Barber & Odean, 2001). Overconfidence has also been argued to be associated with gambling tendencies (Lakey, Rose, Campbell, & Goodie, 2008) and excessive betting on one's own performance (Campbell, Googie, & Foster, 2004).

Along these lines, research conducted alongside the present research highlights behavioral consequences of Google-induced overconfidence in investing skills (Ward et al., 2018). In one study, after learning investing-related information – concepts that people could wish to learn while trying to educate themselves about the "world of investing" (e.g., "What is a 'Bear Market'?") – through Internet search (vs. no search), participants completed an investment task for which they could receive a monetary reward based on their performance. Just before the investment task, participants could balance how much of the reward would consist of a fixed value and how much would depend on their performance (see Fox & Tversky, 1995). Right after completing the investment task (but before having any feedback of their performance), participants had the opportunity to change their bets. Results showed that the group that searched the Internet bet more on their performance but did not perform better. Moreover, carrying out the investment task did not recalibrate participants' confidence in their investing skills (participants did not change their bets when the opportunity for it was given after the investment task).

In another experiment by the same authors, the investment task consisted in the simulation of a retirement plan (inspired on platforms like Betterment) where participants chose how to allocate an initial amount of $10,000.00 between bonds and stocks. The instructions for this simulation explicitly stated that allocating more money on bonds was considered a more conservative strategy whereas allocating more money on stocks was a more aggressive one (alluding to the concept that stocks are a riskier investment than bonds). Before making the allocation, participants received a recommendation from the system of the simulation suggesting how much they should invest in stocks based on their age. The recommendation included a range around the suggested percentage and explained that investing above (below) that range would be too aggressive (conservative) for them. The group that used Google to access investing-related information before the simulation deviated more from the recommendation. Moreover, this deviation gravitated towards the limit of allocation on stocks above which their investment would be considered aggressive. Thus, Google-based financial learning not only hindered advice-taking but also motivated riskier investing behavior.

Although there are worrying consequences, overconfidence must carry certain advantages with it that overshadow its costs. Otherwise, the evolution of the human species would have extinguished overconfidence a long time ago – instead of allowing it to become, to some extent, a default feature of human beings (e.g., Moore & Healy, 2008). Previous research has shed some light on this puzzle and identified certain circumstances in which operating under the influence of positive illusions pays off. In particular, some areas that require people to cope with high uncertainty (e.g., international relations, novel technologies, untested allies) tend to reward overconfident behavior (Johnson & Fowler, 2011).

From an evolutionary perspective, another possible contribution of overconfidence might reside in the maintenance of a motivation to stay alive. In critical situations like life threats, overconfidence can motivate people to resist. In contexts that are not necessarily so critical, but (like Google) are perhaps more common in modern life, overconfidence might reward us with self-fulfilling prophecies that benefit our sense of accomplishment, well-being, and satisfaction with life. Studies 4 and 5 were built on this concept and showcase an instance of such prophecies.

To dissertate on the self-fulfilling prophecy hypothesis, it might be helpful to revisit the concept of overconfidence as a trap for decision makers. This concept stems from observations in settings in which the chosen option can be objectively verified to be superior or inferior to the dismissed alternatives – e.g., financial decisions. Monetary profits and losses from an investment, a gamble, or a negotiation are observable and directly measurable. Importantly, the outcomes of the options available in this kind of decision context are independent of the decision maker's perceptions– e.g., a financial investment yields returns or losses regardless of how the investor feels about that particular investment.

The objective verification of the outcome is not tangible for all kinds of choices – or at least not as much as in contexts like the ones mentioned above. The outcomes of experiential choices (e.g., watching a movie, traveling, listening to music, hedonic consumption of food) are certainly less sharply defined than the outcomes of financial investments. Curiously though, one might argue that the experiential, subjective outcomes of choices are much more prevalent than the objective, verifiable ones. After all, because even decision contexts that revolve around objective outcomes can be assessed on the merits of their experiential qualities (e.g., investing can be described and evaluated as an experience, instead of simply a means to increase wealth).

It is true that, just as people make financial decisions aiming for the best outcomes (i.e., higher profits), people make experiential choices with the aim of having the best experience. However, because experience superiority is not an objective assessment, one's conclusion about her or his own experience is subject to the influence of numerous factors that are extrinsic to the features engineered into the experience itself. Many of these factors - including mood, personal values, and biased beliefs – are internal to the individual (even though they can be dictated by external forces) and change experiences through top-down processes.

Lee, Frederick, and Ariely (2006) provide a good example of the influence of top-down processing on experiences in their "MIT brew" studies. These studies involved tasting and evaluating two beers: a regular one and the "MIT brew." The latter was adultered with balsamic vinegar (an ingredient that, with the dose used in the experiments, does not degrade the flavor of the beer, but sounds unappealing for participants). A group of participants tasted both beers without knowing of the balsamic vinegar, another group was told of the balsamic vinegar in the "MIT brew" before tasting the beers, and another group received this information right after tasting the beers. Preference for the "MIT brew" was lower among those who received the information before drinking the beer. Preference of participants who received the information after drinking the beer was no different from the preference of blind tasters.

In essence, awareness of the balsamic vinegar shaped participants' thoughts about the taste of the beer even before they experienced what the beer actually tasted like, forming the expectation of a bad taste. This expectation came true in the drinking experience: they drank the same beer as the other groups but had a less pleasant experience.

A different example of how top-down processing can conform experiences to expectations is given by Klaaren et al. (1994). In a study where participants watched Charlie Chaplin's *The Immigrant*, the experimenter said things suggesting that the movie was good and enjoyable to half of the participants before they watched it, promoting the expectation of a positive experience. The affective expectation established by such prior information colored participants' movie experiences: those who heard the positive comments from the experimenter reported enjoying the movie more than those who did not hear any comment.

Lee et al.'s beer experiments and Klaaren et al.'s movie experiment illustrate how the subjective nature of experiences allows self-fulfilling prophecies to arise and make the same experience feel different. In both cases, an external force (information about the upcoming experience) was internalized in people's schemata to cope with and process the upcoming experience. The beliefs that incorporated the external information about the experience pre-shaped perceptions of what the experience was like. But can internal forces inform these beliefs and exert this same kind of influence on an upcoming experience?

Recall that, in Studies 2 and 3, Internet search led participants to estimate that they would be capable of selecting the superior option even before they engaged in the decision task and knew the alternatives from which they could choose. An interpretation of these studies is that participants' Google-induced overconfidence produced positive expectations about their own future choices. In essence, because mastering the skills to select superior options from a set of alternatives should lead to optimal choices, confidence in decision skills produces the expectation of an optimal outcome of the choice.

Because choice superiority of subjective experiences is not objectively verifiable, such an expectation can guide how the individual feels and perceives her or his experience even when confidence in decision skills incorporates metacognitive errors induced by the Internet. These errors will simply not be corrected by the subjective experience. Moreover, in addition to the spillover of affective expectations into the experience, confidence-driven expectations can exert a reinforcing effect on choice perception by refraining post-choice uncertainty, which can occupy the individual's mind with "what if" thoughts about the dismissed alternatives and impede immersion in the experience with the chosen option. In line with this idea, previous research has found that individuals with "greater subjective knowledge are likely to feel less confused and more certain about the quality of their choice" (Raju et al., 1995, p. 175).

Studies 4 and 5 explored the idea that inflated confidence in decision-making skills due to Internet search improves subjective experiences by forming the belief that these skills safeguard the promise of optimal experiential choices.

STUDY 4: GOOGLE-INDUCED CONFIDENCE IMPROVES EXPERIENCES

Inspired by previous research on the effects of affective expectations on experience enjoyment (Klaaren et al., 1994), Study 4 explored experiences with movies. Specifically, this study used short animated films.

The basic idea of Study 4 was to boost participants' confidence in their abilities to make film choices by having them search for information related to animation and movies on the Internet. Then, participants would have the opportunity to choose an animated short film. After watching the chosen film, participants would complete measures that should reveal if their experience was different from that of participants who accessed the same information without online search.

Besides experience enjoyment, two other outcomes of Google-induced overconfidence were examined after participants watched the film. One of them assessed choice evaluation, which should be more positive among participants with overconfidence induced by the Internet. The other one assessed choice confidence, strategically measured by assessing participants' belief in the superiority of the film they chose to watch in relation to the dismissed options. Internet search should trick participants into forming stronger beliefs in the superiority of the selected option.

Both these choice-related measures were designed to help mapping greater enjoyment not simply to extra confidence and self-esteem in the area of films, but specifically to confidence in decision abilities in this domain. This is a central analysis for the self-fulfilling prophecy hypothesis elaborated in the previous section. External to this hypothesis, non-choice-related forces that can emerge from Internet search could contribute to increased enjoyment. One such force could be individuals' engagement with the domain of the stimulus: more so than receiving information without search, googling facts about animation and films might boost interest and set up a more

favorable affective state to go through experiences with animated films in general. In this case, experience enjoyment might be increase after searching the Internet, but perpections of choice superiority should be necessarily higher.

Another potential force stems actually from confidence, but not in the strict sense of positive perceptions of one's own decision skills and rather unrelated to expectations occasioned by these perceptions. A sense of mastery of cognitive skills that are relevant in a specific context might elevate feelings of preparedness to navigate through experiences that occur in that context (the Google effect on the persuasion knowledge dimension of consumer self-confidence [Study 1] might reflect this phenomenon to a certain extent). This overall self-perceived capacity to navigate through the experience can be a source of enjoyment.

These (and other) factors might contribute for a better film experience after online search, but here I focus on how Google-induced confidence in decision skills changes experiences. Better post-experience choice evaluation and increased choice confidence are part of and help illuminate this process.

Method

Participants and design

Participants (N = 310, after the exclusion of 40 participants who stopped watching the film before the end credits and 5 participants who admitted interrupting the study to do some unrelated task[3]) were recruited on Amazon's Mechanical Turk and completed

[3] Neither skipping part of the film nor interrupting the study was associated with the experimental condition, $X^2(1) = 0.003$, $p = .95$ and $X^2(1) = 1.31$, $p = .253$, respectively.

the study on Qualtrics. The experiment followed a single-factor design with two levels: *no search* vs. *online search*.

Procedure

Study 4 involved three phases. Each phase is described below.

Phase 1. The first section consisted in an information exposure procedure in the same vein as Studies 1-3. However, instead of reading travel-related information, participants read about topics related to movies – in some cases with a specific focus on movie animation (e.g., "What is CGI animation"? – see full list in Appendix A).

The topics and information used to induce overconfidence returned to the quick answer format adopted in Study 2. That is, all topics were selected so that, when using them as the search term on Google, the results page would provide a straightforward answer in the "Answer Box" on the top of the page followed by results in the traditional format (i.e., links). As in Study 2, participants randomly assigned to the *online search* condition received a link that would open Google on a new window and were instructed to search information about each topic online. The instructions explicitly said that the information in the "Answer Box" was sufficient for the study. The same information was presented to participants in the *no search* condition without requiring them to engage in online search. Each participant received five randomly selected topics.

The quick answer format was preferred in this study because of the introduction of a new phase in the procedure, Phase 2 – a choice and experience section. This factor combined with the information format adopted in Studies 1 and 3 (full articles instead of quick answers) could make the experiment excessively demanding and lead to fatigue and disengagement of participants before they completed the study. Importantly, in the current study, the disadvantages of using quick answers revealed by Study 2 should not

affect the results. In Study 2, it was hypothesized that the quick answer format led *no search* participants to infer that the difficulty of the decision task in Phase 2 was lower (compared to the other groups), leading them to display the same levels of confidence as participants who had their confidence inflated by Google-induced feelings of already knowing information found online. In the current study, at no point beliefs about the upcoming parts of the study were measured. Instead, the outcome measures are backward-looking (see *Measures*). Also, terms that allude to the notion of a challenge or any kind of test of skills (e.g., "quiz") were not used in prompts and instructions of the experiment to avoid performance concerns and related thoughts about the technical difficulty of parts of the study that could influence participants' self-confidence.

Phase 2. The second part of Study 4 consisted in a choice and experience phase. In the beginning of this phase, participants read the following introduction:

> *In this section, you will be presented with three short animated film options. These short animations were created by film students from different film schools around the world during their internships in professional studios and will be officially released during a festival on July (details will be provided at the end of the study).*
>
> *Based on the information that will be provided for each film option and using your ability to make film choices (as when you go to movie theaters), you will choose a short animated film to watch.*
>
> *After watching the film, you will complete a short questionnaire about it.*

Participants had the opportunity to select a short-animated film from a set of three options: "The Answer," by Florent Rubio and Xin Zhao (2015); "Réflexion," by Planktoon and Yoshi Tamura (2012); and "The God[4]," by Konstantin Bronzit (2003). These films were pretested with a separate sample (N = 88) to ensure they no systematic effect of the film on experience enjoyment. Participants of the pretest were randomly assigned to watch one of the three movies and then expressed how much they liked it (same measure as in the main study – see *Measures*). The pretest showed no differences across films, $F(2, 85) = 0.27$, $p = .762$.

Film frequency was the same across experimental groups, $X^2(2) = 1.48$, $p = .48$, suggesting that the experimental condition did not affect participants' choices. More importantly, this means that although three different films were watched across the sample, both experimental groups had virtually the same experience.

Phase 3. Participants reported how much they liked the short animation (experience enjoyment) and completed the measures of choice evaluation and choice confidence. No item assessing participants' thoughts about the quality of their film choice was presented before the film experience because of the risk that participants would complete post-experience measures in an effort to remain consistent with their own responses provided just before watching the film and considering their own theories about the purpose of the study (i.e., demand effects – Orne, 1962). This behavior would diminish the impact of objective features of the experience on their post-experience responses, clouding the influence of affective expectations driven by the experimentally induced extra confidence due to a commitment to previously exposed beliefs. Moreover, Studies 1-3 demonstrate Google-induced confidence in decision skills before experiencing one's own chosen option. Studies 2 and 3 show

[4] No official page from the creators with or about this film was found when this document was prepared.

Google-induced confidence in the quality of a specific decision even before the opportunity to make that decision. Considering that this pre-choice confidence has been established, in the current study, instead of increasing chances of demand effects, differences in decision-related measures that succeeded the film experience were conceptually mapped to the positive illusions evidenced in the previous experiments (see the "Measures" section).

On the final page Phase 3, participants completed personal information questions and were thanked and debriefed. The complete dataset is available at OSF.

Measures

Choice evaluation, choice confidence, and experience enjoyment were measured in this study.

Choice evaluation consisted of a question asking "What do you think about your film choice?" with answers ranging from 1 = *It was a very bad choice* to 7 = *It was a very good choice*. Because this variable was measured after participants watched the animated film, responses were likely colored by information from the film experience. At the same time, by asking the question in terms of the "choice," instead of the film or the experience, this item should capture reminiscent information about participants' affective expectation – which was not measured before they watched the film to avoid demand effects and attempted response consistency. This is an important consideration for the serial mediation model examined in this study (more details in the "Results" section).

The measure of choice confidence asked participants to complete the following item, "Considering the three film options you could choose from, you believe the one you chose is:" using a 7-point scale ranging from 1 = *Much worse than the others* to 7 =

Much better than the others. Again, by framing the item in terms of the "choice" and, also, capitalizing on the fact that participants did not have the opportunity to watch the dismissed options, this measure attempted to capture information that anteceded the experience – in this case, participants' confidence in the higher quality of their selected option. Without this swollen confidence being brought into the experience, participants should process information from the experience in such a way that the inferred quality of the dismissed options would be of a similar level (i.e., the experience would be used as a reference point).

Experience enjoyment was measured by asking participants "How much did you like the film you watched?" (7-point scale, 1 = *I strongly disliked it*, 7 = *I liked it very much*).

The order of the items was randomized.

Results

Results revealed that choice evaluations of participants who accessed film-related knowledge through online search before choosing the short film was better (M = 5.26, SD = 1.53) than the evaluations of those who were exposed to the same knowledge without online search (M = 4.88, SD = 1.74), $t(308) = 2.01$, 95% CI = [0.01, 0.76], p = .045, d = 0.23 (Figure 8). Participants who searched the information online were also more confident that their chosen option was superior to the dismissed alternatives (M = 4.99, SD = 1.34) compared to participants who did not search online (M = 4.67, SD = 1.46), $t(308) = 2.00$, 95% CI = [0.01, 0.65], p = .046, d = 0.23 (Figure 9). Thus, it seems that inflated perceptions of decision skills were reflected in participants' feelings and perceptions even after they experienced their chosen option. This inflation was such that

participants remained confident that they achieved the best possible outcome given the set of alternatives even though they had no access to the rejected alternatives to make proper assessments about them.

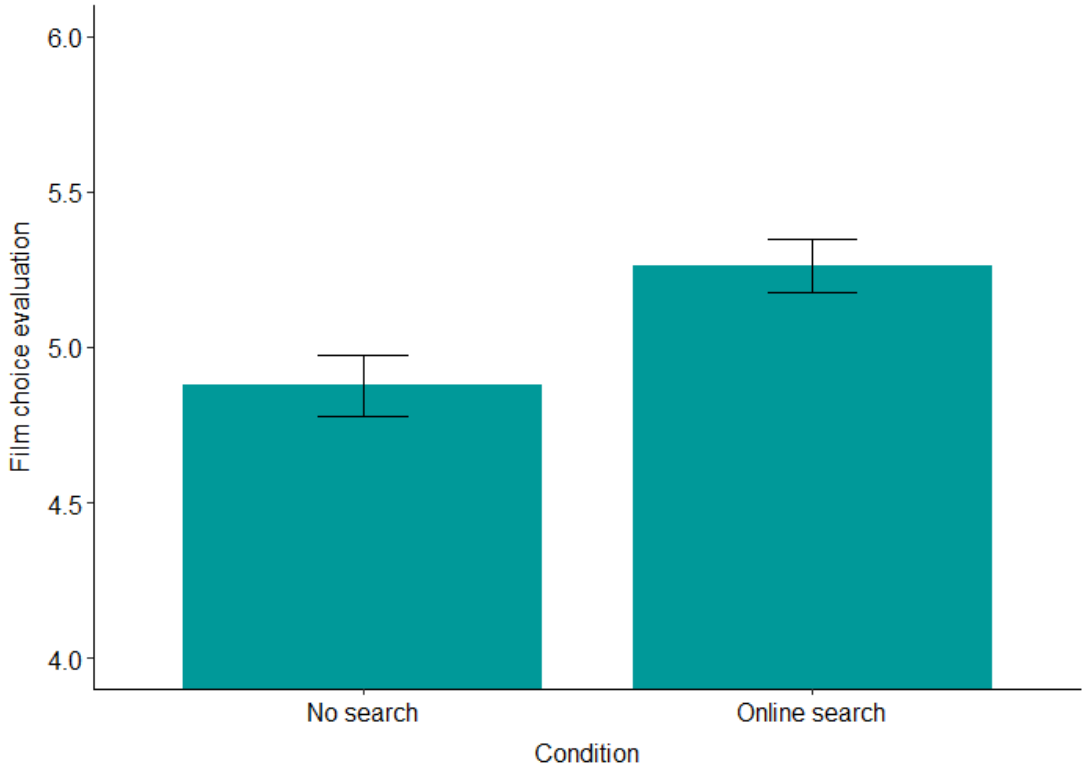

Figure 8. Means and ± SEM of choice evaluation across *search* conditions in Study 4.

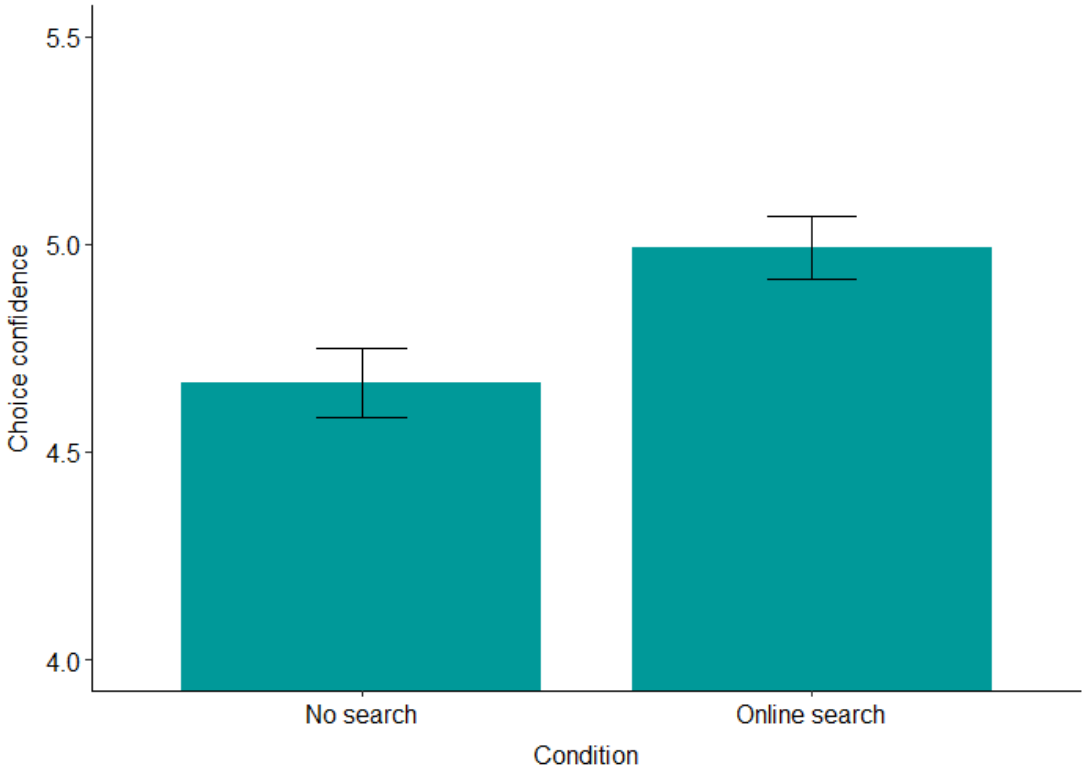

Figure 9. Means and ± SEM of choice confidence across *search* conditions in Study 4.

In line with the self-fulfilling prophecy hypothesis, the *online search* group also reported higher levels of enjoyment of the experience (M = 5.19, SD = 1.46) compared to the *no search* group (M = 4.84, SD = 1.64), with the significance level of this difference approaching the typical threshold of alpha = .05, $t(308) = 1.95$, 95% CI = [-0.002, 0.71], $p = .052$, $d = 0.23$ (Figure 10).

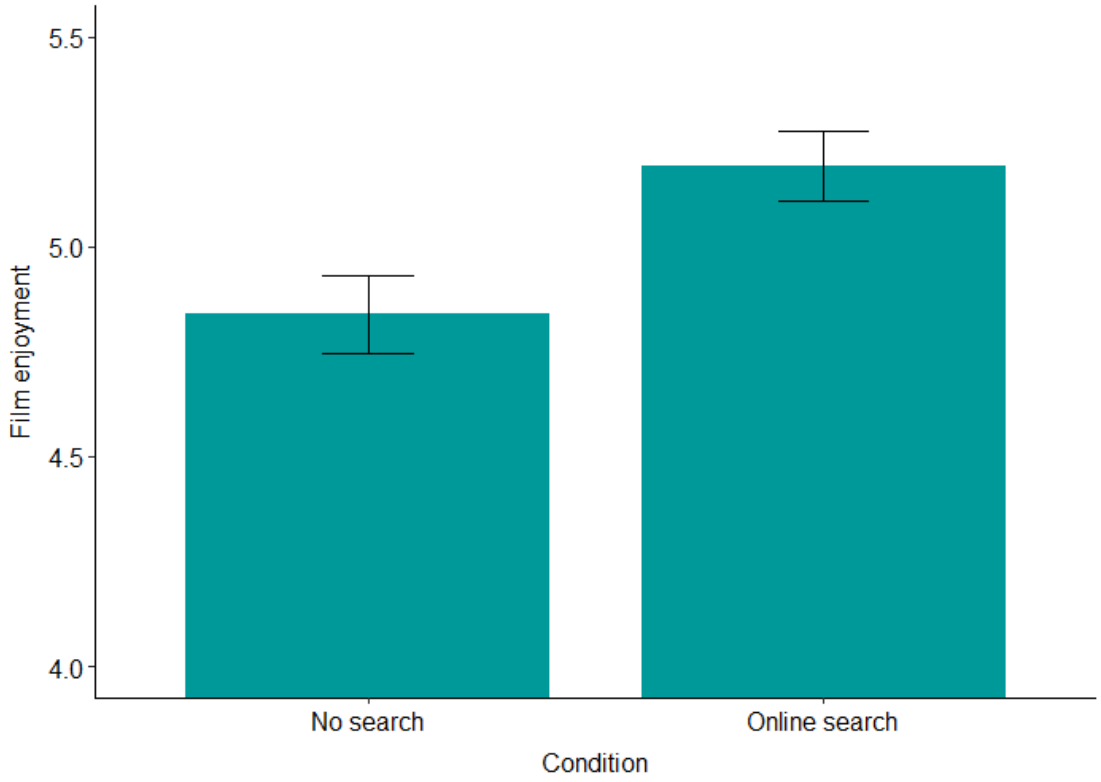

Figure 10. Means and ± SEM of experience enjoyment across *search* conditions in Study 4.

To demonstrate elements of the mechanistic the process behind this phenomenon (that were not explored in Studies 2 and 3), choice confidence and choice evaluations were tested as mediators of the Google effect on experience enjoyment. Initially, choice confidence was examined in a simple mediation model (Figure 11). The model builds on the idea that positive perceptions of one's own capacity to make optimal decisions (even when inaccurate) guide confidence in the quality of one's choice, and such confidence alters one's experience with the chosen option. Results of the path analysis are shown in Table 4. The test showed that choice confidence mediated a significant indirect effect of online search on enjoyment, b = 0.26, BCa bootstrap 95% CI with 10,000 samples= [0.01, 0.53].

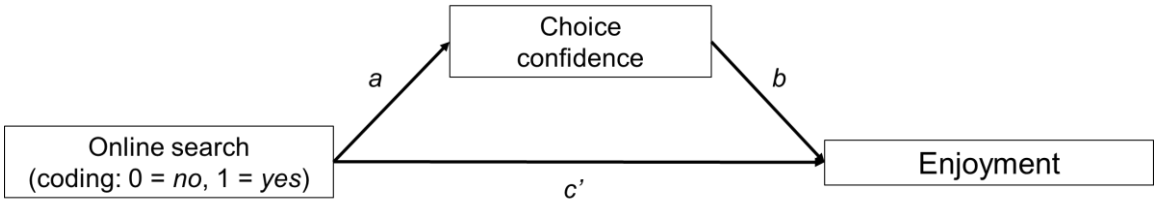

Figure 11. Mediation model used to examine the role of choice confidence (confidence in the superiority of the selected experience relative to the dismissed ones) in Google-driven influences on subjective experiences in Studies 4 and 5.

Table 4. Results of the path analysis of the single mediator model in Study 4: unstandardized coefficients, standard errors, test statistics, and Pearson correlations.

Path	*b*	*SE*	Test	*r*
a	0.33	0.16	95% CI = [0.01, 0.66], $t(308) = 2.00$, $p = .046$	.11
b	0.79	0.04	95% CI = [0.71, 0.88], $t(307) = 17.89$, $p < .001$	.71
c'	0.09	0.13	95% CI = [-0.16, 0.35], $t(307) = 0.74$, $p = .458$	.04

Note: Based on the mediation model in Figure 11.

This mediation analysis supports the idea that confidence in decision-skills induced by Internet search informed beliefs of choice superiority, which spilled over into and improved the film experience. It follows that to the extent that the selected option was believed to be the best alternative, participants should expect that experiencing it would confirm the quality of their choice. In turn, this expectation adds to the objective features of the chosen option – which are the same for any person –, producing a different subjective experience with the same content. Assuming that participants' choice evaluations included reminiscent information about this affective expectation, choice evaluation should mediate the relationship between choice confidence and

experience enjoyment. With this in mind, choice evaluation was introduced in the model and a serial mediation was tested (Figure 12).

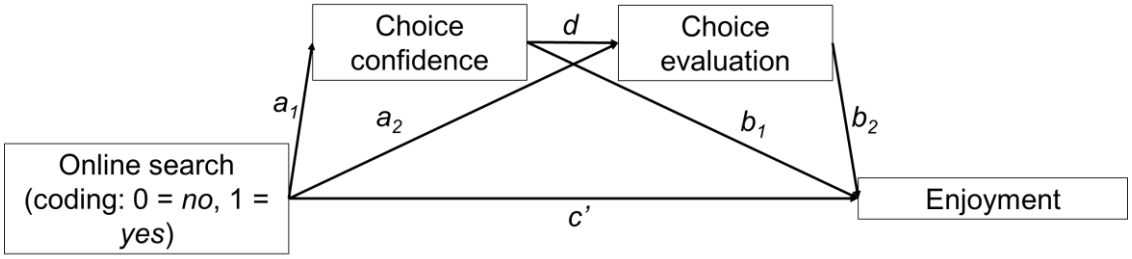

Figure 12. Serial mediation model used to examine the role of choice evaluation (affective expectation) as an outcome of Google-induced choice confidence that changes subjective experiences in Studies 4 and 5.

Results of the path analysis are shown in Table 5. The analysis of the indirect effects revealed that choice confidence mediated the influence of Internet search on choice evaluation, $b = 0.29$, BCa bootstrap 95% CI with 10,000 samples = [0.02, 0.58]. Despite the introduction of choice evaluation as a predictor of enjoyment, the indirect effect of Internet search on enjoyment mediated by choice confidence was still significant, $b = 0.03$, BCa bootstrap 95% *CI* with 10,000 samples = [0.001, 0.11]. When choice evaluation was tested as a single-mediator of the relationship between Internet search and film enjoyment in this model, the indirect effect was not significant, $b = 0.08$, BCa bootstrap 95% *CI* with 10,000 samples = [-0.11, 0.26]. However, choice evaluation mediated how choice confidence affected enjoyment, $b = 0.69$, BCa bootstrap 95% *CI* with 10,000 samples = [0.57, 0.80]. The fact that the effect of choice confidence on enjoyment remained significant while accounting for choice evaluation as a predictor/mediator is indicative of the existence of other factors explaining a relevant

portion of this relationship. On the other hand, the correlation between choice evaluation and experience enjoyment was stronger than the correlation of enjoyment with choice confidence, which decreased to a considerable compared to the same estimate of the correlation in the one mediator model. Combined with the significant indirect effect of choice confidence on enjoyment mediated by choice evaluation, this difference in effect sizes supports the proposed order of factors in the process. Because the model of this process was built on the assumptions that these measures are informed by a state of confidence in decision skills and affective expectations that preceded the experience, such results also support these assumptions. Importantly, the indirect effect of the serial mediation was significant, $b = 0.23$, bootstrap BCa bootstrap 95% *CI* with 10,000 samples = [0.01, 0.46]. In conclusion, given the assumptions outlined in the introduction of the current study, the analysis supports the concept that the extra confidence in decision skills emanated from the use of Google gives rise to beliefs of choice superiority, which inform affective expectations about the chosen experience and ultimately change how the experience itself.

Table 5. Results of the path analysis of the two-mediator model in Study 4: unstandardized coefficients, standard errors, test statistics, and Pearson correlations.

Path	*b*	*SE*	Test	*r*
a_1	0.33	0.16	95% CI = [0.01, 0.66], $t(308) = 2.00$, $p = .046$	.11
a_2	0.1	0.13	95% CI = [-0.15, 0.34], $t(307) = 0.79$, $p = .449$	.04
d	0.88	0.04	95% CI = [0.80, 0.97], $t(307) = 20.11$, $p < .001$	.75
b_1	0.1	0.04	95% CI = [0.02, 0.18], $t(306) = 2.35$, $p = .020$	.09
b_2	0.78	0.04	95% CI = [0.71, 0.86], $t(306) = 21.63$, $p < .001$	.51
c'	0.02	0.14	95% CI = [-0.14, 0.18], $t(306) = 0.24$, $p = .808$	.04

Note: Based on the mediation model in Figure 12.

Discussion

Study 4 demonstrated that the overconfidence in decision-making skills that arises as a consequence of engaging in Internet search can improve experiences related to the domain of the information found online. Although theoretical accounts and even results give margins for other factors driving this phenomenon as well, results indicate that this overconfidence breeds positive expectations that shape subjective experiences. Alas, to empirically explore the roles of this metacognitive miscalibration and the consequent beliefs that end up molding subjective experiences, Study 4 relied solely on measures collected after the film experience. It was theorized that, to a reasonable degree, these measures reflect assessments (of decision skills and expected quality) that preceded the experience. Still, empirically they were correlational variables. Inevitably, along with information about confidence in decision-making skills and affective expectations that indeed emerge before participants watched the film, these measures were also informed by the objective components of the film experience. In consideration of this limitation, Study 5 was designed to provide additional support to the proposed process through which Google searches can alter experiences.

STUDY 5: GOOGLE-INDUCED CONFIDENCE IMPROVES *CHOSEN* EXPERIENCES

To not solely rely on the mediation analysis of Study 4, this experiment was designed with the purpose of shedding light on the underlying process of the self-fulfilling prophecy by removing a critical component of this process, a component without which, according to the proposed model, the "prophecy cannot be fulfilled."

If extra confidence in decision skills is in the heart of how changes in the subjective experience of the same content arise from using Google, the subjective experience should be the same regardless of whether it was preceded by Internet search or not if these decision skills never came into play when the content was selected. To be more precise, the positive expectations that mold the subjective experience echo a reliance on the high quality of the selected option that stems from (confidence in) these skills. If the experience was never selected by the individual who was induced to be overconfident, the positive expectations will not be formed. Study 5 exploited this rationale.

Method

Participants and design

Participants (N = 519, after the exclusion of 73 participants who did not watch the film until the end credits and 5 participants who admitted interrupting[5]) were recruited on Amazon's Mechanical Turk and completed the study on Qualtrics. The experiment

[5] Skipping the film and interrupting the study were not related to the search condition, $X^2(1) < 0.001$, $p = .998$ and $X^2(1) = 0.04$, $p = .841$, respectively, nor choice condition, $X^2(1) = 0.05$, $p = .825$ and $X^2(1) < 0.001$, $p = 1$, respectively.

followed a 2 (search: *no search* vs. *online search*) x 2 (choice: *no* vs. *yes*) design and random assignment of participants.

Procedure

Study 5 employed the same procedure and materials used in Study 4, except that, in Phase 2, the *no choice* group read the following introduction:

> *In this section, you will watch a short animated film created by film students during their internships in professional studios. The film will be officially released during a festival on July (details will be provided at the end of the study).*
> *After watching the film, you will complete a short questionnaire about it.*

Following this introduction, instead of selecting a film, these participants were directed to a page where they watched an animated film randomly selected from the set of options available for participants in the *choice* condition to choose. Although the film experience was not randomized in the *choice* condition, film choice was not systematically different between participants in the *no search* and the *online search* conditions, $X^2(2, N = 258) = 0.28$, $p = .868$.

Full dataset is available at OSF.

Measures

Study 5 used the same measures as Study 4, but choice confidence and choice evaluation were only collected from the *choice* condition (because these measures were meaningless for participants who did not have the opportunity to make a film choice).

With these measures, the mediation models examined in Study 4 could be tested in a new sample.

In addition to the measures mentioned above, participants general liking of animated films (single item: "How much do you like animated films?", 1 = *I hate animated films*, 7 = *I love animated films*) was incorporated in the analysis plan. This was a particular concern because of the inclusion of the *choice* manipulation. The more a person likes watching animations, the more receptive that person will be to the opportunity to watch an animated film, even when the choice of the film is not their own. Because of this, general preference for animations and its interaction with the choice condition of the experiment were factored into the analysis. These factors could be positive confounders and override the focal effects of online search and its interaction with choosing a film, but could also be negative confounders and push the effect of the interaction between the experimental conditions closer to the null hypothesis when not included in the model (Mehio-Sibai, Feinleib, Sibai, & Armenian, 2005).

A pre-analysis of the data supported the idea that overall appreciation of animated movies undermines the importance of the opportunity to choose the film experience. Participants' liking of animated movies was mean-centered and tested for an interaction with the choice condition (coded as 0 = *no choice*, 1 = *choice*). The interaction was found to be significant, b = -0.18, SE = 0.09, 95% CI = [-0.36, -0.003], $t(515) = 2.00$, p = .046, r = -.09. Using a spotlight approach (Irwin & McClelland, 2001), it was found that at one standard deviation above the mean, whether participants could choose the film or not did not influence their experience enjoyment, b = -0.13, SE = 0.18, 95% CI = [-0.48, 0.22], $t(515) = 0.72$, p = .471. In turn, at one standard deviation below the mean,

participants enjoyed more the experience when they were able to select the film, b = 0.38, SE = 0.18, 95% CI = [0.03, 0.74], $t(515) = 2.11$, $p = .035$, $r = .09$.

The opportunity to choose also changed the extent to which liking animations predicted liking the animated film of the experiment. It was a stronger predictor when participants watched a random film, $b = 0.48$, $SE = 0.06$, 95% CI = [0.36, 0.60], $t(515) = 7.95$, $p < .001$, $r = .33$, than when they watched a film of their choice, $b = 0.30$, $SE = 0.07$, 95% CI = [0.16, 0.43], $t(515) = 4.35$, $p < .001$, $r = .19$.

Given the pre-analysis, both the extent to which the participants liked animations and its interactions with the *choice* condition should act as negative confounders on the effect of the interaction between the experimental conditions. Specifically, the coefficient of the effect of these variables on enjoyment (reported above) were positive and negative, respectively. Their associations with the interaction between the experimental conditions were negative ($r = -.03$) and positive ($r = .02$), respectively – related note: *search* condition was coded as 0 = *no search*, 1 = *online search*. Finally, the relationship of the interaction between the experimental conditions and enjoyment was positive ($r = .09$ – complete results of this relationship are reported below). This configuration of associations involving the outcome variable, the interaction of the manipulated variables, and the hypothesized confounders anticipates a negative direction of each confounding factor (Mehio-Sibai et al., 2008).

Results

An ANCOVA revealed a significant effect of the interaction between the two experimental conditions on enjoyment of the animated film, $F(1, 513) = 4.52$, $p = .034$, $\eta^2 = .01$. This interaction was qualified by how much participants liked watching

animated movies in general, $F(1, 513) = 63.90$, $p < .001$, $\eta^2 = .13$, and its interaction with whether participants were able to choose the film or not, $F(1, 513) = 4.14$, $p = .042$, $\eta^2 = .01$. Both factors were shown to be negative confounders, but, overall, results held the same when not adjusting enjoyment for their influence. When not accounting for the confounding interaction and testing preferences for animated movies as the single confounder, the effects of the remaining confounder and the interaction between the experimental conditions were essentially the same, $\eta^2 = .13$ and $\eta^2 = .01$, respectively. There was an improvement of the F-statistic and significance level of the confounder, $F(1, 514) = 78.18$, $p < .001$, and a small downgrade in the F-statistic and significance level of the interaction, $F(1, 514) = 4.36$, $p = .037$. When not accounting for any confounding variable, there was a greater weakening of the F-statistic of the interaction between conditions, $F(1, 515) = 3.55$, and its significance level became marginally significant, $p = .060$. These changes in F-statistics and significance levels support that liking animations and its interaction with choice opportunity are negative confounders of the relationship between the manipulations (interacting with each other) and experience enjoyment, but also suggest that the manipulations were sufficiently effective to reveal clear patterns when film enjoyment was not adjusted for them. Results of the ANCOVA with adjustment for the two confounders are represented in Figure 13.

Planned comparisons showed that enjoyment levels were significantly higher among participants in the *online search* group that were able to choose the animated film they would watch ($M = 5.21$, $SD = 1.43$), $t(513) = 2.28$, $p = .023$. Results held when only accounting for preference for animations as a confounder, $t(514) = 2.25$, $p = .025$, and when not accounting for the control variables $t(515) = 2.55$, $p = .011$. Film enjoyment levels of participants who searched online but did not have the opportunity to

choose the film (M = 4.79, SD = 1.43), participants who did not search but chose an animated film (M = 4.84, SD = 1.43), and participants who neither searched nor chose the film (M = 4.96, SD = 1.44) were statistically the same, all $t < 0.94$, $p > .34$ (regardless of whether the analysis included confounding variables or not). This finding shows that miscalibrated decision confidence can only improve a subjective experience when the content of the experience was selected. Such concept is in line with the idea that the influence of confidence on the subjective experience occurs through affective expectations that are formed based the individual's decision confidence.

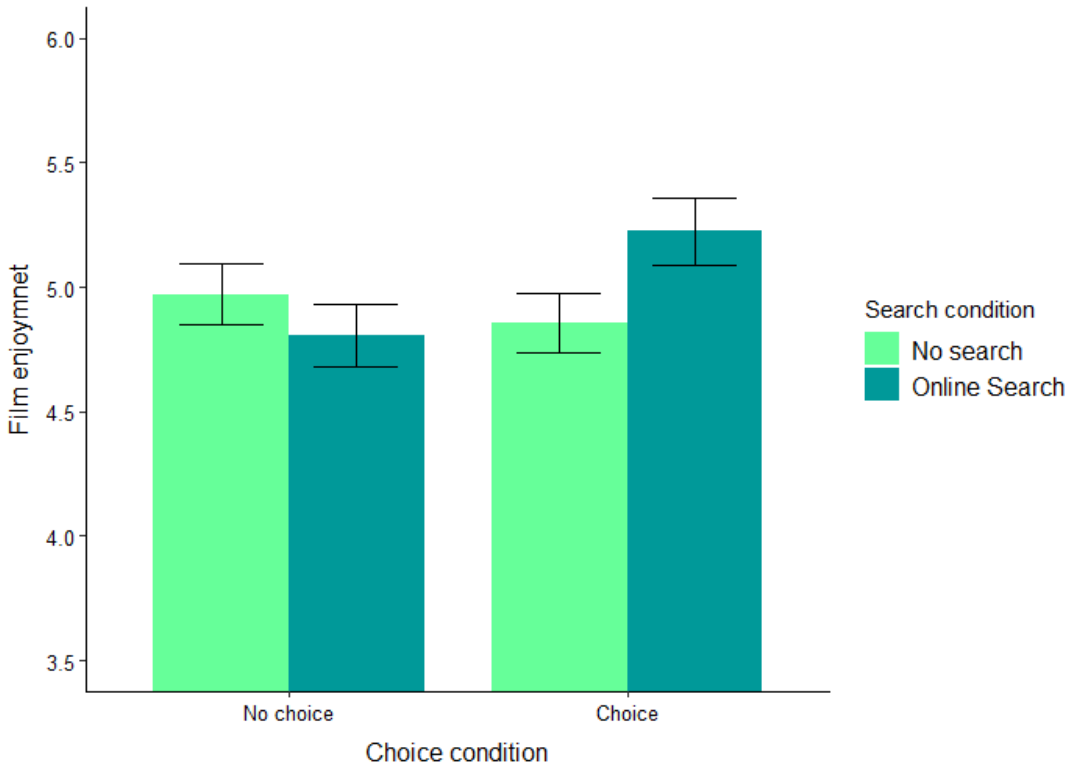

Figure 13. Means and ± SEM of experience enjoyment across experimental conditions in Study 5.

Next, focus was directed towards the *choice* group and the choice-related measures in an attempt to replicate results from Study 4. Searching online again produced better choice evaluations (M = 5.34, SD = 1.64) than accessing the same information without online search (M = 4.97, SD = 1.47), with the significance level of the difference between the conditions slightly above the alpha = .05 cut off mark, $t(256) = 1.85$, 95% CI = [-0.02, 0.75], $p = .066$, $d = 0.24$. Means and standard errors of choice evaluation are shown in Figure 14. As expected, when accounting for how much participants liked animations in general, the F-statistics barely changed: $F(1, 256) = 3.41$ without confounder and $F(1, 255) = 3.44$ with it. The influence of the confounder on the significance level was also negligible, $p = .065$. Recall that the pre-analysis suggested that people's general appreciation for experiences in a given category (in this case, animated films) has a greater role when the experience is not the output of a decision process.

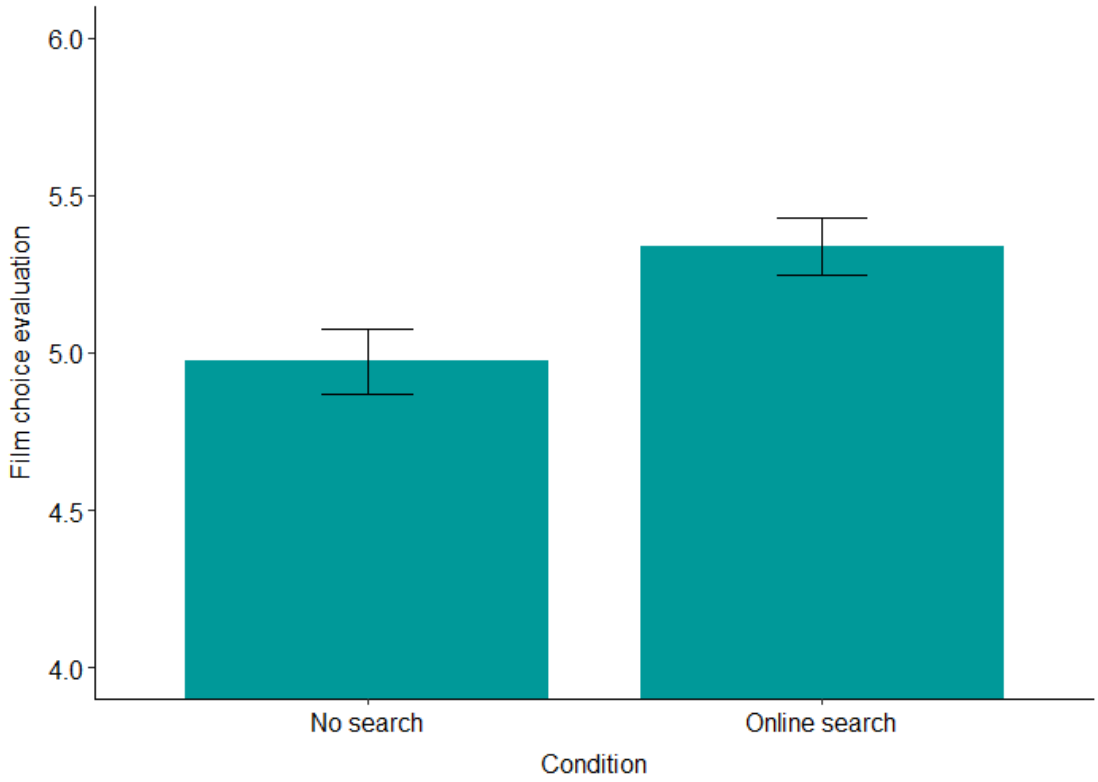

Figure 14. Means and ± SEM of choice evaluation across *search* conditions in Study 5.

Google effects on choice confidence were replicated as well (Figure 15). The *online search* group reported greater confidence that their selected film was better than the dismissed options (M = 4.89, SD = 1.36) compared to the *no search* group (M = 4.50, SD = 1.39), $t(256) = 2.30$, 95% CI = [0.06, 0.74], $p = .022$, $d = 0.28$. As expected, introducing participants' preference for animations as a confounder had a negligible influence on the F-statistics of this effect, with $F(1, 256) = 5.29$ without the confounder and $F(1, 255) = 5.32$ when accounting for it. Relatedly, the p-value adjusted for the confounder was the same when rounded to the third decimal place.

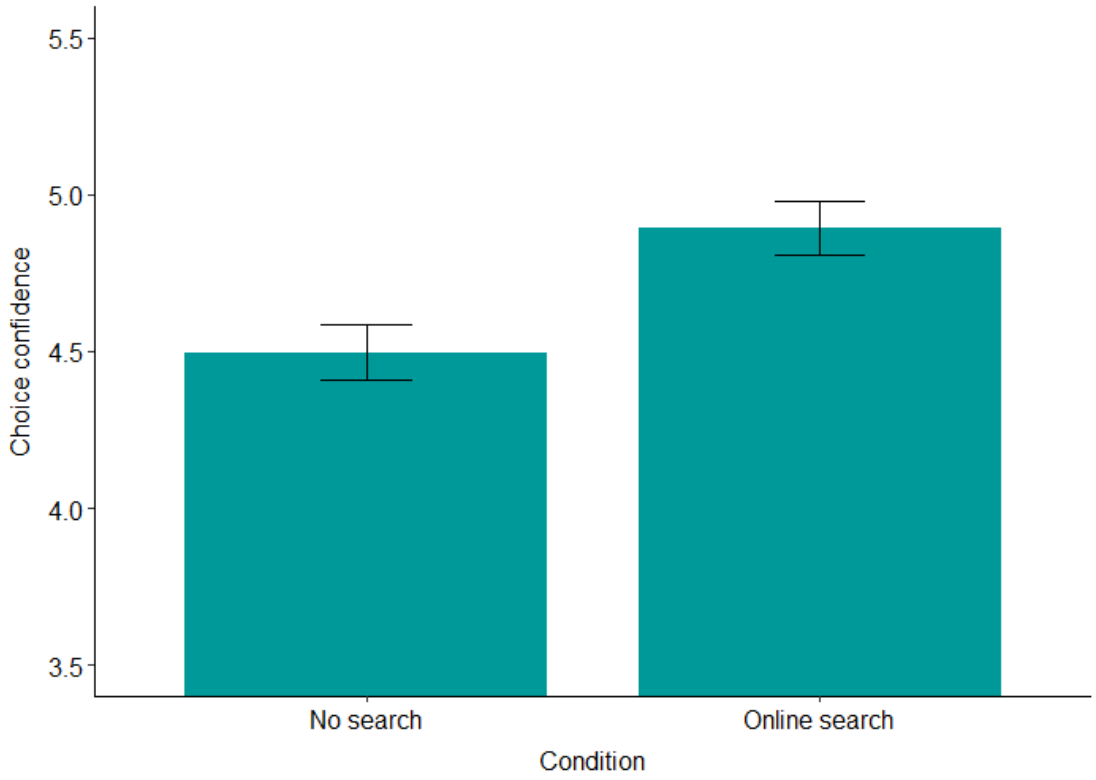

Figure 15. Means and ± SEM of choice confidence across *search* conditions in Study 5.

The mediation models explored in Study 4 were tested again in this new sample. Because, liking animations was shown not to be a substantial confounding variable when examining Google effects on choice evaluation and choice confidence, it was not included in this analysis. Thus, the models represented in Figure 11 and Figure 12 were not modified for the tests with the current sample.

Results of the path analysis of the single mediator model (Figure 11) are detailed in Table 6. The analysis again revealed a significant indirect effect of online search on enjoyment mediated by choice confidence, $b = 0.30$, BCa bootstrap 95% CI with 10,000 samples= [0.05, 0.67].

Table 6. Results of the path analysis of the single mediator model in Study 5: unstandardized coefficients, standard errors, test statistics, and Pearson correlations.

Path	*b*	*SE*	Test	*r*
a	0.40	0.17	95% CI = [0.06, 0.74], $t(256) = 2.30$, $p = .022$	.14
b	0.77	0.05	95% CI = [0.67, 0.86], $t(255) = 15.18$, $p < .001$	.69
c'	0.07	0.14	95% CI = [-0.21, 0.35], $t(255) = 0.51$, $p = .610$	.03

Note: Based on the mediation model in Figure 11.

The path analysis of the serial mediation is shown in Table 7. The analysis of the indirect effects showed that the influence of Internet search on choice evaluation was mediated by participants' confidence in the superior quality of their choice, $b = 0.35$, BCa bootstrap 95% CI with 10,000 samples = [0.06, 0.64]. With the introduction of choice evaluation as a predictor of film enjoyment, the indirect effect of Internet search on enjoyment mediated by this confidence (observed in the single mediator model) was no longer significant, $b = 0.02$, BCa bootstrap 95% CI with 10,000 samples = [-0.01, 0.08]. In turn, there was a significant indirect effect of choice confidence on experience

enjoyment mediated by choice evaluation, $b = 0.72$, BCa bootstrap 95% CI with 10,000 samples = [0.63, 0.81]. Unlike Study 4 (and in even greater alignment with the revolving the choice confidence and choice evaluation measures and with the proposed model), when accounting for choice evaluation as a predictor of enjoyment, the direct effect of choice confidence on enjoyment was not simply weakened, it actually became null. Finally, the indirect effect of Internet search on film enjoyment was serially mediated by choice confidence and choice evaluation, $b = 0.28$, BCa bootstrap 95% CI with 10,000 samples = [0.05, 0.54].

Table 7. Results of the path analysis of the two-mediator model in Study 5: unstandardized coefficients, standard errors, test statistics, and Pearson correlations.

Path	*b*	*SE*	Test	*r*
a_1	0.40	0.17	95% CI = [0.06, 0.74], $t(256) = 2.30$, $p = .022$	.14
a_2	0.02	0.13	95% CI = [-0.24, 0.27], $t(255) = 0.14$, $p = .888$	.01
D	0.87	0.05	95% CI = [0.78, 0.96], $t(255) = 18.84$, $p < .001$	.76
b_1	0.04	0.05	95% CI = [-0.06, 0.14], $t(254) = .88$, $p = .381$	.04
b_2	0.83	0.04	95% CI = [0.74, 0.91], $t(254) = 18.57$, $p < .001$	.49
c'	0.06	0.09	95% CI = [-0.12, 0.24], $t(254) = 0.62$, $p = .537$	.04

Note: Based on the mediation model in Figure 12.

Discussion

Building on the model initially explored in Study 4, Study 5 adopted an *ablata causa tollitur effectus* approach to cancel the influence of Internet search on an experience. Because, according to the proposed model, a central piece of the process consists in the individual choosing the content of the experience (without this piece, positive expectations about the upcoming experience are not formed), the strategy employed in the study was to eliminate the decision component of the experimental

procedure used in half the participants. As expected, these participants did not go through a different subjective experience with the film they watched during the experiment as a consequence of whether they were exposed to the Internet stimulus or not.

The group that had the opportunity to choose an animated film had different subjective experiences depending on whether they searched the Internet or not. Replicating findings of Study 4, Google effects improved their film experience. For a second time, the serial mediation model suggested that this influence on film experience is self-fulfilling. Participants in the *online search* group convinced themselves that the film they chose was the best film available in the list, even though they never had the opportunity to watch the other films. This suggests their assessments were built on their self-perceived decision abilities, more so than the actual film experience, and they were likely confident in their decision even before watching the film. This confidence informed a positive evaluation of the film that started to take form before the film experience. In turn, the subjective experience with the film conformed to this preconceived evaluation.

Importantly, the preconceived evaluation (i.e., the affective expectation) added to the perceived quality of the film, which was also informed by the objective features of the film, leading participants with Google-induced overconfidence to have a better experience than others. The influence of the objective features of the experience is reflected in the (lower) enjoyment levels of participants who did not search the Internet and could not choose the film. The difference between them and the group that had the subjective experience altered due to inflated confidence in decision skills reflects the extent to which affective expectations elevated the film enjoyment.

GENERAL DISCUSSION

The experiments presented here demonstrate that Google-induced deregulation of metacognition does not only affect self-perceived intelligence as assessed in knowledge tests and cognitive self-esteem – shown in previous research. This miscalibration is reflected in decision tasks as well. Google-induced knowledge misattribution creates a false sense of prior knowledge in the domain of the decision task that makes people feel more capable of judging choice alternatives and identifying a superior option. This perceived capacity to make high-quality decisions, albeit illusory, is confirmed in people's subjective experiences with the option they selected. The superior experience is not a consequence of an objectively better decision. Subjective experiences are enhanced because they are colored by affective expectations that people form based on their self-assessment of their own decision skills, following an "if I chose it, it must be good" line of reasoning.

Illuminating how this self-fulfilling prophecy unfolds from the simple act of searching the Internet is not only a contribution to the new area of Google effects on (meta)cognition; the findings highlight self-fulfilling phenomena in consumer experiences. Studies 4 and 5 showed that positive expectations about choice quality spilled over into people's experiences with the film they chose to watch and increased their satisfaction. In a similar vein, the "MIT brew" studies described in the "RESEARCH BACKGROUND II: THE SELF-FULFILLING PROPHECY OF GOOGLE-INDUCED DECISION CONFIDENCE" section can be interpreted as showing that fomenting negative expectations led to lower satisfaction with the beer. These findings might seem out of tune with the typical view of expectations as reference points to performance evaluations and satisfaction as a function of the (dis)confirmation

of such expectations (Oliver, 1980; Spreng, MacKenzie, & Olshavsky, 1996). According to the expectancy disconfirmation framework, overly optimistic expectations about the film should lead to greater dissatisfaction with the experience and lower expectations about the "MIT brew" should make it easier for the drinking experience to exceed expectations and increase satisfaction with the beer. The question of when a self-fulfilling expectation vs. the disconfirmation of expectations will be a stronger determinant of satisfaction is an interesting one and might shed light on an overlooked problem in an old area of consumer research – consumer satisfaction.

A possible reason why experiments like Studies 4 and 5 show that the liking of experiences conforms to expectations (instead of being affected by disconfirmation) lies in the combination of the holistic nature of the expectations fomented in these studies and the subjective nature of the experiences they explored. In the expectancy disconfirmation framework, expectations are usually defined in terms of the performance of specific attributes or features of the content of the experience (e.g., Spreng et al., 1996). For the disconfirmation of this type of expectation to determine levels of satisfaction, consumers must be able to track and examine each relevant attribute or feature. However, expectations that have self-fulfilling influences do not emphasize specific features of the content of the experience. They simply provide a rough cue of its quality. Moreover, even though experiential content like movies and trips – and, sometimes, food and beverages – might have objective features that can be pinpointed if one wants to, the experiences that this kind of content provides tend to build on the blending of several features into a global experience. Because of this, people do not focus on the individual performance of each feature unless they are stimulated to do so (e.g., someone tells them to pay special attention to the soundtrack of a movie). If the positive expectation does not specify features of the content and the

evaluation of the experience does not involve processing individual feature performance, the subjective experience will likely be anchored on the experiential elements that better align with the expectations (i.e., the things that work well during the experience), turning the expectation into a personal subjective reality.

While I certainly believe that the conciliation of self-fulfilling and disconfirming influences of expectations is not a trivial research problem, there are a number of other insights and notes tightly connected to the contributions and limitations of the current set of studies that I would like to address here. I present these thoughts organized into three overarching topics next.

Technology and self-fulfilling prophecies

A broad theme related to the findings of this research involves the extent to which, beyond Google effects, modern life makes confidence inflation a common phenomenon and produces an excess of self-fulfilling experiences. This theme involves two overaching avenues: (1) addressing questions related to how pervasive is the intensification of metacognitive miscralibration as a result of interaction with technology, and (2) exploring far reaching consequences of self-fulfilling prophecies induced by this kind of interaction.

In previous studies that explored self-fulfilling expectations, beliefs about the upcoming experience were formed based on external information provided to participants. Studies 4 and 5 charted new territories by showing that internal forces (i.e., confidence in decision skills) can determine such expectations.

There is something interesting about affective expectations related to the outcomes of personal decisions being influenced by internal forces – especially positive illusions

– because they might be much harder to circumvent. People might learn to recalibrate their expectations when they are exposed to external information using their judgments about the source and the quality of the information. For instance, if information comes from a source that has incentives to lead people to form positive expectations, people have some intuition that they should not let blindly allow themselves to be influenced by that information. However, internal forces like beliefs in one's own capacity to make optimal decisions might be much more persuasive than external sources with manipulative intentions. Concepts held internally tend to be considered true and complete until proven otherwise and people do not seem to actively question their validity (Alba & Hutchinson, 2000; Collins et al., 1975; Gilbert, 1991). Thus, even when equally misleading, affective expectations driven by positive metacognitive illusions might be more stable than those driven by external influencers.

Self-fulfilling prophecies might also be surprisingly present in our lives. Considering that people tend to be positively miscalibrated in nature (Moore & Healy, 2008), decision-related self-fulfilling prophecies might be more common than we have recognized so far. As a matter of fact, in Studies 4 and 5, one might argue that there is some degree of a self-fulfilling influence in the levels of film enjoyment of *no search* participants – because, as average people, they probably are overconfident as well –, but this influence was stronger in the *online search* group because their overconfidence was boosted by Internet search. However, what I would like to underline here is that, beyond Google itself, technological advances might have produced an environment where people are heedlessly surrounded by and have immediate access to an immense assortment of confidence boosters that make us even more miscalibrated that we already are.

Historically, technology has been brought into the world with the intent of helping people overcome their natural limitations. From clothes being, at some point, cutting-edge technology to help us better protect our bodies against the weather and physical threats of the environment to motorized vehicles that, essentially, make as faster, technology has been used to enhance our capacity to do things that our human resources cannot do. Whereas much of the past technological developments have focused on overcoming our physical limitations, in recent years, there has been a more intense advance in the expansion our capacity to execute cognitively demanding tasks. The GPS improves our sense of direction and location, electronic calendars and notifications boost our memory and organization capacities, information aggregators release us from the mental labor of gathering information from different sources, etc. Most of these advanced cognitive aids are readily accessible in our computers and smartphones – which, in turn, are readily accessible on our desks and in our pockets. Similar to how people fail to separate their own memory from Google, they might conflate the performance of other cognitive tools and their own.

Furthermore, the cognition-enhancing functions of information technology might not be the only forces in our connected lives that propitiate miscalibration. The online environments of the everyday life are designed to be hedonically appealing and often stimulate addiction (Block, 2008). While online experiences are engineered to avoid that users feel uncomfortable and incapable, they might overdose in the opposite direction, stimulating positive illusions. For instance, it has become clear that while platforms are programmed to bring information of people's interests and like-minded users closer, they create information bubbles where people's views and opinions about the world are constantly echoed and rarely challenged (Parisier, 2011). Seeing repeated arguments about our own opinions and interpretations of reality coming from different

sources might lead us to think of these opinions and interpretations as facts of the world. In turn, the sensation that internally held beliefs are objective facts of reality can increase confidence as well. Thus, living in these bubbles can be another source of miscalibration.

But, as we realize the omnipresence of miscalibrating stimuli and opportunities for self-fulfilling influences on our personal experiences, should we avoid them or embrace them? Most likely we should sometimes avoid and other times embrace them and we should invest on understanding when to do one or the other.

Enhanced subjective experiences due to overconfidence in decision skills can be beneficial in several ways. They might, for instance, reduce tension and stimulate engagement with cognitive tasks in certain domains. Think of a person who is interested in learning more about the history of her or his country and is looking for a documentary about it. Suppose that person chooses and watches a documentary under the influence of a positive illusion such as Google-induced overconfidence. The self-fulfilling effect might make the documentary experience more enjoyable and, consequently, motivate the person to keep pursuing more history knowledge. Moreover, to the extent that many of our experiential choices serve to isolate us from external stressors that cannot be avoided in other situations of the daily life, the self-fulfilling effect of overconfidence can help steer clear of tensions related to the decision process that can undermine the pleasure from the experience. Thus, positive illusions and their self-fulfilling influence might contribute for the effectiveness of personal experiences intended for relaxation and recovery from stress.

Nevertheless, there are pitfalls to these self-fulfilling prophecies as well. One is that they reinforce miscalibration because people's subjective experiences falsely confirm choice quality. The other is that they reward miscalibrating behavior such as interacting

with technological cognitive aids. This idea implies that the self-fulfilling effect of overconfidence on subjective experiences can help understand Internet addiction. Exploring downstream consequences Internet-driven enhancements in subjective experiences to identify its contributions to phenomena like Internet addiction is an important research avenue if we want to understand (and potentially overcome) the costs of our extreme reliance on technology.

Moderators

The current research adds to the empirical evidence of Google-induced miscalibration. An important task for future research is to clarify the boundaries of this phenomenon.

Thus far, there is only evidence of two factors that limit the effects of Internet search on memory (see Ward, 2013b). One such factor is familiarity with the search tool: Internet search assisted by unfamiliar search engines seems to highlight the presence of the external source of information and reduce misattribution of knowledge. The other factor is the difficulty level of the "question" to be answered with the assistance of online search: metacognitive miscalibration does not seem to be an issue when the knowledge accessed on Google is related to easy or difficult problems, but only with moderately difficult ones. Considering this condition, it is important to understand how question difficulty plays out in natural Internet search behavior. One possibility is that most things we search online are inspired by moderately difficult questions because easy questions do not make us experience doubt and rather difficult questions are unlikely to emerge in our thoughts because we are not able to formulate them.

The question difficulty boundary can also be examined from the point of view of user expertise. If Google effects experiments take into account participants' prior knowledge of the topics, they might find null results among novices (for whom the stimulus topic might be too difficult to grasp) and experts (for whom they might be too easy). However, initial tests of the moderating effect of expertise show only a linear moderation where the lower the level of expertise the stronger the effect of Internet search, with the effect being null among those with the highest levels of expertise (Ward et al., 2018). The analysis of natural Internet search behavior remains relevant from the point of view of user expertise; people might be unlikely to search topics in which they are experts (because they do not need to access external information on such topics) or about which they have no prior knowledge (because they do not have enough knowledge to start the search).

An interesting aspect of the analysis of the influence of people's expertise on Google effects is that it focuses on characteristics of the individual that make her or him more or less sensitive to these effects. A similar characteristic worth looking into is Internet (or computer) fluency. Based on the discussion about knowledge misattribution (see "RESEARCH BACKGROUND I: VIRTUAL CONFIDENCE IN DECISION SKILLS"), the more one is a stranger to the use of the Internet as a memory resource, the more salient the presence of the external source of information should be.

Internet fluency might have different implications if we examine how it affects digital natives vs. digital immigrants. On the one hand, people born into the digital world might have a more intense self-extension relationship with the Internet and connection devices because these resources have been part of their lives since their early stages of mental development. From this point of view, disentangling their own performance from the performance of the Internet might be trickier and Google-induced

feelings of already knowing should be more likely to arise. On the other hand, it is also possible that interactions with technology in the early stages of the development of a sense of self actually help the mind learn how to separate the self along with one's internal resources from external technological resources like Google. During the first months of life, interpersonal relations provide foundational input to the formation of an initial sense of self (Case, 1991). The way information from these relations and from observing other human beings is absorbed and assimilated in those early stages and concomitant interaction with the Internet might illuminate the differences between one's own human capacities and technological extensions. As a consequence, the digital native mind could become proficient in keeping track of internally held knowledge and information accessed online.

Shifting the focus away from individual characteristics, an issue that remains unclarified in empirical research is the role of the format of the information retrieved from the Internet. So far, studies have explored access to information in the form of quick answers and online articles, but the Internet provides information "in all shapes and colors." For instance, many people look for videos when they search the Internet, especially if they do not expect a short answer. Elements that can be present in a video, such as the voice and image of a person conveying the information, can highlight the exogenous nature of the information and reduce knowledge misattribution.

Particular to decision contexts, another external factor that might inhibit Google-induced overconfidence is the consequential weight of the decision task. As aforementioned, personal decisions involve consequences that will be faced in the future. Because of this, personal decisions are made with a forward-looking perspective that might stimulate revisions of decision criteria and processes, which, in turn, might clarify one's actual aptitude to make the decision. When there is not much at stake,

these revisions might be bypassed. However, decisions that entail more drastic consequences, such as the investment of a substantial portion of one's financial resources or permanent physical changes, should stimulate more careful revisions. As a consequence, there is a greater chance that one will develop a more accurate grasp of one's own decision skills when faced with more serious and consequential decision tasks.

In the "real world"

In the current and previous works, Google effects have been studied in considerably artificial settings. The benefit of the experimental procedures adopted in these works is that they clarify the nature of these effects and how they unfold. The flipside is that they disregard a number of aspects of the way people use the Internet and make personal decisions in the "real world." An important step to be taken in research on Google effects is the investigation of how the findings from the laboratorial settings play out in the field.

The search tasks of the experiments presented here (and in related works) provided participants with the topics they should search and answers would either appear in the form of quick answers or on a webpage participants were instructed to fing (in either case, not much search effort was required after typing the search term and pressing the Enter key). The advantage of this approach is that information exposure tends to be the same for all participants[6]; at the same time, online search often involves sometimes not knowing exactly what to search and how identify the right answer.

[6] Differences in search task and information exposure might still arise due to Google's personalized search, which can produce different quick answers or orders of webpage links on the results page depending on the user (Parisier, 2011).

By providing participants with the topics, the expertiments emulate situations in which people are exposed to cues of how to search the Internet (what to type into the search box). This is one way people engage in online search: they are exposed to terms and concepts that elicit doubt and then look for clarification online. But sometimes we are not really sure how to tell Google what we wan. Imagine, for instance, a graduate student who is interested in learning more about cosmographs because she or he saw one in a conferece presentation, but the student does not know that it is called a cosmograph, she or he only knows what it looks like and has a sense of what it shows. How does one learn more about cosmographs on Google without knowing the word "cosmograph"? And how does the process of coming up with questions and testing different search terms affect the way Google influences confidence and subjetive experiences?

Internet search also might involve not knowing how to navigate through Google's results very clearly. By telling participants that they were looking for the information in Google's "Answer Box" or in a specific website, the experiments reported here emulated situations in which the user has a sense of where to look for information within the Google environment. Indeed, we often read Google's quick answer and do not look further, or we engage in Internet search with a specific page in mind, like Wikipedia or Reddit. But it is also true that sometimes we go from one page to another until we find one that is helpful. This process makes access to the target information slower and more demanding and, therefore, might highlight the external source and diminish Google effects on confidence.

As we try to understand how Google effects on confidence emerge in the "real world," it is crucial to observe and have a critical interpretation of the effect sizes evidenced in the current set of studies, which mostly of a small magnitude. According

to Cohen's (1988) references, the observed Google effects on the feeling of already knowing new information were of a medium magnitude, and effects on confidence in decision skills were medium (Study 1) or between small and medium (Study 3), with *d*s close to 0.50 (for confidence, between 0.20 and 0.50 in Study 3) and η^2 close to 0.06. As we move further from the Google stimulus in the chain of effects and closer to participants' enjoyment of their experiences, as one would expect, effect sizes decrease. According to Cohen's (1988) references, all effect sizes on variables measured after the film experiences in Studies 4 and 5 are considered small (with *d*s close 0.2 and η^2 close to 0.01). However, the effects observed here arose from a short search task (3 to 5 topics) that does not capture the intensity of our use of the Internet. To better understand how the influence of Google on confidence and experiences plays out in people's lives, we need to start exploring how often these effects occur, the extent to which they increase as a function of search activity, and how long they endure. The "real world" impact of Internet-driven miscalibration might not be on the magnitude of the effects, but on how frequent and enduring they are. It is also possible that these effects have cumulative properties that make them increase in size at every new occurrence, in which case search activities should be managed to keep the miscalibration at "healthy levels." In sum, factors related to how search activities occur in natural environments might elucidate the impact of Google effects in more informative ways than the effect sizes that experimental procedures similar to the ones adopted in the present research.

FINAL REMARKS

The opening line of this manuscript relates to concepts and findings that permeate the research on Internet-induced metacognitive errors (including the material presented here). To the extent that we incorporate the Internet as an extension of our own cognitive faculties, what we access through the computer, tablet, and smartphone screens does, in some way, becomes part of who we are. It feels as if that content came from us and is part of our own thoughts. It changes how we perceive ourselves in the world (by, for instance, making us feel as more capable to interact with this world) and how we experience it (by making some things we choose to invest our time and attention on more enjoyable).

However, in principle, those words were not about the Internet. They were Mister Rogers' thoughts about the television, back when it was cutting-edge technology. When the T.V. screen became a ubiquitous presence in American houses, critics and researchers started thinking about how effectively the television grabbed people's attention and its potentially addictive properties. Eventually, it was found that concealed consequences of using the television as a source of information and entertainment like sustained attention and "addictiveness" could be capitalized on for educational purposes, vide Mister Rogers himself (Neville, Capotosto, & Ma, 2018) and Sezame Street (Morrow, 2005). If these anecdotes from the times when the television was the game-changing device can inspire the way we make the Internet part of our lives, perhaps we can be more like Micah Altman and less like Nicholas Carr when someone asks us what we think about the Internet – perhaps we can be more optimistic about where society is heading with it.

If what we see on our T.V., computer, tablet, and smartphone screens is part of who we become, hopefully we can use it to become better people.

REFERENCES

Ackerman, R., & Goldsmith, M. (2011). Metacognitive Regulation of Text Learning: On screen versus on paper. *Journal of Experimental Psychology: Applied, 17*(1), 18-32.

Akerlof, G. A., & Shiller, R. J. (2009). *Animal spirits: how human psychology drives the economy, and why it matters for global capitalism.* Princeton, NJ: Princeton University Press.

Alba, J. W., & Hutchinson, J. W. (1987). Dimensions of Consumer Expertise. *Journal of Consumer Research, 13*(4), pp. 411-454.

Alba, J. W., & Hutchinson, J. W. (2000). Knowledge Calibration: What Consumers Know and What They Think They Know. *Journal of Consumer Research, 27*, pp. 123-156.

Anderson, J., & Lee, R. (2018). *The Future of Well-Being in a Tech-Saturated World.* Pew Research Center & Elon University. Retrieved from www.pewinternet.org/2018/04/17/the-future-of-well-being-in-a-tech-saturated-world/

Bhargave, R., Mantonakis, A., & White, K. (2016). The Cue-of-the-Cloud Effect: When Reminders of Online Information Availability Increase Purchase Intentions and Choice. *Journal of Marketing Research*, *53*(5), 699-711.

Block, J. J. (2008). Issues for DSM-V: Internet Addiction. *The American Journal of Psychiatry, 165*(3), 306-307.

Carr, N. (2008, July/August). Is Google making us stupid? What the Internet is doing to our brains. *The Atlantic*.

Carr, N. (2010). *The Shallows: What the Internet Is Doing to Our Brains.* New York: W. W. Norton & Company, Inc.

Case, R. (1991). Stages in the Development of the Young Child's First Sense of Self. *Developmental Review, 11*, 210-230.

Choi, J., & Fishbach, A. (2011). Choice as an end Versus a Means. *Journal of Marketing Research, Vol. XLVIII*(June), 544-545.

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences* (2nd ed.). New York: Academic Press.

Collins, A., Warrock, E. H., Aiello, N., & Miller, M. L. (1975). Reasoning From Incomplete Knowledge. In D. G. Dobrow, & A. M. Collins, *Representation and Understanding* (pp. 383-415). New York: Academic Press.

Ferguson, A. M., McLean, D., & Risko, E. F. (2015). Answers at your fingertips: Access to the Internet influences willingness to answer questions. *Consciousness and Cognition, 37*, 91-102.

Fisher, M., Goddu, M. K., & Keil, F. C. (2015). Searching for Explanations: How the Internet Inflates Estimates of Internal Knowledge. *Journal of Experimental Psychology: General, 144*(3), pp. 674 – 687. doi:10.1037/xge0000070

Fisher, M., Smiley, A., & Grillo, T. L. (2018). Information Without Knowledge: The effects of Internet search on learning. *Manuscript under review.*

Fox, C. R., & Tversky, A. (1995). Ambiguity Aversion and Comparative Ignorance. *Ambiguity Aversion and Comparative Ignorance, 110*(3), 585-603.

Gilbert, D. T. (1991). How Mental Systems Believe. *American Psychologist, 46*(2), 107-119.

Google Search Statistics. (2018). Retrieved 2018, from Internet Live Stats: http://www.internetlivestats.com/google-search-statistics

Harris, J. E. (1982). External Memory Aids. In U. Neisser, *Memory Observed: Remembering in Natural Contexts* (pp. 337-342). San Francisco: W. H. Freeman and Company.

Hayes, A. F. (2013). *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach.* New York: The Guilford Press.

Hayes, A. F. (2017). *Introduction to Mediation, Moderation, and Conditional Process Analysis* (2 ed.). New York: Guilford Press.

Irwin, J. R., & McClelland, G. H. (2001). Misleading Heuristics and Moderated Multiple Regression Models. *Journal of Marketing Research, 38*(1), 100-109.

Jerath, K., Ma, L., & Park, Y.-H. (2014). Consumer Click Behavior at a Search Engine: The Role of Keyword Popularity. *Journal of Marketing Research, 51*(4), 480-486.

Johnson, D. D. (2004). *Overconfidence and War: The havoc and glory of positive illusions.* Cambridge, MA: Harvard University Press.

Johnson, D. D., & Fowler, J. H. (2011). The Evolution of Overconfidence. *Nature, 477*(7364), 317-320.

Johnson, D. D., & Levin, S. (2009). The Tragedy of Cognition: Psychological Biases and Environmental Inaction. *Current Science, 97*(11), 1593-1603.

Johnson, E. K., Moe, W. W., Fader, P. S., Bellman, S., & Lohse, G. L. (2004). On the Depth and Dynamics of Online Search Behavior. *Management Science, 50*(3), 299-308.

Klaaren, K. J., Hodges, S. D., & Wilson, T. D. (1994). The Role of Affective Expectations in Subjective Experience and Decision-Making. *Social Cognition, 12*(2), 77-101.

Lee, L., Frederick, S., & Ariely, D. (2006). Try It, You'll Like It: The Influence of Expectation, Consumption, and Revelation on Preferences for Beer. *Psychological Science, 17*(12), 1054-1058.

Mathwick, C., & Rigdon, E. (2004). Play, Flow, and the Online Search Experience. *Journal of Consumer Research, 31*(2), 324-332.

Mehio-Sibai, A., Feinleib, M., Sibai, T. A., & Armenian, H. K. (2005). A Positive or a Negative Confounding Variable? A Simple Teaching Aid for Clinicians and Students. *Annals of Epidemiology, 15*(6), 421-423.

Moore, D. A., & Healy, P. J. (2008). The Trouble with Overconfidence. *Psychological Review, 115*(2), 502-517.

Morrow, R. J. (2005). *Sesame Street and the Reform of Children's Television.* Baltimore: Johns Hopkins University Press.

Neale, M. A., & Bazerman, M. H. (1985). The Effects of Framing and Negotiator Overconfidence on Bargaining Behaviors and Outcomes. *The Academy of Management Journal, 28*(1), 34-49.

Net Marketshare. (2018). Retrieved 2018, from Market Share Statistics for Internet Technologies: https://netmarketshare.com/search-engine-market-share.aspx

Neville, M., Capotosto, C., & Ma, N. (Producers). (2018). *Won't You Be My Neighbor?* [Motion Picture]. Focus Features.

Nielsen. (2016). *Global Connected Commerce: Is etail therapy the new retail therapy?* The Nielsen Company.

Oliver, R. L. (1980). A Cognitive Model of the Antecedents and Consequences of Satisfaction Decisions. *Journal of Marketing Research, 7*(4), 460-469.

Orne, M. T. (1962). On the social psychology of the psychological experiment: With particular reference to demand characteristics and their implications. *American Psychologist, 17*(11), 776-783.

Palfrey, J., & Gasser, U. (n.d.). *Bron Digital.*

Parisier, E. (2011). *The Filter Bubble: What the Internet is hiding from you.* New York: Penguin Press.

Park, C. W., Mothersbaugh, D. L., & Feick, L. (1994). Consumer Knowledge Assessment. *Journal of Consumer Research, 21*(1), 71-82.

PwC. (2016). *Total Retail 2016.* Retrieved from http://www.pwc.com/gx/en/retail-consumer/publications/assets/total-retail-global-report.pdf

Raju, P. S., Lonial, S. C., & Mangold, W. G. (1995). Differential Effects of Subjective Knowledge, Objective Knowledge, and Usage Experience on Decision Making: An Exploratory Investigation. *Journal of Consumer Psychology, 4*(2), 152-180.

Risko, F. E., & Gilbert, J. S. (2016). Cognitive offloading. *Trends in Cognitive Sciences, 2016*, 676-688.

Shrout, P. E., & Bolger, N. (2002). Mediation in Experimental and Nonexperimental Studies: New Procedures and Recommendations. *Psychological Methods, 7*(4), pp. 422–445. doi:10.1037//1082-989X.7.4.422

Sparrow, B., & Chatman, L. (2013). Social Cognition in the Internet Age: Same As It EverWas? *Psychological Inquiry, 24*, pp. 273–292. doi:10.1080/1047840X.2013.827079

Sparrow, B., Liu, J., & Wegner, D. M. (2011). Google Effects on Memory: Cognitive Consequences of Having Information at Our Fingertips. *Science, 333*, pp. 776-778. doi:10.1126/science.1207745

Spreng, R. A., MacKenzie, S. B., & Olshavsky, R. W. (1996). A Reexamination of the Determinants of Consumer Satisfaction. *Journal of Marketing, 60*(3), 15-32.

Ward, A. F. (2013a). Supernormal: How the Internet Is Changing Our Memories and Our Minds. *Psychological Inquiry, 24*, 341–348.

Ward, A. F. (2013b). One with the Cloud: Why People Mistake the Internet's Knowledge for Their Own. *Unpublished Doctoral Dissertation, Harvard University*. Retrieved from http://nrs.harvard.edu/urn-3:HUL.InstRepos:11004901

Ward, A. F., & Lynch, Jr., J. G. (2018). On a Need-to-Know Basis: How the Distribution of Responsibility Between Couples Shapes Financial Literacy and Financial Outcomes. *Journal of Consumer Research, ucy037*. doi:10.1093/jcr/ucy037

Ward, A. F., Grillo, T. L., & Fernbach, P. M. (2018). From Novice to Know-it-All: How Google-Based Financial Learning Affects Financial Confidence and Decisions. *Advances in Consumer Research (upcoming).* Dallas, TX: Association of Consumer Research.

Wegner, D. M. (1987). Transactive Memory: A Contemporary Analysis of the Group Mind. In B. Mullen, & G. R. Goethals, *Theories of Group Behavior* (pp. 185-208). New York: Springer.

Wegner, D. M., & Ward, A. F. (2013). The Internet Has Become the External Hard Drive for Our Memories. *The Scientific American*. Retrieved from Scientific American.

Appendix A

Test of topics and online information used in Phase 1 of all studies.

Previous research has shown that using Internet search to access answers that are either too easy or too hard to come up with might not induce miscalibration (Ward, 2013b). Because of this, questions used in the studies presented here were tested in separate samples. In the test, participants would be presented with a topic intended to be used in a study on one page and the answer extracted from Google (specifically, the relevant quick answer when the stimulus question pertained to Studies 2, 4, or 5, or the target article when the stimulus question pertained to Studies 1 or 3). After reading the answer, participants were asked, "How difficult it is to come up with an answer like the one you read on the previous page?" A 7-point scale was used to answer the question. The points of the scale were not numbered. Instead, each point contained a label: *Extremely easy*, *Moderately easy*, *Slightly easy*, *Neither easy nor difficult*, *Slightly difficult*, *Moderately difficult*, *Extremely difficult*, in this order from left to right.

To avoid an undermining influence information complexity on the studies by exposing participants to answers that were either too simple or too complex, only answers within the range of *Slightly easy* to *Slightly difficult* were used. With this in mind, difficulty evaluations of all the topics were tested for significant differences from 2 (i.e., *Moderately easy*) and 6 (*Moderately difficult*). Results are presented below.

Test of topics for Studies 1 and 3:

Topic	N	Mean	SE	Test	
				H0: mean = 2	H0: mean = 6
How to avoid credit card and ATM fees while traveling abroad?	29	4.55	0.29	$t(28) = 8.87$, $p < .001$	$t(28) = 5.04$, $p < .001$
What to avoid in Amsterdam?	34	4.68	0.29	$t(33) = 9.18$, $p < .001$	$t(33) = 4.54$, $p < .001$
How to communicate with locals in Italy?	31	3.77	0.33	$t(30) = 5.34$, $p < .001$	$t(30) = 6.67$, $p < .001$
What happens to lost luggage?	27	4.37	0.39	$t(26) = 6.21$, $p < .001$	$t(26) = 4.27$, $p < .001$
How to get around in Istanbul?	27	5.07	0.39	$t(26) = 7.92$, $p < .001$	$t(26) = 2.38$, $p = .025$

Test of topics for Study 2:

Topic	N	Mean	SE	Test	
				H0: mean = 2	H0: mean = 6
How to avoid credit card and ATM fees while traveling abroad?	29	4.55	0.29	$t(28) = 8.87$, $p < .001$	$t(28) = 5.04$, $p < .001$
What to avoid in Amsterdam?	34	4.68	0.29	$t(33) = 9.18$, $p < .001$	$t(33) = 4.54$, $p < .001$
How to communicate with locals in Italy?	31	3.77	0.33	$t(30) = 5.34$, $p < .001$	$t(30) = 6.67$, $p < .001$
What happens to lost luggage?	27	4.37	0.39	$t(26) = 6.21$, $p < .001$	$t(26) = 4.27$, $p < .001$

Continued…

Topic	N	Mean	SE	Test	
				H0: mean = 2	H0: mean = 6
How to get around in Istanbul?	27	5.07	0.39	$t(26) = 7.92$, $p < .001$	$t(26) = 2.38$, $p = .025$
How to use your driver license abroad?	30	4.6	0.3	$t(29) = 8.73$, $p < .001$	$t(29) = 4.70$, $p < .001$
What are the most visited countries in the world?	31	3.77	0.28	$t(30) = 6.31$, $p < .001$	$t(30) = 7.92$, $p < .001$
What are the best destinations in Italy?	31	2.97	0.31	$t(30) = 3.16$, $p = .004$	$t(30) = 9.92$, p < .001
How do budget airlines work?	28	3.32	0.29	$t(27) = 4.61$, p < .001	$t(27) = 9.35$, $p < .001$
What is Germany known for?	32	2.86	0.23	$t(31) = 3.84$, $p < .001$	$t(31) = 13.72$, $p < .001$

Test of topics for Studies 4 and 5:

Topic	N	Mean	SE	Test	
				H0: mean = 2	H0: mean = 6
What is Icelandic food like?	30	4.83	0.33	$t(31) = 3.84$, $p < .001$	$t(31) = 3.84$, $p < .001$
What is a Schengen Visa?	28	4.48	0.4	$t(27) = 6.22$, $p < .001$	$t(27) =$, $p < .001$
What is a TSA-approved padlock?	33	2.91	0.26	$t(32) = 3.63$, $p = .001$	$t(32) = 12.12$, $p < .001$
What are the main tourist attractions in Greece?	30	3.7	0.31	$t(30) = 5.37$, $p < .001$	$t(30) = 7.30$, $p < .001$
Is tipping common in Japan?	31	2.9	0.29	$t(30) = 3.07$, $p = .006$	$t(30) = 10.51$, $p < .001$

Appendix B

Topics and websites used for the experimental induction in Studies 1 and 3.

Topic	**Website**
1. "How to avoid credit card and ATM fees while traveling abroad?"	usatoday.com
2. "What to avoid in Amsterdam?"	amsterdam.info
3. "How to communicate with locals in Italy?"	expatfocus.com
4. "What happens to lost luggage?"	telegraph.co.uk
5. "How to get around in Istanbul?"	tripadvisor.com

Appendix C

Consumer Self-Confidence scale items – Study 1.

Dimension **Items**	**Cronbach's α**
Acquisition of information (AI)	.92
1. I know where to find information I need prior to making a travel related decision. 2. I know where to look to find travel information I need. 3. I am confident about my ability to research about traveling. 4. I know the right questions to cover when preparing for a trip. 5. I have the skills to obtain needed information before making important travel decisions.	
Consideration-set formation (CSF)	.88
6. I am confident about my ability to recognize options (e.g., locations, attractions, hotels etc) worth considering when traveling or planning a trip. 7. I can tell which options (e.g., locations, attractions, hotels etc) will meet my expectations when I travel or plan a trip. 8. I trust my own judgement when deciding which options (e.g., locations, attractions, hotels etc) to consider while I am traveling or planning a trip. 9. I can focus easily on a few options (e.g., locations, attractions, hotels etc) when I travel or plan a trip.	
Personal outcomes (PO)	.85
(all items were reverse coded for the analysis) 10. I often have doubts about the travel decisions I make. 11. I frequently agonize over what to do/buy travel wise. 12. I often wonder if I've made the right selection of options (e.g., locations, attractions, hotels etc) when I travel. 13. I never seem to choose the right thing for me when it comes to traveling. 14. Too often my travel experiences are not very satisfying.	
Social outcomes (SO)	.91
(all items were reverse coded for the analysis) 15. My friends are impressed with my ability to handle myself when I travel. 16. I impress people with my trips. 17. I get compliments from others on my trips.	

Consumer Self-Confidence scale items – used in Pilot Study 1 (continued).

Dimension **Items**	**Cronbach's α**
Persuasion knowledge (PK)	.87
18. When it comes to traveling, I know when an offer (e.g., a flight, a hotel deal etc) is "too good to be true". 19. When it comes to traveling, I can tell when an offer (e.g., a flight, a hotel deal etc) has strings attached. 20. When I plan trips and travel, I have no trouble understanding bargaining tactics used by hotels, airlines, and sales agents. 21. When I travel, I know when a marketer is pressuring me to buy something. 22. I can see through sales gimmicks used to get tourists to buy stuff. 23. I can separate fact from fantasy in advertising aimed at travelers.	
Marketplace Interfaces (MI)	.92
(all items were reverse coded for the analysis) 24. I am afraid to "ask to speak to the manager" when it comes to purchases related to a trip. 25. When I travel, I don't like to tell a service provider something is wrong with the service. 26. I am too timid when problems arise while I am traveling. 27. When I travel, I am hesitant to complain.	
Consumer self-confidence (CSC) – full scale	.84