

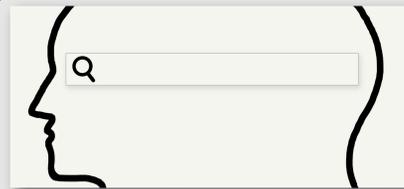
THE "GOOGLE EFFECT"

- We attempted to replicate Experiment 1 of Sparrow, Liu, & Wegner, *Science* (2011).
- In the original work, the researchers hypothesized that the internet is treated by individuals as an external resource in a 'transactive memory' (TM) system, and is therefore primed when information retrieval is required.
- TM is a sort of distributed memory that develops amongst dyads or groups of individuals, and includes information stored in an individual's memory, as well as information accessible to that individual through another (traditionally human) TM partner.
- The researchers purported to demonstrate that participants were primed to think of the internet and search engines when confronted with difficult informational demands. They did this by documenting delayed color-naming RTs for generic and brand named computer and search engine terms in a Modified "Stroop Task" (MST).
- This investigation sought to replicate these findings as the first step in a series of experiments aimed at exploring the Google Effect. We hoped to establish converging evidence for this phenomenon.

Google Effects on Memory: Cognitive Consequences of Having Information at Our Fingertips

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The advent of the Internet, with sophisticated algorithmic search engines, has made accessing information as easy as lifting a finger. No longer do we have to make costly efforts to find the things we want. We can "Google" the old classmate, find articles online, or look up the actor



METHOD



Sample of Modified Stroop Task, computer-related brand name term.

- Participants (N= 71) were undergraduate PGS 201 students at NMSU, who participated for partial course credit.
- Participants were instructed how to perform the Stroop Task. Specifically to identify the color of the typeface while doing their best to ignore the word itself.
- Before the experiment began, participants took part in practice trials to familiarize them with the task, and allow them to memorize the response options.
- The experiment then commenced, beginning with counterbalanced blocks of easy/hard trivia questions.
- Feedback was provided regarding trivia performance (but not regarding Stroop performance).



- After each block of questions, participants were administered a MST.
- The MST included 16 terms unrelated to computers (4 brand name, 12 general), and 8 computer terms (2 brand names and 6 general).
- For the duration of each MST, participants were tasked with remembering a 6 digit string to induce cognitive load, which they later recalled following the MST block.

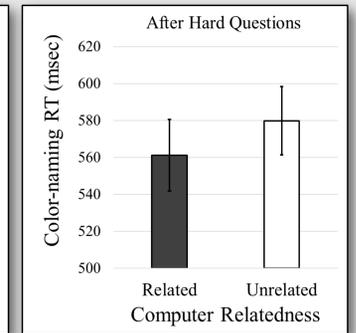
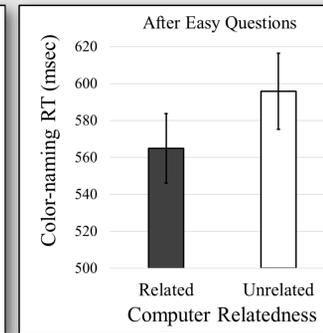
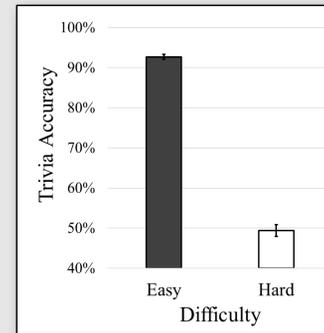
Computer terms	Unrelated terms
Google	Target
Yahoo	Nike
Screen	Table
Browser	Book
Modem	Hammer
Internet	Eraser

A selection of Stroop stimuli.

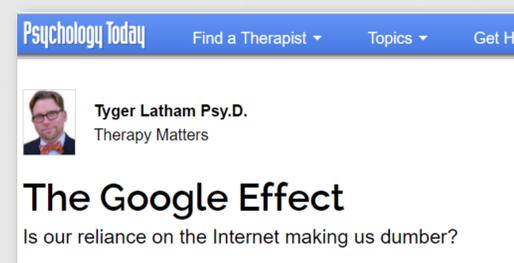
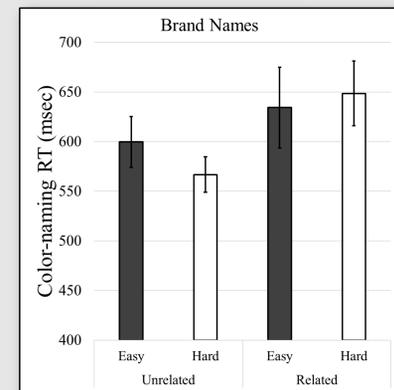
Easy questions	Hard questions
Are dinosaurs extinct?	Did Benjamin Franklin give piano lessons?
Are there 24 hours in a day?	Do all countries have at least 2 colors in their flag?
Is oxygen a metal?	Were family names first used in Roman times?
Does 5 plus 7 equal 30?	Do insects feel hunger?
Does a triangle have 3 sides?	Is a quince a fruit?

A selection of trivia questions.

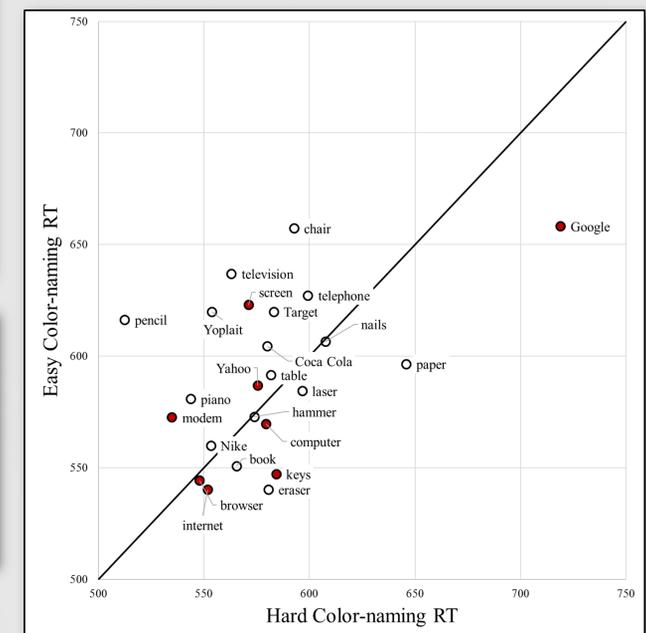
RESULTS



- Trivia accuracy revealed that the Easy vs. Hard question manipulation was effective.
- Despite our best efforts to faithfully replicate the original findings, however, we found no evidence to support the claims of the original study, as concerns Stroop performance.
- Individual item analysis revealed no meaningful difference for any term, save "Google."



Let's pump the brakes a bit! This might not be as robust a problem as the media portrays.



Scatterplot of RTs for each item after easy and hard blocks. The "Google Effect," if present, would appear as computer-related terms (shown in red) falling within the bottom triangle.

DISCUSSION

- We conducted the most faithful replication we could, given the information in the published study. However, there were gaps in our knowledge with respect to certain aspects of the original methodology.
- Though we found no support for the original findings, an updated conceptual replication may serve to rediscover these findings with a newer generation of students.
- Specifically, an updating of the computer terms may be necessary to account for changes in media frequently used to access information since 2011 (e.g., prevalence of smartphones, Facebook).
- Our upcoming systematic conceptual replication (which will be submitted for publication as a "Registered Reports and Replication") may help to resolve questions surrounding findings that run contrary to this heavily cited and influential work.

