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ARTICLE IN PRESS

Journal of Applied Research in Memory and Cognition xxx (2017) xxx–xxx

Contents lists available at ScienceDirect

Journal of Applied Research in Memory and Cognition

journal homepage: www.elsevier.com/locate/jarmac

Taxing the Brain to Uncover Lying? Meta-analyzing the Effect of Imposing Cognitive Load on the Reaction-Time Costs of Lying

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Lying typically requires greater mental effort than telling the truth. Imposing cognitive load may improve lie detection by limiting the cognitive resources needed to lie effectively, thereby increasing the difference in speed between truths and lies. We test this hypothesis meta-analytically. Across 21 studies using response-time (RT) paradigms (11 unpublished; total $N = 792$), we consistently found that truth-telling was faster than lying, but found no evidence that imposing cognitive load increased that difference (Control, $d = 1.45$; Load, $d = 1.28$). Instead, load significantly *decreased* the lie–truth RT difference by increasing the RT of truths, $g = -.18$, $p = .027$. Our findings therefore suggest that imposing cognitive load does not necessarily improve RT-based lie detection, and may actually worsen it by taxing the mental system and thus impeding people's ability to easily—and thus quickly—tell the truth.

General Audience Summary

A popular idea in contemporary deception research is that lying is typically more difficult than telling the truth. People may therefore use cognitive effort as a cue for deception. Unfortunately, such cues are often faint. A novel technique to help lie detection is asking the interviewee to do an additional task (e.g., math exercises): liars would find such an additional task particularly debilitating because they are already investing cognitive effort in lying. We identified 21 studies that investigate this idea and statistically aggregated their results. An additional task did not increase lie–truth differences. In fact, imposing cognitive load made discriminating between lying and truth-telling slightly more difficult. We reason that imposing cognitive load may interfere with retrieving the truthful answer.

Keywords: Lying, Deception, Reaction time, Cognitive load, Honesty, Lie detection

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Please cite this article in press as: Verschuere, B., et al. Taxing the Brain to Uncover Lying? Meta-analyzing the Effect of Imposing Cognitive Load on the Reaction-Time Costs of Lying. *Journal of Applied Research in Memory and Cognition* (2017), https://doi.org/10.1016/j.jarmac.2018.04.005

Lying often imposes greater mental demands than truth-telling. It can entail suppression of the truth, switching from the truthful narrative to a deceptive one, keeping the lie in working memory, or monitoring whether others believe the lie. Indeed, people often experience lying as being more difficult than truth-telling, and also experience the need to consciously suppress the truth when lying (Walczyk, Roper, Seemann, & Humphrey, 2003). Studies have employed a variety of methods to assess the cognitive processes associated with lying (Granhag, Vrij, & Verschuere, 2015), and of these, response times (RTs) have proven particularly useful. A recent meta-analysis of 114 studies (total $N = 3307$) found that responding with a lie takes longer than responding with the truth (Suchotzki, Verschuere, Van Bockstaele, Ben-Shakhar, & Crombez, 2017). This finding fits with the idea that lying typically requires greater mental capacity than truth-telling, and suggests that one can use RTs to detect lies. Indeed, some RT paradigms allow for differentiating between lies and truths well above chance levels (Verschuere & Kleinberg, 2016).

Based on a cognitive perspective of lying, Vrij, Fisher, Mann, and Leal (2006) propose that increasing people's cognitive load (e.g., by asking them to do an additional task on top of being interviewed) will benefit lie detection: If people are under cognitive load and are trying to do two things at once, they will not have the mental capacity to lie effectively. This idea has attracted much scientific interest (Levine, Blair, & Carpenter, 2018; Vrij, Fisher, & Blank, 2017; Vrij & Granhag, 2012; Vrij, Meissner, et al., 2017). However, researchers have raised concerns that, by imposing cognitive load, honest people may also struggle to come up with true pieces of information (because they are also doing multiple things at once). Their difficulty in answering questions might mistakenly be seen as an indication of lying (Blandon-Gitlin, Fenn, Masip, & Yoo, 2014). Moreover, liars might actually profit from being placed under cognitive load: they can divert their attention away from the challenging interview and their deceptive answers and focus instead on the secondary task (Ambach, Stark, Peper, & Vaitl, 2008). Indeed, doing mental math is an established strategy to beat the polygraph lie test (Honts, Devitt, Winbush, & Kircher, 1996), and lie–truth differences in RTs are smaller when processing of questions is more shallow (Suchotzki, Verschuere, Crombez, & De Houwer, 2013). These reasons suggest that imposing cognitive load does not necessarily help and could in fact hinder lie detection.

A previous meta-analysis (Suchotzki et al., 2017) estimated the size of the lie–truth difference in RT paradigms and argued that the large lie–truth differences support the cognitive theory of lying. The cognitive-load hypothesis states that imposing cognitive load will further increase the lie–truth difference.[2] Because cognitive load may in fact have the undesirable consequence of reducing these differences, the current meta-analysis summarizes the present state of knowledge regarding the effect of cognitive load on the lie–truth difference in RTs.

Method

Literature Search

We searched scientific databases (Web of Science and Google Scholar) using the following combinations of keywords: ["lying task" OR lying OR CIT OR "Concealed Information Test" OR "Sheffield Lie test" OR "autobiographical Implicit Association Test" OR "aIAT"] AND [deprivation OR depletion OR "cognitive load" OR intuition OR priming OR "time pressure"]. In addition, we searched the reference lists of a recent meta-analysis (Suchotzki et al., 2017), sent direct emails to researchers in our network, and put out a call for papers via several channels (mailing lists, Twitter, and Research Gate). By November 2017, we identified 21 studies (total $N = 792$) that met our inclusion criteria by (a) recording lie and truth RTs, within subjects, for at least 20 trials each, in a computerized task, and (b) including an experimental manipulation of cognitive load.[3] Where necessary, we contacted the authors to obtain additional information. All included studies are marked with an asterisk (*) in the reference list. The relevant data from the included studies to reproduce our findings can be found at https://osf.io/a2twq/.

Lying Paradigm

Lie and truth RTs can be collected using one of several paradigms, most notably the RT-based Concealed Information Test (CIT; Seymour, Seifert, Shafto, & Mosmann, 2000), the autobiographical Implicit Association Test (aIAT; Sartori, Agosta, Zogmaister, Ferrara, & Castiello, 2008), and the differentiation-of-deception paradigm (DoD; Furedy, Davis, & Gurevich, 1988). We will illustrate how these paradigms measure truth and lie RTs with the case of false identity.

In the CIT, the participant is presented with an item that has special saliency (e.g., the participant's first name, TWAN) among a series of irrelevant items (e.g., first names such as WISSE, TIES, MICHAEL, LUKA). The participant is instructed to press one (YES) button for a dedicated target stimulus only (e.g., RAMSES), and press the other (NO) button for all other stimuli. Participants in the CIT may be explicitly informed that a NO response to the salient stimulus is a lie and/or be asked to hide recognition of the salient information such that the NO

[2] The terminology in this field has been confusing, because "cognitive load" (Vrij et al., 2006) may refer to both the specific technique of imposing cognitive load as well as to the general cognitive theory of lying. The cognitive theory holds that lying is typically more effortful than truth-telling. The cognitive-load hypothesis refers to a specific prediction derived from the cognitive theory, namely, that increasing cognitive load (e.g., by asking to do an additional task) will amplify lie–truth differences.

[3] Because RTs are noisy and have to be averaged across sufficient trials to provide a reliable and valid index of deception, and in line with Suchotzki et al. (2017), we excluded studies that did not have at least 20 lie and 20 truth trials (e.g., Ambach et al., 2008; Cheng and Broadhurst, 2005; Gawrylowicz et al., 2016; Walczyk et al., 2003). We also excluded studies that used a correlational rather than an experimental design (e.g., Suchotzki et al., 2015). Furthermore, we excluded studies in which the cognitive-load manipulation was confounded with the lie/truth manipulation (e.g., Suchotzki and Gamer, 2017; Van Bockstaele et al., 2012; Verschuere et al., 2011). Our operationalization of cognitive load did not include brain-stimulation techniques (e.g., Fecteau et al., 2013; Karton and Bachmann, 2011) or faking strategies (e.g., Hu et al., 2012).

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