



Using more different and more familiar targets improves the detection of concealed information

Kristina Suchotzki^{a,*}, Jan De Houwer^{b,1}, Bennett Kleinberg^c, Bruno Verschuere^c

^a Department of Psychology, University of Würzburg, Marcusstr. 9-11, 97080 Würzburg, Germany

^b Department of Experimental-Clinical and Health Psychology, Ghent University, Henri Dunantlaan 2, 9000 Ghent, Belgium

^c Department of Clinical Psychology, University of Amsterdam, Nieuwe Achtergracht 128, 1018, WS, Amsterdam, The Netherlands

ARTICLE INFO

Keywords:

Response conflict
Familiarity
Concealed Information Test
Guilty Knowledge
Target
Recollection

ABSTRACT

When embedded among a number of plausible irrelevant options, the presentation of critical (e.g., crime-related or autobiographical) information is associated with a marked increase in response time (RT). This RT effect crucially depends on the inclusion of a target/non-target discrimination task with targets being a dedicated set of items that require a unique response (press YES; for all other items press NO). Targets may be essential because they share a feature - familiarity - with the critical items. Whereas irrelevant items have not been encountered before, critical items are known from the event or the facts of the investigation. Target items are usually learned before the test, and thereby made familiar to the participants. Hence, familiarity-based responding needs to be inhibited on the critical items and may therefore explain the RT increase on the critical items. This leads to the hypothesis that the more participants rely on familiarity, the more pronounced the RT increase on critical items may be. We explored two ways to increase familiarity-based responding: (1) Increasing the number of different target items, and (2) using familiar targets. In two web-based studies ($n = 357$ and $n = 499$), both the number of different targets and the use of familiar targets facilitated concealed information detection. The effect of the number of different targets was small yet consistent across both studies, the effect of target familiarity was large in both studies. Our results support the role of familiarity-based responding in the Concealed Information Test and point to ways on how to improve validity of the Concealed Information Test.

1. Introduction

Imagine the following scenario. Three robbers enter a burger restaurant and shout ‘All on the floor!’. They grab the money from the cash register and escape on their motorbikes. A few days later, based upon CCTV images, the police identify a possible suspect. The suspect denies involvement in the crime, and the police therefore ask the suspect to take a Concealed Information Test (CIT, also referred to as Guilty Knowledge Test; Lykken, 1959). The CIT consists of a series of multiple-choice questions on the robbery. The suspect may, for instance, be asked where the robbery took place (Was it a gas station? a clothing store? a burger restaurant? a café? a jewelry store?), how many people were involved (Was it one person? two persons? three persons? four persons? five persons?), what the robbers shouted when entering the store (‘Everybody down!’, ‘Give us the money!’, ‘All on the floor!’, ‘Freeze, this is a robbery!’, ‘No crazy shit!’), and how they escaped (the subway? motorbikes? on foot? by car? by minivan?). Denying involvement and any knowledge about the crime, the overt behavioral

response of the suspect is not expected to differ between the crime-related and the irrelevant items (i.e., NO). Rather, some indirect reaction to all items is analyzed. This indirect measure may be an autonomic nervous system activity measure such as skin conductance (Lykken, 1959) or the P300 event-related brain potential (Farwell & Donchin, 1991; Rosenfeld et al., 1988). In an adequately designed test that consists of sufficient questions and alternatives and that uses irrelevant items that are well-matched to the crime-related items, it is unlikely for an innocent suspect to consistently show stronger activity to the crime-related than to the irrelevant items. Rather, such pattern of responding reveals recognition of the crime-related details. The validity of the CIT has been well-established (for meta-analyses see Ben-Shakhar & Elaad, 2003; Meijer, Klein Selle, Elber, & Ben-Shakhar, 2014).

In recent years, there is an increased interest in the use of response times (RTs) as the dependent variable that is used to assess the recognition of concealed information. In the RT-based CIT, the effect of interest is a typically observed prolonged NO response to critical compared to irrelevant items (i.e., the RT-CIT effect). In addition to the

* Corresponding author at: Experimental Clinical Psychology, Department of Psychology, University of Würzburg, Marcusstr. 9-11, 97070 Würzburg, Germany.
E-mail address: kristina.suchotzki@uni-wuerzburg.de (K. Suchotzki).

¹ Jan De Houwer is supported by Methusalem Grant BOF16/MET_V/002 of Ghent University.

critical and the irrelevant items, the RT-based CIT uses target items. Target items are a dedicated set of items that require a unique response. Building on the example above, the examinee may be instructed to give a unique response (i.e., YES) to such target items as ‘a post office’, ‘six persons’, ‘Nobody moves!’ and ‘sportscar’, and to answer NO to all other items. With the inclusion of such targets, the validity of the RT-based CIT is high. The meta-analysis of Suchotzki, Verschuere, Van Bockstaele, Ben-Shakhar, and Crombez (2017), including 34 studies with 1063 participants, found a large effect for the RT-based CIT (Cohen's $d = 1.297$; 95% CI [1.060, 1.535]). Whereas that meta-analysis relied solely upon the RT-CIT effect in individuals with concealed information (i.e., sensitivity), Meijer, Verschuere, Gamer, Merckelbach, and Ben-Shakhar (2016) evaluated the diagnostic efficiency in discriminating individuals with versus without knowledge. Their summary of the results of 11 studies with 981 participants showed a high diagnostic efficiency (area under the receiver operating characteristic curve $a = .82$).

Initially, it was argued that targets in the CIT procedure simply serve to assure attention to the stimuli (Farwell & Donchin, 1991). Whereas evidence suggests that this may be the case for some CIT measures (e.g., the P300 event-related potential; Rosenfeld, Biroshchak, & Furedy, 2006), evidence suggests that in the RT-based CIT, targets may serve a much more important role, and actually drive the RT-CIT effect. Matsuda, Nittono, Hirota, Ogawa, and Takasawa (2009), for instance, omitted the target items, and simply asked participants to press the same button for all items. With the omission of the target items, the CIT effect disappeared. The same result was found in the fMRI study of Gamer, Klimecki, Bauermann, Stoeter, and Vossel (2012): without target items, the well-established, large RT-CIT effect completely disappeared. In sum, research suggests that the use of target items is vital to the validity of the RT-based CIT.

Why might targets be so important? For a knowledgeable suspect, targets and critical items share an important feature that they do not share with the irrelevant items: Familiarity (Verschuere & De Houwer, 2011; see also Seymour & Schumacher, 2009). While critical items are familiar as the result of their link with the critical event under investigation (e.g., a crime), target items are familiar because they are mentioned in the instructions and the examinee is usually required to memorize them. Importantly, responding on the basis of familiarity allows for fast and accurate responding for most of the stimuli: it not only allows for quick YES responses to (familiar) targets but also for quick NO responses to (unfamiliar) irrelevant items, which together with the targets typically account for 5/6th of the trials. For unknowledgeable suspects, familiarity-based responding also allows for rapid rejection of the critical items. It is only for knowledgeable suspects that familiarity-based responding leads to the wrong response for critical items: knowledgeable suspects are familiar with the critical items (which should lead to a YES response when responding is based on familiarity), but want to deny recognition (requiring a NO response). Resolving this response conflict requires time. Direct support of the role of response conflicts is provided by the observation that critical items are associated with increases in RT and activity in brain regions associated with response inhibition only when the examinee is required to answer NO to the critical items, but not when (s)he may answer YES (Suchotzki, Verschuere, Peth, Crombez, & Gamer, 2015). First evidence for the role of familiarity comes from a study by Lukacs, Kleinberg, and Verschuere (2017). These authors reported three experiments in which participants tried to hide autobiographical information such as their country of origin. Participants were tested with a RT-based CIT that did or did not include familiarity-related filler trials, that is, trials on which stimuli were semantically related to the concept “familiarity” (e.g., the word ‘familiar’ and the word ‘unfamiliar’) and required the same binary classification as the other stimuli. It was reasoned and found that familiarity-related filler trials would increase the validity of the CIT, presumably because they would promote participants' greater reliance on familiarity also for the classification of irrelevant and critical items.

While suggestive of the role of familiarity, this study did not include a control condition of fillers unrelated to familiarity, opening the possibility that processes other than familiarity-based responding contributed to the effect. Moreover, substantial participant loss (up to half of the sample) limits the protocol's applicability in applied settings.

In the present study, we explore two new ways to increase participants' reliance on familiarity in the RT-CIT. First, increasing the number of different target items should increase the diagnostic value for participants to base their decisions on familiarity because familiarity is a shared feature of all target items and therefore is the easiest way of identifying different targets. Second, the use of target items that were already familiar to the participant before the test (from now on: familiar targets) as opposed to otherwise unknown items that are only learned during the test and indicated to be targets (from now on: unfamiliar targets) may also increase the probability that responding will be based on a familiarity judgment. In the present study, participants were asked to conceal their country of origin and their birthdate. We orthogonally manipulated the number of different targets (either 2 or 4) and the familiarity with the targets. To achieve the latter, either two irrelevant items were dedicated to be the targets and participants simply learned them before conducting the CIT, or two familiar items – a country and date that participants indicated to be important for them – were chosen to be the targets. We expected successful detection of the concealed autobiographical information, and that detection would be facilitated when using more targets, and when using familiar targets.

2. Experiment 1

2.1. Method

2.1.1. Participants

The study conformed to the principles expressed in the Declaration of Helsinki. Participants were recruited via the data collection website Crowdflower (<http://www.crowdflower.com/>), provided written informed consent and received 0.50 \$ for their participation. Participants were randomly assigned to one of the four between-subject conditions (two familiar targets, four familiar targets, two unfamiliar targets, four unfamiliar targets). In total, we collected data of 444 participants, of which in nine cases, no data was recorded, most likely due to web-browser issues (see Kleinberg & Verschuere, 2015), resulting in complete data for 436 participants. In order to exclude participants who may have taken the test repeatedly, 6 participants were removed because their IP addresses were identical with the IP address of another participant. Of the remaining participants, 73 were excluded because they had 50% or less remaining trials per item category after the exclusion of error and RT outlier trials.

The final sample consisted of 357 participants, with a mean age of 33.48 years ($SD = 9.83$; $n = 242$ or 68% male participants). The most common native language was English (17%), followed by Serbian (13%), and many other languages (70%). Participants originated mostly from India (13%), Serbia (6%), Bosnia and Herzegovina (6%), and from 59 other countries. Three percent of the participants indicated that they have obtained at least elementary school, 23% high school, 6% professional training, 20% college, and 49% university education.

Of the final sample, 108 had been assigned to the 2 unfamiliar target condition ($M_{Age} = 34.80$; $SD = 10.71$; 67% male participants), 60 had been assigned to the 4 unfamiliar target condition ($M_{Age} = 32.15$; $SD = 9.63$; 67% male participants), 100 had been assigned to the 2 familiar target condition ($M_{Age} = 32.88$; $SD = 9.72$; 64% male participants), and 89 had been assigned to the 4 familiar target condition ($M_{Age} = 33.45$; $SD = 10.02$; 74% male participants). The conditions did not differ in the number of men and women, $X^2(3) = 2.41$, $p = .492$, or age, $F(3, 353) = 1.14$, $p = .334$.

2.1.2. Procedure

The study was advertised as a lie detection test in which participants

Download English Version:

<https://daneshyari.com/en/article/7276715>

Download Persian Version:

<https://daneshyari.com/article/7276715>

[Daneshyari.com](https://daneshyari.com)