Concealed Information Testing on Fringe Awareness: Using Pupillometry and RSVP

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Abstract

The concealed information test (CIT) is a method to detect the presence of information that a person is attempting to hide. CIT rests on the assumption that a confrontation with "guilty knowledge" will elicit an (involuntary) physiological reaction. It is, however, prone to various countermeasures. Presenting stimuli on the fringe of awareness reduces top-down processing and renders attempting countermeasures less effective. Previously studied using electroencephalography (EEG) and Rapid Serial Visual Presentation (RSVP), we now focus on pupillometry and RSVP as a CIT. This method has been successfully used by Chen et al. (2021), which study we will attempt to replicate. Participants were asked to look for a chosen fake name in a stream of names, while ignoring their real name. During these trials their pupil size was measured. We found that pupil size of participants is significantly larger when presented with their real name, compared to a random control name. Our results provide evidence that pupillometry with the RSVP method can be an effective form of CIT. Future research is needed to finetune the pupillometry method and to combine different CIT methods into one predictively powerful CIT.

Keywords: Concealed information testing; RSVP; pupillometry; fringe awareness

Concealed Information Testing using Pupillometry with RSVP on Fringe Awareness

Researching concealed information testing is increasing in popularity. The concealed information test (CIT) was developed to detect the presence of information in a person, which they are trying to hide. An early CIT was developed by Lykken (1959), which relied on the assumption that confrontation with "guilty knowledge" would evoke involuntary physiological responses. In 1990, Elaad (1990) reported the first evidence of the validity of CIT in the field. In real-life criminal investigations, Elaad (1990) managed to correctly classify 94% of innocent people and 65% of guilty people. His findings opened up new possibilities to protect innocent suspects from an incorrect conviction.

People tend to show different physiological responses when asked a question that they are trying to hide knowing the answer to (Lykken, 1959). Older lie detection methods tried to use differences in amplitude of physiological responses to measure deception. However, properly conducted empirical studies have never supported the claims that these lie detection tests assure high validity (Lykken, 1959). So, Lykken (1959) tried to come up with a more valid form of CIT that reflected crime settings more realistically. The tests he used were based on the assumption that a guilty person, within a mock crime setting, would show involuntary physiological responses to presented stimuli that have to do with details of the presumably recalled crime. These "guilty knowledge tests" contain questions that only the guilty will know. After asking the question, different answer possibilities are read to the mock suspect. The physiological reactions are measured during the presentation of these answer possibilities and compared to each other to see if anything stands out. The following sentence is an example of a question that (Lykken, 1959) used in his experiment: *"If you are the murderer, you will know that there was an unusual object present in the murder room. Was it (a) a record (b) an easel (c) a candy box (d) a chess set?"*

With his new experiment, Lykken (1959) was able to distinguish between guilty and innocent with a success rate of 93.3%. It seems Lykken was onto something promising. As a result, interest in the practical implications of CIT kept growing. However, CIT is still not yet regularly applied in the field by examiners (Krapohl, 2011).

As mentioned before, there were several CITs that relied on stress-related body measurements. People were, however, able to combat these reactions through special techniques or training. The creator of the control question polygraph test, which compares the physiological response during a guilty knowledge question with a control question, admitted his test could be beaten in this matter (Reid, 1945). Creating fake physiological responses during a control question could not be distinguished from a normal response by the polygraph. As a result, no clear difference could be detected during response comparison between guilty and control questions that indicated guilty knowledge (Reid, 1945). Although many polygraphers have caught people trying to defeat the polygraph, there is no conclusive scientific evidence to indicate how many people have been able to beat the polygraph test unnoticed (Lykken, 1984). Consequently, the reliability and validity in real-life situations could not be assured with these methods.

The major disadvantage of CIT is that it can easily be countered when participants are given enough time to top-down process the presented stimuli. However, when a participant perceives stimuli of a CIT on the fringe of awareness, the effectiveness of countermeasures can be greatly reduced (Bowman et al., 2013).

The state of fringe awareness during stimuli confrontation can be achieved by Rapid Serial Visual Presentation (RSVP). During RSVP stimuli are presented in a very rapid sequence at the exact same location (Broadbent & Broadbent, 1987). The reason that this method is promising, is that participants are unable to top-down control their reaction to the stimuli due to a lack of time (Broadbent & Broadbent, 1987).

The implementation of RSVP in CIT has mostly been investigated using electroencephalography (EEG) (Bowman et al., 2013; Bowman et al., 2014; Harris et al., 2021). Bowman et al. (2013; 2014) presented participants with salient stimuli, the participants' first names, amongst unfamiliar stimuli. While being told to ignore their first name, the salient stimuli still evoked brain activity that can be related with fringe awareness. Similar results were found by Harris et al. (2021) using participants' email address as the salient stimuli.

Recently, however, Chen et al. (2021) presented a new way to detect concealed information using RSVP streams. Since EEG is impractical in certain situations, their study focused on pupillometry to measure physiological response to an RSVP. Measuring pupil dilation during an RSVP task proved to be a promising way to identify when people try to conceal information (Chen et al., 2021).

In this study we attempt to detect concealed information, using pupillometry in combination with the RSVP method. Chen et al. (2021) have already provided evidence in favor of this method. Within an RSVP stream, participants had to look for a fake name, while ignoring presentation of their real name. Chen et al. (2021) observed significantly different pupil dilation when presented with the fake name. Moreover, significant differences in pupil dilation were recorded when participants were presented by their salient real name compared to the control name. These findings implicate the potential of this method within CIT, which we will try to replicate. So similarly, in our study participants are asked to look for a *critical name* within an RSVP stream of random names, which differs between two conditions. In the Truth condition, this *critical name* is their real name. For the Lie condition, participants are instructed to respond to a chosen fake name, while ignoring the presentation of their real name.

To further build on the work of Chen et al. (2021), we aim to minimalize the impact of eye fatigue, learning effects and habituation that occurred in their study. Consequently, we significantly decrease the overall length of the experiments using less trials. Furthermore, we change the control name with each trial in order to prevent certain control names becoming more salient to participants.

The first hypothesis of our experiment is that participants in the Lie condition have a significantly larger pupil dilation whenever their fake name appears on screen compared to control names that changed with every trial. Our second hypothesis is that participants who were in the Lie condition have a significantly larger pupil dilation whenever their real name comes up compared to only control names that change with every trial. Both hypotheses will be tested within the timeframe 320ms – 1120ms after the presentation of the *critical name*, which Chen et al. (2021) recommended future research to use.

Methods

Participants

The study consisted of a sample of 36 participants, which were all first-year Psychology students at the University of Groningen. Prior to the experiment, every participant gave informed consent. All participants had normal or corrected to normal vision. The average age of all 36 participants (9 male, 27 female) was 20.2 (*SD* = 1.4). Participants received study points for participation, which is part of the requirements to pass a course. One participant was excluded due to their glasses hindering calibration and one was excluded due to the experiment software malfunctioning. Four participants were not present.

Apparatus and stimuli

The experiment took place in a lab located in the Social and Behavioural Sciences faculty building of the University of Groningen. The lab consisted of a desk with a 27" LCD Iiyama PL2773H monitor where an EyeLink 1000 eye-tracker using Pygaze was placed in front (Dalmaijer et al., 2014). Pupil size was recorded at 1,000 Hz and downsampled to 50 Hz offline. The eye-tracker was set at a distance of approximately 60 cm to the participant, measuring the pupil size throughout the whole procedure. Participants sat behind the monitor with their heads placed comfortably on a chin rest pointed towards the middle of the screen. On the monitor, each participant was presented with 96 trials of a randomly selected series of names through RSVP. All names started with a capital letter and had the same monospaced font (Courrier), size (21 pixels) and luminance. The names on the screen were shown sequentially in the centre of the screen with the same length. The difference in name lengths was evened out using hashtags and plus signs randomly before and after the names to ensure that every string consisted of eleven characters. As a result, the visual angle for each stimulus was 0.61°, whereas the whole screen consisted of a rectangle of 52.97° by 31.31°. The experiment was designed and carried out using Open Sesame 3.2.8 running on Windows 10 Enterprise.

We used the same set of names as Chen et al. (2021), consisting of 533 names, 281 of which are female and 252 of which are male. Those names were taken from the database by the Meertens Institute for Dutch language and culture research. Chen et al. (2021) first selected the first 100 top Dutch names of each year between 1975 and 2014 and then selected all names that are 10 characters or shorter. From that set of names, several subsets of 15 names were randomly selected to be presented to the participant in each trial. The fake name was picked by the participant from one of these subsets of unfamiliar names. The remaining distractor names to put before and after the fake, real and control names were selected randomly from the set of 533 names. Control names are randomly picked names from the name pool of Chen et al. (2021). Names with more than two identical consecutive letters were not allowed to be next to each other in one trial.

Procedure

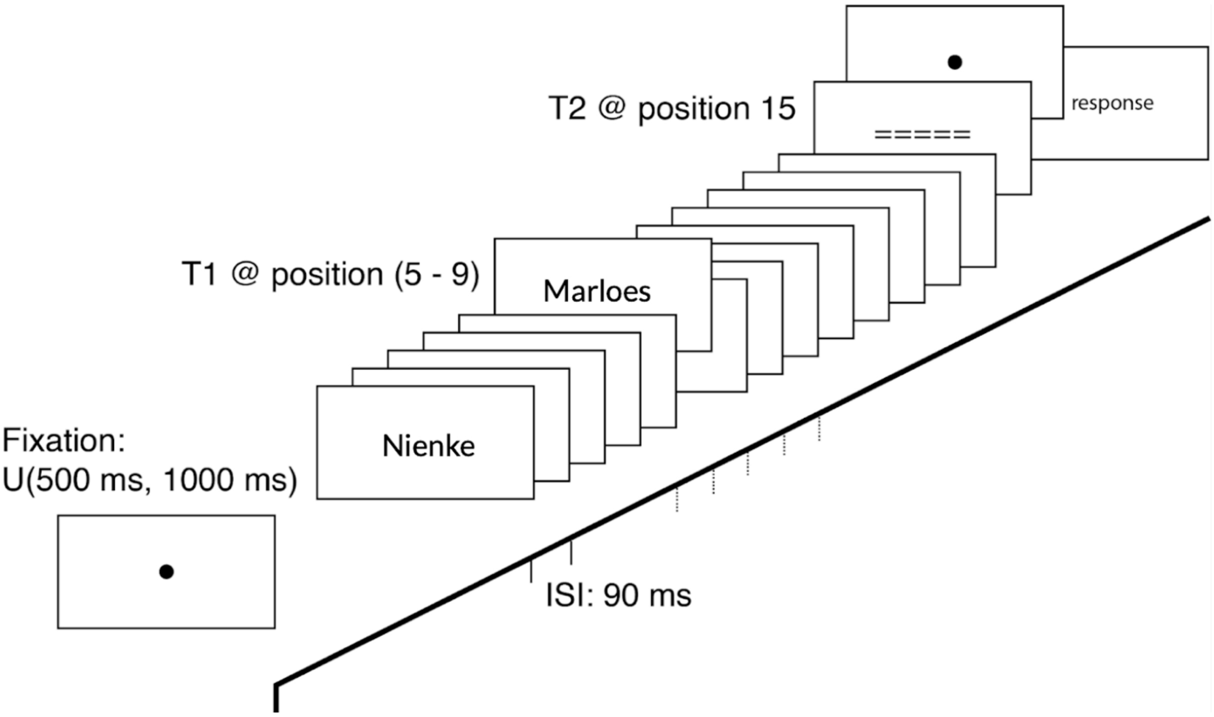
First, the eye-tracking camera was calibrated and the chin rest was adjusted. Then, the program asked for demographic details such as age, dominant hand, and real name. Prior to the first trial, half of the participants were asked to select an unknown fake name out of a randomly selected subset with 15 names of their indicated sex. In each trial sequence, the participants were presented with 15 randomly selected names that appeared for 100 milliseconds each in the middle of the screen. Depending on the condition, in each stream, the participant is presented with either the real name, fake name or control name. Those three options of names are called *critical names*. In each trial, the critical name could be shown at one of the positions between positions 5 to 9 (see Figure 1). The names in positions prior and after functioned as distractors. After the names, dashes or equal signs were shown for 100ms and the participants had to indicate which one they saw to assure they paid attention up to the end of the RSVP. Participants were asked to indicate whether they saw their target name by pressing “M” on a QWERTY keyboard when they did not see the target and “C” when they did see it. The order of the response keys was counterbalanced between participants. When responses to the first question were correct participants would earn 5 points or lose 5 points when the answer was wrong. For the response whether the participants saw the critical name 10 points were added when correct or subtracted when incorrect, meaning responses to the critical name were emphasised. The eye-tracker measured and recorded the participants’ pupil sizes throughout every trial. Every trial started with a one-point drift-correction procedure.

Design

The participants started with 10 practice trials to get familiar with the procedure. In total, the experiment consisted of 96 trials. Even participants were told to look for their real name (Truth condition). Uneven participants were instructed to search for the fake name they had to choose prior to the trials (Lie condition). For this study, an experiment with a 4 x 2 design was used. There were four conditions (T1) for the Lie and Truth conditions respectively: Target, Secret Target, Control and No Target. Participants had to indicate whether they saw the target, the chosen fake name, in the Lie condition while in the Truth condition they searched for their real name. In the Lie-Secret Target condition, the real name was shown and in the Lie-Control condition, the reaction to a randomly chosen distractor name that was the same for every control trial was recorded. Finally, in the Lie-No Target condition, a different randomly chosen distractor was shown. For the Truth-Target condition, the real name was shown, while in the Truth-Secret Target and Truth-Control condition the same randomly chosen distractor was presented. For both Truth and Lie conditions, each trial a different name was chosen for the No Target condition. An example of one trial in the Lie-Secret Target condition is shown in Figure 1.

Figure 1

Example of one trial in the Lie-Secret Target Condition



Note. In this trial, random names are shown before and after position 6. T1 is presented at position 6 and it is the participant's real name Marloes. T2 consists of equal signs and is presented at position 15. After another fixation point, participants responded to the questions regarding T1 and T2.

Data Processing and Analysis

All data and analysis scripts are publicly accessible in the Open Science Framework (https://osf.io/aq8pm/). Raw data is accessible on reasonable request.

For data analysis R was used with lme4 (v1.1-26; Bates et al., 2015). First, we analysed how accurate participants responded to questions one and two. Question one *(Did you see ------ or ====?)* indicates how well participants maintained their attention on the screen during the RSVP trials. Question two *(Did you see your (fake) name?)* was used to assess how well participants were able to detect their (fake) name and to get an indication of task difficulty.

Regarding our hypotheses, we did the analysis solely on the data of participants that were in the Lie condition. The first hypothesis of our experiment is that participants in the Lie condition had a significantly larger pupil size whenever their fake name (Target) appeared on screen compared to control names that changed with every trial (No Target). Our second hypothesis is that participants who were in the Lie condition would have a significantly larger pupil whenever their real name (Secret Target) came up compared to only control names that changed with every trial (No Target). Mean pupil sizes within the window of 320-1120ms were calculated for each trial. Pupil size was then time-locked and baselined by subtracting mean pupil size during a period of 300ms leading up to the presentation of T1 from the rest of the pupil trace.

To test these hypotheses, we estimated linear mixed-effects regression (LMER) models on a group level to investigate the difference in pupil size between the No Target reference conditions and the Secret Target, Target and Control conditions respectively. With the LMER we test if the variance between mean pupil sizes can be explained by the T1 conditions. Next, we used Bayes Factors to find evidence for or against the absence of the effect the T1 condition has on pupil size. Pupil size was used as a dependent continuous variable, and T1 was considered a categorical independent variable. Participant was used as a random factor. After that, we did a post-hoc contrasts analysis. This included a Tukey correction for multiple comparisons. Only No Target and Target were compared, as well as No Target and Secret Target. Lastly, we did an exploratory analysis where we visualised a linear mixed-effects regression on each time point to find out the critical time points at which Target Secret was significantly larger than No Target. In other words, we are looking for a time window when the p-value for pairwise comparison of Secret Target vs No Target is smaller than .05 and thus significant.

Results

Task Performance

Participants responded to the attention question, whether they saw -------- or ======, with an accuracy of 97.34% and to the T1 response question with 94.56% (see Table 1). This implies that the participants were able to detect their fake names during the RSVP trials and maintained attention up to the end of the trials.

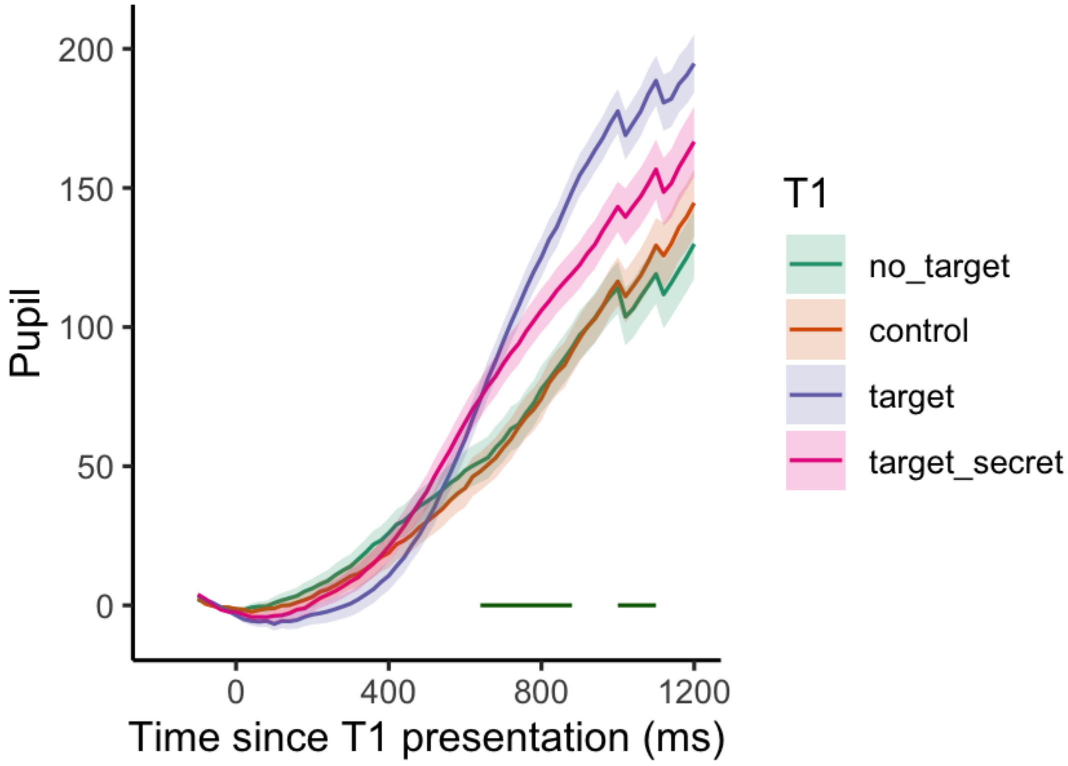
Pupil Data

Chen et al. (2021) mentioned in the discussion that setting a fixed time window for pupil variation observation would be advisable. Their results showed a range (from 320ms to 1120ms) in which the pupil size was significantly larger when presented with their real name than with a random control name. Our hypotheses, that in the Lie condition pupil size would be significantly larger in the Target and Secret Target condition than in the No Target condition in the range of 320ms to 1120ms, was not confirmed by our data. For that, we plotted the mean pupil size traces (see Figure 2a).

Figure 2a and 2b

2a) *Mean Pupil Size Traces for all T1-Lie Conditions*

2b) *Green Line that indicates the time point in which the pairwise comparison of Secret Target and No Target is significant*

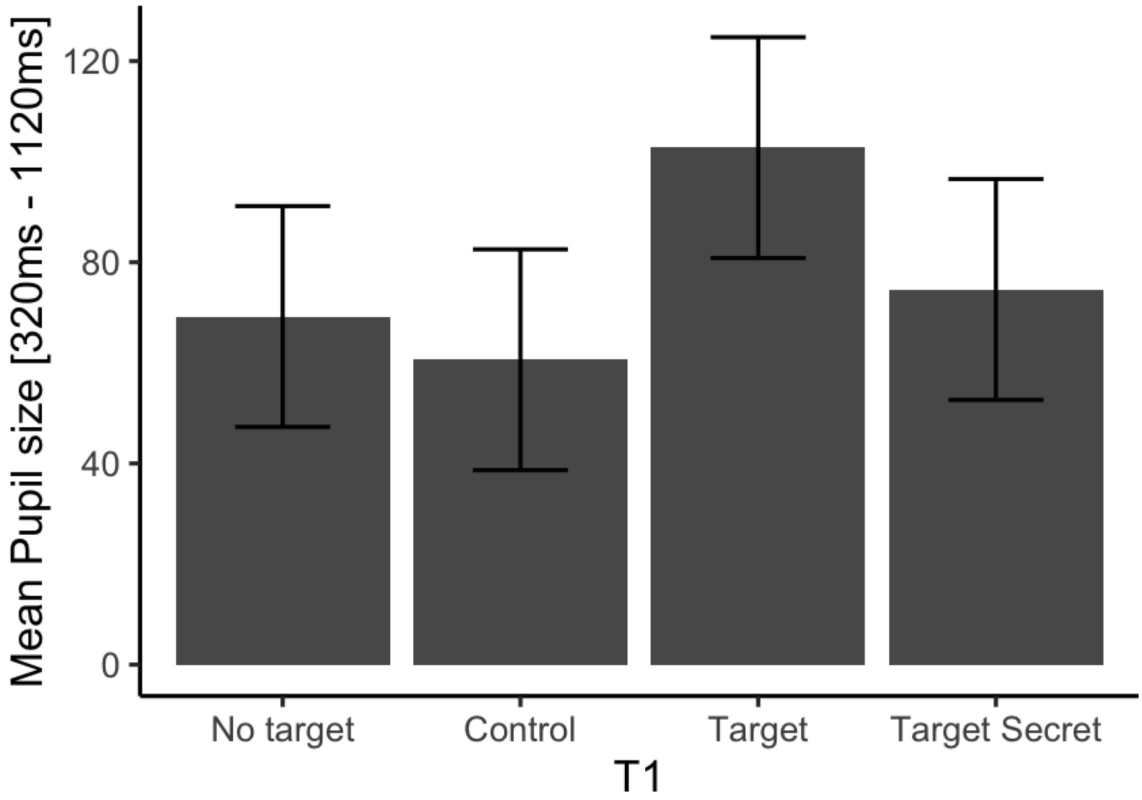


Note. This plot shows the pupil size for each condition in the time window -100 – 1200ms as well as the corresponding standard errors. The green line indicates the time frames for which the p-value for pairwise comparison of Secret Target vs No Target is smaller than .05, thus indicating a significant difference between Secret Target and No Target.

The average pupil size in the Lie condition is between 320ms and 1120ms since T1 presentation was calculated (see Figure 3 and Table 2a). The average pupil size in the Target condition is 91.4 (*SE* = 15.8), Secret Target condition: 82.4 (*SE* =15.8), Control is 63.3 (*SE* =15.8), and for the No Target condition 65.8 (*SE* =15.8).

Figure 3

Bar Graph of the Mean Pupil Sizes of all T1-Lie Conditions Including Their Standard Error for Time Points Between 320ms and 1120ms



We used a linear mixed-effects regression analysis to test whether the variance between mean pupil sizes between 320ms and 1120ms since T1 presentation can be explained by the T1 condition. Mean pupil sizes within that window were calculated for each trial and were used as dependent variables. Bayes Factor (*BF*) was estimated by comparing a model with the T1 condition as a dependent categorical variable with a model without that variable using Bayes Information Criterion ($BF > 1000$) (BIC, Wagenmakers, 2007). Next, we did a post-hoc comparison. Post-hoc comparisons revealed that both the differences between No Target - Target ($p = .088$, $z = -2.83$) and No Target - Secret Target ($p = .594$, $z = -1.84$) were not significant at a 5% significance level (see Table 3). From that information, we can conclude there is no significant evidence for or against either of the two hypotheses in the time window 320 - 1120 ms.

Finally, we did an exploratory analysis and plotted a linear effects regression on each time point to find the time points at which the differences between the T1 conditions are not equal to 0 (see Figure 2a (or 2b) & Table 4). In our data, we observe *p*-values lower than .05 in the time frame between 640ms to 920ms and 1000ms to 1100ms since the T1 presentation. This means that we found a time window that shows a significant difference between the Secret Target and No Target conditions. When comparing *p*-values of the No Target and Target condition we observe values lower than the 5% significance level for the whole time frame -200 - 1200.

Discussion

Concealed information testing, trying to detect whether people attempt to withhold information, underwent much attention recently (Bowman et al., 2013; Bowman et al., 2014; Harris et al., 2021; Chen et al., 2021). Although proven effective in certain situations, older methods of CIT had considerable disadvantages (Lykken, 1959). Since slowly presented stimuli may be vulnerable to countermeasures, we used the advantages of fringe awareness when using RSVP to conduct our experiment (Broadbent & Broadbent, 1987). We used pupillometry with the RSVP method as a CIT, in the same fashion Chen et al. (2021) did, in attempt to replicate their findings.

We expected to find a significantly larger mean pupil size for both the Target (fake name) and Secret Target (real name) conditions compared to the No Target condition (control name), within the timeframe of 320ms - 1120ms after the presentation of T1. Both comparisons turned out to be not significant. During exploratory analysis however, we found significantly larger means for Target and Secret Target conditions when compared to No Target when we inspected different time windows.

Consistent with the results of Chen et al. (2021), we found the same significant differences when participants were presented with information that they were ought to conceal. We could not however precisely replicate their results, as we found significant differences in pupil dilation within a different time window. The results of our study are also in accordance with the work of Bowman et al. (2013). This means that using EEG with RSVP is not the only viable option to conduct a CIT, while taking advantage of fringe awareness.

The accuracy scores on Q1 and Q2 imply that the full experiment of 96 trials was not too long. This is in line with the research of Chen et al. (2021). They recorded a drop in the mean pupil size after the first 90 trials, which could be attributed to fatigue of the eye and habituation. Future pupillometry CIT's using the RSVP method should take a look at different amounts of trials during experiment development. In this matter, we can hopefully find the perfect balance between most trials as possible for more robust data, while minimalizing effects of fatigue and habituation.

The database with names that we used solely consisted of Dutch names. Our participants, however, were not exclusively Dutch people. Differences in pupil size for participants with a non-Dutch name may have been slightly different from participants with Dutch names. Recognizing your own name in a stream of names from a different language may be less challenging than from the same language. Future studies should take this into account by only using participants with the same nationality or creating different experiments for different nationalities.

Since we used a database of the most common Dutch names it is plausible that participants were presented with a name that was very familiar to them, like a friend or family member. These names could also elicit an involuntary pupillary response. Future research could eliminate this by including questions that ask the participant to report familiar or important names beforehand.

At the end of the mean traces, we found a zigzagging part when plotting our data. We expect this occurred due to a lack of useable data points at the end of the measured timeframe. This may have something to do with the position of the T1 presentation. Because the pupil size is measured from the onset of the *critical name* until the end of the trial, not every trial contains the same amount of captured pupil sizes. A T1 presentation at position 5 out of 15, for example, means there is a longer period of time for the eye tracker to collect pupil data until the end of the trial, than a T1 presentation at position 10 out of 15. Possible solutions may be to extent the RSVP stream and to increase the sample size. Furthermore, future research should consider not analyzing after the moment the first possible T1 presentation is finished. In our study this would be position 5 out of 15 which is finished after 1000ms.

Since we found significant differences between our conditions for a different time window than Chen et al. (2021) did, future research should clarify this discrepancy. Ordinarily, pupil responses are much slower. Mathot (2018) found that pupils take about 25 seconds to dilate back to normal levels after exposure to red light, while taking up to several minutes after blue light. To reach the point of being applicable in the field, CITs with pupillometry and RSVP require more knowledge regarding the timeframes in which pupil dilation should be compared.

Most importantly, researchers should focus on combining what we know about CIT. They should attempt to detect concealed information using both EEG and pupillometry to measure physiological responses to RSVP streams. Additionally, it would be interesting to study whether combining these RSVP methods with older detection methods will end up increasing the predictive capabilities of CIT's as a whole. After all, cross validating and combining our knowledge has proven effective in psychology countless times before.

Taking into account the costs and impracticality of EEG focused studies and unreliability of older CITs like the polygraph, the combination of pupillometry and RSVP might just be the missing link to concealed information testing that researchers have been seeking for decades.

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Tables

Table 1

Mean Traces of all T1 Conditions for Questions One and Two

T1	T1 correct	T2 correct
Target	0.8900463	0.9537037
Target secret	0.9664352	0.9756944
Control	0.9606481	0.9849537
No target	0.9652778	0.9791667

Table 2

Estimate, Standard Error, Degree of Freedom and Upper and Lower Confidence Interval Bounds for Each T1 Condition

T1	Estimate	*SE*	df	95% CI	
				LL	UL
No Target - Lie	65.77509	15.81492	Inf	34.77842	96.77177
Control - Lie	63.29287	15.82414	Inf	32.27813	94.30762
Target - Lie	91.40178	15.81802	Inf	60.39903	122.40454
Secret Target - Lie	82.42912	15.82102	Inf	51.42050	113.43774
No Target - Truth	72.65481	15.85974	Inf	41.57029	103.73934
Control - Truth	57.93543	15.85585	Inf	26.85854	89.01233
Target - Truth	114.18350	15.86591	Inf	83.08689	145.28012
Secret Target - Truth	66.74712	15.86279	Inf	35.65662	97.83762

Note. CI = confidence interval; LL = lower limit; UL = upper limit

Table 3

Contrast Table

Contrast	Estimate	*SE*	df	*z*-ratio	*p*
No target lie – control lie	2.482	9.07	Inf	0.274	1.0000
No target lie – target lie	-25.627	9.06	Inf	-2.829	0.0879
No target lie – target secret lie	16.654	9.06	Inf	-1.837	0.5943
No target lie – no target truth	-6.880	22.40	Inf	-0.307	1.0000
No target lie – control truth	7.840	22.39	Inf	0.350	1.0000
No target lie – target truth	-48.408	22.40	Inf	2.161	0.3757
No target lie – target secret truth	0.972	22.40	Inf	-0.043	1.0000
Control lie – target lie	-28.109	9.07	Inf	-3.097	0.0410
Control lie - target secret lie	19.136	9.08	Inf	-2.108	0.4098
Control lie – no target truth	-9.362	22.40	Inf	-0.418	0.9999

Contrast	Estimate	*SE*	df	*z*-ratio	*p*
Control lie – control truth	5.357	22.40	Inf	0.239	1.0000
Control lie – target truth	-50.891	22.41	Inf	2.271	0.3097
Control lie – target secret truth	3.454	22.41	Inf	-0.154	1.0000
Target lie – target secret lie	8.973	9.07	Inf	0.989	0.9761
Target lie – no target truth	18.747	22.40	Inf	0.837	0.9910
Target lie – control truth	33.466	22.40	Inf	1.494	0.8109
Target lie – target truth	-22.782	22.40	Inf	1.017	0.9721
Target lie – target secret truth	24.655	22.40	Inf	1.101	0.9569
Target secret lie – no target truth	9.774	22.40	Inf	0.436	0.9999
Target secret lie – control truth	24.494	22.40	Inf	1.094	0.9584
Target secret lie – target truth	31.754	22.41	Inf	-1.417	0.8496
Target secret lie – target secret truth	15.682	22.40	Inf	0.700	0.9970

Contrast	Estimate	*SE*	df	*z*-ratio	*p*
No target truth – control truth	14.719	9.20	Inf	1.600	0.7506
No target truth – target truth	41.529	9.22	Inf	-4.506	0.0002
No target truth – target secret truth	5.908	9.21	Inf	0.641	0.9983
Control truth – target truth	-56.248	9.21	Inf	-6.106	<.0001
Control truth – target secret truth	8.812	9.20	Inf	-0.957	0.9802
Targe truth – target secret truth	47.436	9.22	Inf	5.144	<.0001

Note. Degrees-of-freedom method = asymptotic; number of contrasts = 28; 4 x 2 Design; *p*-value adjustment: Tukey method for comparing a family of 8 estimates

Table 4

P-Values for 71 Observations for Every 20ms comparing Target vs No Target and Secret Target vs No Target

Time	*p* Target vs No Target	*p* Secret Target vs No Target
-200	3.838940e-01*	0.27352378
-180	4.368272e-01*	0.36356238
-160	3.249122e-01*	0.12886363
-140	5.016298e-01*	0.27772775
-120	3.973150e-01*	0.31737751

Time	*p* Target vs No Target	*p* Secret Target vs No Target
-100	4.319924e-01*	0.24659622
-80	4.698054e-01*	0.27729985
-60	1.147252e-01*	0.93621303
-40	9.817355e-01*	0.20933405
-20	2.906907e-01*	0.14699469
0	1.614969e-01*	0.68620829
20	8.370765e-02*	0.52409019
40	4.193294e-02*	0.17391582
60	5.584579e-02*	0.22061577
80	1.235786e-01*	0.29385822
100	3.463594e-02*	0.24452132
120	6.522067e-02*	0.20847705
140	5.687859e-02*	0.26423483
160	6.665998e-02*	0.37210655
180	7.441697e-02*	0.27971378
200	8.866641e-02*	0.41828556
220	7.156204e-02*	0.49275426
240	7.164052e-02*	0.53393724
260	5.212664e-02*	0.46786465
280	4.710359e-02*	0.48850944
300	4.744431e-02*	0.55262912

Time	*p* Target vs No Target	*p* Secret Target vs No Target
320	3.783173e-02*	0.46107308
340	3.494375e-02*	0.50331084
360	2.864253e-02*	0.46341853
380	5.414441e-02*	0.63238500
400	5.530946e-02*	0.70428743
420	7.282703e-02*	0.75500556
440	1.496689e-01*	0.93217098
460	2.559438e-01*	0.99292074
480	3.507858e-01*	0.99290545
500	5.964229e-01*	0.91514767
520	8.585372e-01*	0.67756676
540	9.999829e-01*	0.49819413
560	9.089053e-01*	0.36823574
580	6.198141e-01*	0.19335405
600	3.800130e-01*	0.12648286
620	1.330275e-01*	0.06447917
640	3.207157e-02*	0.03351090*
660	6.228228e-03*	0.01900985*
680	2.975364e-03*	0.02205828*
700	7.749382e-04*	0.01439293*
720	3.167835e-04*	0.01530493*

Time	*p* Target vs No Target	*p* Secret Target vs No Target
740	7.208315e-05*	0.01144135*
760	3.114908e-05*	0.01127933*
780	1.466264e-05*	0.01190484*
800	2.255088e-05*	0.01862819*
820	6.863212e-06*	0.02110851*
840	5.646435e-06*	0.02310384*
860	2.385124e-06*	0.02849537*
880	1.195626e-06*	0.03818725*
900	8.944168e-07*	0.05757398
920	6.826870e-07*	0.04767915*
940	5.233383e-07*	0.05598409
960	5.737148e-07*	0.05353320
980	4.368729e-07*	0.05094060
1000	3.326033e-07*	0.03967117*
1020	3.176216e-06*	0.01855278*
1040	2.654440e-06*	0.01654581*
1060	4.017606e-06*	0.02091431*
1080	2.117450e-06*	0.01902652*
1100	1.515462e-06*	0.01612155*
1120	6.242735e-05*	0.05905138
1140	1.363861e-04*	0.07153397

Time	*p* Target vs No Target	*p* Secret Target vs No Target
1160	1.237123e-04*	0.06144384
1180	1.706553e-04*	0.06149453
1200	2.247243e-04*	0.06107930

*$p < .05$.