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HOW PEOPLE [TRY TO] DETECT LIES IN EVERYDAY LIFE

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Abstract. Laboratory-based deception-detection experiments often fail to capture the features of everyday life lie detection among ordinary citizens. In this study, we examined how people [try to] detect deception in real life. Over 10 weeks, every time the participants felt they had detected a lie, they filled in an online survey. Results show that, in everyday life, many lies are detected unexpectedly, often from non-behavioral indicators, that people suspecting deception search for both behavioral cues and non-behavioral information, but that non-behavioral information is more useful to detect deception. The study addresses aspects unexplored in prior studies on everyday life lie detection, provides new insights, and has theoretical implications.

Keywords: deception detection, lie detection strategies, deception cues, truth-default theory, ALIED, non-behavioral information, behavioral cues

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1. Introduction

Lying is considered a reprehensible form of social behavior, and children worldwide are socialized into honesty. An effective way to induce honesty is to foster in children the belief that lying will never go unnoticed, as it will generate specific emotions (e.g. shame) that will be revealed through behavioral cues (see Global Deception Research Team 2006). These practices may explain why people worldwide believe that behavior reveals deceit, and why they share similar stereotypes about deceptive behavior (Global Deception Research Team 2006).

Similar to lay people, scientists have traditionally believed that deception leaves apparent behavioral traces and have spent decades searching for them. Indeed, the most prominent theoretical perspectives in deception-detection research make specific predictions about ‘behavioral cues to deceit’ (e.g. Buller and Burgoon 1996, DePaulo et al. 2003, Ekman 2009, Zuckerman et al. 1981).

However, several meta-analyses cast serious doubt about the prospects of detecting deceit from behavior. First, the association between behavioral cues and deception is weak and under the influence of a host of moderator variables (DePaulo et al. 2003, Luke 2019, Sporer and Schwandt 2006, 2007). Second, across studies, observers’ accuracy in judging veracity from behavior is low: 54%, compared to 50% chance accuracy (Bond and DePaulo 2006). Third, training observers to detect deception from behavioral observation alone yields only limited increases in detection accuracy (Hauch et al. 2016).

These meta-analytical conclusions draw a dim picture concerning humans’ prospect to detect deceit. However, one can question their relevance for everyday life lie detection. Most deception studies have been conducted in laboratory settings, and concerns have been raised that laboratory lie-detection experiments fail to mirror real-life deception and its detection (Levine 2018). In particular, there is some evidence that outside the laboratory most lies are detected from non-behavioral information rather than from behavioral cues, and that access to non-behavioral information boosts observers’ accuracy in judging veracity. We discuss these topics next.

1.1. Lie detection in the laboratory as compared to real-world settings

In a typical laboratory experiment, senders tell inconsequential truths and lies at the request of an experimenter. Observers, who are unacquainted with the senders, have to judge whether each sender is truthful or deceptive. Normally, the senders’ communications are either video-recorded, audio-recorded, typed or transcribed; thus, there is no opportunity for interaction. Finally, observers have to make their judgments immediately. Under these conditions, the only information available to observers is the senders’ behavior at the time the lie is told. As explained above, behavior is a poor marker of deception; this might explain the poor accuracy rates obtained in laboratory experiments.[1]

Conversely, in most everyday life circumstances, deception targets know the deceiver (background information) and can question him or her, both at the time the lie is told and later. Also, deception targets can determine whether the sender lied or told the truth long after the lie was told. This provides them with opportunities to carefully search for diagnostic non-behavioral information (such as tangible evidence, information from third parties, etc.). Detectors can also learn about the liar’s circumstances, in particular their incentives or motivations to deceive. In short,

[1] Here we depict *the typical* laboratory experiment, but not all experiments have all these features.

a number of characteristics of real-life deceptive situations facilitate lie detection by enabling observers to access and use diagnostic non-behavioral information. While laboratory experiments tell us much about lie detection based on behavioral cues, they tell us very little about how people detect deception in real life.[2]

1.2. In real life, people detect deception from non-behavioral information

In a seminal study, Park, Levine, McCornack, Morrison and Ferrara (2002) asked college students to recall a lie they had detected in the past and to report how they detected it. The results showed that most everyday life lies are not revealed from behavioral cues, but from non-behavioral information such as third-person information, tangible evidence, inconsistencies with the detectors' knowledge, and the liar's confession. While behavioral cues are visible, vocal, and verbal behaviors [assumed to be] displayed by the sender at the time the lie is told (e.g. fidgeting, pauses, amount of detail in the statement…), non-behavioral information involves some knowledge about the context (i.e., knowledge that goes beyond the sender's behavior during the specific deceptive exchange) that contradicts the deceptive statement (Blair et al. 2012; see also Blair et al.'s [2010] notion of 'content in context'). Examples are pieces of information provided by witnesses or informed others, physical evidence, the detector's specific knowledge about the deception topic, and the liars' ultimate admission that the exchange was deceptive (see Park et al. 2002).

Besides the predominance of non-behavioral over behavioral indicators, Park et al. (2002) also found that most detected lies had been told by familiar senders (friends, romantic partners, family members…) and had been discovered hours, weeks, or months after being told. Park et al.'s results provide strong evidence that laboratory experiments do not capture the ordinary real-life conditions where deception judgments are made, that empirical results of laboratory experiments cannot be generalized to everyday-life circumstances, and that in everyday life it is non-behavioral information, rather than behavioral cues, that allows people to detect deceit.

Park et al.'s (2002) findings relative to the prominent role of non-behavioral information (compared to behavioral cues) in detecting real-life deception have been replicated more recently by Levine and Daiku (2019), Masip and Herrero (2015), Novotny et al. (2018), and Park and Lee (cited in Levine 2020). Masip and Sánchez (2019) conducted a mini meta-analysis of the four empirical studies available at the time and found that, across studies, 82% of the indicators reported were non-behavioral, while only 17% were behavioral (but see Sánchez and Masip 2020, for a study failing to find this effect).

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[2] See Levine (2018) for additional differences between typical lie-detection laboratory experiments and real-life deception contexts.

1.3. Non-behavioral information increases observers' detection accuracy relative to behavioral cues

Empirical research shows that access to non-behavioral information, which is typically absent in laboratory experiments, facilitates lie detection. Across eight deception-detection experiments, Blair et al. (2010) found that while the accuracy rate of observers with access to behavioral cues only was 57%, the accuracy rate of observers with access to non-behavioral information in addition to behavioral cues was 75%. Similarly, Bond et al. (2013, Experiment 3) found an accuracy rate of 51% among observers with access to visible behavior only, and of 76% among those with access to non-behavioral information (the senders' incentives to lie or tell the truth) in addition to visible behavior. A third group who only had access to non-behavioral information attained a 97% accuracy rate.[3] In short, compared to a behavior-only condition, access to non-behavioral information increases observers' accuracy in judging veracity (see also Blair et al. 2018).

One reason why non-behavioral information helps people judge veracity is that it allows observers to compare the sender's statement with that [presumably] reliable information (Blair et al. 2010, 2012). This strategy consists of using the so-called *correspondence criterion* (Blair et al. 2018), which has long been considered by philosophers to be one way of determining whether a belief is true or false (see Dunwoody 2009). It is also consistent with the so-called *situational familiarity hypothesis*, according to which "in familiar contexts, observers are able to 'visualize' the situation in question and judge the plausibility and validity of verbal content" (Stiff et al. 1989: 560, see also Reinhard et al. 2011, 2012).

1.4. Summary

In short, while people worldwide believe that behavioral cues signal deception, the accumulated evidence indicates that behavior is a poor marker of deceit. Laboratory experiments show that people are poor truth/lie detectors, but this might be a consequence of experimental participants typically having access to behavioral cues only. Most everyday life lies are not detected from behavior but from non-behavioral information. Non-behavioral information is normally absent from laboratory experiments and has been shown to increase observers' accuracy in judging veracity. Because laboratory experiments typically fail to capture the characteristics of everyday life deception and its detection, naturalistic studies are needed. We examined some unexplored topics outside the confines of the laboratory.

1.5. Theoretical background

Our goal in conducting this study was to examine how lies are detected outside the laboratory, in real-life circumstances. Two recent deception theories helped us make a number of predictions: Levine's (2014, 2020) *Truth-Default Theory* (TDT)

[3] This is important because it shows that the superior accuracy of the behavior-and-context group was not just a consequence of that group having access to more information than the behavior-only group.

and Street's (2015) *Adaptive Lie Detector account* (ALIED). However, this research was not conceived to test any specific theory. Nor was it conceived to compare TDT against ALIED. In some respects, these two theories make similar predictions, but they differ in the posited underlying mechanisms. Ascertaining which theory is correct was indeed beyond the scope of this study, which was designed solely to explore how lies are detected in real life.

Rather than a focused, unitary theory, Levine's TDT is "a collection of quasi-independent mini-theories, models, or effects that are joined by an overarching logic" (Levine 2014: 379). TDT is based on prior research by Levine and his colleagues, and it incorporates many of the findings reviewed above. TDT contains 13 modules and 14 propositions. Those modules most relevant for this research are briefly summarized in Table 1, and the propositions (which we grouped under five separate topics) are in Table 2.

Street's (2015) ALIED is more focused than TDT. It provides an account of the way humans make truth/lie judgments. Laboratory research shows that humans display a strong tendency to believe others are honest (e.g., Bond and DePaulo 2006). This tendency has been conceived as a cognitive bias. Street (2015) challenges this view, arguing that the truth 'bias' is actually a strategic attempt of the detector to make the best possible guess when telltale information is absent. More specifically,

Table 1. Modules of truth-default theory (TDT; Levine 2014, 2020) most relevant for this research

Module	Brief description
Deception motives	Most people tell the truth most of the time, as they see no reason to lie unless the truth is inconsistent with their goals.
Veracity effect	Because deceptive communication is infrequent, people normally assume others are truthful.
Projected motive model	Because people know that others might lie if there is a good reason for it, whenever they think the sender has a motive to lie, they might doubt veracity.
How people really detect lies	In everyday situations, most lies are detected because at some point, often long after the lie was told, some evidence comes out that contradicts the lie, or because the liar confesses.
Content in context	Lie detection can be facilitated by knowing about the context where the specific communication happens.
Correspondence and coherence	Contextual knowledge is useful because it allows the detector to use the *correspondence criterion*—that is, the detector can compare the communication content against contextual information. Correspondence is normally more indicative of veracity than the internal *coherence* of the message verbal content (i.e. lack of verbal contradictions).

Table 2. Propositions of truth-default theory (TDT; Levine 2014, 2020) grouped according to topic

Topic	Propositions (P)
Deception prevalence	Most people tell the truth most of the time (P1), with most lies being told by just a few prolific liars (P2). In fact, ordinary people do not lie unless they cannot achieve their goals with the truth (P5).
Truth bias	Because deception is rare, most of the time most people believe what others say (P3). This is adaptive and often results in efficient communication, but it also makes people vulnerable to deceit (P4).
Suspicion triggers	However, under certain circumstances people might suspect deceit, such as when they believe that the sender has a good reason to lie (P6). Other factors triggering suspicion are (but are not limited to) behavioral cues stereotypically associated with deception, verbal inconsistencies, a lack of correspondence between the message content and the detector's knowledge or beliefs, and third-person information contradicting the message (P7). Suspicion triggers may occur long after the lie was delivered (P10), and if they are strong enough, they might lead the person to scrutinize the message to assess its veracity (P8).
Deception detection	People can resolve that a message is deceptive based on the sender's behavior, internal inconsistencies in the message, the liar's motivations, relevant information from third parties, or because the message contradicts the detector's knowledge or beliefs (P9). However, because the act of lying does not elicit telltale behavioral markers of deception, the mere observation of the senders' behavior at the time of lie delivery will not permit observers to accurately detect deception (P11). Rather, accurate lie detection typically occurs long after-the-fact and is based on external evidence, the correspondence criterion or the deceiver's confession (P12).
Lie-detection skill	While context-sensitive questioning of the sender can elicit diagnostic information, the wrong type of questioning might decrease truth and lie detection accuracy (P13). Expertise in lie detection is nor determined by any kind of skill to observe or interpret behavior, but by skill in eliciting diagnostic information from senders (P14).

ALIED distinguishes between 'individuating information' and 'context-general information'. The former is information about the truthfulness of a specific statement. For instance, Mark told Lara that he has never been to France, but Lara saw a picture of Mark next to the Eiffel tower. The picture is a piece of individuating information contradicting Mark's statement.

Unlike individuating information, context-general information does not refer to a specific statement but to statements in general. For example, the fact that people in general, and Mark in particular, are typically honest, is a piece of context-general information. It suggests that the probability that Mark's current statement is deceptive is low. But it refers to statements in general, not to that specific statement of Mark.

According to ALIED, when telltale individuating information is absent (as in most laboratory-based lie-detection studies), people use context-general information to make an informed guess. Indeed, Street et al. (2016) showed in an experiment that as individuating cues became less diagnostic of veracity, the participants relied more on context-general information to make their truth/lie judgments.

Note that while both ALIED and TDT predict a preponderance of truth judgments in most situations, the reason for this observable outcome differs. While ALIED posits it to be a strategic response to make the best possible guess (by considering that most people tell the truth most of the time), TDT understands it as a default, automatic response.

1.6. Unresolved issues

1.6.1. Strategies to detect deception

In the study by Park et al. (2002) and subsequent replications, the participants were asked to report how they had successfully detected a lie (revealing information). They were *not* asked to report everything they did to detect the lie (strategies used). This distinction is crucial, as the finding that most real-life lies are successfully detected from non-behavioral information does not necessarily mean that detectors do not actively seek for, or pay attention to, behavioral cues. Maybe they do, but because these cues ultimately do not allow them to detect deception, they don't mention them when asked to list the cues that *allowed* them to detect the lie. We addressed this issue by asking participants to report everything they did to detect the lie, including unsuccessful strategies.

1.6.2. Unexpected lies

Participants in laboratory experiments are instructed to detect deception; thus, they actively scrutinize the senders' communications to assess their veracity. But, according to TDT, if people are not prompted to expect deception, then the idea that the other person might be lying does not even come to mind (see the *Veracity Effect* module, as well as Propositions 3 and 4; for some real-world examples, see Gladwell 2019). Therefore, they will not carefully examine the communication to ascertain its veracity (Clare and Levine 2019, Levine et al. 2020).

Unlike what typically happens in laboratory experiments, in real life people normally do not expect deception. Therefore, it is conceivable that a number of everyday lies are detected unexpectedly from highly telling non-behavioral cues without the deception target having ever entertained the idea that they had been deceived. Let us consider the following example: Last week, Lucy told her boyfriend John that she would not be able to meet him on Saturday because she needed to spend the full weekend studying hard for this week's exam. John had no reason to think she was lying. However, earlier this week, John saw a picture on Facebook of a party that took place on Saturday night; in the picture, along with some other people, there is Lucy dancing and having fun with another young man (very telling non-behavioral indicator).

Similar predictions can also be made based on ALIED. Typically, people are honest, and Lucy has been honest to John most of the time. Absent telltale individuating information, this context-general information would make it unlikely for John to consider that Lucy's statement is deceptive. But, when John confronts a highly revealing piece of individuating information (the picture on Facebook), his view about the honesty of Lucy's statement changes.

In this study, participants had to indicate whether they had detected lies unexpectedly or following suspicion. Based on the theoretical frameworks above, we expected that under naturalistic, real-life conditions, a substantial proportion of lies would be detected unexpectedly.

1.7. The current study

Over a period of 10 weeks, every time the participants felt they had detected a lie they had to fill in an online survey to indicate, among other things, whether they had detected the lie unexpectedly (and, if so, how they had detected it) or whether they first had a suspicion and then did something to corroborate their suspicion (and, if so, they had to list everything they did, which specific strategies worked, which strategy had been the most useful one, and which had been the least useful one).

Note that our goal was to study lie detection as it happens naturally in everyday life. Not content with just creating a naturalistic situation in the laboratory, we turned to *actual* deception-detection contexts. Senders were not randomly assigned to either lie or tell the truth, nor did we manipulate whom they would lie to, their motivations or the stakes. Detectors were free to use any strategy they wished to detect deception. They could either focus on behavioral cues or utilize non-behavioral information. Finally, no time constraints were imposed on them to make a veracity judgment.

1.8. Predictions

Because very little is known about everyday life lie detection, some aspects of this study were exploratory. Thus, while some predictions were in fact rather specific hypotheses (i.e. Predictions 2, 4, 5, 6, and 7 below), others were tentative and unspecific (Predictions 1 and 3). Some aspects of interest could be examined based on descriptive data only. Note that we did not explore accuracy in detecting truths and lies; instead, our focus was on how people [try to] detect deception.

People tell the truth most of the time (TDT *Deception Motives* module; TDT Proposition 1, P2, and P5). Therefore, individuals might assume that others are truthful (TDT *Veracity Effect* module; P3 and P4; Clare and Levine 2019) and, absent any reason for suspicion, will not be continuously alert trying to detect deceit. Similarly, people's general tendency to be honest may lead individuals to consider that others are truthful in most situations (ALIED). Thus, we predicted that, on many occasions, lies would be revealed surprisingly and unexpectedly (*Prediction 1*), often on the basis of individuating non-behavioral information (*Prediction 2*), which is more telling than ambiguous behavioral displays (according to both, ALIED and TDT's *How People Really Detect Lies* module, P11 and P12).

If some individuals suspect deception (see P6 and P7), then they can use specific strategies to assess veracity (see TDT's P8). We anticipated that participants would use not only strategies aimed at collecting non-behavioral information (hereafter 'non-behavioral strategies' for short), but also strategies to observe or elicit behavioral cues ('behavioral strategies') (*Prediction 3*). This prediction was based on the allure of behavior for potential lie detectors. First, people worldwide believe that behavioral cues reveal deception (Global Deception Research Team 2006). Second, this belief is pervasive. Masip and Herrero (2015) first asked participants how lies can be detected. The participants mostly mentioned *behavioral* cues. Then, they asked participants to report how they had detected a lie in the past. The participants mentioned primarily *non-behavioral* indicators. That is, despite their experience in discovering lies from non-behavioral information, Masip and Herrero's participants still believed that lies can be detected mostly from behavior. Third, people trying to detect deception feel inclined to use behavioral cues, even when more reliable information is available. In the experiment by Bond et al. (2013) described earlier, while the behavior-and-context condition increased accuracy compared to the behavior-only condition, it decreased accuracy compared to the context-only condition. Thus, the mere presence of behavioral cues acted as a magnet, capturing the participants' attention and limiting their accuracy.

Based on (a) the limited diagnostic value of behavioral cues, (b) TDT's *How People Really Detect Lies, Content in Context*, and *Correspondence and Coherence* modules, and (c) TDT's P11 and P12, we predicted that the most successful lie-detection strategies would be non-behavioral rather than behavioral (*Prediction 4*), while the least successful strategies would be behavioral (*Prediction 5*).

We also sought to replicate prior findings showing that deception detection often occurs long after the fact (TDT's P10, P11, P12) (*Prediction 6*), and that discovered deception typically happens among family members and close friends rather than strangers (Park et al., 2002) (*Prediction 7*). Finally, because little is known about deception detection outside laboratory settings, we also explored some additional questions. These are not further discussed in the text due to space constraints, but they are presented in Supplemental Files 1 (available at <https://bit.ly/3mRlVKc>).

2. Method

2.1. Participants

Thirty college students signed up to participate in exchange for an academic incentive. However, five of them never replied to the online survey and were excluded from all analyses reported herein.[4] Twenty-five participants remained (19 females and six males; M_{age} = 20 years, *SD* = 1.38). Note that for most analyses the unit of analysis was not the participant, but either the lie (67 lies were reported), the lie indicator for unexpected lies (58 indicators) or the strategy used to detect suspected lies (44 strategies).

2.2. Procedure

The participants were invited to participate during a lecture. They were told that if they signed up to participate, then, during the period of the study, every time they felt they had discovered a lie they had to inform us by filling in an online survey. We explained that a lie is a deliberate attempt to create or maintain in another person a belief that the communicator considers false (Masip et al. 2004). We informed them that they were to report only those lies told specifically to them during face-to-face interactions (which excluded lies told massively through the mass media). We stressed that, because our goal was to examine everyday life lie detection as it happens naturally, we expected them not to alter their typical behavior for the sake of the study.

Those interested in participating signed up online. An informed consent form was displayed on screen, and they were instructed to read it carefully and not to sign up if they did not feel comfortable doing so. The study was conducted in accordance with institutional, national, and international (e.g. the APA Ethics Code and the Declaration of Helsinki) ethical guidelines. Both the signup form and the study survey were placed at the electronic Moodle-based learning platform of the university. The students who had signed up were later informed via email about the day the study would begin. An online survey was available to participants during the time of the study (10 weeks). Table 3 lists all questions in the survey.

2.3. Coding

All responses to open questions were coded independently by two coders who were blind to the research predictions. Before coding, both coders read a manual with coding instructions and category descriptions. Some categories were based on those used in prior research. For instance, the definitions of non-behavioral vs. behavioral, as well as the separate categories of non-behavioral indicators, were adapted from Masip and Herrero (2015) and Park et al. (2002). Some other categories were defined anew, often using a data-driven approach (such as for relational closeness;

[4] We invited these five students to email us explaining why they reported no lies. Four of them replied; all four said they did not discover any lie over the 10-week period.

Table 3. Questions in the survey

1. How confident are you that you were told a lie? (1-to-5 scale).
2. Which was the lie? Describe in detail the circumstances under which you were told the lie. If you can recall it, please write in detail what the liar told you exactly.
3. Do you think the topic of the lie is important? (1-to-5 scale)
4. What day did the lie happen?
5. On that day, at about what time did the lie happen?
6. What day did you detect the lie?
7. On that day, at about what time did you detect the lie?
8. What is your relationship with the liar?
9. Is the liar aware that you discovered the lie? (I believe the liar is aware / I believe the liar is not aware / I have no idea)
10. Why?
11. Describe in detail the circumstances surrounding the detection of the lie.
12. How did you detect the lie? (I first suspected that was a lie and did something to corroborate it / I discovered the lie unexpectedly)
    * If "I discovered the lie unexpectedly" was chosen:
        13. What did indicate you that this was a lie?
    * If "I first suspected that was a lie and did something to corroborate it" was chosen:
        14. What did you do to check your suspicion? Please report all strategies you used to find out whether that was a lie or not: What did you pay attention to or what did you do to find out whether that was a lie? Please, be exhaustive and report everything you did regardless of whether it worked or not.
        15. Out of all the strategies you used, with which one(s) were you able to detect the lie?
        16. Out of all the strategies you used, which was THE MOST useful to find out whether the person lied or not? Why?
        17. Out of all the strategies you used, which was THE LEAST useful to find out whether the person lied or not? Why?

Note. In parentheses: scales used (for Questions 1 and 3) or response options (for Questions 9 and 12). For scales, higher ratings denoted more confidence (Question 1) or importance (Question 3).

see below). The coders also underwent systematic training over several sessions. The training involved (a) describing the categories to the participants, (b) answering their questions, (c) substantial practice (with both examples that we created for the training as well as actual responses from other studies either published or in progress), and (d) extensive feedback. For some variables (e.g. behavioral vs. non-behavioral strategy or indicator), the training additionally involved homework and subsequent feedback and clarification.

Specific categories and reliabilities are displayed in Table 4. To test Prediction 2, the deception indicators mentioned in response to Question 13 (see Table 3) were coded as behavioral or non-behavioral. Because most of them were non-behavioral, we also coded the specific kinds of non-behavioral information used (Table 4).

Question 14 was asked to collect information to test Prediction 3 (behavioral vs. non-behavioral strategies). Note that Question 14 asked participants to list all *strategies* (not indicators) used; however, some participants mentioned indicators in addition to, or instead of, strategies. Some of these indicators, which we called *elicited*

Table 4. Reliabilities

Categories	Kappa	Percent agreement
Indicators Used to Detect Unexpected Lies (Q13)		
Behavioral vs. Non-behavioral [a]	.67	87.93
Non-behavioral Indicators Used to Detect Unexpected Lies (Q13)	*.75*	*82.93*
Third-person Information	.82	92.68
Evidence	.70	85.37
Inconsistency with knowledge	.66	87.80
Confession	1.00	100.00
Dispositional Honesty/Dishonesty	1.00	100.00
Other	--	--
Strategies (Q14)		
Behavioral vs. Non-behavioral [b]	.93	95.45
Indicators (Q14)		
Behavioral vs. Non-behavioral [a]	.84	92.31
Indicators (from both Q13 and Q14)		
Behavioral vs. Non-behavioral [a]	.79	90.44
Useful (Q15)		
Useful Strategy (Yes/No)	.82	92.50
Useful Stand-alone Indicator (Yes/No)	.76	92.68
Most Useful (Q16)		
Most Useful Strategy (Yes/No)	.75	87.50
Most Useful Stand-alone Indicator (Yes/No)	.81	95.13
Least Useful (Q17)		
Least Useful Strategy (Yes/No)	1.00	100.00
Least Useful Stand-alone Indicator (Yes/No)	.88	97.56
Time Until Detection (Q4-Q7)	.92	94.00
0 min – 10 min	.88	94.03
> 10 min – 1h	1.00	100.00
> 1 h but same day	.68	94.03
Next day	1.00	100.00
Two or more days	1.00	100.00

Categories	Kappa	Percent agreement
Relational (Emotional) Closeness (Q8)	*.93*	*95.52*
Close individuals	.97	98.51
Family members	1.00	100.00
Close acquaintances	.90	95.52
Distant acquaintances	.79	97.01

Notes. Q13, Q14, etc. = Question 13, Question 14, etc. in the survey; -- = This category was not used by either coder; Reliabilities in the rows in italics were calculated across all subcategories, while reliabilities for the other rows were calculated based on a dichotomous decision (yes/no; present/absent; or behavioral/non-behavioral).

[a] None of the coders used the *both* category nor the *other* category.
[b] None of the two coders used the *both* category and only one coder used the *other* category, where she coded just one strategy. The behavioral vs. non-behavioral reliabilities were calculated excluding this strategy. Separate reliabilities for behavioral and non-behavioral were Kappa = .87, percent agreement (PCA) = 95.45, and Kappa = .94, PCA = 97.73, respectively.

indicators, were described as resulting from having used a specific strategy (e.g. "I asked him repeatedly [strategy] until he confessed [indicator]"), while others, which we called *stand-alone indicators*, were not explicitly connected to any strategy (e.g. "I know she was lying because she looked nervous"). Thus, as planned, *strategies* were coded as oriented to collect behavioral cues, non-behavioral information, both, or neither/impossible to tell (*other* category).[5] However, in addition, we also coded *indicators* as behavioral, non-behavioral, both or neither/impossible to tell (*other* category). It also happened that sometimes, in their responses to Questions 2, 11, 15, 16 or 17 (see Table3), the participants mentioned strategies or indicators not mentioned in their responses to Question 13 or 14. All these items were coded as if they had been reported in replying to Question 13 or 14.

For each individual lie, coders also had to determine, out of all strategies and stand-alone indicators reported to detect that lie, which specific ones were mentioned by the participant as having been *useful* to detect the lie (Question 15), which one had been designated as *the most useful* (Question 16), and which one had been designated as *the least useful* (Question 17). These questions were asked to test Predictions 4 and 5. Coders also had to calculate how long it took to detect each lie from the responses to Questions 4 to 7 (Prediction 6), and then had to assign each lie to one of the time categories in Table 4.

[5] After the coding was finished, we noticed that in all cases where a participant said the strategy used was 'asking the sender' but did not specify the purpose of the strategy, the strategy was coded as behavioral. Note that this strategy can be either behavioral (e.g. asking questions *to elicit behavioral cues*), non-behavioral (e.g. asking questions *to get a confession*), or both. Therefore, these cases should have been allocated to the *other* category, which, surprisingly, was not used at all by the coders in coding either strategies or indicators. We therefore re-allocated these seven cases to the *other* category. With the original codings we still found support for the notion that useful (OR = 2.75, RD = 0.20) and most useful (OR = 5.23, RD = 0.28) strategies were non-behavioral rather than behavioral, but the effects were weaker than in the analyses presented in the text, which were conducted with the corrected data set.

The participants' responses to Question 8 (Prediction 7) were quite diverse, and sometimes it was hard to determine whether a specific relationship involved more or less relational-emotional closeness compared to others (e.g. brother-in-law, uncle, neighbor, classmate…). To resolve this issue, we conducted a small study (see Supplemental Files 2 at <https://bit.ly/3mRlVKc>). The final categories used by coders were *close individuals* (father/mother, brother/sister, romantic partner, friend), *family members* ('family member', grandparent/grandmother, uncle/aunt, cousin), *close acquaintances* (brother/sister in law, nephew/niece, former romantic partner, classmate, etc.), and *distant acquaintances* (acquaintance, someone living in my area, landlord/landlady, unacquainted person, etc.). It is clear from Table 4 that, overall, reliabilities were good for all categories in all variables.

3. Results

We report descriptive statistics and the results of non-parametric tests. The units of analysis were lies, detection strategies, or deception indicators. Although some participants reported more than one lie and some lies had been discovered with more than one strategy or indicator, in many cases 'clusters' (i.e. participants or reported lies) contained only one observation (see Supplemental Files 3 at <https://bit.ly/3mRlVKc>). Still, to examine whether our observations were interrelated, we calculated a number of intraclass correlations coefficients (*ICC*s) for binary data (Paul et al. 2003, Ridout et al. 1999). The resulting *ICC*s were small and not significant, thus showing that the observations were not interrelated. A description of the *ICC* analyses is provided in Supplemental Files 3 <https://bit.ly/3mRlVKc>.

3.1. Reported lies

Overall, 67 lies were reported. The participants were very confident that the communications had been deceptive (Question 1 in Table 3), $M = 4.49$ on a 1-to-5 scale, $SD = 0.75$; no one gave a score of 1 or 2, and 64% of the lies had a score of 5. The importance of the deception topic (Question 3) was moderate, $M = 2.49$, $SD = 1.30$, $Mdn = 2$, $Mode = 2$; however, seven lies had a score of 5 and nine had a score of 4.

3.2. Lies detected unexpectedly vs. after suspicion

Prediction 1 was that, in everyday life, many lies would be revealed unexpectedly. Indeed, 61.19% (i.e. 41 lies) of the 67 lies reported by the participants had been detected unexpectedly ($M = 1.64$ lies per participant, $SD = 1.44$). The remaining 38.81% (26 lies) had been preceded by suspicion ($M = 1.04$, $SD = 1.37$).[6] Similarly,

[6] The participants actually indicated that 43 lies (64.18%) had been detected unexpectedly and the remaining 24 (35.82%) after suspicion. However, the participants' responses to the open questions in the survey revealed that four 'unexpected' lies had actually been preceded by suspicion (and the participants subsequently used specific strategies to corroborate their suspicion), while two 'suspected' lies had actually been discovered unexpectedly.

while 84% of participants reported unexpected lies, only 56% reported lies detected after suspicion. In short, the data show that, in everyday life, a substantial proportion of the lies that are detected are discovered unexpectedly. (For more descriptive data concerning both unexpected and suspected lies, see Supplemental Files 4 at <https://bit.ly/3mRlVKc>.)

3.3. Lies detected unexpectedly: indicators

We predicted that unexpected lies would be detected mostly from non-behavioral information rather than from behavioral cues (Prediction 2). This prediction was supported: participants mentioned 58 indicators that revealed the 41 unexpected lies (M = 1.41 indicators per lie, SD = 0.71); out of these, 82.76% (48 indicators) were non-behavioral, while the remaining 17.24% (10 indicators) were behavioral, χ^2 (1) = 24.90, $p < .001$.[7] The non-behavioral indicator mentioned most often was evidence (45.83%), followed by inconsistencies with knowledge (22.92%), third-person information (18.75%), the liar's confession (10.42%), and dispositional honesty/dishonesty (2.08%).

3.4. Lies detected following suspicion: strategies and indicators

Although Questions 14 to 17 asked participants about their lie-detection *strategies*, many participants reported indicators rather than, or in addition to, strategies. Specifically, participants mentioned 44 strategies, 33 indicators obtained as a result of having used a strategy (*elicited indicators*) and 45 indicators not explicitly connected to any strategy (*stand-alone indicators*).

3.4.1. Quality of strategies and indicators

Table 5 shows how many strategies and indicators were behavioral vs. non-behavioral. As anticipated in Prediction 3, participants did not use only non-behavioral strategies, but also behavioral ones. Specifically, one out of every three strategies was behavioral. Similarly, two out of every five indicators were also behavioral. Chi-square tests comparing the number of non-behavioral and behavioral strategies and indicators failed to reach significance; for strategies, χ^2 (1) = 2.19, p = .139; for all indicators, χ^2 (1) = 1.85, p = .174; for elicited indicators, χ^2 (1) = 0.03, p = .862; for stand-alone indicators, χ^2 (1) = 2.69, p = .101.

3.4.2. Usefulness of strategies and stand-alone indicators[8]

Because our focus was on strategies rather than indicators, Questions 15 to 17 asked participants about useful, most useful, and least useful strategies (not

[7] This test (and several other chi-square tests reported herein) corresponds to a comparison between two proportions, not a 2 x 2 table. Therefore, phi cannot be calculated.

[8] As explained in note 6, four suspected lies were designated as unexpected by the participants. Because of that, no information was collected about the usefulness of the four strategies, four elicited indicators, and four stand-alone indicators used to detect these lies, which are therefore not included in the analyses described in this section.

Table 5. Frequencies and percentages of behavioral, non-behavioral, and other strategies and indicators used to corroborate suspected lies

		Behavioral		Non-behavioral		Other	
Variable	Total	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Strategies	44	14	31.82	23	52.27	7	15.91
Indicators	78	33	42.31	45	57.69	0	0.00
Elicited	33	16	48.48	17	51.52	0	0.00
Stand-alone	45	17	37.78	28	62.22	0	0.00

indicators). However, some participants mentioned indicators in responding to these questions. To deal with this problem, we instructed coders to do the following: (a) If a participant had indicated that a specific *strategy* had been useful, the most useful, or the least useful to detect the corresponding lie, that strategy was coded that way; (b) if a participant had indicated that an *elicited cue* had been useful, the most useful, or the least useful, then the strategy that elicited that cue was coded as useful, the most useful, or the least useful; (c) if a participant had indicated that a *stand-alone indicator* had been useful, the most useful, or the least useful, then it was that indicator what was coded as useful, the most useful, or the least useful.

As shown in Table 6, about two out of every three strategies were considered useful, nearly one half of strategies were designated as the most useful one to detect that specific lie, and only 20% were considered as the least useful. Apparently, whenever people suspect deception, they know which strategies they need to use to uncover the truth. Regarding stand-alone indicators, very few were cited as useful,

Table 6. Frequencies and percentages of useful, most useful, and least useful strategies and stand-alone indicators employed to corroborate suspected lies

		Useful		Most useful		Least useful	
Variable	Total[a]	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Strategies	40	27	67.50	19	47.50	8	20.00
Stand-alone indicators	41	9	21.95	6	14.63	5	12.20

[a] Excluding four strategies and four stand-alone indicators used to detect four suspected lies that the participants had designated as unexpected.

most useful or least useful (Table 6), which impeded conducting additional tests. Unfortunately, the small frequency for least useful strategies also impeded us to test Prediction 5, but we could test whether the most useful strategies were non-behavioral rather than behavioral (Prediction 4).

Table 7 displays how many strategies designated as useful and how many of those not designated as useful were behavioral, non-behavioral, or pertained to the *other* category. It also contains the same information for strategies named/not named as the most useful. Visual inspection suggests that most strategies designated as useful (or as most useful) were non-behavioral, while strategies not designated as such tended to be behavioral. Odds ratio (OR) and risk difference (RD) analyses supported these impressions. For useful strategies, $OR = 5.33$ (i.e. the odds of a strategy designated as useful being non-behavioral in proportion with a strategy not mentioned as useful being non-behavioral were 5.33), and $RD = .40$ (i.e. strategies designated as useful were 40% more likely to be non-behavioral than strategies not designated as useful). For most useful strategies the effects were even stronger, $OR = 7.00$ and $RD = .44$. As benchmarks, please note that $OR = 2.0$ can be considered a "recommended minimum effect size representing a 'practically' significant effect for social science data" (Ferguson 2009: 533), $OR = 3.0$ a moderate effect, and $OR = 4.0$ a strong effect (Ferguson 2009). In short, as anticipated (Prediction 4), both useful and the most useful strategies were non-behavioral rather than behavioral.

Table 7. Frequencies and percentages of strategies designated/not designated as useful or most useful that were behavioral, non-behavioral, or allocated to the *other* category

Strategies	Total	Behavioral		Non-behavioral		Other	
		Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Designated as useful	27	7	25.93	16	59.26	4	14.81
Not designated as useful	13	7	53.85	3	23.08	3	23.08
Designated as most useful	19	4	21.05	14	73.68	1	5.26
Not designated as most useful	21	10	47.62	5	23.81	6	28.57

3.5. Time until detection and relational or emotional closeness

In line with Prediction 6, only 43% of lies were detected at the time they were told or shortly thereafter (within 10 min). Descriptive data are displayed in Table 8.

Our prediction that the frequency of lies would increase with relational closeness

(Prediction 7) was not supported (Table 8). Apparently, the real factor behind the number of discovered lies was not emotional closeness but opportunity for interaction. One has more opportunities to interact with *close individuals* and *close acquaintances* than with more distant *family members* and *distant acquaintances*. Indeed, across both groups with high opportunity for interaction, the number of lies was 56 (83.58%), while across the two groups with low opportunity for interaction it was only 11 (16.42%), χ^2 (1) = 30.22, $p < .001$. Because the original four categories were not designed to capture opportunity for interaction but relational-emotional closeness, two new coders coded all 67 responses to Question 8 as high or low in opportunity for interaction[9] (Kappa = .95, percent agreement = 98.50). Again, data showed that significantly more lies had been told by people with whom the participants could interact easily (54 lies, 80.60%) than by people with whom they could not interact so easily (13 lies, 19.40%), χ^2 (1) = 25.09, $p < .001$.

Table 8. Frequencies and percentages for the time until discovery and the relationship categories

Category	Frequency	Percentage
Time until discovery		
0 min – 10 min	29	43.28
> 10 min – 1h	7	10.45
> 1 h but same day	7	10.45
Next day	10	14.93
Two or more days	14	20.90
Relationship		
Close individuals	33	49.25
Family members	7	10.45
Close acquaintances	23	34.33
Distant acquaintances	4	5.97

[9] Responses to be coded as *high* in opportunity for interaction were father/mother, brother/sister, romantic partner, friend, classmate, 'someone I have a good relationship with', and residence-dorm mate/flatmate. Responses to be coded as *low* were 'family member', grandparent/grandmother, uncle/aunt, cousin, brother/sister-in-law, former romantic partner, nephew/niece, new acquaintance, acquaintance, someone living in my area/apartment building/little village, landlord/landlady, and unacquainted person.

4. Discussion

Hundreds of deception-detection studies have been conducted over the last half a century; however, most of them fail to capture the features of everyday life lie detection. Recently, an interesting new wave of research has emerged considering interactive situations where the interviewer adopts an active role to elicit deception cues (e.g. Vrij 2014). This interesting new trend of research acknowledges at least two limitations of traditional laboratory experiments, namely, that the sender's spontaneous behavior is poorly related to veracity and that interacting with the sender might facilitate lie detection. However, its focus is on designing interview approaches to help practitioners detect deception in forensic or intelligence contexts. It does not describe strategies and cues ordinary citizens use to detect lies in their everyday-life interactions. We aimed at filling this gap in deception research.

Our findings expand the conclusions of the few extant studies on the topic. These studies did not examine whether lies are detected unexpectedly of after using specific strategies following suspicion. We addressed this issue and found that 61% of lies were revealed unexpectedly, normally (83% of the time) from non-behavioral information. These are novel findings that are consistent with both theoretical frameworks (TDT and ALIED): Because typically people are honest, there is no reason to think a message is deceptive unless specific 'hard evidence' (tangible proofs, third-person information, the liar's admission…) is available revealing the lie. Note that, consistent with ALIED, almost all categories of non-behavioral information are instances of individuating information. Also in line with ALIED, dispositional honesty (which is context-general information) was mentioned only rarely.

It might seem that unexpected lie discovery is inconsistent with TDT. According to TDT, lie detection happens only after certain factors elicit suspicion, the detector takes specific steps to corroborate their suspicion, and finally telltale non-behavioral indicators reveal the lie. However, rather than falsifying this process, the current results suggest that sometimes triggers are so strong that they not only arouse suspicion but expose the lie altogether. This happens mostly when these triggers are telltale non-behavioral indicators rather than vague and unspecific behavioral cues.[10] We also found that many lies were detected after suspicion in a way consistent with TDT. Thus, rather than falsifying TDT, the current findings expand the theory by suggesting additional ways lies are detected in real life. Since TDT is a modular theory with diverse but coherent 'mini-theories, models, or effects' (Levine 2014: 379), there is room for it to incorporate this new finding.

We just discussed that in everyday circumstances people rarely make deception judgments. Additional support for this notion comes from the small frequency of lies discovered overall. Over 10 weeks, 25 participants reported 67 lies. Recall that five additional participants reported no lies at all and that four of them informed that they never discovered any lie (see note 4). Therefore, over the course of one week, each of 29 participants detected only 0.23 lies on average. Or, put another way, they detected

[10] Yet, this does not mean that non-behavioral indicators *always* unveil the lie; they also play a major role in merely eliciting suspicion (see Masip and Sánchez 2019).

just about one lie every four weeks. This is a surprisingly low rate, particularly if mere participation in the study made participants somewhat wary of deception. Research on lie prevalence (for a review, see Chapter 9 in Levine 2020) shows that, on average, people lie once or twice a day. Although the lie-prevalence distribution is very skewed, such that most people lie only rarely and a few individuals lie very often, it is very likely that our participants were exposed to more than just one lie every four weeks, given the high number of interactions typical students are involved in (DePaulo et al. 1996).[11] The current data reveal that, in real life, whenever there is no apparent trigger, many lies go undetected.

While cues revealing unexpected lies are typically non-behavioral, we found, as predicted, that whenever people suspect deceit they search for, and focus on, behavioral cues in addition to non-behavioral information. This novel finding aligns with prior research showing that behavioral cues have a strong magnetism over individuals trying to detect deception (Bond et al. 2013, Global Deception Research Team 2006). However, observers would be well advised to dismiss behavioral cues altogether and focus instead on non-behavioral information only: In this study, useful strategies (and the most useful strategy to detect each lie) were much more often non-behavioral than strategies not tagged as useful (or as most useful). We also predicted that the majority of least useful strategies would be behavioral but, unfortunately, the small frequencies prevented us from formally testing this prediction. Finally, consistent with prior research, we found that many lies (57%) were not detected immediately (though this effect was much stronger in the seminal work by Park et al. [2002] than in both this study and Masip and Herrero's [2015] research).

These findings qualify the conclusions of prior studies (Levine and Daiku 2019, Masip and Herrero 2015, Masip and Sánchez 2019, Novotny et al. 2018, Park et al. 2002, Sánchez and Masip 2020). Participants in previous studies were asked to describe how they had detected a lie (revealing indicators), and they reported mostly non-behavioral indicators. However, prior research did not differentiate between unexpected and suspected lies. We found that over 80% of unexpected lies were detected from non-behavioral information. Therefore, if unexpected lies were over-represented in prior research, this might have increased the reporting of non-behavioral indicators. Our data, however, also show that prior outcomes might have been obtained without any remarkable over-abundance of unexpected lies, as [the most] useful strategies focused on non-behavioral rather than behavioral information. In short, although participants suspecting deception use both behavioral and non-behavioral information (as shown in this study), they reported primarily non-behavioral indicators in prior studies probably because these were the specific kind of indicators that actually revealed the lies. In line with previous research, this study supports the superiority of non-behavioral information over behavioral cues in unveiling lies (both unexpected and suspected ones). But it also adds to prior findings the notion that participants still search for, and focus on, behavioral cues.

[11] According to DePaulo et al.'s (1996) data, on average, every day students are involved in almost seven social interactions lasting 10 min or more (plus an unknown number of shorter interactions).

We also examined whose lies are detected. Contrary to Prediction 7, relational-emotional closeness was not significantly associated with the number of lies discovered. Instead, opportunity for interaction was. These two variables might have been correlated in prior research, but they are conceptually different (DePaulo and Kashy 1998). A positive correlation between emotional closeness and reported lies would suggest either that (a) people lie more often to emotionally close others than to more distant individuals, or (b) people are particularly adept at detecting the deceptions of emotionally-close others. Close individuals do seem to be better able to detect real-life lies than more distant individuals (DePaulo and Kashy 1998), but research shows that people lie *less* often to individuals to whom they feel closer (DePaulo and Kashy 1998, Smith et al. 2014). Our data suggest that, provided there is opportunity for interaction, people might lie to distant acquaintances.[12] It is, however, interesting that participants were able to use non-behavioral information to detect the lies of even distant acquaintances (but note that this finding is in line with Masip and Herrero's [2015] results for police officers).

4.1. Limitations and future research

This study is not without limitations. First, a weakness of prior studies examining real-life lie detection is that one cannot assert with full confidence that all the 'lies' that respondents reported were in fact lies. We partially addressed this issue by measuring the participants' confidence that they detected a lie. Confidence ratings were extremely high, but the participants' perceptions can still differ from the objective reality. However, our study did not pretend to examine observers' accuracy in detecting everyday life lies; rather, it focused on the strategies people use when they suspect deception.

Second (and relatedly), this study relied on self-reports. The participants' impressions may be subjective and under the influence of a number of biases. However, while caution is warranted in interpreting the results, this limitation is inherent to all studies based on self-report measures. Given the non-sensitive nature of the topic, it is unlikely that social desirability bias, self-esteem protection, or similar factors distorted the participants' responses. Furthermore, some findings (such as the prevalence of non-behavioral over behavioral indicators of unexpected lies, or the preponderance of non-behavioral strategies among those designated as useful) are contrary to stereotypical beliefs that could have influenced the participants' responses (such as the belief that behavioral cues reveal deception). Unfortunately, the study of certain phenomena as they happen in real life leaves no option but to rely on self-reports.

[12] Contrary to DePaulo and Kashy (1998), Whitty et al. (2012) found a *positive* association between relational closeness and frequency of lying, but, in line with our arguments, they speculated that opportunity for interaction (which unfortunately they did not measure) could be responsible for the effect. Yet, in DePaulo and Kashy's (1998) study, frequency of interaction did not predict the rate of lying when the effect of relational closeness was partialled out. Clearly, more research is needed to disentangle the impact of relational closeness and opportunity for interaction on the frequency of lying.

Third, one can wonder whether Prediction 1 can be tested with our design. Although we stressed that we were interested in naturalistic situations and asked participants to behave as usual, it would be naïve to assume that they acted as if they had not been prompted. Yet, prompting (a) certainly did not increase the number of unexpected lies reported, as the participants themselves designated these lies as unexpected and surprising; (b) might have increased suspicion, but suspected lies were not the focus of the study, only detected lies were. Prompting might also have decreased the participants' truth bias in assessing whether suspected lies were actually lies, but we believe this is unlikely. First, if participants had lowered their criteria to classify messages as deceptive, they would classify many messages as deceptive, but probably with low certainty. However, mean deceptiveness ratings were 4.49 on a 1-to-5 scale, and no lie scored 1 or 2. Second, the surprisingly low number of lies reported strongly suggests that participants did not substantially abandon their truth bias. Indeed, actively questioning the veracity of all incoming messages for a sustained period of ten weeks would be so cognitively demanding that no normal human being would be able to do it.

Another limitation of this study is that it is possible that some participants suspected deception but did nothing to corroborate their suspicion, or that they did but were unsuccessful. While these possibilities are interesting and deserve empirical scrutiny, they were beyond the goals of the current study, which focused on lies that the participants felt they had ultimately discovered.

Finally, although the number of both reported lies and strategies was relatively large, only a few strategies were designated as least useful by the participants. This made it impossible to formally test Prediction 5. Future studies should be conducted with more strategies. This would also permit deeper explorations. For instance, a taxonomy of strategies could be made and the effectiveness of each [type of] strategy could be examined. Identifying effective strategies can be useful, as these can subsequently be taught to practitioners whose jobs require assessing deception – such as law-enforcement officers, judges, intelligence personnel, etc.

To conclude, little is known about lie detection by ordinary individuals in everyday life. This study examined the strategies and indicators people use to detect lies in real-life contexts, outside the confines of the laboratory. It provides some new insights that contribute to our understanding of real-life lie detection. It also yields some new knowledge that could be incorporated to theory. We hope additional research will follow, further increasing our still limited knowledge about how people [try to] detect deception in everyday life.

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