The Impact of Thin(ner) Slicing on Deception Detection

by

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An oral defense of this thesis took place on August 8, 2022 in front of the following examining committee:

Examining Committee:

Chair of Examining Committee	Dr. Karla Emeno
Research Supervisor	Dr. Amy-May Leach
Examining Committee Member	Dr. Joseph Eastwood
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The above committee determined that the thesis is acceptable in form and content and that a satisfactory knowledge of the field covered by the thesis was demonstrated by the candidate during an oral examination. A signed copy of the Certificate of Approval is available from the School of Graduate and Postdoctoral Studies.

ABSTRACT

I examined whether the length of thin slices (i.e., observations of behavior less than five minutes) affected deception detection. Participants (N = 262) were randomly assigned to one of seven exposure length conditions (i.e., 5-second, 10-second, 15-second, 20-second, 25-second, 30-second, or full-length clips). They attempted to detect the deception of 12 speakers. Participants' ability to discriminate between truth- and lie-tellers did not significantly differ across conditions. Response biases, decision-making processes, and response times were similarly unaffected by exposure. However, there was some indication that confidence differed for truth- and lie-tellers across exposure lengths. That is, significant differences in confidence for truth- and lie-tellers were observed in the 5- and 10-second conditions, although the direction of effects differed. Therefore, while researchers can be confident that the decision to use long or short thin slices will not affect deception detection, it could affect participants' confidence in those judgments.

Keywords: deception detection; thin slicing; discrimination; bias

AUTHOR'S DECLARATION

I hereby declare that this thesis consists of original work of which I have authored. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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STATEMENT OF CONTRIBUTIONS

I contributed to the development and conceptualization of this research. I collected the data, conducted all analyses, and wrote the thesis.

I hereby certify that I am the sole author of this thesis and that no part of this thesis has been published or submitted for publication. I have used standard referencing practices to acknowledge ideas, research techniques, or other materials that belong to others. Furthermore, I hereby certify that I am the sole source of the creative works and/or inventive knowledge described in this thesis.

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The Impact of Thin(ner) Slicing on Deception Detection

Laypeople's accuracy at detecting deception is little better than chance (i.e., 54%; Bond & DePaulo, 2006). However, it is relatively unknown how accuracy varies with exposure length (i.e., the amount of time an observer views an interviewee). Judgments regarding deceptiveness are often made quickly with little information (Porter et al., 2010). Moreover, there is considerable variability in the lengths of the interviews assessed in laboratory studies (e.g., Leach et al., 2004; Evans et al., 2017; Vrij et al., 2008). Therefore, understanding whether exposure length affects deception detection is valuable both practically and theoretically.

Intuitive versus Deliberative Processing

When making a decision, relevant information is typically processed in one of two ways: deliberatively or intuitively (see Evans, 2008, for a review). Deliberative processing is an analytic approach that requires deeper reasoning and effort. On the other hand, intuitive or heuristic processing is more automatic and relies on mental shortcuts, gestalt feelings or impressions. There is debate in the field regarding the modelling of the specific pathways (e.g., Chaiken's [1980] Heuristic-Systematic Model; Petty & Caccioppo's [1986] Elaboration Likelihood Model). Although researchers may differ in their understanding of processing pathways, they do agree that while one type of processing relies on deeper reasoning, the other relies on a more spontaneous approach.

Researchers have begun assessing whether encouraging one decision-making process over the other affects judgment accuracy (e.g., Albrechtsen et al., 2009; Dijksterguis, 2004). For example, when asked to think about their decision critically (i.e.,

engage in deliberative processing), lay persons' ratings of strawberry jams were less consistent with those of experts (Wilson & Schooler, 1991). Similarly, participants were less accurate at assessing teachers' effectiveness when asked to provide reasons for their judgments (Ambady, 2010). However, their accuracy did not decrease when they engaged in a distraction task (i.e., intuitive processing was encouraged). It is evident that attempting to control the decision-making process used can influence the accuracy of judgments.

Reliance on a particular type of processing can also occur as a result of naturalistic task demands. Deliberative processing has typically been regarded as the superior method of decision-making (e.g., Kahneman & Anderson, 2003). When information is very complex, for example, deliberation can be better than intuition (e.g., MacGregor & Armstrong, 1994). However, the benefits of intuitive processing have come to light in several studies (e.g., Ambady, 2010; Coffman, 2010; Dijkstra et al., 2012). Intuition has proven to be particularly advantageous in time-restricted tasks that require more unconscious thought or when cues are available for a short time (Chaiken & Ledgerwood, 2012; Dijksterguis, 2004; Patterson & Eggleston, 2017).

Decision-Making and Thin Slices

Given the factors influencing decision-making processes, one area that might give rise to the use of intuition is thin slicing. Ambady and Rosenthal (1992) describe thin slices as brief observations of expressive behavior that are typically under five minutes. Due to the limited exposure time, observers might only have a small amount of information upon which to base their judgments. Ambady (2010) has suggested that not

only are these judgments intuitive in nature, but that interfering with intuitive decision-making can hinder the processing of information contained in thin slice stimuli.

Ambady and Rosenthal (1992) examined the accuracy of judgments of thin slices in a meta-analysis. They analyzed thin slicing in social psychological (e.g., teacher effectiveness) and clinical (e.g., therapist ratings and patient outcomes) domains. For example, one study examined lay persons' ability to distinguish between anxious and non-disordered individuals (Waxer, 1977). Participants' judgments were accurate after viewing one-minute clips of nonverbal behavior. Other researchers found that cues (e.g., hostility or warmth) used to distinguish between biased and unbiased teachers were identifiable in verbal and nonverbal clips as short as 10 seconds (Babad et al., 1989). In most of the studies included in Ambady and Rosenthal's (1992) meta-analysis, accuracy was determined by comparing lay persons' judgments to an ecologically valid criterion (e.g., comparing lay persons' anxiety judgments to those determined using appropriate assessment tools; Waxer, 1977). Overall, ratings were similar, regardless of clip length. Thus, thin slice judgments were considered accurate.

Deception Detection and Thin Slices

Comparing the accuracy of decision-making across different exposure times might be particularly useful in the area of deception detection. There are real-life situations that require judgments of deceptiveness to be made within seconds. For example, airport security officials and customs officers have a short amount of time to observe people before having to judge whether they are deceitful (e.g., terrorists or smugglers; Porter et al., 2010; Vrij et al., 2020). Some researchers have claimed that shorter periods of exposure to behavior should not significantly impact accuracy (e.g.,

Leach et al., 2004). However, there is only limited research available to support such claims.

In fact, researchers often rely on what would be considered thin slices in their studies (e.g., Evans et al., 2017; Leach et al., 2004; Mann et al., 2004). For example, in the last two years alone, at least eight published deception detection studies have used clips under five minutes in length (see Table 1). Furthermore, there was considerable variability in the lengths of those thin slices. One cut-off point used in prior research has been 30 seconds (e.g., comparing accuracy under 30 seconds vs. over 30 seconds; Ambady & Rosenthal, 1992). Henceforth, I will refer to thin slices of 30 seconds or less as “short thin slices,” and those greater than 30 seconds as “long thin slices”. Although numerous deception detection researchers have relied on both short and long thin slices, only two sets of researchers (Albrechtsen et al., 2009; Ambady & Rosenthal, 1992) have examined whether judgment accuracy differed across thin slice lengths.

Table 1

Summary of 2020-22 deception detection studies and video exposure times

Studies	Exposure Time
Duran, Dochez, Tapiero & Michael (2020)	27-51 seconds
Gongola, Quas, Clark & Lyon (2021)	150-180 seconds
Gunderson & Ten Brinke (2022)	35 seconds
Schindler, Wagner, Reinhard, Ruhara, Pfattheicher & Nitschke (2021)	120-180 seconds
Ulatowska, Nowatkiewicz & Rajdaszka (2020)	60 seconds
Wielgopolan & Imbir (2021)	20-30 seconds
Zloteanu, Bull, Krumhuber & Richardson (2021)	33 seconds
Zloteanu, Krumhuber & Richardson (2021)	30 seconds

Note. Studies were included in this table if their methodology included having participants view, and subsequently make veracity judgments about, clips of speakers that were five minutes or less in length. This includes both single clips or a combination of multiple clips joined together.

Ambady and Rosenthal's (1992) meta-analysis of the accuracy of thin slice decisions included deception detection studies. For example, participants in one study viewed 20-second segments of interviewees discussing their stances on positive, negative, or neutral sociopolitical topics (Riggio et al., 1987). They were subsequently asked whether they thought the individual was lying or telling the truth. Other studies in the meta-analysis required participants to watch longer thin slice clips before making their judgments. For instance, researchers evaluating the effect of inferring an

interviewee's attitude on veracity judgments used clips that were three minutes and 20 seconds long (comprised of 25-second segments; Zuckerman et al., 1984).

Ambady and Rosenthal's (1992) analyses revealed that accuracy was not significantly affected by variations in clip length. Similar to other domains, participants' ability to detect deceit in studies using clips under 30 seconds was similar to those using clips that were five minutes in length. However, the analysis only included three studies that featured shorter thin slices (i.e., clips under 30 seconds). Furthermore, none of these studies used thin slices under 10 seconds in length.

To my knowledge, there has only been one additional study on short thin slices since the meta-analysis was published. Researchers compared participants' ability to detect deceit while viewing either a 15-second or a three-minute clip (Albrechtsen et al., 2009). Judgments based on the shorter clips were more accurate. The researchers argued that decision-making processes could explain this finding: when there was little information available, participants might have relied on their "gut feeling" (i.e., intuition over deliberation). However, this was not tested empirically.

The Current Study

Although researchers have examined the accuracy of thin slice judgments, there is a lack of work on the effects of shorter slices (i.e., those under 30 seconds). In fact, there is little modern work on thin slicing of any kind. Of the existing research, findings have been mixed (i.e., some researchers have found that judgments were significantly more accurate with short [vs. long] thin slices, whereas others found no difference; Albrechtsen

et al., 2009; Ambady & Rosenthal, 1992). Thus, I examined deception detection at exposure lengths under 30 seconds.

Specifically, I focused on 5-second, 10-second, 15-second, 20-second, 25-second, and 30-second exposures (vs. the full-length clips ranging from 57 seconds to 238 seconds). I included the 5-second and 10-second conditions because it was unknown how accuracy was affected when exposure time was ten seconds or less: previous deception studies had only used short thin slices that were over ten seconds long (e.g., Albrechtsen et al., 2009; DePaulo et al., 1982; Riggio et al., 1987; Riggio & Friedman, 1983). Given that the research on short thin slices has been relatively sparse, it was unclear whether reported mixed findings were attributable to the weakness of the effect, idiosyncrasies of the stimuli, or the use of different exposure times across studies. Thus, I examined accuracy levels at five-second intervals to establish whether there were significant differences in accuracy across short exposure times.

It is possible that the amount of time one is exposed to a deception stimulus influences decision-making processes. A reliance on intuitive judgments (vs. deliberative judgments) is more likely when stimuli are available for short periods of time (Chaiken & Ledgerwood, 2012; Patterson & Eggleston, 2017). Olds and Link (2016) argue that the tendency to favor one type of processing is also domain-specific and likely attributed to the types of cues that are attended to: people are more likely to rely on intuition when attending to ambiguous cues. Because the usefulness of verbal and behavioral cues to deceit is not always clear (DePaulo et al., 2003; Luke, 2019; Vrij et al., 2010), deception detection might generally be more intuitive. Albrechtsen et al. (2009) suggested that intuitive judgments about deception are even more dominant when using thin slices

compared to full length clips. Processing was examined across exposure times using self-report and response time measures to assess these claims.

Hypotheses

Discrimination. I hypothesized that there would be a significant effect of exposure length on discrimination. Specifically, I predicted that participants would be better able to discriminate between truth- and lie-tellers in the 15-second and under exposure conditions versus those viewing full-length clips. In keeping with past findings (e.g., Albrechtsen et al., 2009), I did not expect a significant difference between exposure conditions above 15 seconds. Furthermore, I hypothesized that participants in the 15 seconds and under conditions would perform significantly better than chance levels, whereas those in exposure conditions above 15 seconds would perform at chance levels.

Bias. In the only previous study on the topic that examined bias, there were no statistically significant differences in observers' response biases (i.e., their propensity for identifying a speaker as either a truth- or lie-teller) when they viewed 15-second versus full-length clips (Albrechtsen et al., 2009). However, they found a truth bias when participants relied more heavily on intuition (i.e., during a concurrent task). If truth bias results from intuitive processing, it might occur at shorter clip lengths (i.e., when participants are more likely to rely on intuition; Dijksterguis, 2004). Thus, I hypothesized that there would be a significant effect of exposure length on response bias. I expected to find a significant difference in bias between exposure conditions up to 15 seconds and those over 15 seconds (i.e., there would be a greater truth bias when exposure length was 15 seconds or less). I hypothesized, however, that I would observe a truth bias in all conditions, in keeping with past findings (e.g., Bond & DePaulo, 2006).

Decision-Making Processes. Researchers have suggested that the length of time a stimulus is present will influence the decision-making process used (i.e., when stimuli or cues are available for a short time, people will rely on their intuition rather than deliberative processing; Chaiken & Ledgerwood, 2012; Patterson & Eggleston, 2017). Therefore, I hypothesized that judgments made in the shorter thin slice conditions would reflect a reliance on intuitive processing. Conversely, participants viewing longer thin slices would rely more on deliberative reasoning. I also wanted to explore whether decision-making process and response time mediated the effect of exposure time on discrimination, but had no firm predictions about the pattern of results.

Response Time. Intuitive processing is believed to occur significantly quicker than deliberative processing (e.g., Evans, 2008). Therefore, I hypothesized that there would be a significant effect of exposure length on response time. I expected that response times would be shorter in conditions that were 15 seconds or under (vs. over 15 seconds). I also planned to explore whether exposure time and veracity interacted to affect response time.

Confidence. The swiftness of the decision following short exposures is suggested to result in greater confidence in that decision (Simmons & Nelson, 2006). However, deception detection researchers have not found such a relationship (i.e., participants' confidence did not differ based on the decision-making process used; Shaw & Lyons, 2017). Of the work that has been done on deception detection using thin slices, few studies have included confidence in their analyses. I conducted an exploratory analysis to assess the effect that exposure time had on participants' confidence in their decisions.

Method

Pre-registration

This study was preregistered on the Open Science Framework (OSF; https://osf.io/fsdmk/). This included the pre-registration in addition to amendments made to the registration after data collection had commenced. The original design included a 100-millisecond condition. This condition was removed due to technical difficulties during data collection and no further data was collected in that condition. Any associated changes to the registration were addressed in the amendments.

Design

I employed a Veracity (truth-teller vs. lie-teller) x Exposure (5-second vs. 10-second vs. 15-second vs. 20-second vs. 25-second vs. 30-second vs. full-length video clips) mixed-factors design. Participants were randomly assigned to one of seven exposure length conditions and viewed a set of truth- and lie-tellers. That is, they all judged the veracity of the same truth- and lie-tellers, but the exposure time was either 5 seconds, 10 seconds, 15 seconds, 20 seconds, 25 seconds, 30 seconds, or the full-length video clip.

Participants

Undergraduate students were recruited from Ontario Tech University using the psychology participation pool. Participants received course credit as compensation for their time. Based on a G*Power power analysis (Faul et al., 2007), 287 students were required to reach sufficient power (i.e., 0.90). Data from 356 participants were collected. In total, 94 participants were excluded from the study: 62 people did not complete the

session, eight exceeded the one-hour cut-off, 20 failed one or more attention checks, and four reported technical difficulties. After exclusions, 262 participants (M_{age} = 21.19 years, SD_{age} = 5.46; Females = 178, Males = 81, Other = 3) were included in the analyses. One self-identified as Aboriginal/Indigenous, 17 as Arab or West Asian, 20 as Black, 10 as Chinese, 13 as Filipino, 3 as Korean, 5 as Latino/Hispanic, 1 as Pacific Islander, 93 as South Asian, 12 as South East Asian, 66 as White/Non-Hispanic, and 21 as Multi-ethnic or Other.

Materials

Videos

The videos that I used in this study were created as part of a larger "Missions" study. In the creation of this stimuli, interviewees were instructed to go on a mission around Ontario Tech University's main campus. They began this mission by picking up a package at a designated location. Instructions specified where they were to deliver this package. Once that task was completed, they were provided with instructions about the next leg of the mission (and so on). At one point during the mission, the interviewees were intercepted by either a friendly or hostile female "agent." If they encountered a friendly agent, as identified by a code phrase, they were instructed to tell the truth in the subsequent interview. If the agent was hostile, they were instructed to lie about the mission. All interviewees were asked the same questions about their mission (e.g., "I need you to describe everything that happened from the minute you began the mission until I intercepted you. Retrace your steps", and "I know that you met another agent on your way. Describe what they looked like."; see Appendix A). A video camera captured their faces, upper bodies, and responses.

Twelve clips were compiled from the original mission interviews. There were six truth-tellers and six lie-tellers in each exposure condition (i.e., 5-second, 10-second, 15-second, 20-second, 25-second, 30-second, and full-length). To create each condition – other than the full-length condition – interviews were edited ten ways to control for potential cue and content effects. That is, the required exposure length was sampled from a given interview at ten random start times. Only one of these ten versions was randomly presented to each participant. This was done for all 12 interviews.

Demographics Questionnaire

A demographics questionnaire (Appendix B) was used to collect each participant's age, gender, and race.

Veracity and Confidence Judgment Task

Following each video clip, participants were asked to indicate whether each interviewee was a truth-teller or lie-teller. A statement appeared on screen (i.e., "The person in the video was:"), and participants selected one of two options (i.e., "lying" or "telling the truth"). They were also asked to provide their confidence in their decision from 0 to 100% (i.e., 0 = not at all confident, 100 = extremely confident).

Decision-Making Questionnaire

A decision-making scale was used to assess the type of decision-making process (i.e., intuitive vs. deliberative) that each participant relied on when making their veracity judgments (Appendix C). I used a modified version of the *Unified Scale to assess Individual Differences in Intuition and Deliberation (USID)* that was originally developed by Pachur and Spaar (2015) to assess decision-making across different

domains. This modified scale was a 19-item questionnaire containing questions about the participant's approach to decision-making (e.g., "My judgments usually came to mind almost immediately").

Psychopathy and Personality Measures

Two psychopathy and personality measures were administered. The Interpersonal Reactivity Index IRI - EC & PT questionnaire included 14 items regarding the participant's personality. Participants were asked to identify how well each item described them. The Psychopathic Personality Inventory — Revised questionnaire included 40 questions regarding the participant's personality. Both of these measures were administered for an unrelated study; we did not have any planned analyses related to either in this project.

Attention Checks

To ensure participants were paying attention to the stimuli, I included two attention checks (e.g., "Please select the 'Agree' option below"; Appendix D). These checks were simple multiple-choice questions presented after the veracity judgment and confidence rating questions on trials three and eight.

Procedure

This study took place entirely online using Qualtrics (Qualtrics, Provo, UT). Participants began the study by reading over the instructions (Appendix E) and completing the consent form. Next, each participant was randomly assigned to one exposure condition. They then viewed 12 video clips and rendered a veracity and confidence judgment for each. Attention checks were presented after two of the trials. At

the end of the session, participants completed the decision-making and demographics questionnaires. In all exposure conditions (except for the full-length condition) participants also completed two psychopathy and personality measures. Finally, participants were debriefed and compensated. Completion time depended on the exposure condition, with the longest being approximately 45 minutes.

Results

Signal Detection Theory

I used Signal Detection Theory (SDT; Green & Swets, 1966) to examine both participants' response biases (criterion c) and their ability to discriminate between truth- and lie-tellers (*d*'). Discrimination related to a participant's ability to correctly identify a lie-teller and reject the presence of deception when viewing a truth-teller. Response bias assessed whether participants exhibited a tendency to choose one response over another (e.g., being more likely to indicate that interviewees were telling the truth, regardless of their actual truthfulness). Numerical values were assigned to participants' judgments (i.e., "0" = incorrect, "1" = correct) from which average scores were calculated. Then, I calculated hits (i.e., the correct identification of lie-tellers) and false alarms (i.e., truth-tellers mistakenly identified as lie-tellers; 1.00 – Mean Truth Accuracy). I also performed a standard correction, such that values of 0 and 1 were converted to 1/(2N) and 1 – 1/(2N), respectively. Discrimination and bias were calculated using Macmillan and Creelman's (2005) formulas (i.e., d^'=z(Hit)-z(FalseAlarm), c=-1/2[z(Hit)+z(FalseAlarm)]).

Overall Accuracy

To contextualize the results, I examined the overall accuracy rates. Participants' mean accuracy was 57% (*SD* = 15.93%). Scores ranged from 8% to 100%.

Discrimination

I conducted a one-way between-participants ANOVA to analyze participants' abilities to discriminate between truth- and lie-tellers across exposure conditions (i.e., 5-second, 10-second, 15-second, 20-second, 25-second, 30-second, and full-length). Discrimination data failed to meet two assumptions underlying ANOVAs (i.e., no outliers and normally distributed data). To account for this, I added a constant (i.e., 1.66) to eliminate negative values and conducted a Log transformation on the variable. There was no significant main effect of exposure length on discrimination, $F(6, 255) = .517$, $p = .795$, $\eta_p^2 = .012$, 95% CI [.000, .023].

Additional one-sample *t*-tests were used to examine whether discrimination in each condition significantly differed from chance (i.e., compared to zero, or no discrimination; See Table 2). Participants could discriminate between truth- and lie-tellers in all exposure conditions, except the 5-second and 15-second conditions.

Table 2

t-test results comparing discrimination to chance across exposure conditions

Exposure	***M(SD)***	***t***	***p***	***d***
5 Seconds	0.062(0.521)	0.722	0.475	0.119
10 Seconds	0.367(0.622)	3.639	<0.001*	0.590
15 Seconds	0.204(0.622)	2.024	0.050	0.328
20 Seconds	0.311(0.699)	2.744	0.009*	0.445
25 Seconds	0.277(0.573)	2.941	0.006*	0.484
30 Seconds	0.349(0.522)	4.066	<0.001*	0.668
Full-Length	0.395(0.751)	3.200	0.003*	0.526

Note. Comparisons of discrimination to chance (i.e., 0) have been reported for each exposure length individually. Any *p* value that is less than 0.05 represents an exposure length that significantly differed from chance levels.

*$p < .05$, two-tailed.

Bias

A one-way between-participants ANOVA was performed to examine response biases across exposure conditions. Similar to discrimination, the bias data failed to meet assumptions related to outliers and normality. I added a constant (i.e., 1.18) to account for negative values and a Log transformation was used. There was no significant main effect of exposure length on bias, $F(6, 255) = .977$, $p = .441$, $\eta_p^2 = .022$, 95% CI [.000, .045]. I used one-sample *t*-tests to examine whether bias significantly differed from chance (i.e., compared to zero or no bias) in each condition (See Table 3). Participants' exhibited a

significant truth bias in the 20-second, 25-second, and 30-second conditions. There was no significant response bias in the other conditions.

Table 3

t-test results comparing bias to chance across exposure conditions

Exposure	***M(SD)***	***t***	***p***	***d***
5 Seconds	-0.032(0.330)	-0.582	0.564	-0.096
10 Seconds	-0.006(0.434)	-0.086	0.932	-0.014
15 Seconds	-0.016(0.420)	-0.229	0.820	-0.037
20 Seconds	-0.181(0.237)	-4.718	<0.001*	-0.765
25 Seconds	-0.204(0.413)	-3.003	0.005*	-0.494
30 Seconds	-0.209(0.361)	-3.520	0.001*	-0.579
Full-Length	-0.002(0.455)	-0.027	0.979	-0.004

Note. Comparisons of participant response bias to chance (i.e., 0) have been reported for each exposure length individually. Any *p* value that is less than 0.05 represents an exposure length that significantly differed from chance levels.

*$p < .05$, two-tailed.

Decision-Making Processes

I used a one-way MANOVA to examine the impact of exposure on intuitive and deliberative decision-making. The variables violated two of the assumptions for this analysis due to outliers in the data set and a lack of normally distributed data. I performed a Log transformation on the dependent variables. There was no significant effect of exposure on the combined dependent variables, $F(6, 255) = 1.280$, $p = .226$, $\eta_p^2 = .029$, 95% CI [.000, .048].

Response Time

I conducted an Exposure x Veracity mixed-factors ANOVA on response time (i.e., the amount of time from when the page loaded to when the participant clicked the 'next' button). This particular measure failed to meet the assumptions regarding outliers, normal distribution of the data, and homogeneity of variances. A Log transformation was used. There were no significant main effects of veracity, $F(1, 255) = 0.059$, $p = .808$, $\eta_p^2 = .000$, 95% CI [.000, .010], or exposure, $F(6, 255) = 1.601$, $p = .147$, $\eta_p^2 = .036$, 95% CI [.000, .059]. Additionally, there was no significant interaction between veracity and exposure, $F(6, 255) = 1.603$, $p = .147$, $\eta_p^2 = .036$, 95% CI [.000, .059].

Exploratory Analyses

Confidence

An Exposure x Veracity mixed-factors ANOVA was conducted on participants' confidence ratings. The data for these variables contained outliers and was not normally distributed. I performed a Log transformation to address these violations. There were no significant main effects of veracity, $F(1, 255) = 0.913$, $p = .340$, $\eta_p^2 = .004$, 95% CI [.000, .026] or exposure length, $F(6, 255) = 0.802$, $p = .569$, $\eta_p^2 = .019$, 95% CI [.000, .029]. However, there was a significant interaction between veracity and exposure, $F(6, 255) = 3.466$, $p = .003$, $\eta_p^2 = .075$, 95% CI [.016, .112]. To further assess this finding, I conducted paired sample *t*-tests to examine differences in confidence between conditions when participants viewed either truth- or lie-tellers. Participants' were significantly more confident when assessing truth-tellers versus lie-tellers in the 5-second condition;

however, the opposite occurred in the 10-second condition. I did not find statistically significant differences at any of the other exposure lengths.

Table 4

t-test results comparing confidence for truth- and lie-tellers across conditions

Exposure	***Truth-tellers M(SD)***	***Lie-tellers M(SD)***	***t***	***p***	***d***
5 Seconds	1.832(0.104)	1.779(0.175)	-2.366	0.023*	-0.389
10 Seconds	1.783(0.129)	1.810(0.094)	2.168	0.037*	0.352
15 Seconds	1.812(0.123)	1.792(0.129)	-1.130	0.226	-0.183
20 Seconds	1.817(0.082)	1.830(0.081)	1.109	0.274	0.180
25 Seconds	1.815(0.100)	1.830(0.075)	1.438	0.159	0.236
30 Seconds	1.810(0.116)	1.795(0.127)	-1.240	0.223	-0.204
Full-Length	1.838(0.070)	1.834(0.075)	-0.314	0.755	-0.052

Note. Comparisons of participants' confidence ratings across conditions for both truth- and lie-tellers have been reported for each exposure length individually. Any *p* value that is less than 0.05 represents an exposure length in which confidence significantly differed between truth- and lie-tellers.

*$p < .05$, two-tailed.

Additional Response Time Measures

I used a repeated measures MANOVA to examine the effects of two additional response time measures – "time to first mouse click" and "total number of mouse clicks" – across conditions. Similar to the first response time analysis, three of the assumptions were not met (i.e., no outliers, normally distributed data, and homogeneity of variances).

A log transformation was performed for each of the dependent variables. There were no significant main effects of veracity, $F(1, 254) = 0.104$, $p = .901$, $\eta_p^2 = .001$, 95% CI [.000, .013], or exposure $F(6, 255) = 1.095$, $p = .362$, $\eta_p^2 = .025$, 95% CI [.000, .041]. There was also no significant interaction between veracity and exposure on the combined variables, $F(6, 255) = 1.214$, $p = .269$, $\eta_p^2 = .028$, 95% CI [.000, .046].

Mediating Effects

In the final exploratory analysis, I had intended to examine whether the effect of exposure time on discrimination was mediated by decision-making process or response time. However, because that effect did not reach statistical significance, I did not explore mediating factors further.

Discussion

In this study, I examined the effect of exposure length on deception detection. Specifically, I focused on short thin slices (i.e., observations under 30 seconds). Overall, participants' ability to correctly detect deceit did not significantly differ, regardless of the length of the videos presented. However, thin slicing did affect certain aspects of their decisions.

Discrimination

I assessed whether participants' ability to discriminate between truth- and lie-tellers differed depending on the amount of time that they viewed a speaker. I predicted that discrimination would be significantly better in the 15-second and under conditions (vs. conditions over 15 seconds), and that there would not be a significant difference between exposure conditions above 15 seconds. These hypotheses were partially

supported. Discrimination was not affected by exposure length in any of the conditions. This finding did not align with more recent research. Albrechtsen et al. (2009) found that participants were better able to detect deception at shorter exposure lengths (i.e., 15 seconds). However, it was consistent with Ambady and Rosenthal's (1992) meta-analysis. Although they used very few deception detection studies in that analysis, their conclusions regarding thin slicing were supported by my work.

I also predicted that participants in the 15-second and under conditions would perform significantly better than chance, whereas those over 15 seconds would perform at chance levels. This hypothesis was only partially supported; discrimination significantly differed from chance for all exposure lengths except 5 seconds and 15 seconds. I was unable to replicate the chance level discrimination ability at longer exposure lengths reported by Albrechtsen et al. (2009). They proposed that improved discrimination resulted from intuitive processing in the 15-second condition (vs. three minutes). However, here, the length of exposure actually had no effect on decision-making process. Albrechtsen et al. (2009) also suggested that the difference in discrimination could be the result of overthinking in longer conditions (i.e., due to the use of deliberative processing). I failed to find evidence that exposure length impacted the time participants took to make a decision. Perhaps one explanation for the discrepant results is the content presented in each studies' videos. Albrechtsen et al. (2009) created their 15-second clips by compiling three 5-second clips from the beginning, middle, and end of the interviews; my videos were continuous clips sampled from random start times. The difference in structure might have impacted how participants' made decisions. That

is, the implicit encouragement to make a comparison across the interviews in Albrechtsen et al.'s (2009) study could have influenced discrimination beyond exposure length.

Bias

Participants' response biases were also examined. I hypothesized that participants would be more likely to judge shorter thin slices as containing truth-tellers compared to longer clips. Contrary to my expectations, I did not find an effect of condition on response bias. Albrechtsen et al.'s (2009) findings differed depending on methodology. For example, truth bias was greater at shorter thin slice lengths (i.e., 15 seconds) when participants engaged in a concurrent task – a task that encouraged intuitive processing. However, removing the additional task (i.e., when participants were only required to watch the 15-second and 3-minute videos) eliminated the response bias effect. Perhaps because I employed a similar methodology that did not include a concurrent task, I replicated these findings.

I also compared bias to chance because I had hypothesized that there would be a truth bias in all conditions. There was only a significant truth bias in the 20-second, 25-second, and 30-second conditions. Albrechtsen et al. (2009) found the opposite effect, wherein truth bias was greater at shorter exposure lengths. They suggested that the increase in bias was due to intuitive processing amplifying lay persons' existing truth biases. I did not find an effect of exposure time on decision-making; thus, it is unlikely that my results are related to differences in decision-making processes. The differences in clip sampling methods in the shorter thin slice conditions (i.e., compiling of clip segments vs. continuous clips) across studies might explain why I did not find a

significant truth bias. However, it is unclear why a truth bias existed at the longer exposure lengths.

Decision-Making Processes

Exposure length did not impact decision-making processes, contrary to my hypothesis. I used response time as a second measure of decision-making. That is, while the questionnaire reflected participants' self-reported decision-making processes, response time allowed for a more objective assessment. I predicted that participant response times would be significantly shorter in the 15-second and under conditions (vs. conditions over 15 seconds). Similar to the decision-making measure, there were no significant differences in response time across exposure lengths. Additional exploratory response time analyses also failed to reveal any significant effects. This suggests that the tendency to use one type of processing over the other is not related to exposure length.

Researchers (e.g., Chaiken & Ledgerwood, 2012; MacGregor & Armstrong, 1994) have suggested that reliance on a specific process could be attributed to differences in the stimuli from which the judgment is based. Intuitive judgments likely occur as a result of having to make sense of a limited amount of information – such as that presented in shorter thin slices. Conversely, deliberative judgments are more common when information is copious or complex – as expected when viewing longer thin slices. Therefore, it is unclear why I did not find differences in decision-making process across the exposure lengths tested in this study. Perhaps the differences in the content of the videos that encourage one type of decision-making process over the other were not featured in the stimuli that I used, but it is unlikely. Rather, the lack of effect could be due to the seven exposure lengths used. Although I used short and long thin slices, they

were all still under three-and-a-half minutes in length. A change in decision-making might only occur at exposures greater than those used in this study.

Confidence

I conducted an exploratory analysis to explore whether participants' confidence in their decisions would differ based on the length of exposure. The main effects of exposure length and veracity were not significant. Outside of the deception detection literature, researchers have suggested that people tend to be more confident in judgments produced intuitively and with little effort (Simmons & Nelson, 2006). Deliberative judgments, which require more consideration, are thought to be held with less confidence. Therefore, it would be expected that judgments made at shorter exposure lengths (i.e., those likely to rely on intuitive over deliberative processing) would be viewed with greater confidence than those made at longer exposures. However, I found no link between exposure length and decision-making process, which could explain the lack of effect.

There was a significant interaction between exposure length and veracity. Confidence only significantly differed when participants rated truth- and lie-tellers in the 5- and 10-second conditions. That is, confidence ratings were significantly greater when assessing truth-tellers (vs. lie-tellers) in the 5-second condition. Conversely, confidence when judging lie-tellers (vs. truth-tellers) was greater in the 10-second condition. It is unclear why the differences only existed in these two conditions, or why they were opposite to one another. Only one dissertation (Albrechtsen, 2007) that I know of examined the effect of thin slicing on confidence; participants' confidence was significantly higher at longer exposures (i.e., 3 minutes) than shorter ones (i.e., 15

seconds). It is unclear why I failed to replicate this finding. However, given the relatively small effect size, it might be inappropriate to put a lot of weight on these findings. Replication is needed.

Limitations and Future Directions

While there was significant consideration given to the design and methodology of this study, it was not without its shortfalls. One limitation pertains to the video segments used in each exposure conditions. I randomly sampled ten segments from the full-length videos for each short thin slice condition. This method allowed me to compile a realistic sample of videos while minimizing the chance that unexpected factors might play a role in the results (e.g., if every clip started from the beginning of the video, only those in the longer thin slice conditions would include statements from the end of the interview). However, there still might have been differences in the content of the videos – especially at shorter exposure lengths. Content could have varied based on what cues to deception the participant could attend to (e.g., verbal vs. non-verbal) and what the interviewee was talking about. For example, while clips with longer exposure lengths likely featured both verbal and non-verbal behavior from the interviewee, some of the shorter clips possibly only included non-verbal behavior (e.g., the interviewer was speaking, and the interviewee was silent). What each video depicted could have influenced decision-making. While it is unclear how helpful cues are when judging deceptiveness, researchers have suggested that paying attention to certain cues can affect decision-making processes and accuracy (e.g., DePaulo et al., 2003; Link, 2016). Future studies might consider sampling only from portions of videos that include verbal behavior or sampling a greater number of clips.

In terms of the full-length clips, one notable limitation was their length. The average truth-teller video was 136 seconds long compared to 78 seconds for the average lie-teller video. The difference in length between veracity groups could have had an unexpected effect on the findings, as longer clips include more information that can be attended to and considered. Future researchers could control for video length, although I was reluctant to choose this approach because truth-tellers naturally tend to provide more information (i.e., resulting in longer videos; DePaulo et al., 2003). Thus, addressing this limitation makes sense methodologically, but it is not necessarily ecologically valid.

Finally, it is important to note that the data collected for the variables included in this study violated several assumptions – namely, those related to outliers and normality. Although this was the nature of the data and not a simple limitation to address, it could still have had an effect on the results. I chose to make corrections rather than exclude data or rely entirely on the robustness of the analyses (i.e., ignore violations). There have been debates in the field regarding the most appropriate response to violated assumptions; I chose a conservative approach, which might have impacted my results.

Implications

Despite my findings only partially supporting more recent research regarding thin slicing (Albrechtsen et al., 2009), they replicated Ambady and Rosenthal's (1992) seminal meta-analysis. That suggests that exposure length does not affect the ability to discriminate between truth- and lie-tellers. This has important implications for deception detection research, where video clip lengths can vary greatly (See Table 1, for example). These findings provide deception detection researchers with the knowledge that the exact length of the thin slice clips used in their studies should not affect the ability to detect

deceit. However, researchers should still exercise caution when using short thin slices as clip length does appear affect bias and confidence.

The usefulness of this study further extends to sectors of law enforcement where judgments about deceptiveness need to be made within a short period of time (e.g., airport security, border crossings). My findings suggest that the short length of time that an officer is exposed to the speaker is unlikely to impact their ability to detect deceit. However, it could influence their bias or confidence in that judgment. That could have significant consequences because there is evidence to suggest that there already is a disconnect between deception detection accuracy and confidence in law enforcement (Kassin et al., 2007).

Conclusions

Understanding the effect exposure length can have on deception detection is important due to the fact that the amount of time an observer is exposed to a speaker can vary greatly both in the laboratory and in the field. I examined whether or not the total length of a video clip has a significant effect on participants' decision-making. Contrary to what I predicted, discrimination did not significantly differ across conditions. This suggests that participants are able to detect deceit with the same level of success, regardless of whether they are viewing short or long thin slices of behavior. However, their confidence in those judgments could differ between truth- and lie-tellers at shorter exposure lengths. The implications of these findings are of value for researchers studying deception detection and those working in law enforcement.

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Appendices

Appendix A

Missions Study Script

<Participant has a seat, and the interrogator sits across the table from them.>

Interrogator: "What I can tell you is that I have brought you here because I've received notice that you may have compromised the mission. I need you to describe everything that happened from the minute you began the mission until I intercepted you. Retrace your steps."

<Wait for their response.>

Interrogator: "So, which buildings did you visit?"

<Wait for their response.>

Interrogator: "Did you have anything with you during this time?"

<Wait for their response.>

Interrogator: "I know that you met another agent on your way. Describe what they looked like."

<Wait for their response.>

Interrogator: "What exactly did you give them? What were the contents of the package?"

<Wait for their response.>

Interrogator: "I'm sorry but I really don't think you are telling me the truth. Are you lying to me about what happened?"

<Wait for their response.>

Interrogator: "Do you have anything else to say?"

<Wait for a long pause.>

Further information regarding second part of the study provided to participants (not in video)

Appendix B

Demographics Questionnaire

First, participants will see a CAPTCHA question provided by Qualtrics at the beginning of the experiment (this is to ensure that no studies are completed by bots)

Demographics

What is your current age? ____

What is your gender (select one)?

- ☐ Male
- ☐ Female
- ☐ Please specify: ____

Which of the following best describes you (select one)?

- ☐ Aboriginal or indigenous (i.e., Alaskan native, American Indian, First Nations, Inuit, Metis)
- ☐ White
- ☐ South Asian (e.g., East Indian, Pakistani, Sri Lankan)
- ☐ Chinese
- ☐ Black
- ☐ Filipino
- ☐ Arab
- ☐ Latin American
- ☐ South East Asian (e.g., Vietnamese, Cambodian, Laotian, Thai)
- ☐ West Asian (e.g., Iranian, Afghan)
- ☐ Korean
- ☐ Japanese
- ☐ Multi-ethnic or other (please specify): _____

Appendix C

Decision-Making Questionnaire

[Before answering the decision-making questionnaire, participants will be presented with instructions]

Instructions:

When answering the following 19 questions regarding your decision-making, please think about the decisions you made about whether each person was lying or telling the truth (i.e., their veracity).

1. When I made a decision regarding veracity, it was more important for me to feel the decision was right than to have a rational reason for it
2. When I made a decision regarding veracity, I trusted my inner feeling and reactions
3. When making decisions regarding veracity, it made sense to completely rely on my feelings
4. When judging veracity, I preferred to draw conclusions based on my feelings, my knowledge of human nature, and my experience of life
5. I believe using my gut feelings worked well for me when judging veracity
6. When judging veracity, I trusted my hunches
7. When judging veracity, I believe I performed best when I listened to my deepest gut feelings to find an answer
8. When judging veracity, I often used my heart as a guide for my actions
9. When judging veracity, I made quick decisions
10. I felt I was aware of whether someone was lying or telling the truth even before I consider all relevant aspects
11. When judging veracity, I've had enough experience to just know what I needed to do most of the time without trying to figure it out every time
12. My judgements regarding veracity usually came to mind almost immediately
13. I typically determined whether someone was lying or telling the truth swiftly
14. I quickly did the right thing when deciding whether someone was lying or telling the truth because I've often faced almost the same thing before
15. I rarely needed to mull things over when judging veracity; how to decide usually became quickly apparent
16. When I made decisions regarding veracity, I proceeded step-by-step
17. Before I made decisions regarding veracity, I usually thought about the goals I wanted to achieve
18. When I made decisions regarding veracity, I preferred to think about it in depth rather than make swift decisions
19. When judging veracity, I usually had clear, explainable reasons for my decisions

Response Options

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree

Appendix D

Attention Check Questions

[After the response sections for clip three and clip eight, participants will complete the following attention checks]

Please select the "Agree" option from the choices listed below.

- ☐ Strongly Disagree
- ☐ Disagree
- ☐ Neutral
- ☐ Agree
- ☐ Strongly Agree

Please select the "Disagree" option from the choices listed below.

- ☐ Strongly Disagree
- ☐ Disagree
- ☐ Neutral
- ☐ Agree
- ☐ Strongly Agree

Appendix E

Lie Detection Task Instructions

The following is a script of the instructions that will appear on the screen for participants. The first (general) instructions will appear once, however, the questions specific to condition (i.e., 'was the participant in the video lying/telling the truth' and 'how confident are you in your decision') will appear after each video.

Instructions – Please read carefully

You will watch video clips of different adults speaking with an experimenter. In each clip, you will see an adult answering a series of questions. Some adults will be lying, whereas others will be telling the truth. The clips will be randomly presented, so that each adult has a 50-50 likelihood of telling the truth or lying. The segments are also independent. This means that if the person in Clip 1 is telling the truth, there is still a 50-50 chance that the person in Clip 2 is telling the truth or lying.

What you are asked to do:

For each of the following videos, please indicate whether the individual in the video is lying or telling the truth about what happened.

[Participant clicks 'continue']

New screen

[Video plays]

[Upon the completion of the video, a 'continue' button appears. Participant must click 'continue']

New screen

[Participants will provide their veracity judgment on a dichotomous scale]

The person in the video was:

- ☐ Lying
- ☐ Telling the truth

[Participant clicks 'continue']

[Participant will provide their confidence rating on a scale of 0 to 100%]