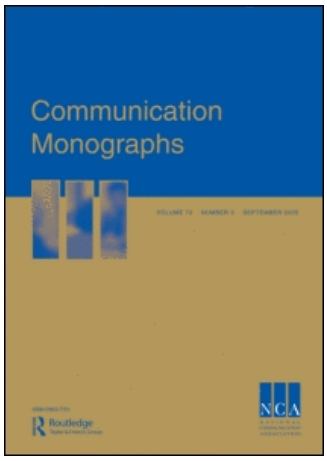

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Post-Probe Decision Making in a Prison Context

Gary D. Bond, Daniel M. Malloy, Laura A. Thompson, Elizabeth A. Arias & Shannon N. Nunn

If a listener becomes suspicious during a conversation, and asks questions (probes) of a speaker, the listener tends to judge the speaker's message as honest. This result has been termed the probing effect (McCornack, Levine, Aleman, Oetzel, & Miller, 1991). This study hypothesized that an untested decision-making phenomenon, an opposite probing effect, or a post-probe tendency to judge a message as deceptive, might occur when lie-biased individuals judge statement veracity. Prison inmates and non-inmates participated in dyads as judges and speakers. Speakers watched a video, and then lied or told the truth to judges. Judges covertly showed thumbs up or down before asking questions, and subsequently made post-probe judgments. Findings indicate that inmates use heuristic processing to a greater extent than non-inmates, and that inmates, surprisingly, exhibit a probing effect, and not an opposite probing effect, when heuristic processing is employed to decide message veracity.

Keywords: Probing effect; Reversed probing effect; Lie-biased; Deception; Heuristics

The Probing Effect

In the course of a conversation, a listener might ask questions of a speaker when the listener suspects that the speaker is being deceptive. The probing strategy is intended to confirm or to dismiss the suspicion that the speaker is lying. Studies designed to

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investigate post-probe detection judgments, however, have uncovered an interesting phenomenon: listeners tend to judge speakers' messages as being more honest after asking questions (Buller, Strzyzewski, & Comstock, 1991a). This phenomenon has been termed the *probing effect* (McCornack, Levine, Aleman, Oetzel, & Miller, 1991). The probing effect is exhibited in truth-biased samples. Explanations of probing, the probing effect, and truth-bias follow.

The definition of probing is the direct, interactive questioning of a speaker by a conversational partner with the intent to determine the veracity of communicated information, or to request additional information (Levine & McCornack, 2001). The interactive act of probing increases the believability of a speaker. The consequent probing effect, the decision that comes after probing, is a consistent, predictable outcome. The probing effect is defined as a listener's tendency to judge a speaker's message as truthful after questions are asked of the speaker, without regard to a listener's pre-probe judgment of message veracity. The probing effect has been observed most prominently in interactive conversations (Buller et al., 1991a; Granhag & Strömwall, 2001). It has been suggested that interactive participant-listeners are caught up in the encoding and decoding of the semantic structure of natural language, the generation of feedback, image-management, staying on the conversational topic, and maintaining continuity in the conversation through turn taking (Buller et al., 1991a; Buller, Strzyzewski, & Hunsaker, 1991b). Listeners are dividing their attention between these tasks and other cognitive processes. Thus, the pervasive truth-bias, the tendency to believe that most information that one hears is truthful, contributes to the probing effect (Buller, Stiff, & Burgoon, 1996; Levine & McCornack, 1992; McCornack & Levine, 1990). Listeners, overloaded with cognitive demands (Burgoon, le Poire, & Rosenthal, 1995) might judge messages more truthfully than would passive observers, who are not involved in the intricate processes of the interactive communication, after they have probed the speaker.

A proposed explanation for the probing effect is termed the *behavioral adaptation explanation* (BAE; Buller, Burgoon, White, & Ebesu, 1994). The BAE posits that after judges ask questions, speakers adapt their behaviors to appear to be more truthful, and this behavioral adaptation causes the probing effect to be shown by judges. Levine and McCornack (2001) effectively disproved the BAE hypothesis, however, finding that a speakers' behavioral adaptation did not have to occur for a probing effect to be shown. They kept source behaviors constant in nonprobe and probe conditions, and found that in probe conditions, judges perceived senders as being more honest.

The probing effect is evidenced through heuristic message processing (Levine & McCornack, 2001). Those who tend to process messages heuristically depend less on actively processing semantic message content or source behaviors, and they use mental shortcuts, or rules of thumb, to a greater extent, to process veracity (Levine & McCornack, 2001; Stiff, Miller, Sleight, Mongeau, Garlick, & Rogan, 1989). Processing type (active, heuristic) was recently found to be an important determinant as to whether the probing effect was or was not exhibited by participants in the Levine and McCornack (2001) study. Those researchers manipulated experimental

instructions to increase motivation, and trained participants to recognize deception cues, resulting in the active processing of messages, diminishing the probing effect. Thus, the probing effect may only be evidenced when people are heuristically processing message content. Those who are heuristic processors are highly truth-biased, whereas persons who are active processors of information seem to be less so (Levine & McCornack, 2001; Levine, Park, & McCornack, 1999; Stiff et al., 1989).

An Hypothesized Opposite Probing Effect

Lie-bias, as opposed to truth-bias, is the tendency to believe that most messages one hears are deceptive (McCornack & Levine, 1990). In this research a hypothesized *opposite probing effect* is tested for the first time with a lie-biased sample of prison inmates. The opposite probing effect and theoretical reasons why this effect should be shown by lie-biased prisoners is detailed in this section. Prisoners are used in this study because, with few exceptions, such as in studies conducted by Garrido and Masip (2001) and Vrij and Baxter (1999), a lie-bias has not been shown in laboratory studies. However, Bond, Malloy, Arias, Nunn, and Thompson (in press) have found a lie-bias in a prisoner population in the prison context. In the laboratory, Vrij and Baxter (1999) reported that judges who heard very little verbal information (e.g., denials) were lie-biased. Spanish police officers who judged female undergraduates from videotapes and from still photographs were lie-biased (Garrido & Masip, 2001). When suspicion has been manipulated at differing levels (McCornack & Levine, 1990; Toris & DePaulo, 1985) and at various times before, during, and after an experiment (Hubbell, Mitchell, & Gee, 2001), judges still have not shown a lie-bias in a laboratory context. Therefore, to test a hypothesis concerning an opposite probing effect, prisoners participated in a field experiment in their own context in this research.

The opposite probing effect is proposed to be exhibited when a listener heuristically judges a speaker's message as being more deceptive after asking questions. Particularly, prisoners' judgments about statement veracity should be strongly affected by the social and cultural contexts of prison. Social contextual elements are hypothesized to take the form of context markers, which are cues in the physical and social environment that comprise the context for communication (Bateson, 1973). Context markers afford communicants a framework for interpreting, constructing, and reconstructing their understanding of the meaning of conversations (Neuman, Bekerman, & Kaplan, 2002). The prison environment constitutes the physical framework, and other prisoners represent the social framework for interpreting, constructing, and reconstructing messages. In a physical and social environment that is highly restrictive and is populated with thieves and murderers, probably the receiver of information already suspects deception in others' communication, and after hearing a message and asking questions, might continue to suspect that social others are being deceptive because of physical and social context markers.

Further, the effect of cultural context on cognition has been demonstrated by Trafimow, Silverman, Mei-Tai Fan, and Shui Fun Law (1997) in a social cognition

study that investigated the effects of language and priming of private and collective self-cognitions. Trafimow and colleagues' research examined students from Hong Kong and the United States, and the researchers found that priming the private self increased retrieval of private self-cognitions, while priming the collective self increased retrieval of collective self-cognitions. In prison, prisoners engaged in interactions are primed by the prison culture within which they are conversing, and so the cumulative, collective effect of those cultural elements might prime the retrieval of collective prisoner beliefs, values, and thoughts. Therefore, prisoners, who as individuals outside of prison might normally be truth-biased, tend to alter their decision-making processes within the social and cultural contexts afforded by prison, showing a lie-bias (Bond et al., in press). After asking questions of a prisoner who is already believed to be deceptive, based on cognitive priming of the collective prison culture, a listener might continue to show a lie-bias based upon retrieval of beliefs that other prisoners are liars. Thus, the prediction that lie-biased prisoners will exhibit the opposite probing effect is based upon a context effects explanation, where context is defined as the physical, social, and cultural elements comprising the prison environment.

In a truth-biased sample, in a context that is not restrictive, not populated with criminals, and in a context which primes expectations that others will present clear, concise, truthful information (Grice, 1989), the believability of a message is enhanced when truth-biased judges ask questions. Lie-biased judges in a restrictive prison environment, living among criminals, primed by the culture of prison, might exhibit an opposite behavior, disbelieving others' messages after asking questions during a conversation. The probing effect occurs only when listeners are making their judgments based on heuristics rather than actively processing behaviors that the speaker is exhibiting, and so lie-biased evaluators who are making decisions heuristically should only exhibit the opposite probing effect when they are not actively processing the speaker's behaviors.

An opposite probing effect is measured as the number of deceptive post-probe judgments that lie-biased judges make using heuristic processing. In other words, if a lie-biased person is making judgments based on intuition or feeling, that person should have a tendency toward judging most conversations, after a probe, as deceptive.

Active Processing and the Reversed Probing Effect

Only through active processing of behaviors, post-probe, might an inmate show a *reversed probing effect* (Levine & McCornack, 2001). That is, when actively processing message behaviors, diagnostic information from behaviors and message content allow the participant to make a reasoned decision, whether it is a truth or lie decision, based on that diagnostic information. The term reversed probing effect implies that an active processing strategy is employed to make a decision, whereas the probing effect and the opposite probing effect implies that an heuristic processing strategy is used to determine message veracity.

Predictions

One hypothesis concerning active processing and outcome was explored. If active processing is used to make final detection decisions, the reversed probing effect will be evidenced over inmate and non-inmate decision cases. Two hypotheses concerning heuristic decision making and effect outcome were also tested. If heuristics are used to make final detection decisions, (a) inmate judges will evidence the opposite probing effect and (b) non-inmates will exhibit the probing effect.

Method

Participants

Thirty-six male prison inmates from Southern New Mexico Correctional Facility near Las Cruces, NM, and the same number of female prison inmates from Corrections Corporation of America-New Mexico Women's Correctional Facility in Grants, NM, participated in their respective contexts. Originally, 40 dyads of males and 40 dyads of females participated, but due to audiotaping errors, stimulus videotape jamming in the videotape player, and prison staff ending experimental sessions early because of lack of supervisory staff, the final number of dyads were 36 per gender group. Therefore, only 36 male and 36 female introductory psychology students from New Mexico State University in Las Cruces, NM participated in a laboratory context as non-inmate comparison groups, matching the final number of dyads run in the prison context. There were four treatment groups of judge-participants that consisted of male and female inmates and male and female non-inmates (18 in each group). Randomly assigned judges were the participants of interest in this research, although male and female inmates and non-inmates (18 in each group) were also randomly assigned to be speakers in interactions. The two groups ranged in age from 17 to 44 (inmate $M = 28.99$, $SD = 5.9$; non-inmate $M = 20.93$, $SD = 3.3$). The inmate groups signed up to participate in exchange for a group pizza party after all inmates participated. Introductory psychology students participated for partial course credit. Each of the groups participating within contexts (inmates and non-inmates) were paired in dyads from sign-up lists. Prisoners had served for two consecutive months or longer in their present prison institution in order to participate. Ranges of time served were 2 months to 8 years for female inmates ($M = 2.87$ years, $SD = 3.6$), and 3 months to 8 years for male inmates ($M = 2.67$ years, $SD = 1.5$). Non-inmates had not served a sentence in a jail or prison.

Design

In this research two context-based groups, inmates and non-inmates, were employed. Participants in each context participated in dyads, and members of dyads were randomly assigned to "speaker" and "judge" roles given their choices of high or low playing cards. Speakers watched short video segments and either lied or told the truth to judges (two lies and two truths were told during each dyad's

experimental session). Judges made pre-probe and post-probe detection judgments. Before judges asked their first question in the interaction, they covertly signaled to an experimenter thumbs up (for a truth decision) or thumbs down (for a lie decision), indicating that they felt the speaker was telling the truth or was lying before the first probe was sent. After the interaction, judges related their post-probe detection decision. Based on a question to judges about how they came to their conclusion that their partner was lying or telling the truth, researchers were able to code post-probe decisions into one of two categories, active decisions or heuristic decisions. Actively processed decisions were considered to be those decisions based on specific behaviors or message content which were listed as reasons why a judge decided that a speaker was telling a lie or telling the truth. Heuristically processed decisions were those decisions that were based on a feeling that a speaker was telling the truth or lying, without mention of specific behaviors or message content that characterized those decisions. Each decision, rather than an individual's decisions over an experiment, was used as a case for analysis. Decisions were used as cases because participants could not precisely be categorized as active processors or heuristic processors if they used active processing on two messages and used heuristic processing on two messages, which was a possible outcome given the base rate of two lies and two truths across an experiment. The coding procedures made it possible to identify three outcomes for the two context-based groups: (1) the hypothesized opposite probing effect for heuristic judgments, (2) the probing effect for heuristic judgments, and (3) the reversed probing effect for actively processed judgments.

Materials and Apparatus

A multitrack recorder was used to audiotape conversations, because videotaping was not allowed. Headsets (combination headphone and microphone units) were used by inmate dyads and non-inmate dyads during interactions, in order to block out frequent announcements over loudspeakers in the prison, and in order to clearly record the participants' messages, probes, and answers. Headsets were connected to a six-channel microphone mixer, which connected to the recorder. Participants heard each other through the headphones as they conversed. A 15-inch color television and a videotape player were used to present stimuli to speaker-participants. Stimuli for eyewitness recollections and lies consisted of four crime-related video segments, and each were 3 minutes long. The segments were taken from *Inside the Minds of Criminal Profilers* (Cosgrove & Meurer, 1992), and from *Stalkers: Against the Law* (CBS News, 1997), and depicted acts of arson, domestic assault, computer crimes, and stalking.

Procedure

Experiments were conducted in one room and an adjoining smaller area at each prison facility and at the university. Chairs and a small table were set up in each of

the rooms to maintain a comparable spare context. Four experimenters (one female and three males) conducted experimental sessions at the male prison facility and at the University. Three of the four experimenters (males) also conducted experiments at the female prison facility. No correctional officers were present in the experimental areas at the prison facilities; however, the experiments were monitored by closed-circuit cameras from a control booth for security reasons. An experimenter read the consent form to all participants. Participants signed a short consent form after the reading of the document and after questions about the experiment were answered. A demographics questionnaire was administered both to inmates and students.

Assignment

An experimenter asked one participant to choose between the words "high" and "low", and the other participant chose between the words "speaker" and "judge." Each participant and each of two experimenters chose a card. The participant and experimenter with the two highest cards were assigned to work together, and the participant and experimenter with the low cards worked together. Based on the choices of high and low and speaker and judge, the high card designated either speaker or judge, and the low card designated the other role.

Interactive phase of experiment

The judge was taken outside of the room, and the speaker was seated and was shown the first video segment. The following instructions were read to the speaker:

> In a moment, your partner will come in and listen to you as you describe what you just saw. (He/she) may ask questions about your story, either during your story or after you have told it. You will be watching a total of four video clips during the experiment, and this was the first. You will choose whether you want to tell a lie or tell the truth about what you have just seen. If you choose to lie, you need to be as convincing as you possibly can, because your partner will be trying to decide whether you are lying or telling the truth. If you do lie, make sure you don't just change little facts about what you have seen; you must tell a complete lie. You will tell two lies and two truths during your speaking session.

The judge and speaker were seated face to face. The judges were instructed to interrupt and to ask questions about the message while listening to the speaker or after the speaker was finished. Probes were not artificially fixed temporally by experimental protocol at certain intervals; rather, the judge controlled the natural timing of the probes and the number of probes. The number of probes ranged from 0 to 36 per conversation ($M = 3.92$, $SD = 4.1$). Probes sent by judges were requests for clarifications or for more information, misleading questions, statements about the possible veracity of the message, and so on. If judges had no questions for speakers after any given presentation, they were not prompted to ask any questions. Only two judges did not ask questions after two messages were presented. The judges were instructed, prior to entering the room, to show thumbs up or thumbs down covertly to his or her assigned experimenter before the first interruption or before

asking the first question during the conversation. The thumbs up signal indicated that the judge felt that the speaker was telling the truth up to the point of the first interruption or probe, and the thumbs down indication signified that the judge felt that the speaker was lying before the first interruption or probe. The covert signals were given behind the judges' backs, so that speakers did not know that signals were being given to the experimenter. The experimenter assigned to the judge recorded the judge's pre-probe decision on an index card.

At the end of each conversation, the speaker was taken outside of the room and the judge was asked three questions:

1. Was your partner lying or telling the truth?
2. On a scale from 1 to 5, how sure are you that the speaker was [lying/telling the truth] to you? (1 is not at all sure, and 5 is completely certain)
3. What made you come to your decision that the speaker was [lying/telling the truth]?

Post-interaction question–answer sessions were audio recorded. The speaker was then brought into the room and the judge was taken outside of the room. The speaker was asked (1) whether they lied or told the truth; (2) if they felt that the judge believed their story; and (3) how confident they felt that they were believed (on a scale from one to five). The same procedure was followed for each of the four conversations. Speakers were reminded how many lies and truths they had told, and that they were to tell a total of two lies and two truths. While speakers were watching their stimulus scenarios, judges were secluded outside of the experimental room. Participants' Generalized Communication Suspicion (GCS; Levine & McCornack, 1991) and Interpersonal Trust (ITS; Rotter, 1971) was measured, but those results are reported in a separate study (Bond & Lee, in press).

Results

Gender Analyses

In order to investigate whether males and females might be collapsed into larger inmate and non-inmate groups for subsequent analyses, decision-making cases in each of the gender groups were assessed. Planned two-tailed *t*-tests were conducted in order to identify any differences in pre-probe judgments between male and female decision cases in each of the context-based groups. Frequencies of pre-probe decisions in each of the veracity conditions (truth, lie) were tested first. Comparisons across gender for the inmate group did not show a statistically significant difference for frequencies of truth decisions, $t(17) = 0.16$, *ns* (male inmate $M = 1.33$, $SD = .77$; female inmate $M = 1.28$, $SD = 1.27$, $d = .05$), and no differences were shown in frequencies of lie decisions between males and females in the inmate groups, $t(17) = -0.16$, *ns* (male inmate $M = 2.67$, $SD = .77$; female inmate $M = 2.72$, $SD = 1.27$, $d = -.05$). Means reported are constituents of the base rate of four decisions over cases in the groups. Thus, taking an example of the male inmate

context group, there was an average of 1.33 truth decision cases out of four total decision cases, and an average of 2.67 lie decision cases out of four total decision cases over the group. Pre-probe decision making in each of the veracity conditions (truth, lie decisions) across gender for the non-inmate groups was not statistically significant, $t(17) = -1.41$, *ns* for truth decision cases (male non-inmate decision cases $M = 2.33$, $SD = .97$; female non-inmate decision cases $M = 2.83$, $SD = 1.04$, $d = -.50$), and $t(17) = 1.41$, *ns*, for lie decisions (male non-inmate $M = 1.67$, $SD = .97$; female non-inmate $M = 1.16$, $SD = 1.04$, $d = .51$). Thus, pre-probe decision results did not evidence differences in any of the veracity conditions across gender that would preclude collapsing males and females into their respective contexts for further analyses.

Frequencies of post-probe decisions in each of the veracity conditions (truth, lie) were tested next. The results were $t(17) = 0.89$, *ns* for truth decisions (male inmate decision cases $M = 1.67$, $SD = .91$; female inmate decision cases $M = 1.39$, $SD = .92$, $d = .30$), and $t(17) = -0.89$, *ns*, for lie decisions (male inmate decision cases $M = 2.33$, $SD = .91$; female inmate decision cases $M = 2.61$, $SD = .92$, $d = -.30$). Gender differences in post-probe decision making in each of the veracity conditions for the nonincarcerated group were not statistically significant, $t(17) = -0.36$, *ns* for truth decisions (male non-inmate cases $M = 2.28$, $SD = .96$; female non-inmate cases $M = 2.39$, $SD = .78$, $d = -.13$), and $t(17) = 0.36$, *ns*, for lie decisions (male non-inmate cases $M = 1.72$, $SD = .96$; female non-inmate cases $M = 1.61$, $SD = .78$, $d = .13$). Because gender results showed no significant differences in decision-making cases, males and females were collapsed into inmate and non-inmate context groups.

Heuristic and Active Message Processing

Post-probe decisions in truth and in lie conditions were coded into heuristic or active processing categories by two research assistants. Coders were trained to code decision cases as belonging to the heuristic category if the judge had a feeling that the speaker was telling the truth/lying or if no verbal, nonverbal, or content reasons were given for a decision. If a specific reason was given, such as "her eyes looked away from me," or "he used hand gestures frequently," for example, those decisions were coded as actively processed. Coders listened to judges' audiotaped responses and recorded a dichotomous judgment of active or heuristic for each decision. Coders exhibited $r(144) = .88$ agreement in truth decisions coded into active and heuristic categories, and $r(144) = .92$ in lie decisions in the dichotomous categories. After coding all of the decisions individually, differences in coding decisions were resolved during laboratory meetings. Two messages were coded as post-probe heuristic decisions, even though in those two instances, judges did not ask questions. Judges, when asked after the interactions, did state that they just had a feeling that the messages were lies in both cases, however.

Overall, the frequency of using post-probe active and heuristic decisions across veracity conditions was analyzed with context group as the independent variable.

First, the use of active processing in making decisions showed that non-inmates used active processing more than inmates, $t(35) = -2.08$, $p = .05$ (inmate $M = 2.39$, $SD = 1.34$; non-inmate $M = 3.00$, $SD = .99$, $d = -.52$). Second, inmates used heuristic processing more often in making decisions than did non-inmates, $t(35) = 2.08$, $p = .05$ (inmate $M = 1.61$, $SD = 1.34$; non-inmate $M = 1.00$, $SD = .99$, $d = .52$). Thus, context groups differed in their frequency of using active and heuristic processing in deciding message veracity.

Active processing analyses

The frequency of the use of active processing in making decisions in each of the veracity conditions was analyzed. Findings indicate that non-inmate decision cases were actively processed substantially more often in truth judgments, whether those truth judgments were correct or incorrect, than inmate cases, $t(35) = -3.57$, $p = .001$ (inmate cases $M = 1.06$, $SD = .79$, non-inmate cases $M = 1.72$, $SD = .88$, $d = -.80$). The use of active processing in lie decision cases was not different between context groups, $t(35) = -0.36$, *ns* (inmate cases $M = 1.56$, $SD = 1.08$, non-inmate cases $M = 1.64$, $SD = .83$, $d = -.09$).

After analyzing the frequency of using active processing in veracity decisions, the accuracy of context-based decision cases were analyzed for cases in which active processing was used to detect message veracity. Decision accuracy was presented as the number of correct actively processed cases divided by the base rate of two in each of the truth and lie veracity conditions. Findings indicated that non-inmate decision cases were substantially more accurate in deciding truth when using active processing than inmate cases, $t(35) = -5.29$, $p = .0001$ (inmate cases $M = 0.25$, $SD = .28$; non-inmate cases $M = 0.58$, $SD = .25$, $d = -1.25$). No context-based differences in decision cases were found in lie detection, $t(35) = -0.82$, *ns* (inmate cases $M = 0.40$, $SD = .35$; non-inmate cases $M = 0.47$, $SD = .38$, $d = -.19$).

Heuristic processing analyses

Heuristic post-probe data were also analyzed in terms of frequency and accuracy. No differences were found between group context decision cases for frequency of using heuristic decisions in truthful judgments, $t(35) = -0.13$, *ns*, with $M = 0.64$, $SD = .90$, for inmates, and non-inmates $M = 0.67$, $SD = .86$, $d = -.03$. The frequency of the use of heuristics in making lie decisions (both correct and incorrect) was substantially different between context group decision cases, $t(35) = 3.33$, $p = .002$, with $M = 0.97$, $SD = .97$ for inmates, and $M = 0.33$, $SD = .63$ for non-inmates ($d = .78$). Thus, inmates made more heuristic lie decisions than did non-inmates.

Accuracy results revealed no difference between groups in accuracy in the truth condition when heuristic decision cases were analyzed, $t(35) = -0.96$, *ns* (inmates' decision cases $M = 0.15$, $SD = .26$; non-inmates' decision cases $M = 0.22$, $SD = .33$, $d = -.23$). Further analysis of accuracy revealed a statistically significant difference between groups in accuracy in the lie condition when heuristic decision cases were analyzed, where inmate decisions were more accurate than non-inmate decisions,

$t(35) = 2.09$, $p = .04$ (inmates' $M = 0.24$, $SD = .30$; non-inmates' $M = 0.13$, $SD = .22$, $d = .42$).

Tests of Decision-Making Processes

Paired samples *t*-tests were conducted to test the hypotheses that predicted processing outcome effects, because there were two decisions made over time by the two context-based groups. Processing outcome effects were categorized as (1) the probing effect, (2) the opposite probing effect, and (3) the reversed probing effect.

Probing effect hypothesis

First, the probing effect would be evidenced as statistically significantly higher numbers of post-probe heuristic truth judgment cases as compared to pre-probe judgment cases within each of the context-based groups. The data were dichotomized, truth decisions were assigned a one, and lie decisions were assigned a zero. A paired samples *t*-test was conducted on the non-inmate group's pre-probe to post-probe heuristic decision cases, and the results revealed $t(35) = -1.78$, $p = .08$ (M pre-probe truth judgments $= 0.67$, $SD = .48$; M post-probe truth judgments $= 0.83$, $SD = .38$, $d = -.39$). Since there were no differences between pre- and post-truth judgments, the probing effect was not evidenced by non-inmates. In the inmate group a *t*-test showed $t(57) = -2.18$, $p = .03$ (M pre-probe truth judgments $= 0.40$, $SD = .49$; post-probe truth decisions $M = 0.52$, $SD = .50$). The inmate group, surprisingly, evidenced a probing effect, albeit a small one ($d = -.24$).

Opposite probing effect hypothesis

The opposite probing effect would be evidenced as statistically significantly higher percentages of post-probe heuristic lie judgments as compared to pre-probe judgments within each of the context-based group decision cases. Results showed that neither group exhibited an opposite probing effect. In fact, paired samples *t*-tests showed a statistically significant reduction in post-probe lie decisions as compared to pre-probe decisions in inmate judgments, $t(57) = -2.18$, $p = .03$. The non-inmate group did not show a statistically significant difference between pre-probe and post-probe lie decisions, $t(35) = -1.78$, $p = .08$, *ns* Group means were as follows: pre-probe inmate cases $M = 0.60$, $SD = .49$; post-probe inmate cases $M = 0.48$, $SD = .50$; $d = .24$; pre-probe non-inmate cases $M = 0.33$, $SD = .48$, post-probe non-inmate cases $M = 0.17$, $SD = .38$, $d = .37$.

Reversed probing effect hypothesis

The reversed probing effect was analyzed using the actively processed decision data. Decisions were dichotomized, with 1 assigned to an actively processed truthful judgment, and 0 assigned to an actively processed lie judgment. A paired samples *t*-test was conducted on the pre-probe and post-probe decisions made by the non-inmate group, and results were $t(107) = -2.49$, $p = .01$ (M pre-probe deci-

sions = 0.64, $SD = .48$, and M post-probe decisions = 0.48, $SD = .50$). The effect size was $d = -.32$. Results supported evidence of a reversed probing effect in the non-inmate group, because statistically significantly larger numbers of lie decisions were made post-probe. Inmates showed $t(85) = 0.39$, *ns*, indicating no reversed probing effect. Means and standard deviations for inmates were M pre-probe = 0.28, $SD = .45$; and M post-probe = 0.30, $SD = .46$, $d = -.05$. Contrary to predictions, support for a reversed probing effect was found in only one of the two context-based groups.

Signal Detection Analyses

Pre-probe SDT analyses

Pre-probe decision data were analyzed using percentages in signal detection theory (SDT) categories of hit (lie presented, lie judged), miss (lie presented, truth judged), false alarm (truth presented, lie judged), and correct rejection (truth presented, truth judged). Inmates were found to be lie-biased, and highly so, with a hit rate of 69.4%, and a false alarm rate of 65.3%. The overall number of lie decisions in the inmate group was 67.4%. Comparison non-inmates evidenced a hit rate of 44.4% and a false alarm rate of 26.4%, for a 35.4% rate of lie decisions. Inmates made 32.6% overall truth judgments, and non-inmates made 64.6% overall truth judgments, showing a truth-bias in the comparison group. Inmates set their decision-making criterion for lies at $\beta = -.39$, within the signal + noise distribution, setting a liberal criterion level. Inmate discriminability (d prime, or d') was $d' = .12$, with little separation between signal and signal + noise distributions. Non-inmates set their criterion for judging lies at .63, a conservative level, with d' at .49. Therefore, non-inmates exhibited greater discriminability in lie conditions.

Post-probe SDT analyses

Post-probe decision data were analyzed using signal detection theory categories. Inmates as a group were found to be lie-biased, although less highly so than in the pre-probe decision-making results, evidencing a hit rate of 59.7%, and a false alarm rate of 63.9%. Inmates' overall percentage of post-probe lie decisions was 61.8%. Non-inmates evidenced a post-probe hit rate of 50% and a false alarm rate of 33.3%, for a 41.7% rate of lie decisions. Inmates made 38.2% overall truth judgments, and non-inmates made 58.3% overall truth judgments, indicating a truth-bias still present in the latter group, although not as strongly as in pre-probe judgments (64.6%). Inmates set their decision making criterion for lies at $\beta = -.36$, and inmate discriminability was $d' = -.11$ (as compared to .12 in pre-probe judgments). Non-incarcerated individuals set their criterion for judging lies at .43, with discriminability (d') at .43.

Post-probe detection accuracy results were obtained by averaging hits and correct rejections. Inmates, overall, were chance detectors of truth and lies, at 47.2% (dropping from a 52.1% overall accuracy rate in pre-probe judgments), whereas non-inmates' overall detection accuracy was 59.7% (versus 60.4% in pre-probe

judgments). In post-probe lie detection, inmates evidenced a 59.7% deception detection rate, whereas non-inmates judged deception at a rate of 50%. In truth decision making, inmates scored at 34.7% accuracy, and non-inmates were above-chance detectors of truth at 69.4% accuracy.

Discussion

Personal safety and survival are paramount to inmates, and the ability to detect lies is an important survival behavior. In prison, inmates are suspicious and lie-biased. As one female inmate said before making her fourth of four lie judgments in one experiment, "before you ask me whether she was lying or telling the truth, let me tell you that everything I hear in this place is a lie; I don't trust anyone in here." Evidence of lie-biased decision making lends substance to the theoretical arguments that context markers (Bateson, 1973) and the social and cultural context (Trafimow et al., 1997) of prison deeply affects inmate cognition and decision making. Pre-probe decisions certainly reflected the effect of context upon participants in this study. A previous study that examined inmate deception decisions found a high false alarm rate in non-probe judgments (Bond et al., in press), and similarly, this study also discovered a high false alarm rate in prisoners in pre-probe decisions. Inmates' deception detection rates approached 70% in pre-probe judgments, with an almost equal number of incorrect lie judgments. Processing after probes, however, served to obfuscate inmates' abilities to detect deception.

There might be an argument for the greater pre-probe accuracy and the subsequent post-probe reduction in deception detection accuracy exhibited by inmates in this study. Buller et al. (1996) argue that listeners in the midst of communicative give-and-take might be cognitively overloaded such that their abilities to attend to behaviors and to content are weakened. Such an outcome might result in what Levine and McCornack (2001) found to be a reliance on heuristic decision-making processes to make a final decision, which is oftentimes a tendency toward judging a message as truthful (helping to explain post-probe accuracy). In contrast, passive observers who are not involved in the intricacies of interaction might not be dividing their attention, and might be concentrating most of their cognitive resources on the task at hand, deciding message veracity (helping to explain pre-probe accuracy). Inmates were passively observing message presentation to the point of the pre-probe thumbs-up or thumbs-down, and the subsequent give-and-take in the question and answer period before making the post-probe decision might have obscured or inhibited optimal decision making. This inhibition of inmate processing resulted in inmates using heuristic judgments to a greater extent, coupled with a surprising post-probe tendency to assign truth to messages.

This study's most surprising discovery was the finding that inmates exhibited the probing effect (heuristic truth judgments changed from 39.7% pre-probe to 51.7% post-probe). This finding should be qualified, however, because the total number of inmates' heuristic judgments was small ($N = 58$) compared to actively processed

decisions ($N = 86$). A larger number of decision cases should be examined in future studies, given that the effect size ($d = -.24$) found in this study was small.

Post-probe, inmates exhibited false alarms at a lower rate (almost 10% lower) with an attendant 10% reduction in the hit rate. Inmates did not evidence an opposite probing effect by increasing their post-probe lie decisions as hypothesized; rather, they made greater numbers of truth decisions after lie presentations (an increase of 12% in misses with no change in correct rejections). Those data provided evidence that inmates were exhibiting a probing effect with no correspondent increase in truth accuracy. Perhaps inmates are accustomed to hearing gradations of lies in higher frequencies, interspersed with fewer truths than non-inmates might hear. This kind of communicative environment might lead to an inmate's tendency to designate a truthful judgment to lies that sound less deceptive; hence the finding of more misses across inmate truth decisions. Correct rejections remained constant from pre-probe to post-probe at 35%, but inmates' discriminability of truthful messages worsened from first to second decision, possibly due to the division of cognitive attention that resulted from the effect that the probing give-and-take had on their post-probe decision making capacities. The finding that inmates were not substantially more accurate than non-inmates in detecting lies from demeanor or content, using active processing, might show that inmates are not focusing on effective behavioral cues or on message content in order to detect lies. A future study might survey the cues that inmates use to detect deception and to detect truth (following Vrij & Semin, 1996), and in the same study, might explore the cues that inmates use in interactions. There may be differences in what inmates think they know about deceptive and truthful behaviors and messages, and what they report or how they behave during the course of a live interaction.

Accuracy in detecting lies was not different from comparisons when the reversed probing effect was exhibited by inmates, but that group did use active processing to a greater extent than they used heuristic processing to determine the veracity of messages. The 60:40 ratio of active processing to heuristic processing when inmates made post-probe decisions depicts inmates as active seekers of message and behavioral cues to determine the veracity of messages. Accuracy in detecting truthful messages was high in the comparison group when they used active processing (comparison cases employed active processing at a ratio of 3:1 over heuristic processing overall).

Although inmates evidenced a large number of actively processed lie decisions showing little change from pre-probe to post-probe judgments, the comparison group moved from deciding that a large number of pre-probe messages were truthful to a post-probe lie and truth tally that was almost equal in number. This decision-making trend seems to indicate that the non-inmates were actively using behavioral and message content cues post-probe to make what they felt were informed decisions. Results supporting a reversed probing effect in this study bolstered Levine and McCornack's (2001) argument that active processing reduces the strong tendency toward truth-bias.

No gender differences in decision-making biases were found. Female inmates are as lie-biased as male inmates. Experimenters noticed that the female prison context seemed less restrictive compared to the context in which the male prisoners lived. Female inmates enjoyed participation in several institutional programs, as well as family- and child-oriented programs. The finding that females were no different than males in lie-bias was surprising, due to the female inmates' program and activity alternatives. The key to a finding of no differences between male and female inmates may lie in the lack of social contacts with non-inmates.

This study was a field experiment, and with any quasi-experiment there are inherent problems. One methodological concern involved pre-probe judgments. Experimenters did not take speakers out of the room after the pre-probe judgment in order to assess whether the judge was using active processing or heuristic processing in their pre-probe decision. This methodological compromise restricted the gathering of useful data. In the interest of maintaining ecological validity, however, pre-probe judgments consisted of a swift and secret thumbs-up or thumbs-down to allow a natural conversational give-and-take, with probes and interruptions allowed during the remainder of the conversation. Inmates could not be paired with non-inmates, and vice versa, as a true experiment would warrant. Legal and social constraints would not permit such a design, unless prisoners on work release and students who were interested in participating in an experiment in a prison could be brought together. Probably, a differential amount of suspicion would be evidenced in the latter situation, and in the former, inmates on work release are not as greatly affected by their context compared to those inmates who consistently reside behind concrete walls and razor wire barriers (Bond et al., in press). Within these limitations, however, evidence of contextual effects on the decision making of those in each group was apparent.

All crime-related scenarios were presented to speakers, which might have caused differential effects in speakers' ability to lie and the detectors' ability to decide message veracity. In a concurrent study, however, crime-related and neutral segments were presented to speakers, and accuracy and biases were equivalent across segment type for both inmate and non-inmate judge groups (Bond et al., in press). Further, speaker behaviors across crime and neutral segments were not different (Bond & Lee, 2004). Based on those findings, only four segments, all crime-related, were presented to speakers because the number of probes given by judges was not time-constrained, and prison officials permitted only a limited time to conduct each experimental session.

This experiment was conducted in a primarily Hispanic region of the United States, and the overall demographics of the prison population in the United States is different, although minorities are over-represented in the inmate population. There were 2,100,146 inmates in the United States at the end of 2001; 1177 Hispanic males per 100,000 Hispanic males in the population were incarcerated in prisons, whereas 3535 African American males per 100,000 and 462 white males per 100,000 were prisoners (U.S. Department of Justice, 2002). Research might be performed in prisons that are closer to present demographic ratios to assess the generalizability of this study's results.

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