True and False Intentions:
A Mental Representational Approach

Sofia Calderon

To my family
for always being supportive

Abstract

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The study of *true* and *false* intentions is a specific case of deception-detection research. The focus is on how to discriminate between lies and truths about *future* behavior, as opposed to previous deception research that focused almost exclusively on past behavior. The societal value of this research is great, since many legal settings demand that practitioners make credibility judgments of intentions. Here, the focus is specifically on the mental representations of lies and truths. The current thesis proposes and experimentally tests a theoretical model that suggests differences in the mental representation and communication of true and false intentions. It is based on research showing that psychologically distant tasks (e.g., unlikely tasks) are more abstractly represented than psychologically proximal tasks (e.g., likely tasks). The purpose of this model is to help provide powerful predictions about how to differentiate between true and false intentions (e.g., generate novel cues to deceit) and to investigate the possibilities to apply construal level theory to deception contexts. In brief, the model proposes that false intentions should be more abstractly represented than true intentions since they concern unlikely rather than likely future tasks. This difference should in turn be mirrored in language use. Four studies tested this. In **Study I**, participants were asked either to perform or not to perform (but to claim to perform in all cases) simple future tasks while construal level of the tasks was measured, using a behavior segmentation task (Exp. 1), and participants' preference for abstract/concrete descriptions of the tasks (Exp. 2). Failing to support the prediction, liars' and truth tellers' construal levels of the task did not differ. **Study II** again tested the prediction that false intentions are more abstractly represented than true intentions. Schema consistency (schema-consistent vs. schema-inconsistent tasks) was added as a manipulated factor to the tests in Study I. It was predicted that truth tellers would represent the future task, particularly for the schema-inconsistent task, in more concrete terms. Again, no between-group differences were found in level of construal of the task. A meta-analysis across the three experiments in Studies I and II showed an average effect size close to zero (Hedges' g = 0.02). In **Study III**, it was tested whether false statements of intentions are more abstractly phrased than true statements of intentions. A computerized content analysis of over 6,000 statements of true and false intentions—using two established measures of linguistic abstraction—revealed no support for the predicted difference. In **Study IV**, two close replication experiments were conducted on the CLT finding at the core of the proposed construal level of intention (CLINT) model: that unlikely future events are more abstractly construed than likely ones. Both attempts failed to replicate this finding. In summary, the results of the thesis lend no support to the prediction that false intentions are represented at a higher, more abstract construal level than true intentions. A possible explanation of the null findings is that the basic CLT assumption may not hold true. The thesis contributes to the burgeoning field of true and false intentions. It also adds to the research field of CLT. It makes a particularly valuable addition to the small number of studies investigating the effect of the subjective likelihood of future tasks on their construal level.

Keywords: Deception, true and false intentions, construal level theory, mental representation, abstraction, action identification theory

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Swedish Summary

En stor mängd forskning har genom åren bedrivits i syfte att särskilja sannings-sägare från lögnare. Dessa studier har dock nästan uteslutande fokuserat på san-ningar och lögner relaterade till tidigare händelser. Det är först under de senaste åren som forskare har börjat intressera sig för och systematiskt testa vilka möj-ligheter det finns att särskilja sanningar och lögner om framtida handlingar – så kallade *sanna* och *falska* intentioner. Att det historiskt sett forskats så lite på lögner och sanningar om framtida handlingar är förvånande med tanke på det stora samhällsvärdet i att korrekt kunna bedöma tillförlitligheten i sådana utsa-gor. Kunskapen kan vara avgörande för att anställda inom rättsväsendet ska kunna förutse och förhindra planerade brott innan de sker, till exempel i situat-ioner då folk uttrycker sina intentioner vid gränskontroller eller påstådda terror-attacker.

I denna doktorsavhandling testas en ny teoretisk modell för att förstå hur sanna och falska intentioner är mentalt representerade. Modellen kallas Construal Level of Intention – CLINT. Den bygger på tidigare forskning kring sanna och falska intentioner, men också på en väletablerad socialkognitiv teori vid namn construal level theory (CLT). I kort menar CLT att situationer som inte upplevs direkt, här och nu, är mentalt representerade på ett kontinuum från mer konkret till mer abstrakt. Teorin föreslår att ju längre ifrån en själv någonting upplevs vara, till exempel en framtida händelse, desto mer abstrakt kommer hän-delsen att representeras mentalt. Empiriska studier stödjer teorin och man har bland annat funnit att framtida handlingar som upplevs som osannolika tenderar att vara mer abstrakt representerade jämfört med handlingar som upplevs mer sannolika. Detta yttrar sig till exempel i att de i högre grad upplevs i mer ab-strakta, generella termer, medan sannolika händelser är förknippade med kon-kreta bilder och specifika drag.

Eftersom en intention är en tänkt framtida handling är den mentalt represen-terad i någon form. Grundantagandet i CLINT-modellen är att en *falsk intention* per definition är en *osannolik* framtida handling (då personen som uttrycker in-tentionen inte planerar att genomföra den), vilket gör att den bör vara mer *ab-strakt* representerad. Eftersom en *sann intention* istället per definition är en *san-nolik* framtida handling (då personen genuint planerar att utföra handlingen) bör den därför vara mer *konkret* representerad. Baserat på ovanstående resonemang formulerades hypotesen att falska (vs. sanna) intentioner om framtida hand-lingar bör vara mer abstrakt (vs. konkret) representerade därför att de upplevs vara mer osannolika (vs. sannolika). Om CLINT-modellen skulle få empiriskt

stöd skulle det leda till en utveckling av CLT i form av ett nytt tillämpningsområde, men också i förlängningen skapa nya möjligheter att avslöja falska intentioner (t.ex. möjliggöra utvecklandet av analysverktyg för verbala utsagor samt intervjutekniker).

Studie I bestod av två experiment där deltagarna ombads att antingen tala sanning eller ljuga om en framtida handling samtidigt som mental abstraktionsnivå mättes. I Experiment 1 ($N = 125$) delades försöksdeltagarna in i tre olika grupper: sann intentionsgrupp, falsk intentionsgrupp, och kontrollgrupp. Samtliga deltagare fick titta på ett videoklipp som föreställde en person som satte samman en leksaksbil i papp. Innan de såg videoklippet fick de veta att de antingen själva skulle sätta samman bilen i slutet av experimentet samt övertyga en person om att de skulle genomföra denna handling (sann intentionsgrupp), att de inte skulle sätta samman bilen men ändå övertyga en person om att de skulle göra det (falsk intentionsgrupp), eller att de helt enkelt skulle sätta samman bilen i slutet av experimentet (kontrollgrupp). Medan de tittade på videoklippet ombads de att dela in klippet i ett antal (för deltagarna) meningsfulla segment. Detta är ett etablerat mått på kategoriseringsbredd där färre segment indikerar en bredare kategorisering och därmed mer abstrakt representationsnivå. I motsats till hypotesen uppmättes inga skillnader mellan grupperna i antal segment som videoklippet delades in i.

I Experiment 2 ($N = 59$) presenterades en serie av åtta enklare uppgifter för deltagarna i tur och ordning. Deltagarna fick veta att de skulle utföra hälften av dessa och inte utföra den andra hälften. Efter att de sett ett videoklipp, men innan handlingen skulle utföras (i de fall då intentionerna var sanna) samlades information om deras intentioner in. Deltagarna ombads beskriva handlingen med egna ord, och även välja vilket av två svarsalternativ de ansåg passade bäst för att beskriva handlingen. Exempelvis var en av handlingarna att spela piano. Deltagarna gavs då alternativen *göra musik* (mer abstrakt) och *trycka på tangenter* (mer konkret). Dessa frågor användes för att mäta deltagarnas preferens för abstrakta respektive konkreta beskrivningar av handlingarna. I motsats till prediktionerna identifierades inga skillnader mellan grupperna i grad av abstraktionsnivå heller på detta mått, i likhet med resultaten i Experiment 1.

Enkelheten i handlingarna i Studie I (t.ex. sätta samman en leksaksbil, spela piano) möjliggjorde eventuellt endast en schematisk representation av handlingarna för både lögnare och sanningssägare. Detta skulle kunna vara en förklaring till nollresultaten. I **Studie II** lades därför ytterligare en faktor till utöver sanningshalt – grad av schematiskhet. Deltagarna ($N = 151$) i denna studie ombads planera ett uppdrag. Hälften av deltagarna uppmanades att föreställa sig att de var en forskningsassistent som fått i uppdrag att gå till ett kontor i byggnaden och

hämta saker och sedan lämna över dessa till en anställd. Resterande deltagare blev ombedda att gå till samma kontor för att lämna en hemlig lapp. Den senare gruppen fick också veta att de eventuellt skulle bli stoppade och utfrågade om sitt ärende, och att de i så fall skulle ljuga med hjälp av en cover-story som matchade sanningssägarnas uppdrag (dvs att hämta saker på ett kontor). Schematiskhet manipulerades genom att hälften av deltagarna ombads hämta, eller ljuga om att hämta, kontorsmaterial (en mer schematisk uppgift; t.ex. papper, penna, sax) och hälften ombads att hämta saker som inte vanligtvis återfinns på ett kontor (mindre schematisk uppgift; t.ex. gummianka, mössa, fruktskål). Mental abstraktionsnivå mättes efter att deltagarna planerat sitt uppdrag och innan de skulle ge sig iväg genom att de fick gruppera sakerna (27 stycken) i grupper som de tyckte kändes naturliga. Färre antal grupper tolkades som en indikation på en mer abstrakt mental representation. I motsats till prediktionerna uppmättes inga skillnader i kategoriseringsbredd mellan grupperna.

Eftersom CLT menar att graden av mental abstraktion kan spegla av sig i folks språkbruk fokuserade **Studie III** på att undersöka om lögner om framtida handlingar är mer abstrakt formulerade än sanningar om framtida handlingar. Rådata från tidigare experimentella studier på ämnet sanna och falska intentioner samlades in ($N = 528$; totalt 3005 sanna och 3106 falska utsagor). Abstraktionsgrad i språket kodades med hjälp av två automatiserade kodningsverktyg. Det ena bestämmer en texts abstraktionsgrad genom att tillskriva varje ord ett konkrethetsindex från 1 (abstrakt) till 5 (konkret). Indexen baseras på en stor mängd personers spontana skattningar av abstraktionsgrad av över 40 000 engelska ord. Exempelvis har ordet *väsentlighet* ett index på 1.04 medan *havssköldpadda* har ett index på 5.00. Det andra kodningsverktyget fokuserar istället på ordklassers olika grad av abstraktion. Verktyget kodar proportionen av substantiv (*mobbare*), adjektiv (*aggressiv*), tillståndsverb (*hata*), tolkningsbara handlingsverb (*skada*), och deskriptiva handlingsverb (*slå*). Samtliga utsagor analyserades med båda verktygen. I motsats till hypotesen uppmättes inga skillnader, utan istället tyder resultaten på att sanna och falska intentioner uttrycks i liknande termer med avseende på abstrakt och konkret språk.

Baserat på nollfynden i Studie I, II, och III testades i **Studie IV** CLT-grundantagandet att framtida händelser som upplevs som osannolika representeras mer abstrakt än de som upplevs som sannolika. Studien bestod av två direkta replikeringsexperiment, det vill säga studier som i mycket hög utsträckning efterliknar tidigare genomförda experiments tillvägagångssätt och mätningar. I Experiment 1 ($N = 115$) fick deltagare se ett videoklipp som föreställde en person som utförde en serie handlingar. I linje med det ursprungliga videomaterialet var det en kvinna som vek och ritade på papper. Hälften av deltagarna fick veta att det var

95 % sannolikhet att de själva skulle utföra handlingarna i slutet på försöket (hög sannolikhetsgrupp). Den andra hälften fick veta att det var 5 % sannolikhet att de själva skulle utföra handlingarna (låg sannolikhetsgrupp). Innan de tittade på klippen ombads de dela in klippet i ett antal (för deltagarna) meningsfulla segment. Ett lägre antal segment indikerar en bredare kategorisering, vilket tyder på en mer abstrakt mental representationsnivå. I motsats till författarna av original-studien uppmättes ingen skillnad i linje med hypotesen att låg upplevd sannolikhet leder till mer abstrakt mental representation.

I Experiment 2 (N = 120) testades deltagares förmåga att abstrahera visuell information beroende på grad av upplevd sannolikhet. Deltagare leddes att tro att de skulle genomföra ett av två tester; (1) urskilja objekt som ser ut att vara dolda i snö, och (2) namnge objekt i fragmentariska bilder. Samtliga deltagare fick genomföra båda testerna i vad de trodde var en testomgång innan det riktiga experimentet. I verkligheten var det prestationen under denna testomgång som var av intresse. Hälften av deltagarna leddes att tro att det var 5 % chans att de skulle genomföra testet med bilder dolda i snö, och 95 % chans att de skulle ge-nomföra testet med fragmentariska bilder, och den andra hälften trodde tvärtom att det var 95 % chans för testet med snöiga bilder och 5 % chans för fragmenta-riska bilder. I motsats till hypotesen presterade deltagare inte bättre på abstrakt-ionstesterna vid låg än vid hög sannolikhet. Det betyder att båda replikeringsför-söken misslyckades att uppmäta samma effekt av sannolikhet på mental ab-straktionsnivå som författarna av originalstudien.

Sammanfattningsvis gav studierna i avhandlingen inget stöd för CLINT-mo-dellen. Tvärtom indikerar nollresultaten att det inte finns någon substantiell skillnad i mental abstraktionsgrad mellan sanna och falska intentioner. De för-sök som gjordes att replikera tidigare CLT-fynd misslyckades, vilket tyder på att avsaknaden av uppmätta skillnader i mental abstraktionsgrad mellan sanna och falska intentioner har att göra med att det teoretiska grundantagandet kring san-nolikhet och abstraktion inte stämmer.

Detta betyder att CLINT-modellen saknar empiriskt stöd vilket också innebär att det i nuläget inte är möjligt att utveckla verktyg och metoder för att avslöja lögner om framtida händelser baserat på modellen. Det faktum att inga skillna-der uppmättes i språklig abstraktionsnivå mellan sanna och falska uttryckta in-tentioner är i linje med tidigare lögnforskning: Det finns få och mycket svaga led-trådar på lögn. Resultaten belyser också behovet av att fortsatt testa tillförlitlig-heten i tidigare fynd inom CLT genom fler replikeringsstudier.

List of Publications

This thesis is based on the following four papers, which are referred to by their Roman numerals:

I.   Calderon, S., Mac Giolla, E., Granhag, P. A., & Ask, K. (2017). Do true and false intentions differ in level of abstraction? A test of construal level theory in deception contexts. *Frontiers in Psychology*, 8(2037). doi:10.3389/fpsyg.2017.02037

II.   Calderon, S., Mac Giolla, E., Ask, K., & Granhag, P. A. (2019). *The mental representation of true and false intentions: A comparison of schema-consistent and schema-inconsistent tasks*. Manuscript under review.

III. Calderon, S., Mac Giolla, E., Luke, T. J., Warmelink, L., Ask, K., & Granhag, P. A., & Vrij, A. (2019). *Linguistic concreteness of statements of true and false intentions: A Mega-Analysis*. Manuscript submitted for publication.

IV.   Calderon, S., Mac Giolla, E., Ask, K., & Granhag, P. A. (2019). *Subjective probability and the construal level of future events: A replication study of Wakslak, Trope, Liberman, and Alony (2006)*. Manuscript submitted for publication.

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Sofia Calderon
Gothenburg, April 2019

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Table of Contents

Introduction

People often communicate their intentions to others. In most situations these statements are genuine and reflect what the person truly intends to do. Sometimes, however, in order to deceive, people will cover their genuine intention with a lie. A 'true intention' refers to a stated future action genuinely intended to be performed. A 'false intention' refers to a stated future action *not* intended to be performed. People's reasons for stating a false intention could be financial (e.g., "I'll give you the money back next month"), social (e.g., "I can't attend your party as I need to work"), or malicious (e.g., "I'll only use this gun for hunting"). In this thesis, the focus is on statements of true and false intentions and the mental representations that underlie them. How are true and false intentions mentally represented? Are there systematic differences in the way that true and false intentions are cognitively construed and communicated? This knowledge could be key to understanding how and why statements of true and false intentions differ, which could eventually lead to the development of coding manuals for verbal content analysis in legal settings and strategic interview protocols to help improve the chances of detecting deception.

I begin with a brief overview of the most influential deception theories and methods for detecting deceit, followed by a definition of true and false intentions and a summary of the empirical work on the topic. I then summarize construal level theory (CLT), which guided the research reported here. To try to unify research on true and false intentions and CLT, I propose a theoretical model called the construal level of intention (CLINT) model. It rests on the assumption that true and false intentions, per definition, differ in the likelihood of carrying out the future actions; false intentions refer to unlikely future tasks, whereas true intentions refer to likely future tasks. Based on empirical work within CLT showing that unlikely future tasks are more abstractly mentally construed than likely tasks, the CLINT model similarly predicts that false intentions will be construed more abstractly than true intentions. Furthermore, the model suggests that this is mirrored in language use, so that false statements of intentions are more abstractly phrased than true statements of intentions.

The CLINT model was experimentally tested in the four studies forming the empirical basis of this thesis, and the findings are discussed in light of deception research and the CLT literature.

Theories of Deception and Methods for its Detection

The need to detect lies is evident in historical texts as well as in popular culture. A Google search on the term 'deception' gives about 57 million hits ranging from references to biblical stories such as Judas' betrayal of Jesus through classical plays such as Shakespeare's 'Hamlet' to more recent discussions about fake news. It should therefore come as no surprise that deception also has a strong research tradition. In academic texts, deception is generally defined as a person's deliberate attempt to make someone else believe something the communicator knows to be false (Vrij, 2008). To detect deception, one needs to know what makes lying different from truth telling. Deception has been extensively studied from this basic standpoint, and the field can be divided into two major approaches: (1) an emotional approach and (2) a cognitive approach.

The traditional focus of lie detection literature has been the relation between non-verbal cues and deception. This approach relies on the assumption that people experience distinctly different feelings when lying than when telling the truth, which evoke different behavioral cues to deception (Ekman & Friesen, 1969). Specifically, liars are thought to experience emotions such as nervousness, thought to prompt behaviors such as gaze aversion and fidgeting. Although this idea may make intuitive sense, these emotionally based assumptions lack empirical support. The two most influential meta-analyses on deception detection looked at behavioral cues to deception (DePaulo et al., 2003), and people's accuracy in detecting deception when asked to passively watch and listen to people lying and telling the truth (Bond & DePaulo, 2006). The results revealed that there are few and unreliable cues to deceit, and that people are poor at detecting lies. In fact, the overall accuracy rate reported in the latter paper, based on over 24,000 veracity judgments, is only just higher than chance (54% correct judgments; for a recent review of theories of nonverbal behavior and deception, see Vrij, Hartwig, & Granhag, 2019). It may come as no surprise that the research focus has moved away from searching for reliable emotionally based behavioral cues, to instead approaching the topic from a cognitive point of view.

Currently, cognitive approaches dominate the agenda of deception detection research (Granhag, Vrij, & Verschuere, 2015). These approaches are based on the assumption that lying involves other mental processes than truth-telling, such as planning, memory, and information management. One line of research (the "passive" cognitive approach) predicts naturally occurring differences in the verbal content of liars' and truth tellers' statements. Established methods for analyzing the verbal content of statements, such as statement validity analysis (SVA; Volbert & Steller, 2014), and reality monitoring (RM; Sporer, 2004), have been

developed within this strand of research. While some researchers claim these tools are efficient for detecting deception (e.g., Volbert & Steller, 2014), others have advised legal practitioners not to use them in court due to their high error rates (SVA and RM have overall error rates of about 30%; Vrij, 2015). A more recent approach, stemming from the above-mentioned tools, is the verifiability approach (VA; Nahari, Vrij, & Fisher, 2014). The reasoning underlying VA is that while liars might add unverifiable details to their verbal accounts to appear credible (Nahari, Vrij, & Fisher, 2012), they will avoid mentioning verifiable details (e.g., ATM cash withdrawals) for fear of being exposed. Truth tellers, on the other hand, are expected not to worry about this. Hence, false statements should contain fewer verifiable details than true statements. Despite relatively few empirical studies so far, the VA approach has shown promising results. In a recent summary of the VA literature, accuracy rates—percentage correctly classified truth teller and liars—ranged from 59% to 88% (Vrij & Nahari, 2017). Six of nine accuracy rates were above 70%, which matches the overall accuracy of the SVA and RM tools.

Another line of research (the "active" cognitive approach) suggests ways to enhance existing cues and create novel ones by asking the right questions (Vrij & Granhag, 2012). This new direction has been called a paradigm shift in deception detection research (Kassin, 2012) and has resulted in a series of research programs. One approach, to be used in situations where the interviewer holds some critical information, is the strategic use of evidence (SUE) technique (Granhag & Hartwig, 2015). It relies on the assumption that liars are more aversive to critical information while truth tellers are more forthcoming (Granhag, Hartwig, Mac Giolla, & Clemens, 2015). This tendency can then be exploited by disclosing evidence in a well-planned manner during the interview. The SUE technique has been shown to increase the magnitude of cues to deceit, such as contradictions between the statement and the evidence at hand (Hartwig, Granhag, & Luke, 2014).

Other active methods that exploit cognitive differences between liars and truth tellers are *imposing cognitive load* on interviewees (e.g., by asking people to tell their story in reverse order; Vrij, Leal, Mann, & Fisher, 2012), asking interviewees to *provide more information* (e.g., by providing a detailed "model" statement; Leal, Vrij, Warmelink, Vernham, & Fisher, 2015), and asking *unanticipated questions*. One particular example of the latter approach is to ask people to draw rather than verbalize their account (Vrij et al., 2010). The drawing-based approach is anchored in the idea that truth tellers have experienced the event they depict and so remember the spatial and perceptual details necessary to produce a drawing of it. Liars, on the other hand, because they lack this experience,

are more challenged by a drawing task. The drawing-based approach has resulted in some of the largest effect sizes in the deception literature (for a review, see Mac Giolla, Granhag, & Vernham, 2017). A recent synthesis of studies imposing cognitive load, asking interviewees to provide more information, and asking unanticipated questions found an overall accuracy rate of truth and lie detection of 71% (Vrij, Fisher, & Blank, 2017). In sum, strategic interviewing is a promising way to detect deception in interview situations.

Although some approaches have shown successful results in separating truths from lies, most studies until recently have focused solely on statements about past events. This thesis focuses on truths and lies about *future* actions. Research into true and false intentions is rather new, which is surprising considering its great societal value. Successful credibility judgments about statements of intentions are in some situations crucial for preventing future crimes, such as at border controls and in suspected terrorist plots (Granhag & Mac Giolla, 2014). As will be shown below, some deception detection techniques have been successfully translated for use with intentions rather than past actions. In addition, since intentions differ in crucial ways from lies and truths about past actions, intention-specific approaches have been developed. Below I start with a formal definition of true and false intentions before summarizing the empirical research on the topic.

Defining True and False Intentions

A true intention refers to a statement about a future action the expresser genuinely intends to carry out. By contrast, a false intention refers to a statement regarding a future action which the expresser does not intend to carry out. A false intention is often used as a cover story to mask a liar's true (socially, morally, or legally less acceptable) intention, and most studies have examined this particular form of false intention (for a review, see Granhag & Mac Giolla, 2014).

In an early paper on the topic, Granhag (2010) illustrated how researchers may develop an understanding of true and false intentions by using the analogy of an authentic and a fake coin. He stated that "in order to decide whether a coin is false, one needs to be able to recognize a true coin" (p. 39). From this, he based his definition of a true intention on the folk-conceptual definition of an intention offered by Malle and Knobe (2001). First, an intention means having a *future goal* (i.e., a desire to follow through on a specific action). Second, the intention needs to be accompanied with *some degree of reasoning* (i.e., thoughts about how to attain the goal). Third, an intention comes with *a strong commitment to act* (i.e., a decision to carry out the intention). In other words, a crucial component of an

intention is a decision to perform the action. To guide future research, Granhag (2010) proposed the narrow definition of a true intention to be a claimed single action genuinely intended to be performed in the near future, which comes with some reasoning and a high degree of commitment. A false intention, on the other hand, is a claimed single action in the near future which comes with *no* commitment to act.

Empirical Research on True and False Intentions

Although the first empirical study on true and false intentions was published as recently as eight years ago (Vrij, Granhag, Mann, & Leal, 2011), a number of doctoral dissertations have already covered the topic (Clemens, 2013; Knieps, 2013; Mac Giolla, 2016; Sooniste, 2015; Wallace, 2014; Warmelink, 2012), and around 30 studies have been published (for a review, see Granhag & Mac Giolla, 2014). The research can be divided into two broad categories: (1) traditional deception-detection approaches applied to intentions (i.e., techniques previously focused on separating true and false statements about past actions) and (2) intention-specific approaches based on assumed cognitive differences between people claiming true or false intentions. Below, I expand on the theoretical reasoning and the empirical findings of this research.

Traditional Deception-Detection Approaches Applied to Intentions

There have been several attempts to apply traditional deception-detection approaches to intention situations. In sum, most attempts based on cognitive theories have translated better than emotionally based approaches to the study of true and false intentions. One successful approach is the SUE technique, which was found to increase the magnitude of cues to deceit (Clemens, Granhag, & Strömwall, 2011). The verifiability approach also translated well to the study of true and false intentions, with false statements of intentions containing less verifiable details than true statements of intentions (Jupe, Leal, Vrij, & Nahari, 2017). A recent exploratory study, which coded statements of true and false intentions based on reality monitoring criteria, found a large effect of veracity on some of the criteria (Mac Giolla, Ask, Granhag, & Karlsson, 2018). A series of memory-based studies have also showed promising results as for differentiating between true and false statements of intentions using the Concealed Information Test (CIT; Meijer, Smulders, & Merckelbach, 2010; Meijer, Verschuere, & Merckelbach, 2010; Meixner & Rosenfeld, 2011; Noordraven & Verschuere, 2013) and the autobiographical Implicit Association Test (aIAT; Agosta,

Castiello, Rigoni, Lionetti, & Sartori, 2011). The CIT aims to detect crime-related information in a suspect's memory (i.e., knowledge about the crime) by measuring changes in skin conductance while showing the suspect probes (i.e., crime related stimuli) and irrelevants (i.e., neutral stimuli). The aIAT is a method used to evaluate which of several alternative versions of events is true and which are false by measuring reaction times.

Some attempts to apply traditional approaches to intentions have been less successful. For example, Kleinberg, Van Der Toolen, Vrij, Arntz, and Verschuere (2018) found providing a detailed model statement had no clear beneficial effects on the accurate classification of deceptive intentions despite its previous promising results for past actions (Leal et al., 2015). Warmelink et al. (2011) found low accuracy rates when testing thermal imaging (i.e., measuring changes in facial temperature) as a tool for differentiating between participants with true and false intentions. Also, Mann et al. (2012) debunked the common deception myth that people look to their right when they are lying. They found no clear pattern in eye-movements when comparing participants with true and false intentions.

Intention Specific Approaches

To reiterate, a true intention is defined as a planned single future action genuinely intended to be performed, which comes with some degree of reasoning and a commitment to perform the action. Intention specific approaches to deception rely on two basic assumptions in line with this definition. First, an intention is accompanied by a host of related psychological constructs and behavioral consequences. For example, forming an intention should activate a behavioral goal, promote planning, and create a mental representation of the future action (e.g., a thought or mental image). and In other words, liars, having a false intention, will be in a different mental state than truth tellers, and will not engage to the same extent in activities typically associated with the formation of a true intention. Based on these assumed discrepancies, it should be possible to discriminate between true and false intentions. Below, I summarize the theoretical approaches from which, to date, intentions have been empirically examined.

Goals

Goals play a crucial role in explaining human action. As long as a goal is active (i.e., not attained) it influences behavior in a variety of ways (Martin & Tesser, 2009). Goals affect explicit behaviors such as planning (Mumford, Schultz, & Van Doorn, 2001) and reasoning (Ajzen, 1991), as well as other types of future-oriented thinking such as mental images of the future (Schacter, Addis, & Buckner, 2008) and spontaneous thoughts (Baars, 2010). Apart from their more

overt consequences, goals also have an implicit influence on actions. For example, information related to active goals is better remembered than information related to completed goals (Zeigarnik, 1939). Research also shows that objects related to active goals are favorably evaluated (Ferguson & Bargh, 2004) and that ambiguous information is interpreted according to active goals (Voss, Rothermund, & Brandtstädter, 2008).

Since an intention involves a commitment to carry out an intended action (Malle & Knobe, 2001) it should activate a behavioral goal. False intentions, however, should not activate any behavioral goal (at least not regarding the claimed, but unintended, future action in question). Hence, the consequences of goals should be non-existent or weaker for false intentions than for true intentions. Ask, Granhag, Juhlin, and Vrij (2013) investigated a specific consequence of goal-activation in the context of true and false intentions: the automatic evaluation of goal-related stimuli. Using an evaluative priming task, Ask and colleagues measured participants' automatic attitudes toward objects relevant to their intention (i.e., to shop at a mall). Participants with a true intention evaluated goal-relevant words (e.g., receipt) positively, while those with a false intention (i.e., claiming but not intending to shop at a mall) demonstrated no such positive evaluation. This finding indicates that forming a true (vs. false) intention may influence cognitive functions such as the automatic evaluation of goal-related information.

Planning

Intentions are often accompanied by some degree of planning (Harman, 1986; Malle & Knobe, 1997). Gollwitzer (1999) separates what he calls *goal intentions* (i.e., decided goals with no concrete plan) from *implementation intentions* (i.e., concrete plans of how to attain the goal). Goal intentions do not necessarily lead to action (Sheeran, 2002), but implementation intentions more likely do (Gollwitzer & Sheeran, 2006). The formation of an implementation intention, however, is unlikely without a previously existing goal intention (Sheeran, Milne, Webb, & Gollwitzer, 2005). Because false intentions lack a behavioral goal, they should be less likely than true intentions to include signs of implementation intentions (specific plans of *how* to implement them). In line with this, true intentions have been found to include more *how*-related utterances than false intentions (Granhag, Mac Giolla, Sooniste, Strömwall, & Liu-Jonsson, 2016; Kleinberg et al., 2018; Sooniste, Granhag, Strömwall, & Vrij, 2014, 2015). This indicates that participants with true intentions to a higher degree than participants with false intentions had formed implementation intentions focusing on the means of the action. Sooniste and colleagues also found that statements of false intentions included more *why*-related utterances than statements of true intentions. This

finding was explained by the fact that liars are usually more worried than truth tellers about being believed (Granhag & Hartwig, 2008), which may result in them having planned an explanatory "cover story" focused on the purpose of their actions.

Episodic Future Thoughts

Planning is often accompanied by episodic future thoughts (EFTs; Szpunar, 2010). EFTs refers to the often automatic tendency to mentally travel into the future by simulating upcoming scenarios. These mental simulations often come in the form of visual mental images (Atance & O'Neill, 2001). The experience of EFTs is an adaptive function as they aid planning and goal attainment, and they are closely related to prospective memory, the ability to remember upcoming events (Schacter et al., 2008). Research has found that prospective memories and EFTs are created from memories of past events. Although episodic memories of past actions (*re-experiences*) tend to be more detailed than prospective memories (*pre-experiences*), mental images of the future can also be vividly experienced (D'Argembeau & Van der Linden, 2006).

Intentions, since they refer to future situations, should promote EFTs. That is, because true intenders are more motivated to plan their future actions, they should also be more likely to experience EFTs. False intenders, on the other hand, are less motivated to plan and should therefore be less likely to experience EFTs. To test this claim, Knieps and colleagues (2013) conducted a series of studies to test whether the existence of mental images varied between participants with true or false intentions. In support of their hypothesis, they found that truth tellers reported having experienced more, and more vivid, mental images than liars (Granhag & Knieps, 2011; Knieps, Granhag, & Vrij, 2013a, 2013b, 2014).

Spontaneous thoughts

Future tasks have been demonstrated to provoke spontaneous thoughts (Christoff, Gordon, & Smith, 2011). These are thoughts that automatically come to mind, such as suddenly thinking about a meeting planned for the next day. These spontaneous thoughts are suggested to be adaptive, as are EFTs, as they aid in planning future goals (Baird, Smallwood, & Schooler, 2011). A true intention, because it activates a behavioral goal, should therefore provoke spontaneous thoughts. False intentions, on the other hand, should not. In three experiments, Mac Giolla, Granhag, and Ask (2017b) investigated true and false intenders' experiences of task-related spontaneous thoughts. They found that participants with a true intention reported having experienced more spontaneous thoughts related to the intention than those with a false intention.

The Need for a Unified Theory of True and False Intentions

As discussed above, previous empirical work on intentions stem from theoretically diverse positions. For example, Ask et al. (2013) approached the topic from a goal perspective, Granhag et al. (2016) and Sooniste et al. (2014) examined true and false intentions from the perspective of planning and implementation intentions, Knieps and colleagues (Granhag & Knieps, 2011; Knieps et al., 2013a, 2013b, 2014) focused on EFTs, while Mac Giolla, Granhag, et al. (2017b) investigated intentions from a spontaneous-thoughts perspective. In other words, the field is disparate and spans several theoretical approaches. Since many previous findings rely on subjective—and hence easily manipulated—measures (e.g., differences in self-reported experiences of EFTs and spontaneous thoughts), they cannot readily be used to detect deception in real-life cases.

I argue that CLT is potentially superior to previous theoretical approaches, as it could incorporate previous findings under a single parsimonious model. It could also allow for more powerful and general predictions about true and false intentions, which could eventually lead to the development of verbal content-analytical tools used to assess the veracity of statements of intentions. As outlined below, both theoretical reasons and empirical findings indicate there may be systematic differences in the cognitive construal of true and false intentions. In this thesis, I take a novel approach to the topic by investigating the mental representations and communication of true and false intentions.

Construal Level Theory

CLT was developed to systematize and explain how people mentally represent (construe) objects and actions that are not directly experienced (e.g., thoughts about future actions). Below, I expand upon the concept of *construal level* and its relation to *psychological distance*, as these are core concepts within the theory.

Construal Level of Objects and Actions

CLT revolves around the concept of construal level. Situations that are not here, now, self-related, and certain are said to be construed somewhere along a continuum from low-level, concrete construal to high-level, abstract construal (Trope & Liberman, 2003). Concrete mental construals are said to be incoherent, subordinate, goal-irrelevant, and inclusive of peripheral features and specific details that usually bind them to specific contexts. Abstract mental construals, on the other hand, are said to be coherent, superordinate, goal-relevant, and inclusive of central, general features (Trope & Liberman, 2010). In other words, they

capture the gist of things and are therefore more invariant across contexts than concrete construals. These definitions derive from basic cognitive theories of object categorization (e.g., Rosch, Mervis, Gray, Johnson, & Boyes-Braem, 1976) and action identification (Vallacher & Wegner, 2014).

In their early work, Rosch and colleagues (1976) found that people mentally structure objects in hierarchical categories. A category consists of several objects considered equivalent, and the term *level of abstraction* refers to a particular level of inclusiveness of objects within a taxonomy. For each object the *basic* level is that which carries the most information (e.g., "car"), for which there is both a superordinate, more *abstract* level (e.g., "vehicle") and subordinate, more *concrete* levels (e.g., "Volvo"). In a similar vein, Action Identification Theory focuses on how people represent actions and proposes that actions are identified either at a higher, more abstract level focused on *why* the action is performed or at a lower, more concrete level focused on *how* the action is performed (Vallacher & Wegner, 1987). According to the theory, the level at which an action is identified varies with contextual factors. For example, people usually identify actions at a higher, more abstract level, but only when they are not in a situation that promotes lower-level concrete representations. For example, when faced with an unfamiliar or schema-inconsistent task, people are likely to adopt a more concrete representation of the task (Wegner, Vallacher, Macomber, Wood, & Arps, 1984).

Measuring construal level

Mental abstraction may manifest itself in a variety of ways. The level at which something is construed may affect people's cognitive processes (e.g., visual perception) as well as behaviors (e.g., communication; Trope & Liberman, 2010). The broad spectrum of predicted consequences of abstraction has resulted in a host of outcome measures in the empirical work on the topic. Some more implicit measures derive from research on visual processing theories (Köhler, 1959); since high-level (vs. low-level) construals are consistent with global (vs. local) processing, an abstract (vs. concrete) mindset should facilitate global (vs. local) visual processing. Hence, outcome measures such as the Navon Task (Navon, 1977) and Gestalt Completion Task (Street, 1931) have been used to estimate construal level (Liberman & Förster, 2009b; Smith & Trope, 2006). Because words are more abstract than pictures (e.g., the word *dog* holds less specific information than a picture of a dog), people's ease of processing pictorial versus linguistic information has been used as an indirect estimate of construal level (Amit, Algom, & Trope, 2009; Rim et al., 2014). In line with categorization theories (Rosch et

al., 1976), a broader, more inclusive chunking of objects and actions (e.g., segmenting an event into fewer behavioral segments; Wakslak, Trope, Liberman, & Alony, 2006) has been used as a type of outcome measure. Furthermore, in line with the assumptions of action identification (Vallacher & Wegner, 1987), mental abstraction can also be measured by examining people's preferences for either abstract action descriptions (e.g., *why* one performs tasks) or concrete action descriptions (e.g., *how* one performs tasks; Liberman & Trope, 1998).

A series of more explicit consequences of mental abstraction are predicted in the CLT framework. These *downstream consequences* are expected to comprise a series of behavioral effects (Soderberg, Callahan, Kochersberger, Amit, & Ledgerwood, 2014). For example, high-level construals should be mirrored in more abstract language than low-level construals (Snefjella & Kuperman, 2015). Language abstraction within CLT has traditionally been measured using the linguistic category model (LCM) described by Semin and Fiedler (1991). It rests on the assumption that certain word classes are more concrete (e.g., action verbs such as 'to exercise') than others (e.g., adjectives such as 'being athletic'). More recently, a folk-conceptual dictionary was developed to computer-code language abstraction (Brysbaert, Warriner, & Kuperman, 2014).

People's decisions are also assumed to be affected by the level at which relevant aspects are construed. Since low-level construals are more focused on *how* to implement an action and high level construals are more focused on *why* (Vallacher & Wegner, 1987), a relative preference is expected for feasibility over desirability concerns in decision-making situations (Liberman & Trope, 1998). As a final example, construal level should affect moral judgments: high-level construals, which revolve around overarching goals rather than specific means (Liberman & Trope, 1998) should promote stronger moral concerns than low-level construals (Agerström & Björklund, 2009).

The Effect of Psychological Distance on Construal Level and Behavior

CLT explains under what circumstances people form more abstract and more concrete mental representations. It proposes a relationship between psychological distance and construal level. According to CLT, the self, the here, and the now are reference points from which situations can be more or less removed. Psychological distance refers to the subjective perception of distance, which increases when an object or event is perceived to be farther removed from these ego-centric reference points. The greater the psychological distance to something, the more abstractly it will be construed.

The CLT literature has mainly examined four dimensions of psychological distance: *Temporal* (e.g., near future/past vs. far future/past), *spatial* (e.g., geographically close vs. geographically distant), *social* (e.g., people similar to vs. dissimilar to oneself), and *hypothetical* (e.g., likely vs. unlikely events). Temporal distance was studied in the first empirical paper which proposed a link between psychological distance and construal level (Liberman & Trope, 1998). Of the four types of distance, temporal distance has been studied most (see Trope & Liberman, 2003), and provides illustrative examples of how distance can influence construal level. Imagine yourself planning to go on a trip in a year's time. At this point in time, you are likely to think about the trip in a more abstract way (considering the purpose of the trip, what you want to experience, and the memories you want to make). Your focus is on the more goal-relevant and central features. As the trip approaches in time, these thoughts will become increasingly concrete, goal-irrelevant, and more peripheral. The night before your trip you will likely have abandoned your thoughts about the abstract features (such as the purpose of your trip) for more concrete thoughts such as what bus to take to the airport or what to eat when you arrive at your destination.

Empirical findings support the theoretical reasoning that psychological distance affects construal level. In their work on temporal distance, Trope and Liberman (2003) found that events in the far future were construed more abstractly than events in the near future. For example, participants who imagined having a yard sale in a year's time grouped objects relevant for the task in larger, more inclusive groups than participants imagining the action the next day. Henderson, Fujita, Trope, and Liberman (2006) found support for a similar link between spatial distance and construal level. For example, participants chunked a behavior imagined to happen in another city into broader categories than one imagined to happen in their own city. Similarly, focusing on social distance, Liviatan, Trope, and Liberman (2008) found that participants described the actions of people similar to themselves in more means-related (concrete) terms and dissimilar peoples' actions in more ends-related (abstract) terms.

As previously mentioned, construal level is assumed to influence a series of behaviors ("downstream consequences"; Soderberg et al., 2014). In line with this, empirical studies have found that psychological distance—presumably mediated by construal level—influences behaviors in ways consistent with the predictions of CLT. Focusing on language, of particular interest for the current research, Bhatia and Walasek (2016) found that psychological distance (i.e., temporal and spatial distance) was associated with more abstract language. For example, tweets time-stamped in the farther future were phrased more abstractly than those referring to events closer in time.

Although the above examples show how different psychological distances can affect construal level and behavior, below and throughout the thesis I focus on the distance dimension of hypotheticality (i.e., the likelihood of events occurring).

Hypotheticality (Likelihood) as Psychological Distance

CLT proposes a link between the perceived likelihood of an event and its construal level very similar to the link proposed between the other three distance dimensions and construal level (Trope & Liberman, 2010). Unlikely events are said to be more psychologically distant, whereas likely events are considered psychologically proximal.

In line with CLT, there is empirical evidence for a link between likelihood and construal level. Unlikely (vs. likely) events are represented at a more abstract (vs. concrete) construal level (Wakslak et al., 2006). Also, a more abstract than concrete mindset leads to lower probability judgments (Liberman & Förster, 2009a; Wakslak & Trope, 2009). Furthermore, likelihood has been found to have downstream effects on moral judgment and preferred decisions. Todorov, Goren, and Trope (2007) found—in line with the reasoning that psychological distance increases the weight of means-related information—that participants preferred more desirable/less feasible outcomes when those outcomes were described as less probable. Also, Kahn and Björklund (2017) found that a scenario involving an immoral act was judged more harshly when described as hypothetical than when described as real. This is in line with CLT's claim that psychological distance increases reliance on values and principles.

Of particular interest is a study by Wakslak and colleagues (2006). In seven experiments, they investigated at what relative level participants construed various future tasks depending on the likelihood of them occurring. In most of their experiments, participants were informed that there was either a low likelihood (e.g., a 5% chance) or a high likelihood (e.g., a 95% chance) that they would perform some future task or experience some future event. Construal level was measured in several ways. For example, participants were asked either to group objects relevant to a future task in whatever categories seemed appropriate or to divide a video of a behavior relevant to their future task into whatever meaningful actions they felt appropriate (i.e., a segmentation task). In both cases, fewer groups and segments were considered to indicate a higher, more abstract construal level. In their seven experiments, Wakslak and colleagues found consistent support for the prediction that unlikely events would be represented at a higher, more abstract construal level than likely events.

The Four Psychological Distance Dimensions are Related

Although the different psychological distance dimensions have individual characteristics, empirical studies have shown that they are related to each other. That is, events described as taking place in a faraway place are also judged as probably happening farther away in time, to someone else, and with less certainty (Fiedler, Jung, Wänke, & Alexopoulos, 2012). Furthermore, studies using different distance perspectives demonstrate similar effects on cognition and behavior (i.e., spatial, temporal, social, *and* hypothetical distance influence category breadth; Trope & Liberman, 2010). In the most recent meta-analysis the overall effects of the four distance dimensions on construal level found were of similar size (Soderberg et al., 2014). All this has contributed to the grouping of the four distance dimensions under the umbrella term psychological distance (Liberman & Trope, 2014).

The Construal Level of Intention (CLINT) model

The need for theory in deception detection is evident; detecting deception is a difficult task (Bond & DePaulo, 2006), but sound theories can help to improve its accuracy (Granhag, Vrij, et al., 2015). In the following section, I propose a theoretical model for how true and false intentions are mentally represented and communicated that could eventually lead to improvements in deception-detection accuracy.

   Intentions, since they refer to future situations and not the present, must be represented by mental construals. Thus, CLT can be used as a theoretical framework for understanding intentions. As explained above, hypotheticality (likelihood) refers to the certainty of future events occurring and is of particular interest for discerning between true and false intentions. Experimental studies have shown that future events with a low likelihood of occurring are represented by high-level abstract construals, whereas future events with a high likelihood of occurring are represented by low-level concrete construals (Wakslak, Trope, Liberman, & Alony, 2006). Since a false intention is defined as a stated future task unaccompanied by a commitment to act, it has a low perceived likelihood of occurring.[1] Therefore, false intentions should—in theory—be represented by high-level construals. True intentions, in contrast, come with a high degree of commitment to carry out the stated intention (Malle & Knobe, 2001) and so have a high likeli-

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[1] Admittedly, a true intention can also be of low likelihood. For example, one can have a true intention to start exercising but still believe it very unlikely to happen. As operationalized here, however, true intentions should have a high subjective likelihood.

hood of occurring. Thus, true intentions should be represented by low-level construals. Since the level at which something is mentally represented is assumed to be mirrored in language use, false intentions should be phrased more abstractly than true intentions.

The current thesis tests a theoretical model which I call the Construal Level of Intention (CLINT) model (see Figure 1). This model proposes that true intentions have a higher likelihood than false intentions, which means they should be represented at a more concrete construal level. This should in turn be mirrored in language use.
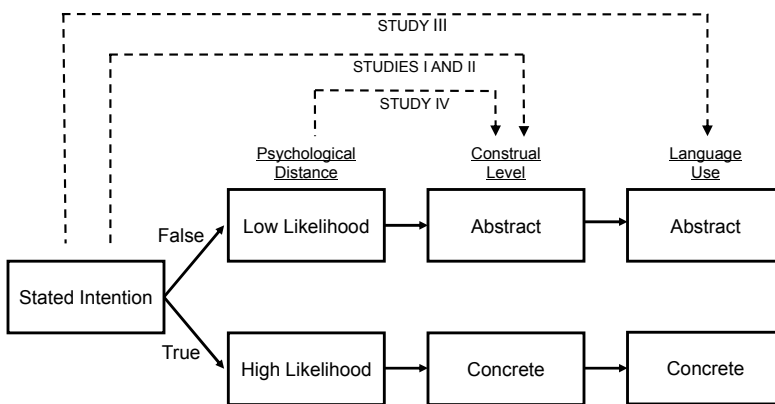

Figure 1. The construal level of intention (CLINT) model, unifying true and false intentions and construal level theory. The dashed lines show the specific relationships within the model that are predicted and tested in each of the studies in the thesis.

Indirect Support for the Model

The CLINT model, proposing systematic differences in how true and false intentions are mentally represented and communicated, can parsimoniously account for previous research findings on true and false intentions. For example, Calderon, Ask, Mac Giolla, and Granhag (2019) asked participants in an online experiment to imagine themselves trying to convince a border control officer about their purpose for entering a country. Participants were presented with a series of statements in the form of binary choice alternatives, which were either more abstract (e.g., "I'm going to spend time with an old friend"), or more concrete (e.g., "I'm going sightseeing with an old schoolmate"). The study was designed to test whether the level of suspicion, which was also manipulated, influenced the preferred level of statement abstraction. Results showed that level of suspicion did

not affect the preferred level of abstraction, but veracity did; participants preferred abstract statements more when lying than when telling the truth. It is possible to interpret this finding from a CLT perspective; it could be that liars imagine events at a higher, more abstract level of construal than truth tellers, which pushes them toward abstract descriptions.

In addition, Knieps and colleagues (Granhag & Knieps, 2011; Knieps, Granhag, & Vrij, 2013a, 2013b, 2014) showed that truth tellers were more likely than liars to experience Episodic Future Thoughts (EFTs), and to have more vivid EFTs (i.e., mental images) related to their stated intentions. The research team attributed these results to the adaptive functions of EFTs for planning and goal attainment (Szpunar, 2010). The CLINT model would provide another explanation for these results. Research on CLT demonstrates that pictures are associated with lower-level construals, while words are associated with higher-level construals (Rim et al., 2014). Truth tellers, because they were more inclined to represent the future event in concrete visual terms, that is, at a lower level of construal, were more likely to have vivid mental representations of their intentions than liars (e.g., Knieps et al., 2013a). In a study supporting this explanation, Calderon, Mac Giolla, Ask, and Granhag (2018) asked a second set of participants to judge the abstractness of hand drawings of mental images of intentions produced by participants in the Granhag and Knieps (2011) study. In line with predictions from CLT, they found that drawings of false intentions were judged to be more abstract than drawings of true intentions.

Other potential support for the CLINT model comes from Warmelink, Vrij, Mann, and Granhag (2013), who found that statements of true intentions were richer in detail than statements of false intentions. For example, statements of true intentions were more likely to contain specific temporal and spatial details than were statements of false intentions (but, see Kleinberg et al., 2018, who failed to replicate this finding). Warmelink et al. (2013) explained their finding from the perspective of prospective memory (McDaniel & Einstein, 2007): true intentions are more salient and better remembered than unintended future acts (Goschke & Kuhl, 1993; Watanabe, 2005), and this could have affected the wealth of details. However, the finding can also be readily accounted for by the CLINT model: the higher level of temporal detail could simply indicate more concrete representations of true intentions.

Further preliminary support for the CLINT model comes from the repeated finding that statements of true intentions are consist of more *how*-related utterances, whereas statements of false intentions consist of more *why*-related utterances (e.g., Sooniste et al., 2014). Instead of explaining this from a planning per-

spective, CLINT accounts for these findings based on studies showing that psychologically distant actions tend to be described in more ends-related terms (i.e., focus on *why*), and psychologically proximal actions in more means-related terms (i.e., focus on *how*; Liberman & Trope, 1998).

Psychological distance has been found to promote positive thinking in several ways. For example, psychological distance has been shown to increase positivity in affect-based evaluations (Williams, Stein, & Galguera, 2013) and improve the retrieval of arguments in favor of a position (pros) and to decrease the retrieval of counter arguments (cons; Herzog, Hansen, & Wänke, 2007). Indirect support for a similar link between positive thinking and true/false intentions comes from Granhag et al. (2016), who found that participants with true intentions were more likely than those with false intentions to state that they had prepared a 'plan B' were something to go wrong when carrying out their alleged intention. Granhag et al. explained this from a planning perspective; however, in the sense that a plan B is a form of negative thinking, the CLINT model could account for the finding in terms of differences in psychological distance.

Despite these many indications of differences in construal level between true and false intentions, no studies have systematically tested this prediction. Hence, this thesis provides the first attempts to test the influence of psychological distance, in the form of likelihood, on levels of construal and abstract language in deception detection contexts.

Aims of the Current Research

The primary aim was to investigate mental representations of true and false intentions. This novel theoretical approach to the topic of truths and lies about the future could contribute to increased understanding of the cognitive mechanisms behind statements of intentions, generate new predictions about true and false intentions, and thereby guide future empirical work in the domain.

The knowledge gained from the research in this thesis may also have important practical implications because it could reveal a novel cue to deception—linguistic abstractness. The long-term purpose of this thesis is to develop tools and techniques for deception detection. Many legal professionals make daily judgments of credibility about past actions, but also about claims about future actions. Tools such as coding manuals to analyze statements of true and false intentions could be developed if the model receives empirical support. Furthermore, knowledge gained from the current research could eventually instruct researchers how to develop interviewing strategies for suspects to elicit cues to deceit, for example, by asking questions which further magnify the differences in

linguistic abstraction between truths and lies. In addition to this long-term practical value, the thesis also adds to Construal Level Theory. To my knowledge, this is the first research program to systematically test the applicability of CLT to deception detection contexts.

Summary of Empirical Studies

The four empirical studies in this thesis were based on research showing that psychological distance influences the level of mental construal of situations not experienced in the here and now (Trope & Liberman, 2010). Specifically, they were inspired by experiments conducted by Wakslak et al. (2006) showing that unlikely (psychologically distant) future tasks are mentally represented at a more abstract level than likely (psychologically proximal) future tasks. Based on the assumption that false intentions refer to more unlikely future tasks than true intentions, it was predicted that true intentions would be more concretely represented and communicated than false intentions. In Study I, a first test of this prediction was employed by manipulating veracity and measuring construal level. In Study II, a second test of the same basic prediction was made, but a second factor—schema consistency—was also introduced to the experimental design based on the findings from Study I. In Study III, the prediction that veracity affects language abstraction in line with CLT was tested by conducting a content analysis of true and false statements of intentions. Finally, Study IV was an attempt at replicating the basic CLT finding that subjective likelihood influences construal level of future events.

Study decisions for studies III and IV were preregistered. These preregistrations, as well as the four studies' material, instructions, and data are available on the Open Science Framework (http://osf.io/f3qvm/).

A priori power calculations were conducted to estimate how many participants were needed to achieve adequate statistical power in the studies. These were based on a generally accepted level of ≥80% (Cohen, 1992) to target effect sizes found in the relevant literature, at an alpha level set to .05.

The research was carried out according to the ethical guidelines of the Swedish Research Council. Participants in the studies granted their written and informed consent. According to the Regional Ethical Board in Gothenburg, Sweden, a full ethical review was not required for the experimental setups.

Study I

Study I consisted of two experiments. In both, participants were asked either to tell the truth (communicate a true intention) or to lie (communicate a false intention) about future tasks. Construal level was measured with an online behavior

segmentation task (Exp. 1), and measures of participants' preferences for either abstract or concrete descriptions of the tasks (Exp. 2).

Method

Experiment 1

Participants in Experiment 1 ($N = 125$) were divided into one of three conditions: true intention, false intention, and control. All participants were asked to watch a short video clip of a person assembling a toy car. Before watching the clip, they were informed according to their group that they were to (1) perform the task themselves at the end of the session and tell another person that they were indeed going to assemble the car (true intention group), (2) *not* perform the task at the end of the session but tell another person that they were going to assemble the care (false intention group), or (3) simply perform the task at the end of the session (control group). Construal level was measured with a video segmentation task: participants were asked to divide the video clip into as many meaningful action units as felt natural to them by pressing the space bar on the keyboard. Newtson (1973) developed this task to measure how people perceive and organize information in more or less fine-grained units, and empirical findings suggest that the task taps into the automatic mental processing of events (Kurby & Zacks, 2008). For example, the number of video segments correlates with activation in brain regions involved in perception of movements (Speer, Swallow, & Zacks, 2003). Furthermore, Zacks, Tversky, & Iyer (2001) found that a higher number of segments was associated with the use of more specific verbs to describe each behavioral segment, suggesting a link between the number of segments and the level of mental construal. More important for the current study, the task has successfully been used as a dependent measure in other CLT studies (Henderson et al., 2006; Wakslak et al., 2006) and has resulted in medium to large effects for both spatial and hypothetical distance on the number of segments (Hedges' g = 0.52 and 1.34, respectively).

It was hypothesized that liars would segment the video clip into fewer units than truth tellers, as this would indicate a higher, more concrete construal level.

Experiment 2

In Experiment 2 ($N = 59$), participants were introduced to a series of eight simple tasks, half of which they were to perform (i.e., true intentions) and half of which they were not (i.e., false intentions). The tasks could all be performed in the laboratory (e.g., attaching a poster to a wall, playing some keys on a piano, wiping a table with a cloth), and participants were introduced to the tasks by short video

clips.[2] After having watched a video clip (but before performing the task in the true intention group), the two dependent variables were collected. First, participants were asked to describe their intention to perform the task (i.e., true and false statements of intention were elicited). Second, they were asked to answer binary forced-choice questions with abstract and concrete descriptions of the tasks. For example, the piano task had the choice alternatives of "press keys" (concrete) and "make music" (abstract). The two dependent measures were (1) the coded level of abstraction of participants' own descriptions of the tasks and (2) the relative preference for abstract or concrete descriptions of the tasks in the forced-choice question (this was an amended version of a measure previously used by Wakslak et al., 2006, and others). It was hypothesized that liars would prefer abstract descriptions more than truth tellers on both these measures.

Results and Discussion

The results did not support the hypotheses. In Experiment 1, liars did not segment the video clip into fewer behavioral units than truth tellers; neither, in Experiment 2, did liars prefer more general descriptions than truth tellers on either of the two measures. From these results, Study I lends no support to the prediction that true and false intentions should be mentally represented at different levels of construal. The results instead indicate that there are no substantial differences in the level of mental representation, at least not in the current context.

One potential reason for the null effect is that the tasks in the study were rather simple and schema consistent, which may have resulted in abstract representations across all experimental conditions. Had the tasks been more schema inconsistent, however, there are theoretical reasons to believe that those with true intentions would have benefited from more concrete construal since it may aid in goal attainment when tasks are disruptive (i.e., schema inconsistent; Vallacher & Wegner, 1987). This assumption was tested in Study II.

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[2] Videos were selected based on three pilot tests. First, participants (N = 30) saw 17 videos and provided free descriptions (maximum five words) of the task. Answers were assessed to find the *basic level* descriptions (i.e., the most commonly occurring descriptions), with reference to which both a higher-level description and a lower-level description were constructed. Second, 12 of the initial 17 videos were chosen and introduced to a new set of participants (N = 37), who indicated which of the two alternative descriptions best represented the task depicted in each video. Two of these 12 videos were excluded due to unequal distribution of answers between the two alternative descriptions, and changes were made to some of the remaining binary choice-alternatives to attain similar proportions. Finally, the remaining 10 videos were introduced to a new set of participants (N = 27). The eight final videos selected had relatively equal proportions of answers on higher- vs. lower-level descriptions: The most unequal distribution was 35% (concrete) to 65% (abstract) of the answers, and the most equal distribution was 49% (abstract) to 51% (concrete).

Study II

Method

As a consequence of the null findings in Study I, a new factor was added to the design in Study I—schema consistency. Half the participants were asked to plan to go to an office to gather some objects in a bag to hand over to a colleague. The other half were instructed to plan to go to the same office, but their mission was instead to leave a secret note there. Participants in the latter group were also told that they might be stopped and asked what they intended to do in the office. They were instructed to say, if they were questioned, that they were going to gather some office supplies to hand over to a colleague (i.e., to offer a cover story thematically similar to the other group's true intention). Schema consistency was manipulated so that half of the participants were asked to gather, or lie about gathering, office supplies from the office (schema-consistent task). The other half were asked to gather, or lie about gathering, random objects not typically found in an office (schema-inconsistent task). Construal levels were measured by asking participants to group the objects into whatever categories they felt appropriate. Participants with a false intention were predicted to make broader categorizations (group the objects into fewer groups) than those with true intentions, as this would indicate a more abstract mental representation (see Wakslak et al., 2006, Exp. 1, for an example of how object categorization tasks have traditionally been used in CLT studies). In line with action identification theory proposing that concrete construal is beneficial to task implementation only when tasks are disruptive (e.g., schema inconsistent, Vallacher & Wegner, 1987), this difference was predicted to be larger in the schema-inconsistent task condition.

Results and Discussion

The results did not support the hypothesis. More specifically, there was no interaction effect between veracity and schema consistency such that false intentions were more abstractly construed than true intentions, particularly when the task was schema inconsistent. This indicates that true and false intentions are construed at similar levels of abstraction, even when the future task is schema inconsistent. In line with Study I, this further speaks against the predicted link between likelihood and construal level.

A limitation of the manipulation of schema consistency in Study II should be noted. Previous studies testing action identification theory typically focused on manipulating the disruptiveness of the specific task at hand (e.g., asking partici-

pants to eat Cheetos either with their hands as usual or with chop-sticks, Vallacher et al., 1987). The operationalization in Study II deviated slightly from this as I varied the typicality of the context of the task instead of the task itself. This may not necessarily make it more difficult for the person to rely on a mental script. To illustrate, it might be as schema consistent to imagine picking fluorescent mushrooms on Mars as to picture picking chanterelles in the forest. The core task of picking mushrooms should be the same.[3] In hindsight, it might have been better to vary more carefully the extent to which the task itself was disrupted—for example, by asking participants not to pick up the objects with their hands—as this would have been more in line with the already established operationalization of task disruptiveness.

Meta-Analysis Across Studies I and II

A cross-experimental meta-analysis was conducted based on the three experiments in Studies I and II to get a more reliable estimate of the true size of the effect of veracity on construal level. From Study I, Experiment 1, the data for the true and false intention conditions were used (the between-groups dependent measure was number of behavioral segments). From Study I, Experiment 2, the weighted average within-subjects data from the two dependent measures (preference for abstract/concrete description and codings of participants' own descriptions). From Study II, the between-groups data of participants' true and false intentions were used (dependent measure was number of object categories); since schema consistency was also manipulated, two separate effect size estimates were used, one for the aschematic task conditions (Experiment 1a) and one for the schematic task conditions (Experiment 1b). The meta-analysis was conducted using the statistics program R with the 'metafor' package (Viechtbauer, 2010).[4] Using a random effects model, the analysis revealed an overall effect size of Hedges' g = 0.02, 95% CI [−0.14, 0.18] with positive values indicating an effect in the predicted direction (see Figure 2). The narrow confidence intervals around this effect further supports the conclusion that there is no meaningful effect of veracity on construal level as conceptualized in the experimental studies of this thesis. This effect size can be compared to the much larger effect found in the most recent meta-analysis on the effect of psychological distance on construal level (Hedges' g = 0.475; Soderberg et al., 2014).

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[3] Thanks to external reviewer Professor Fredrik Björklund for providing this illustrative example.
[4] Effect size and variance were computed for each experiment using formulas recommended by Borenstein and Cooper (2009).

Study 1: Exp. 1	0.04 [-0.32, 0.40]
Study 1: Exp. 2	0.02 [-0.20, 0.24]
Study 2: Exp. 1a	-0.18 [-0.63, 0.26]
Study 2: Exp. 1b	0.20 [-0.25, 0.64]
Random-effects model	0.02 [-0.14, 0.18]

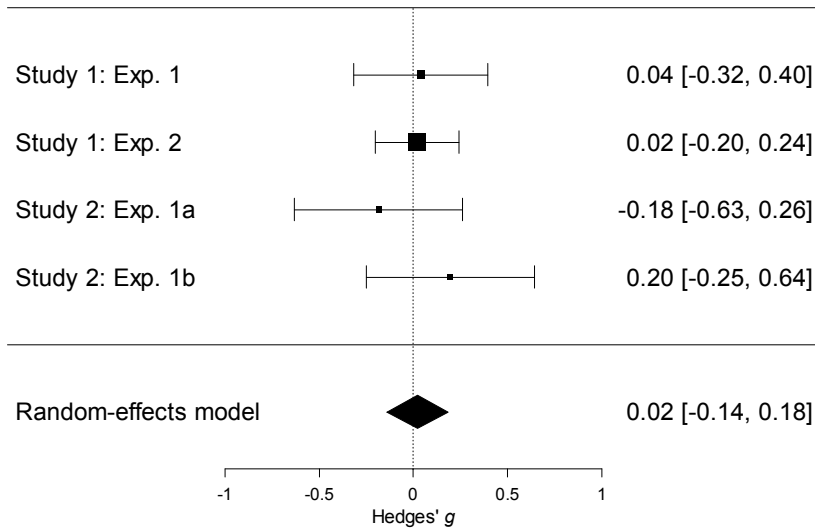-1   -0.5   0   0.5   1

Hedges' g

Figure 2. Forest plot of cross-experimental meta-analysis showing a minimal non-significant average effect of veracity on construal level (positive values indicate effects in the predicted direction).

Study III

CLT proposes that variation in subjective likelihood not only influences mental abstraction, but also has downstream effects on behavior (Trope & Liberman, 2010). For example, psychological distance has been found to influence the level of abstraction in language (Bhatia & Walasek, 2016). The aim of Study III was to examine the effect of veracity of future intentions on level of abstraction in language use. This was done by conducting a mega-analysis on statements of true and false intentions collected in previous experimental studies on the topic. Language concreteness was estimated using two different automated measures: (1) a folk-concreteness measure (Snefjella & Kuperman, 2015) and (2) the LCM (Seih, Beier, & Pennebaker, 2017).

In line with CLT, it was predicted that true statements of intentions would be expressed more concretely than statements of false intentions (H1). Based on deception research showing that truth tellers tend to provide longer and more detailed accounts than liars (Mac Giolla & Granhag, 2015), and to cancel out the possibility of length driving the effect on abstraction, it was also predicted that length would moderate this effect and a greater difference in concreteness would be found in longer statements (H2). In addition, it was predicted that questions

eliciting greater variation in scores of concreteness would elicit greater differences between truth tellers and liars (H3). This hypothesis was meant to ensure that questions that might elicit low variability in concreteness scores (e.g., directed questions such as "What time are you traveling today?") would not dilute the predicted effect of H1. Finally, to see whether some interview questions produce greater differences between true and false statements of intentions we conducted an exploratory examination on the effect of veracity on the concreteness scores for each question.

Method

Transcripts of statements of true and false intentions from six previous experimental studies were collected ($N = 528$). Each study included between 4 and 25 individual questions—90 unique questions overall. For example, participants in the previous studies had been asked to describe their whole intention, the time and place for their plans, and the purpose of their plans.

To account for random effects of participants, studies, and questions, a mixed-effects approach was used to analyze the questions. The transcripts were organized in a single document and tagged with veracity condition, study name, participant ID, question ID, and question label. The dependent variable was computed based on the raw statements, with each participants' answers given two scores of concreteness: (1) a folk-concreteness score (range: 1.43-4.96) and (2) an LCM score (range: 1–5). Answers ranged in length from 1 to 1,416 words ($M = 32.6$, $Mdn = 18.0$). There were 6,104 observations in total: 3,005 true statements and 3,106 false statements.

Results and Discussion

The results did not support the hypotheses. Veracity did not significantly predict participants' folk-concreteness scores or LCM scores (no support for H1). In fact, the raw mean difference between statements of true intentions and statements of false intentions were –0.04 (95% CI [–0.07, –0.01]; negative values are in the predicted direction) for the folk-concreteness measure and 0.02 (95% CI [–0.02, 0.06]; positive values are in the predicted direction) for the LCM scores. In addition, statement length did not moderate the difference in concreteness (no support for H2), and more variability in concreteness scores was not associated with larger differences in concreteness scores between truth tellers and liars (no support for H3). Also, an exploratory forest plot over effect sizes further strengthened the null findings; effect sizes for each interview question were evenly dis-

tributed around zero, and only seven of the ninety effects were statistically significant in the predicted direction, whereas one was in the opposite direction. This implies that there is no systemiatic pattern in the effects related to specific questions.

Study IV

Studies I, II, and III all relied on the basic CLT assumption that low likelihood future events are construed at a higher level than high likelihood future events (Wakslak et al., 2006). A possible explanation for the consistent null findings is that the CLT assumption is not applicable to deception contexts. That is, there may be a boundary condition to the scope of the theory. Another explanation, however, is that the finding that subjective likelihood influences the construal level of future events is unreliable. There are several reasons to believe that the latter is true. First, relatively few experiments have tested the assumption. In fact, although it includes six experiments, only one study on the topic (Wakslak et al., 2006) has been published. Second, the experiments in that study were based on small sample sizes (20 to 95 participants, $M = 42.1$, $Mdn = 34$). Third, despite such small samples, the authors consistently found statistically significant effects of medium to very large sizes (i.e., Hedges' g between 0.39 and 1.34). Considering the current null findings, there is reason to doubt the robustness of the previous finding. Based on this, close replications of two of the experiments in the Wakslak et al. (2006) paper were conducted. The subjective likelihood of future actions was manipulated and construal level measured. More specifically, participants were told there was either a 5% or a 95% chance that they would later perform the tasks.[5]

Method

Experiment 1

The first experiment was a replication of Experiment 4 from Wakslak et al. (2006). Participants ($N = 115$) were seated in front of a computer where they received written instructions. Specifically, they were told that the experiment had

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[5] The study decisions were preregistered by formally implementing the "replication recipe" (Brandt et al., 2014) with an integrated template on the Open Science Framework (https://osf.io/5x8dp/). The replication recipe suggests a number of criteria to be met for a study to be considered a close replication, specifying the extent to which the study properties are exact, close, or different from the original study in terms of geographic location, instructions, stimuli, and procedure. The two current replication studies are as similar as possible to the original studies based on the specified criteria. The major differences were time (2006 vs. 2018) and location (USA vs. Sweden) of data collection.

two parts. The first part involved watching a video clip of a woman performing the second part of the experiments. Participants were told there was either a high likelihood (95%) or a low likelihood (5%) that they would be asked to perform the second part of the experiment. They were also asked to perform a task while watching the video clip. Specifically, they were asked to segment the clip into whatever meaningful action units felt natural by pressing a button on the keyboard each time a meaningful action unit ended and another one began.

The video was around 5 minutes long and depicted a woman folding papers, drawing geometrical shapes on them, and counting the shapes. The number of segments was the dependent variable, with fewer segments indicating more abstract construal (more inclusive action segments).

Experiment 2

The second experiment was a replication of Experiment 5 from Wakslak et al. (2006). Participants ($N = 120$) were recruited ostensibly for a study of visual perception. They were given a booklet with written instructions in which they were told that they were going to perform one of two tests: The Snowy Pictures Test (SPT) or the Gestalt Completion Test (GCT; Ekstrom, 1976). Both tests measure the ability to abstract visual information in order to identify a hidden object. As a cover story, participants were told that a previous study in the same project needed some more participants, and therefore there was a small chance that they would be asked to complete another test. Half the participants were told that there was a 95% chance that they would perform the SPT, and the other half that there was a 95% chance that they were going to perform the GCT.

Before performing what they believed to be the main test, participants were given the opportunity to practice both tests with paper and pencil. This practice round was in fact conducted to collect the dependent measures. Performances on the SPT and GCT were calculated as the number of correctly identified objects on each test; a better performance on the tests (i.e., a better abstraction ability) is indicative of a high-level construal.

Results and Discussion

Both replication attempts were unsuccessful. In Experiment 1, participants in the low likelihood condition did not segment the video clip into fewer segments than those in the high likelihood condition. Instead, the trend of the data was in the opposite direction to that in the original study, $d = -0.19$, 95% CI [-0.56, 0.18]. In addition, the number of correctly classified objects in Experiment 2 did not vary as a function of likelihood: The differences between likelihood conditions were $d = -0.10$, 95% CI [-0.46, 0.26] for the SPT and $d = 0.05$, 95% CI [-0.31, 0.41] for

the GCT. A funnel plot including the current replications and the previous relevant studies examining the effect of perceived likelihood on construal level shows a worrying trend (see Figure 3). The smaller the standard error (i.e., the larger the sample size), the smaller the effect size. In other words, effect size seems to decrease with precision in the estimate. A trim and fill can be used to estimate the number of missing studies in a meta-analysis and calculate an adjusted overall effect size estimate (Duval & Tweedie, 2000). In the current funnel plot, a trim and fill analysis showed that an estimated four studies are missing on the left side of the overall estimated effect size, resulting in an adjusted estimated effect size of Hedges' g = 0.25, 95% CI [−0.00, 0.52]. Taken together, this indicates that the influence of the subjective likelihood of future events on construal level is unreliable or at least not as strong as previously thought.
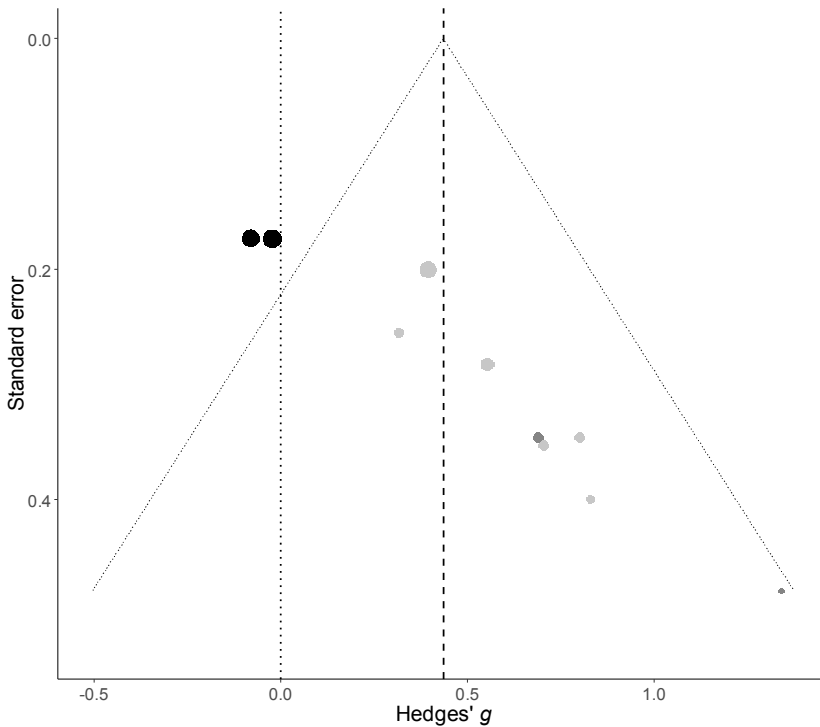

Figure 3. Funnel plot of the relationship between effect size found in experiments examining the effect of likelihood on construal level (X-axis) and the standard error of the study (Y-axis). The dashed vertical line represents the new, smaller overall meta-analytic estimate after adding the two replication studies to the previous eight studies, Hedges' g = 0.44, 95% CI [0.18, 0.70]. The dotted line is the point null effect. The black dots represent the current replication studies, the dark gray dots represent the original studies that were replicated, and the light gray dots represent the remaining studies on the topic. Sample size is indicated by the size of the dots (the larger the dot, the larger the sample size).

General Discussion

This thesis tested the proposed CLINT model. It posited that false (vs. true) intentions, since referring to unlikely (vs. likely) future events, should be more abstractly (vs. concretely) mentally represented. It further suggests that this discrepancy should be mirrored in language use, such that false statements of intentions are more abstractly phrased than true intentions. These predictions were based on CLT (Trope & Liberman, 2010) and specific research on the effect of subjective likelihood on construal level (Wakslak et al., 2006).

The four empirical studies rendered no empirical support for the CLINT model. Below, I start by discussing the null findings and the contributions they make to the field of true and false intentions. Second, I discuss issues pertaining to CLT, specifically the proposition that lower subjective likelihood increases construal level. Finally, I discuss methodological considerations and limitations related to the thesis and propose research topics I believe should receive further attention.

The Mental Representation and Communication of True and False Intentions

The studies in this thesis do not provide any support for the prediction that false intentions will be more abstractly construed than true intentions. This prediction was tested in Studies I and II, in which construal level of true and false intentions were assessed using traditional CLT measures such as object categorization, action segmentation, and preference for *how* versus *why* descriptions of actions—measures stemming from basic cognitive theories of categorization (Rosch et al., 1976) and action identification (Vallacher & Wegner, 1987). Veracity manipulations rendered only non-significant effects on all outcome measures over the three experiments. In fact, an internal meta-analysis revealed a minimal overall effect size of Hedges' $g = 0.02$.

Furthermore, no support was provided for the prediction that false statements of intentions are more abstractly phrased than true statements of intentions. There were no differences in linguistic abstraction between true and false statements of intentions. In Study III, statements of true and false intentions were analyzed for linguistic abstractness using an automated approach and two different measures. Veracity did not predict the statements' levels of abstraction. Taken

together, the current tests indicate that true and false intentions seem to be mentally construed and communicated at similar, not different, levels of abstraction.

It should be noted that other related work does provide some indirect support for the CLINT model. Calderon et al. (2018) found that drawings of false intentions gave a more abstract impression than drawings of true intentions—a finding possibly due to varying levels of mental construal. A possible explanation for the conflicting results is that drawings of mental images may, at least in some cases, be better at capturing construal level differences than traditional CLT measures. Memory research which found that people have a better recall for pictures than words (Mulligan, 2014) supports this reasoning; people may be better at bringing mental images to mind and depicting them in drawings than, for example, grouping words into categories (Liberman, Sagristano, & Trope, 2002; Exp. 1). As far as I know, no other study has used abstractness in drawings to estimate construal level, making this explanation highly speculative. The measure would need to be tested in a more basic CLT setting before being relied upon in an applied setting such as the deception context.

The fact that no empirical support was given to the CLINT model in the four systematic tests of the model presented in this thesis, however, calls for other potential explanations of the drawing finding in Calderon et al. (2018). First, as outlined in the Introduction, the finding could be understood from research on Episodic Future Thoughts (EFTs). That is, having a true intention means having a commitment to perform a future action. Such a behavioral goal is often accompanied by some degree of planning (Harman, 1986), which in turn often gives rise to EFTs (Szpunar, 2010)—mental time travel to the future usually involving forming mental images of anticipated scenes (Atance & O'Neill, 2001). People with false intentions, because they do not have a behavioral goal, should lack the above cognitive operations and behaviors. Hence, mental images should exist less often, and be less vivid, in cases of false intentions.

A second explanation for the Calderon et al. (2018) finding is that those with false intentions strategically drew their intention abstractly in order not to reveal concrete, verifiable details about their false account. This would be in line with the previous finding from the verifiability approach to deception detection that showed that false statements of intention include fewer verifiable details than true statements of intentions (Jupe et al., 2017). Since drawn details are even more concrete than verbal details, communicative strategies aimed to be unverifiable and abstract could be even more pronounced in a drawing-based setting than in spoken interviews. For example, a drawing of talking to someone at a cafeteria will likely reveal more concrete details (e.g., the specific place of the conversation, their seating arrangement) than the comment "We were talking in the

cafeteria." Because liars will be aware of this risk, they might choose to draw more abstractly.

Other work from Calderon et al. (2019) also provides contradictory results to the current findings, specifically the null effect on language use in Study III. They found that participants who imagined talking to a border control officer preferred abstract statements more when they were lying than when they were telling the truth. This could be explained at least two ways. First, from a CLT perspective, it could be an effect of varying levels of construal being mirrored in the language. A second explanation is that people have an intuitive feeling for what is the most suitable level of abstraction when communicating truthful or deceptive intentions (i.e., a form of conversational norm). Either way, the 2019 finding contradicts the findings of Study III. The two studies, however, differ in several ways. First, they used different ways of manipulating veracity: Calderon and colleagues (2019) asked participants to imagine lying or telling the truth at a border checkpoint, while the statements analyzed in the current Study III were actual lies and truths produced in various interview settings (e.g., in the lab, at an airport). Second, the measures of abstractness were highly different. Whereas Calderon et al. (2019) constructed extreme alternatives in either abstract or concrete terms—specifically formulated to make sure that they were at distinctly different levels of abstractness—in Study III, participants' own answers to interview questions were analyzed. Perhaps the more extreme alternatives in the Calderon et al. study captured the slight preference for one over the other. In terms of natural language use, however, differences may not exist. That is, even though they may prefer abstractness or concreteness when given a choice, people may be less able to control their level of abstraction in spoken language.

Theoretical Implications for the Fields of True and False Intentions and Deception Detection

I suggested in the Introduction that the CLINT model, provided it received empirical support, could explain several previous findings from the literature on true and false intentions. These findings were related to the experience and vividness of mental images (Knieps et al., 2014), abstractness of drawings (Calderon et al., 2018), *why-* and *how-*related utterances (Sooniste et al., 2014), and the richness of details in statements (Warmelink et al., 2013). The CLINT model would have provided a more parsimonious explanation for these findings than previous explanations. In light of the absence of empirical support for the model, however, the previous explanations for the findings are more likely at present. As outlined above, research on planning, and specifically research on EFTs, can incorporate both the mental images finding and the drawing finding. In addition, research on

prospective memory could explain why truth tellers' statements are richer in detail, as genuinely intended future actions are better remembered than unintended ones (Goschke & Kuhl, 1993). Furthermore, differences in *how* and *why* utterances may be understood from research on planning behavior. Specifically, implementation intentions (i.e., *how* to implement an action) may be more frequent in statements of true intentions due to the greater planning involved (Gollwitzer, 1999). In sum, based on the current body of empirical findings, a goal-activation framework provides a likely theoretical explanation for many previous findings (for a review of the goal-activation framework, see Mac Giolla, Granhag, & Ask, 2017a).

In addition to contributing to understanding the specific cases of true and false intentions, the current results add to the larger field of deception detection. Previous research has found that cues to deception are weak (DePaulo et al., 2003). The current null difference in abstractness between liars' and truth tellers' mental representations and language use strengthens this general finding. Also, theory-driven approaches to developing deception-detection tools have been highlighted by experts in the field (Granhag, Vrij, et al., 2015). Here, CLT prompted the idea of using linguistic abstraction to detect deception. The current null findings suggest that CLT may not be a good theoretical framework for deception-detection research, at least not as specified in the CLINT model.

Practical Implications

For the time being, I recommend that linguistic abstractness not be used as a deception-detection tool. A core aspect of evidence-based practice is taking a real-world problem and testing it through scientific experimentation and analysis (Satterfield et al., 2009). When there is enough scientific evidence and consensus about the problem at hand, this knowledge can be translated into practice. The theoretical CLINT model, which has the potential to advance legal practice, currently has no direct empirical support. Based on this, it would be premature to use CLT as a basis for moving in a practical direction to develop tools to detect deceit.

A related finding suggests that abstractness in drawings is a potential cue for future use in deception detection purposes. Calderon et al. (2018) found that drawings of false intentions gave a more abstract impression than those of true intentions. In line with the reasoning above, however, more evidence is needed before relying on it as a diagnostic cue. Furthermore, the underlying mechanism for the differences in the Calderon et al. (2018) study is not yet established. This needs to be done before translating the laboratory finding into practice.

Likelihood as Psychological Distance

The overall null findings of the thesis are at odds with previous CLT findings. The current findings indicate that perceived likelihood may not have the reliable influence on construal level previously suggested (Wakslak et al., 2006). The two failed replication experiments (Study IV) provide direct support for this claim. Also, the overall null findings from the studies applying that basic assumption about true and false intentions render cumulative support for its unreliability. Notably, all four empirical studies resulted in null findings over multiple dependent variables (e.g., language use, object categorization, video segmentation, visual perception), manipulations (true vs. false intention manipulation, 5% vs. 95% probability of performing a future action), and contexts (traditional CLT situations vs. deception). This, at the very least, suggests that subjective likelihood is not very robust over different methodologies and contexts.

It should, however, be noted that some previous findings from the CLT literature suggest that likelihood *is* related to abstraction. First, Wakslak and Trope (2009) found that participants who were primed with an abstract mindset made lower likelihood judgments on subsequent tasks than those primed with a concrete mindset. That is, they found support for an effect in the reversed causal direction than that tested here. This suggests that even if the Wakslak et al. (2006) finding is unreliable, there may be an association between likelihood and abstraction. Second, subjective likelihood seems to share a common meaning with the other, more extensively researched, dimensions (temporal, spatial, social) of psychological distance. The large body of empirical evidence of an effect of psychological distance on construal level (Soderberg et al., 2014), coupled with the fact that different distances are correlated with each other (Fiedler et al., 2012), further suggests a link between likelihood and construal level.

Theoretical Implications

I argue that the current findings, in particular the failed replications, make an important theoretical contribution to the literature on CLT. Specifically, they cast doubt on the proposed effect of likelihood on construal level. The implications of these findings depend on the extent of the problem. A first possibility is that likelihood has a true effect on construal level, but it is not as large as previously suggested. The funnel plot produced in Study IV revealed that effect sizes from all relevant studies to date decline as a function of increased statistical power. This trend could indicate a previously overestimated effect size. Inflated effect sizes could have a negative influence on future studies; they could increase the risk of underpowered studies due to powering for too large an effect size, leaving studies

less likely to detect a true effect (Button et al., 2013). This would call for caution in relying on the overall meta-analytical estimate (Hedges' $g = 0.44$).

A second, more severe, possibility is that likelihood does not have a reliable influence on construal level. The fact that two high-powered replication experiments produced non-significant effects supports this possibility. If so, it would mean that the likelihood dimension should not be considered one of four distance dimensions in the concept of psychological distance, but rather that it should be removed from the theoretical framework. It is too early to draw these conclusions based on the current investigation, but future studies could further examine the reliability of the likelihood-as-psychological-distance assumption.

Methodological Considerations and Limitations

Outcome Measures

CLT predicts a host of different consequences of mental abstraction. Hence, construal level was measured with a series of dependent measures: behavior segmentation tasks (Study I, Experiment 1; Study IV, Experiment 1), preference for level of abstractness in binary choice alternatives (Study I, Experiment 2), an object categorization task (Study II), two different language abstraction measures (Study III), and a visual perception task (Study IV, Experiment 2). This set of dependent variables are diverse as they represent both perceptual and conceptual measures and also measure more explicit behavior (abstractness in language use). The fact that the results are consistent over several types of dependent measures corroborates the current null findings. It should be mentioned that previous studies found differences in line with CLT using other measures, such as ease of processing pictorial versus verbal information (Amit et al., 2009) and level of creativity in decisions (Polman & Emich, 2011). Hence, while the current studies investigated several possible outcomes, they are not exhaustive. There is a possibility that differences exist in construal level between true and false intentions in other forms than those measured in the current studies.

In addition, there are some problematic issues related to the LCM used to analyze statements of true and false intentions in Study III. First, the coding manual was developed for the specific case of behavioral descriptions (Semin & Fiedler, 1991). The manual relies on the assumption that certain word classes are more abstract than others (e.g., the specific behavior 'to exercise' is more concrete than the dispositional trait of 'being athletic'). The texts analyzed in Study III were not limited to descriptions of behaviors, but also included descriptions of events and objects. Because of this, LCM may not be an appropriate tool in this context. It

should be noted, however, that the automated LCM has been successful in un-covering differences in language use in line with CLT in texts that are not limited to descriptions of behaviors (Seih et al., 2017).

Second, there is recent indication that the automated version of LCM devel-oped by Seih et al. (2017) does not reliably measure language abstraction. More specifically, the exploratory analysis in Study III revealed that folk-concreteness scores and LCM scores did not correlate (r = 0.025). This indicates that one or both of the codings does not measure what they set out to measure or do so unre-liably. To follow up on this, colleagues and I coded large bodies of texts that are intuitively highly abstract (e.g., philosophical texts) and highly concrete (e.g., home repair tutorials). Whereas the folk-concreteness measure distinguished be-tween the two types of texts, effects for the automated LCM were much smaller (e.g., Cohen's ds of 10.59 and 0.60, respectively). This does not bode well for the automated LCM[6], but strengthens the validity of the folk-concreteness measure used in Study III. We describe the validation of the two measures outlined above in more detail in a recent blog-post (Puddle-Ducks, 2019).

There are several general benefits of automated text analysis. It is an easy, quick, and cheaper alternative to human coding, which makes it possible to code volumes of data that would otherwise be impossible. This may explain why it is increasingly popular to use automated language coding in psychological re-search, with examples from the literature on personality and individual differ-ences (e.g., Pennebaker & King, 1999), emotion (e.g., Cohn, Mehl, & Penne-baker, 2004), and political attitudes (e.g., Graham, Haidt, & Nosek, 2009). There are, however, some inherent disadvantages to using predefined sets of words, so-called user-defined dictionaries (UDD; Iliev, Dehghani, & Sagi, 2015), which are assumed to reflect a particular psychological concept of interest. For example, UDDs ignore the context in which a word occurs. This means, for instance, that they are blind to whether or not a statement refers to the communicator's own experience or to the actions of someone else. Since I rely on the assumption that the communicator's level of construal of their intentions is mirrored in their lan-guage, this poses a threat to measurement reliability (i.e., it may introduce noise in the data which could dilute a true effect).

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[6] One potential issue with the Seih et al. (2017) formula for calculating an abstractness score is that nouns are weighted as the most abstract word category, even though nouns are often highly concrete (e.g., balloon). By simply removing the noun category from the formula, the revised LCM scoring per-formed better, with similar effect sizes to using the folk-concreteness dictionary (Puddle-Ducks, 2019).

Power, Precision, and Effect Sizes

I have argued that the current null findings have important practical and theoretical implications. For example, linguistic abstractness should currently not be used as a tool for detecting deceptive intentions. Also, there are indications that the likelihood–construal-level assumption may not hold true. Since null findings could indicate a true effect in the population was missed due to small samples, I want to address some issues pertaining to the strength of the statistical analyses (i.e., power). First, Study III mega-analyzed a large amount of data—over 6,000 statements from over 500 participants—and is therefore not limited by power issues. Instead, the narrow confidence intervals around the non-significant effect size estimate of veracity on concreteness scores shows the high precision of this null finding. Second, the replication experiments in Study IV were powered to detect effects as large as the lower limit of the CI of the original effect as a targeted effect size when calculating sample size. Since the original studies found very large effects, the lower CIs were also quite large. For one of the replications, this means that the study was underpowered for detecting a small effect. This could have been a problem if a trend was detected in the data in line with the original study. Instead, however, the non-significant effect in this replication experiment was in the opposite direction to that in the original study. Also, it should be mentioned that both replications easily satisfy the recommended *small telescopes* approach for deciding sample sizes for replication studies (i.e., using a sample size 2.5 × the original; Simonsohn, 2015).

Furthermore, all but one of the statistical tests in Studies I and II were sufficiently powered to detect the overall effect size of psychological distance on construal level found in the literature (Hedges' g = 0.475) according to a generally accepted level of power (≥80%; Cohen, 1992). These studies all investigated the predicted effect of veracity on construal level. One potentially problematic issue, however, relates to Experiment 1 in Study I. The experiment was underpowered, with 68% statistical power to find the overall effect of psychological distance on construal level. This is well below the generally accepted level of power, and means a 32% risk of failing to detect a true effect. Despite this power issue, it is important to look at the overall pattern of the complete set of studies to make an informed assessment. The accumulated evidence in favor of an effect of veracity on construal level is represented by a tiny cross-experimental meta-analytical effect size estimate (Hedges' g = 0.02) with narrow confidence intervals. This indicates that if there is any effect, it is likely very small. Moreover, with the findings from the other studies of the thesis in mind, this potential effect might have limited value in relation to the overall findings. First, since the replications suggest

that psychological distance does not have a reliable influence on level of construal, this effect (if it exists) is probably driven by some mechanism other than psychological distance. Second, since no downstream consequences were observed on truthful and deceptive communications, a potential effect is probably not large enough to be of practical value in deception-detection research.

Realism and Motivation

The unrealistic nature of the study settings may have diluted any true effects. The proposed underlying mechanism for all predicted effects in the current thesis is differences in construal level. Since the CLT framework takes a functional approach to the phenomenon of mental abstraction, differences in construal level might be less likely in some situations. An example of the adaptive functions of shifting construal level has to do with goal pursuit. People generally prefer more abstract construal (i.e., thinking about the overarching meaning of things and seeing the big picture), but situational constraints, such as the difficulty of a task, may push people to adopt a lower level, concrete construal because it is more functional for goal attainment (Vallacher & Wegner, 1987). That is, low-level construal may provide a person with the details necessary to successfully carrying out the task. In the current laboratory context, this functional assumption forms a potential threat to ecological validity. For example, participants in low likelihood and truthful conditions may have been less concerned about successful goal attainment than they would have been in a real-life situation. The simple tasks (e.g., putting up a poster on a wall; Study I, Experiment 2) or role-playing missions (e.g., gathering objects from an office to give to an unknown person; Study II) asked of a study participant are very different from the more important goals of real life. This lack of importance may have diluted the differences between truth telling/high likelihood and lying/low likelihood conditions, causing participants to construe all the test events at similar levels.

Meanwhile, some of the data in Study IV were collected in a more realistic setting. For example, participants were interviewed about their actual travel plans at an airport. If realism were the main issue, and the assumptions of the CLINT model were true in more realistic settings, these studies should have rendered differences in language between truth tellers and liars. In addition, the fact that a great many previous CLT studies have found effects of psychological distance manipulations on construal level in laboratory settings (Soderberg et al., 2014) suggests that lack of realism does not reduce the chance of finding effects under these circumstances. Also, manipulation checks in Studies I and II revealed that participants with true intentions were more likely than those with

false intentions to report that they believed they would perform the actions.[7] This indicates that participants believed the instructions and took their missions seriously despite the laboratory setting.

Future Research

A suggested line of future research is to advance the finding that drawings of false intentions gave a more abstract impression than drawings of true intentions (Calderon et al., 2018). One possibility is to further the finding by combining it with the verifiability approach. Since liars may avoid mentioning verifiable details in their verbal accounts (Nahari et al., 2012), this should hold true in drawing-based approaches. In fact, the approach may be even more effective in studies using drawings, since drawn details should be even more concrete and verifiable than verbalized details.

Another interesting line of research would be to test whether humans are better than computers at estimating the level of abstractness of a description. If so, this could be of interest in how we should, or should not, measure the level of abstraction in texts and drawings. There are a couple of reasons to believe that people are currently superior at this task. First, the results from the Calderon et al. (2018) paper on the judged abstractness of drawings of true and false intentions and the null findings of Study III (mega-analysis of linguistic abstractness of true and false intentions) are contradictory. In the Calderon et al. (2018) study, participants' ratings, based on only brief descriptions of what constitutes abstract and concrete according to psychological theory, revealed differences in line with the predictions. Meanwhile, the automated language analysis in Study III rendered no differences in line with the theory. Second, computers may have inherent difficulties in coding language. While parts of language (e.g., single words) can be very concrete, a full sentence containing those words can be highly abstract. For example, idiomatic expressions explain abstract concepts with concrete words (e.g., "a rolling stone gathers no moss"). A word can also be concrete in one context but abstract in another (e.g., "auto-pilot" the term for an actual aviation device is also used colloquially to describe a non-reflective state). Similarly, a drawing of a dog, for example, can depict a series of concrete details (e.g., paws, nose, fur), but if these details are scattered rather than organized realisti-

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[7] Participants in true intention conditions believed to a higher extent than those in false intention conditons that they were going to perform the tasks, both in Study I, Experiment 1 (M_{true} = 5.93, M_{false} = 2.87, d = 1.63), and in Study II (M_{true} = 5.17, M_{false} = 1.80, d = 1.78; both studies used a 7-point Likert-type scale).

cally, the representation is abstract rather than concrete. Based on this reasoning, people's spontaneous global impression of texts and drawings may, for the time being, be a better indication of objective abstractness. Future studies could develop more sophisticated verbal coding procedures than the ones used in the current thesis. Based on the above reasoning, one suggestion is to use a hybrid coding procedure, combining automated and manual coding. As an example, Sagae et al. (2013) let human coders, in consultation, classify certain central features in texts. These annotations were used to refine their machine-learning algorithm to reach their specific research goal. Such an approach may solve some of the problems with the current measures.

Another consideration for future research is implementing functions in the automated coding to separate the words of the speaker from those of other agents in the text. That is, classifying *who* did *what* to *whom*. This is important in research contexts similar to the current one, in which the goal is to infer qualities of communicators' mental states by analyzing their use of language. Semantic role labeling is a statistical method developed for this purpose (Kim & Hovy, 2006). Future studies could test a combination of this approach and another such as the folk-concreteness dictionary.

Another important area for future research is further replications of studies on the effect of perceived likelihood on construal level. It has previously been suggested that researchers pay more attention to the likelihood dimension of psychological distance as it is an understudied dimension in CLT (Soderberg et al., 2014). The current thesis supports this proposition. However, I suggest that future resources be directed toward replicating the effects of direct manipulations of likelihood on construal level. That is, no further research programs should apply the likelihood–construal-level assumption to new contexts without first establishing the validity of the basic assumption.

Conclusions

Previous research on true and false intentions have been anchored in disparate theoretical frameworks such as goal pursuit (Ask et al., 2013), implementation intentions (Sooniste et al., 2014), and episodic future thoughts (Knieps et al., 2013a). The current thesis proposed and tested the novel CLINT model, which may provide a more parsimonious explanation for differences between true and false statements of intentions. The empirical studies in the thesis, however, lend no evidence for the applicability of a likelihood–construal-level assumption to a deception context. This could be because a basic CLT assumption—that unlikely

future events are more abstractly construed than likely future events—is unreliable. This makes an important theoretical contribution to CLT as it cast doubts on previous claims. It also contributes to theorizing about true and false intentions and indicates that previous explanations are superior to CLT accounts. Lastly, the findings of the thesis corroborate the overall finding in the deception-detection literature that cues to deception are weak (DePaulo et al., 2003), as linguistic abstractness was not associated with the veracity of stated intentions.

References

Agerström, J., & Björklund, F. (2009). Moral concerns are greater for temporally distant events and are moderated by value strength. *Social Cognition, 27*(2), 261-282. doi:10.1521/soco.2009.27.2.261

Agosta, S., Castiello, U., Rigoni, D., Lionetti, S., & Sartori, G. (2011). The detection and the neural correlates of behavioral (prior) intentions. *Journal of Cognitive Neuroscience, 23*(12), 3888-3902. doi:10.1162/jocn_a_00039

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179-211. doi: 10.1016/0749-5978(91)90020-T

Amit, E., Algom, D., & Trope, Y. (2009). Distance-dependent processing of pictures and words. *Journal of Experimental Psychology: General, 138*(3), 400-415. doi:10.1037/a0015835

Ask, K., Granhag, P. A., Juhlin, F., & Vrij, A. (2013). Intending or pretending? Automatic evaluations of goal cues discriminate true and false intentions. *Applied Cognitive Psychology, 27*(2), 173-177. doi:10.1002/acp.2893

Atance, C. M., & O'Neill, D. K. (2001). Episodic future thinking. *Trends in Cognitive Sciences, 5*(12), 533-539. doi:10.1016/S1364-6613(00)01804-0

Baars, B. J. (2010). Spontaneous repetitive thoughts can be adaptive: Postscript on "mind wandering". *Psychological Bulletin, 136*(2), 208. doi:10.1037/a0018726

Baird, B., Smallwood, J., & Schooler, J. W. (2011). Back to the future: Autobiographical planning and the functionality of mind-wandering. *Consciousness and Cognition, 20*(4), 1604-1611. doi: 10.1016/j.concog.2011.08.007

Bhatia, S., & Walasek, L. (2016). Event construal and temporal distance in natural language. *Cognition, 152*, 1-8. doi: 10.1016/j.cognition.2016.03.011

Bond, C. F., Jr., & DePaulo, B. M. (2006). Accuracy of deception judgments. *Personality and Social Psychology Review, 10*(3), 214-234. doi:10.1207/s15327957pspr1003_2

Borenstein, M., & Cooper, H. (2009). Effect sizes for continuous data. In H. Cooper, L. V. Hedges, & J. C. Valentine (Eds.), *The handbook of research synthesis and meta-analysis* (2nd ed., pp. 221-235). New York: Russell Sage Foundation.

Brandt, M. J., IJzerman, H., Dijksterhuis, A., Farach, F. J., Geller, J., Giner-Sorolla, R.,... Van 't Veer, A. (2014). The replication recipe: What makes for a convincing replication? *Journal of Experimental Social Psychology, 50*, 217-224. doi:10.1016/j.jesp.2013.10.005

Brysbaert, M., Warriner, A. B., & Kuperman, V. (2014). Concreteness ratings for 40 thousand generally known English word lemmas. *Behavior Research Methods, 46*(3), 904-911. doi: 10.3758/s13428-013-0403-5

Button, K. S., Ioannidis, J. P., Mokrysz, C., Nosek, B. A., Flint, J., Robinson, E. S., & Munafò, M. R. (2013). Power failure: Why small sample size undermines the reliability of neuroscience. *Nature Reviews Neuroscience, 14*(5), 365. doi:10.1038/nrn3475

Calderon, S., Mac Giolla, E., Ask, K., & Granhag, P. A. (2018). Drawing what lies ahead: False intentions are more abstractly depicted than true intentions. *Applied Cognitive Psychology, 32*(4), 518-522. doi:10.1002/acp.3422

Calderon, S., Mac Giolla, E., Ask, K., & Granhag, P. A. (2019). *Preferred level of abstraction when communicating true and false intentions: The effect of veracity and suspicion.* Unpublished manuscript.

Christoff, K., Gordon, A., & Smith, R. (2011). The role of spontaneous thought in human cognition. In O. Vartanian & D. R. Mandel (Eds.), *Neuroscience of decision making* (pp. 259-284). New York: Psychology Press.

Clemens, F. (2013). *Detecting lies about past and future actions: The Strategic Use of Evidence (SUE) technique and suspects' strategies.* (Doctoral dissertation, University of Gothenburg). Retrevied from https://gupea.ub.gu.se/.

Clemens, F., Granhag, P. A., & Strömwall, L. A. (2011). Eliciting cues to false intent. *Law and Human Behavior, 35*(6), 512-522. doi:10.1007/s10979-010-9258-9

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*(1), 155.

Cohn, M. A., Mehl, M. R., & Pennebaker, J. W. (2004). Linguistic markers of psychological change surrounding September 11, 2001. *Psychological Science*, *15*(10), 687-693. doi: 10.1111/j.0956-7976.2004.00741.x

D'Argembeau, A., & Van der Linden, M. (2006). Individual differences in the phenomenology of mental time travel: The effect of vivid visual imagery and emotion regulation strategies. *Consciousness and Cognition, 15*(2), 342-350. doi: 10.1016/j.concog.2005.09.001

DePaulo, B. M., Lindsay, J. J., Malone, B. E., Muhlenbruck, L., Charlton, K., & Cooper, H. (2003). Cues to deception. *Psychological Bulletin, 129*(1), 74-118. doi:10.1037/0033-2909.129.1.74

Duval, S., & Tweedie, R. (2000). Trim and fill: a simple funnel-plot–based method of testing and adjusting for publication bias in meta-analysis. *Biometrics, 56*(2), 455-463. doi:10.1111/j.0006-341X.2000.00455.x

Ekman, P., & Friesen, W. V. (1969). Nonverbal leakage and clues to deception. *Psychiatry, 32*(1), 88-106.

Ekstrom, R. B., French, J. W., Harman, H. H., Dermen, D. (1976). *Kit of factor-referenced cognitive tests*. Princeton, NJ: Educational Testing Service.

Ferguson, M. J., & Bargh, J. A. (2004). Liking is for doing: The effects of goal pursuit on automatic evaluation. *Journal of Personality and Social Psychology, 87*(5), 557-572. doi:10.1037/0022-3514.87.5.557

Fiedler, K., Jung, J., Wänke, M., & Alexopoulos, T. (2012). On the relations between distinct aspects of psychological distance: An ecological basis of construal-level theory. *Journal of Experimental Social Psychology, 48*(5), 1014-1021. doi:10.1016/j.jesp.2012.03.013

Gollwitzer, P. M. (1999). Implementation intentions: Strong effects of simple plans. *American Psychologist, 54*(7), 493-503. doi: 10.1037/0003-066X.54.7.493

Gollwitzer, P. M., & Sheeran, P. (2006). Implementation intentions and goal achievement: A meta-analysis of effects and processes. *Advances in Experimental Social Psychology, 38*, 69-119. doi:10.1016/S0065-2601(06)38002-1

Goschke, T., & Kuhl, J. (1993). Representation of intentions: Persisting activation in memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 19*(5), 1211-1226. doi:10.1037/0278-7393.19.5.1211

Graham, J., Haidt, J., & Nosek, B. A. (2009). Liberals and conservatives rely on different sets of moral foundations. *Journal of Personality and Social Psychology*, *96*(5), 1029. doi: 10.1037/a0015141

Granhag, P. A. (2010). On the psycho-legal study of true and false intentions: Dangerous waters and some stepping stones. *The Open Criminology Journal, 3*, 37-43. doi:10.2174/1874917801003010037

Granhag, P. A., & Hartwig, M. (2008). A new theoretical perspective on deception detection: On the psychology of instrumental mind-reading. *Psychology, Crime & Law, 14*(3), 189-200. doi:10.1080/10683160701645181

Granhag, P. A., & Hartwig, M. (2015). The Strategic Use of Evidence (SUE) technique: A conceptual overview. In P. A. Granhag, A. Vrij, & B. Verschuere (Eds.), *Deception detection: New challenges and cognitive approaches* (pp. 231-251). Chichester, UK: John Wiley & Sons.

Granhag, P. A., Hartwig, M., Mac Giolla, E., & Clemens, F. (2015). Suspects' verbal counter-interrogation strategies: Towards an integrative model. In P. A. Granhag, A. Vrij, & B. Verschuere (Eds.), *Deception detection: Current challenges and new approaches* (pp. 293-313). Chichester, UK: John Wiley & Sons.

Granhag, P. A., & Knieps, M. (2011). Episodic future thought: Illuminating the trademarks of forming true and false intentions. *Applied Cognitive Psychology, 25*(2), 274-280. doi:10.1002/acp.1674

Granhag, P. A., & Mac Giolla, E. (2014). Preventing future crimes: Identifying markers of true and false intent. *European Psychologist, 19*(3), 195-206. doi:10.1027/1016-9040/a000202

Granhag, P. A., Mac Giolla, E., Sooniste, T., Strömwall, L., & Liu-Jonsson, M. (2016). Discriminating between statements of true and false intent: The impact of repeated interviews and strategic questioning. *Journal of Applied Security Research, 11*(1), 1-17. doi:10.1080/19361610.2016.1104230

Granhag, P. A., Vrij, A., & Verschuere, B. (2015). *Detecting deception: current challenges and cognitive approaches*. John Wiley & Sons.

Harman, G. (1986). *Change in view: Principles of reasoning*: Cambridge, MA: MIT Press.

Hartwig, M., Granhag, P. A., & Luke, T. (2014). Strategic use of evidence during investigative interviews: The state of the science. In D. C. Raskin, C. R. Honts, & J. C. Kircher (Eds.), *Credibility assessment: Scientific research and applications* (pp. 1-36). San Diego, CA: Elsevier Academic Press. doi:10.1016/B978-0-12-394433-7.00001-4

Henderson, M. D., Fujita, K., Trope, Y., & Liberman, N. (2006). Transcending the "here": the effect of spatial distance on social judgment. *Journal of Personality and Social Psychology*, *91*(5), 845-856. doi:10.1037/0022-3514.91.5.845

Herzog, S. M., Hansen, J., & Wänke, M. (2007). Temporal distance and ease of retrieval. *Journal of Experimental Social Psychology, 43*(3), 483-488. doi:10.1016/j.jesp.2006.05.008

Iliev, R., Dehghani, M., & Sagi, E. (2015). Automated text analysis in psychology: Methods, applications, and future developments. *Language and Cognition*, *7*(2), 265-290. doi: 10.1017/langcog.2014.30

Jupe, L. M., Leal, S., Vrij, A., & Nahari, G. (2017). Applying the verifiability approach in an international airport setting. *Psychology, Crime & Law, 23*(8), 812-825. doi:10.1080/1068316X.2017.1327584

Kahn, D. T., & Björklund, F. (2017). Judging those closest from afar: The effect of psychological distance and abstraction on value–judgment correspondence in responses to ingroup moral transgressions. *Peace and Conflict: Journal of Peace Psychology, 23*(2), 153. doi:10.1037/pac0000248

Kassin, S. M. (2012). Paradigm shift in the study of human lie-detection: Bridging the gap between science and practice. *Journal of Applied Research in Memory and Cognition, 1*(2), 118-119. doi: 10.1016/j.jarmac.2012.04.009

Kim, S. M., & Hovy, E. (2006, July). Extracting opinions, opinion holders, and topics expressed in online news media text. In *Proceedings of the Workshop on Sentiment and Subjectivity in Text* (pp. 1-8). Association for Computational Linguistics.

Kleinberg, B., Van Der Toolen, Y., Vrij, A., Arntz, A., & Verschuere, B. (2018). Automated verbal credibility assessment of intentions: The model statement technique and predictive modeling. *Applied Cognitive Psychology, 32*(3), 354-366. doi:10.1002/acp.3407

Knieps, M. (2013). *True and false intentions: Mental images of the future.* (Doctoral dissertation, University of Gothenburg). Retrieved from https://gupea.ub.gu.se

Knieps, M., Granhag, P. A., & Vrij, A. (2013a). Back to the future: Asking about mental images to discriminate between true and false intentions. *The Journal of Psychology, 147*(6), 619-640. doi: 10.1080/00223980.2012.728542

Knieps, M., Granhag, P. A., & Vrij, A. (2013b). Repeated visits to the future: Asking about mental images to discriminate between true and false

intentions. *International Journal of Advances in Psychology, 2*(2), 93-102. doi: 10.1080/00223980.2012.728542

Knieps, M., Granhag, P. A., & Vrij, A. (2014). Been there before? Examining "familiarity" as a moderator for discriminating between true and false intentions. *Frontiers in Psychology, 5*. doi:10.3389/fpsyg.2014.00677

Köhler, W. (1959). Gestalt psychology today. *American Psychologist, 14*(12), 727. doi: 10.1037/h0042492

Kurby, C. A., & Zacks, J. M. (2008). Segmentation in the perception and memory of events. *Trends in Cognitive Sciences*, *12*(2), 72-79. doi: 10.1016/j.tics.2007.11.004

Leal, S., Vrij, A., Warmelink, L., Vernham, Z., & Fisher, R. P. (2015). You cannot hide your telephone lies: Providing a model statement as an aid to detect deception in insurance telephone calls. *Legal and Criminological Psychology, 20*(1), 129-146. doi:10.1111/lcrp.12017

Liberman, N., & Förster, J. (2009a). Distancing from experienced self: How global-versus-local perception affects estimation of psychological distance. *Journal of Personality and Social Psychology, 97*(2), 203. doi:10.1037/a0015671

Liberman, N., & Förster, J. (2009b). The effect of psychological distance on perceptual level of construal. *Cognitive Science, 33*(7), 1330-1341. doi: 10.1111/j.1551-6709.2009.01061.x

Liberman, N., Sagristano, M. D., & Trope, Y. (2002). The effect of temporal distance on level of mental construal. *Journal of Experimental Social Psychology, 38*(6), 523-534. doi:10.1016/S0022-1031(02)00535-8

Liberman, N., & Trope, Y. (1998). The role of feasibility and desirability considerations in near and distant future decisions: A test of temporal construal theory. *Journal of Personality and Social Psychology, 75*(1), 5-18. doi:10.1037/0022-3514.75.1.5

Liberman, N., & Trope, Y. (2014). Traversing psychological distance. *Trends in Cognitive Sciences, 18*(7), 364-369. doi:10.1016/j.tics.2014.03.001 doi: 10.1016/j.tics.2014.03.001

Liviatan, I., Trope, Y., & Liberman, N. (2008). Interpersonal similarity as a social distance dimension: Implications for perception of others' actions. *Journal of Experimental Social Psychology, 44*(5), 1256-1269. doi:10.1016/j.jesp.2008.04.007

Mac Giolla, E. (2016). *Towards a theory of true and false intentions.* (Doctoral dissertation, University of Gothenburg) Retrieved from https://gupea.ub.gu.se

Mac Giolla, E., & Granhag, P. A. (2015). Detecting false intent amongst small cells of suspects: Single versus repeated interviews. *Journal of Investigative Psychology and Offender Profiling*, 12, 142-157. doi:10.10002/jip.1419

Mac Giolla, E., Ask, K., Granhag, P. A., & Karlsson, A. (2018). Can reality monitoring criteria distinguish between true and false intentions? *Journal of Applied Research in Memory and Cognition.* doi:10.1016/j.jarmac.2018.08.002

Mac Giolla, E., Granhag, P. A., & Ask, K. (2017a). A goal-activation framework of true and false intentions. *Applied Cognitive Psychology, 31*(6), 678-684. doi:10.1002/acp.3366

Mac Giolla, E., Granhag, P. A., & Ask, K. (2017b). Task-related spontaneous thought: A novel direction in the study of true and false intentions. *Journal of Applied Research in Memory and Cognition, 6*(1), 93-103. doi:10.1016/j.jarmac.2016.04.010

Mac Giolla, E., Granhag, P. A., & Vernham, Z. (2017). Drawing-based deception detection techniques: a state-of-the-art review. *Crime Psychology Review, 3*(1), 23-38. doi:10.1080/23744006.2017.1393986

Malle, B. F., & Knobe, J. (1997). The folk concept of intentionality. *Journal of Experimental Social Psychology, 33*(2), 101-121. doi:10.1006/jesp.1996.1314

Malle, B. F., & Knobe, J. (2001). The distinction between desire and intention: A folk-conceptual analysis. In B. F. Malle, L. J. Moses, & D. A. Baldwin (Eds.), *Intentions and intentionality: Foundations of social cognition* (pp. 45-68). Cambridge, MA: MIT Press, Cambridge, MA.

Mann, S., Vrij, A., Nasholm, E., Warmelink, L., Leal, S., & Forrester, D. (2012). The direction of deception: Neuro-Linguistic Programming as a lie detection tool. *Journal of Police and Criminal Psychology, 27*(2), 160-166. doi:10.1007/s11896-011-9097-8

Martin, L. L., & Tesser, A. (2009). Five markers of motivated behavior. In G. B. Moskowitz & H. Grant (Eds.), *Psychology of goals*. London: The Guilford Press.

McDaniel, M. A., & Einstein, G. O. (2007). *Prospective memory: An overview and synthesis of an emerging field*. Sage Publications.

Meijer, E. H., Smulders, F. T. Y., & Merckelbach, H. L. G. J. (2010). Extracting concealed information from groups. *Journal of Forensic Sciences, 55*(6), 1607-1609. doi:10.1111/j.1556-4029.2010.01474.x

Meijer, E. H., Verschuere, B., & Merckelbach, H. (2010). Detecting criminal intent with the concealed information test. *Open Criminology Journal, 3*, 44-47. doi:10.2174/1874917801003020044

Meixner, J. B., & Rosenfeld, J. P. (2011). A mock terrorism application of the P300-based concealed information test. *Psychophysiology, 48*(2), 149-154. doi:10.1111/j.1469-8986.2010.01050.x

Mulligan, N. W. (2014). Memory for pictures and actions. In: T. J. Perfect & D. S. Lindsay (Eds.), *The Sage handbook of applied memory* (pp. 20-36). Sage Publications.

Mumford, M. D., Schultz, R. A., & Van Doorn, J. R. (2001). Performance in planning: Processes, requirements, and errors. *Review of General Psychology, 5*(3), 213-240. doi:10.1037/1089-2680.5.3.213

Nahari, G., Vrij, A., & Fisher, R. P. (2014). Exploiting liars' verbal strategies by examining the verifiability of details. *Legal and Criminological Psychology, 19*(2), 227-239. doi:10.1111/j.2044-8333.2012.02069.x

Nahari, G., Vrij, A., & Fisher, R. P. (2012). Does the truth come out in the writing? Scan as a lie detection tool. *Law and Human Behavior, 36*(1), 68. doi:10.1037/h0093965

Navon, D. (1977). Forest before trees: The precedence of global features in visual perception. *Cognitive Psychology, 9*(3), 353-383. doi:10.1016/0010-0285(77)90012-3

Newtson, D. (1973). Attribution and the unit of perception of ongoing behavior. *Journal of Personality and Social Psychology, 28*(1), 28-38. doi:10.1037/h0035584

Noordraven, E., & Verschuere, B. (2013). Predicting the sensitivity of the Reaction Time-based Concealed Information Test. *Applied Cognitive Psychology, 27*(3), 328-335. doi:10.1002/acp.2910

Pennebaker, J. W., & King, L. A. (1999). Linguistic styles: Language use as an individual difference. *Journal of Personality and Social Psychology*, *77*(6), 1296. doi: 10.1037//0022-3514.77.6.1296

Polman, E., & Emich, K. J. (2011). Decisions for others are more creative than decisions for the self. *Personality and Social Psychology Bulletin, 37*(4), 492-501. doi:10.1177/0146167211398362

Puddle-Ducks (2019). There might be problems with the automated scoring of linguistic concreteness. *Rabbit Tracks*. Retrieved from https://www.rabbitsnore.com/2019/02/there-might-be-problems-with-automated.html

Richard, F. D., Bond Jr., C. F., & Stokes-Zoota, J. J. (2003). One hundred years of social psychology quantitatively described. *Review of General Psychology*, *7*(4), 331-363. doi: 0.1037/1089-2680.7.4.331

Rim, S., Amit, E., Fujita, K., Trope, Y., Halbeisen, G., & Algom, D. (2014). How words transcend and pictures immerse: On the association between medium and level of construal. *Social Psychological and Personality Science*. doi:10.1177/1948550614548728

Rosch, E., Mervis, C. B., Gray, W. D., Johnson, D. M., & Boyes-Braem, P. (1976). Basic objects in natural categories. *Cognitive Psychology, 8*(3), 382-439. doi:10.1016/0010-0285(76)90013-X

Sagae, K., Gordon, A. S., Dehghani, M., Metke, M., Kim, J. S., Gimbel, S. I.,... & Immordino-Yang, M. H. (2013). A data-driven approach for classification of subjectivity in personal narratives. In *2013 workshop on computational models of narrative*. Wadern, Germany: Schloss Dagstuhl–Leibniz-Zentrum fuer Informatik.

Satterfield, J. M., Spring, B., Brownson, R. C., Mullen, E. J., Newhouse, R. P., Walker, B. B., & Whitlock, E. P. (2009). Toward a transdisciplinary model of evidence-based practice. *The Milbank Quarterly, 87*(2), 368-390. doi:10.1111/j.1468-0009.2009.00561.x

Schacter, D. L., Addis, D. R., & Buckner, R. L. (2008). Episodic simulation of future events. *Annals of the New York Academy of Sciences, 1124*(1), 39-60. doi:10.1196/annals.1440.001

Seih, Y.-T., Beier, S., & Pennebaker, J. W. (2017). Development and examination of the linguistic category model in a computerized text analysis method. *Journal of Language and Social Psychology, 36*(3), 343-355. doi:10.1177/0261927X16657855

Semin, G. R., & Fiedler, K. (1991). The linguistic category model, its bases, applications and range. *European Review of Social Psychology, 2*(1), 1-30. doi:10.1080/14792779143000006

Sheeran, P. (2002). Intention–behavior relations: A conceptual and empirical review. *European review of social psychology, 12*(1), 1-36. doi:10.1080/14792772143000003

Sheeran, P., Milne, S., Webb, T. L., & Gollwitzer, P. M. (2005). Implementation intentions and health behaviour. In M. Conner & P. Norman (Eds.), *Predicting health behavior: Research and practice with social cognition models* (2nd ed., pp. 276-323). Milton Keynes, UK: Open University Press.

Simonsohn, U. (2015). Small telescopes: Detectability and the evaluation of replication results. *Psychological Science, 26*(5), 559-569. doi:10.1177/0956797614567341

Smith, P. K., & Trope, Y. (2006). You focus on the forest when you're in charge of the trees: Power priming and abstract information processing. *Journal of Personality and Social Psychology, 90*(4), 578. doi:10.1037/0022-3514.90.4.578

Snefjella, B., & Kuperman, V. (2015). Concreteness and psychological distance in natural language use. *Psychological Science, 26*(9), 1449-1460. doi:10.1177/0956797615591771

Soderberg, C. K., Callahan, S. P., Kochersberger, A. O., Amit, E., & Ledgerwood, A. (2014). The effects of psychological distance on abstraction: Two meta-analyses. *Psychological Bulletin*, *141*(3), 525-48. doi:10.1037/bul0000005

Sooniste, T. (2015). *Discriminating between true and false intentions: Questions to pose and cues to use.* (Doctoral dissertation, University of Gothenburg). Retreived from https://gupea.ub.gu.se

Sooniste, T., Granhag, P. A., Strömwall, L. A., & Vrij, A. (2014). Discriminating between true and false intent among cells of suspects. *Legal and Criminological Psychology*, *21*(2), 344-357. doi:10.1111/lcrp.12063

Sooniste, T., Granhag, P. A., Strömwall, L. A., & Vrij, A. (2015). Statements about true and false intentions: Using the cognitive interview to magnify the differences. *Scandinavian Journal of Psychology, 56*(4), 371-378. doi:10.1111/sjop.12216

Speer, N. K., Swallow, K. M., & Zacks, J. M. (2003). Activation of human motion processing areas during event perception. *Cognitive, Affective, & Behavioral Neuroscience*, *3*(4), 335-345.

Sporer, S. L. (2004). Reality monitoring and detection of deception. In P. A. Granhag & L. A. Strömwall (Eds.), *Deception detection in forensic contexts* (pp. 64-102). Cambridge, UK: Cambridge University Press.

Street, R. F. (1931). A Gestalt completion test. *Teachers College Contributions to Education*, *481*, vii + 65.

Szpunar, K. K. (2010). Episodic future thought: An emerging concept. *Perspectives on Psychological Science, 5*(2), 142-162. doi:10.1177/1745691610362350

Todorov, A., Goren, A., & Trope, Y. (2007). Probability as a psychological distance: Construal and preferences. *Journal of Experimental Social Psychology, 43*(3), 473-482. doi:10.1016/j.jesp.2006.04.002

Trope, Y., & Liberman, N. (2003). Temporal construal. *Psychological Review, 110*(3), 403. doi:10.1037/0033-295X.110.3.403

Trope, Y., & Liberman, N. (2010). Construal-level theory of psychological distance. *Psychological Review, 117*(2), 440-463. doi: 10.1037/a0018963

Vallacher, R. R., & Wegner, D. M. (1987). What do people think they're doing? Action identification and human behavior. *Psychological Review, 94*(1), 3. doi:10.1037/0033-295X.94.1.3

Vallacher, R. R., & Wegner, D. M. (2014). *A theory of action identification.* London: Psychology Press.

Viechtbauer, W. (2010). Conducting meta-analyses in R with the metafor package. *Journal of Statistical Software*, *36*(3), 1-48.

Volbert, R., & Steller, M. (2014). Is this testimony truthful, fabricated, or based on false memory? *European Psychologist*, *19*(3), 207-220. doi:10.1027/1016-9040/a000200

Voss, A., Rothermund, K., & Brandtstädter, J. (2008). Interpreting ambiguous stimuli: Separating perceptual and judgmental biases. *Journal of Experimental Social Psychology*, *44*(4), 1048-1056. doi:10.1016/j.jesp.2007.10.009

Vrij, A. (2008). *Detecting lies and deceit: Pitfalls and opportunities* (2nd ed.). New York, NY John Wiley & Sons Ltd.

Vrij, A. (2015). Verbal lie detection tools: Statement validity analysis, reality monitoring, and scientific content analysis. In P. A. Granhag, A. Vrij, & B. Verschuere (Eds.), *Detecting deception: Current challenges and cognitive approaches* (pp. 3-35). Chichester: John Wiley.

Vrij, A., Fisher, R. P., & Blank, H. (2017). A cognitive approach to lie detection: A meta-analysis. *Legal and Criminological Psychology*, *22*(1), 1-21. doi:10.1111/lcrp.12088

Vrij, A., & Granhag, P. A. (2012). Eliciting cues to deception and truth: What matters are the questions asked. *Journal of Applied Research in Memory and Cognition*, *1*(2), 110-117. doi: 10.1016/j.jarmac.2012.02.004

Vrij, A., Granhag, P. A., Mann, S., & Leal, S. (2011). Lying about flying: The first experiment to detect false intent. *Psychology, Crime & Law*, 17(7), 611-620. doi:10.1080/10683160903418213

Vrij, A., Hartwig, M., & Granhag, P. A. (2019). Reading lies: nonverbal communication and deception. *Annual Review of Psychology*, *70*, 295-317. doi: 10.1146/annurev-psych-010418-103135

Vrij, A., Leal, S., Mann, S., & Fisher, R. (2012). Imposing cognitive load to elicit cues to deceit: Inducing the reverse order technique

naturally. *Psychology, Crime & Law*, *18*(6), 579-594. doi: 10.1080/1068316X.2010.515987

Vrij, A., Leal, S., Mann, S., Warmelink, L., Granhag, P. A., & Fisher, R. P. (2010). Drawings as an innovative and successful lie detection tool. *Applied Cognitive Psychology, 24*(4), 587-594. doi:10.1002/acp.1627

Vrij, A., & Nahari, G. (2017). The verifiability approach. In J. Dickinson, N. Schreiber Compo, R., Carol, & M. McCauley (Eds.), *Evidence-based investigative interviewing*. London: Routledge.

Wakslak, C. J., & Trope, Y. (2009). The effect of construal level on subjective probability estimates. *Psychological Science, 20*(1), 52-58. doi:10.1111/j.1467-9280.2008.02250.x

Wakslak, C. J., Trope, Y., Liberman, N., & Alony, R. (2006). Seeing the forest when entry is unlikely: Probability and the mental representation of events. *Journal of Experimental Psychology: General, 135*(4), 641-653. doi:10.1037/0096-3445.135.4.641

Wallace, D. B. (2014). *The effect of malintent on visual attention.* (Doctoral dissertation, City University of New York). Retrieved from https://academicworks.cuny.edu

Warmelink, L. (2012). *Lying about intentions.* (Doctoral dissertation, University of Portsmouth). Retreived from https://researchportal.port.ac.uk

Warmelink, L., Vrij, A., Mann, S., & Granhag, P. A. (2013). Spatial and temporal details in intentions: A cue to detecting deception. *Applied Cognitive Psychology, 27*(1), 101-106. doi:10.1002/acp.2878

Warmelink, L., Vrij, A., Mann, S., Leal, S., Forrester, D., & Fisher, R. P. (2011). Thermal imaging as a lie detection tool at airports. *Law and Human Behavior, 35*(1), 40-48. doi:10.1007/s10979-010-9251-3

Watanabe, H. (2005). Semantic and episodic predictions of memory for plans. *Japanese Psychological Research, 47*(1), 40-45. doi:10.1111/j.1468-5584.2005.00271.x

Wegner, D. M., Vallacher, R. R. Macomber, G., Wood, R., & Arps, K. (1984). The emergence of action. *Journal of Personality and Social Psychology, 46*(2), 269-279. doi:10.1037/0022-3514.46.2.269

Williams, L. E., Stein, R., & Galguera, L. (2013). The distinct affective consequences of psychological distance and construal level. *Journal of Consumer Research, 40*(6), 1123-1138. doi:10.1086/674212

Zacks, J. M., Tversky, B., & Iyer, G. (2001). Perceiving, remembering, and communicating structure in events. *Journal of Experimental Psychology: General*, *130*(1), 29. doi: 10.1037//0096-3445.130.1.29

Zeigarnik, B. (1939). On finished and unfinished tasks. In E. D. Ellis (Ed.), *A source book of Gestalt psychology*. New York: Harcourt Brace. (Original work published 1927)