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ARTICLE

Producing deceit: the influence of veracity on linguistic processes in speaking and writing

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Abstract
This experimental study explored how adopting a deceptive stance affects linguistic processes during real-time production of multi-sentence texts in speaking and writing. Language production involves planning, monitoring and editing – processes that give rise to and are shaped by fluctuations in processing demands. Deception is assumed to influence these processes as speakers and writers manage competing communicative goals: to be coherent while concealing the truth. Narratives were elicited by asking participants to account for events from four short films: two truthful and two deceitful, in both speaking and writing. In speaking, deception decreased the total number of pauses, but in longer deceptive texts, pausing instead increased, suggesting adaptive adjustments to regulate overt cues to lying. In writing, deception decreased text revisions and altered pause behaviour, suggesting that writers modified their production patterns when altering information. Together, these findings suggest that deceptive language production involves shifts in planning, monitoring and editing processes that manifest differently across modalities: while speech shows suppression of pauses, writing reveals subtle changes in revision and pausing behaviour. These results highlight modality-specific signatures of deception and demonstrate how speakers and writers dynamically adapt their language production processes to align with communicative intent.

Keywords: cognitive processes; keystroke logging; language processing; lies; deception

1. Introduction and background

This experimental study explores how real-time language production in speaking and writing are affected when individuals adopt a deceptive stance during narrative accounts. Regardless of modality, there are two fundamental problems that speakers and writers need to solve simultaneously: determining *what* to say (i.e. the linguistic

content) and *how* to say it (i.e. the linguistic form) (Hayes & Flower, 1980; Levelt, 1989). Managing these problems relies on limited processing capacity (cf., Baddeley, 2007; Cowan, 2010), and when multiple demands compete for these resources, moment-to-moment fluctuations in planning and monitoring processes can leave observable traces during language production (Levelt, 1989; McCutchen, 1996). Such traces often manifest as differences in pausing behaviour in both speaking and writing, as well as in patterns of verbal disfluencies, such as false starts, repetitions and reformulations in speaking (Clark & Wasow, 1998), and in revision behaviours, such as deletions, insertions and rearrangements of text in writing (Torrance, 2016).

Building on this framework, the present study investigates how adopting a deceptive stance – defined as sustained communicative orientation towards deception – affects speaking and writing processes when producing multi-sentence narrative texts. To explore this, participants were instructed to truthfully and deceitfully retell events depicted in four specially designed elicitation films, whereof one text in each veracity condition was in speaking and one in writing. In the deceptive condition, participants were instructed to deliberately alter a specific part of the narrative – that is, to lie about the events.

1.1. Defining deception

There is a wide literature defining deception, but in this study, deception (or lying) refers to when a person **knowingly** gives false or misleading information with the purpose of making the receiver believe it to be true, that is, subjective deception that does not account for the factual truth but is instead closely related to the intention of the speakers/writers. Deception can occur either through fabricating parts of a story, inventing something completely novel (DePaulo et al., 1996), or by lying through omitting information (Leal et al., 2024; Vrij et al., 2025). Here, only lies where information is changed or added are of interest since omitting information is not linguistically or cognitively comparable to adding or altering the events of a story.

1.2. Cognitive processes underlying language production

During language production, speakers and writers are engaged in multiple interrelated cognitive processes, such as planning, formulating, monitoring and revising, described in well-established stage theories on speaking (Fromkin, 1973; Levelt, 1989) and writing (Hayes & Flower, 1980; see also the edited volume on language production in speaking and writing by Hartsuiker & Strijkers, 2023). These processes rely on an interplay between long-term memory and working memory. Long-term memory provides access to stored linguistic knowledge, including lexical, syntactic and genre-related information, which forms the foundation for constructing coherent and contextually appropriate utterances. At the same time, working memory supports the temporary maintenance and manipulation of linguistic and conceptual representations (Baddeley, 2007; Cowan, 2010), requiring speakers and writers to recruit their limited attentional resources to coordinate the interplay between integrating retrieved information and transforming abstract ideas into linguistic output (Kellogg, 2001; McCutchen, 2000). Consequently, language production is an inherently dynamic and effortful cognitive activity that relies on both the activation of preexisting knowledge and the real-time processing of information. As speakers/writers

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work to meet communicative goals and adapt to contextual constraints, the demands placed on limited attentional resources contribute to altered processing demands (Clark & Wasow, 1998; Matsuhashi, 1981).

1.3. Language production in speaking and writing

Most linguists would describe speaking as the primary mode of communication, ontologically as well as for everyday purposes. Speaking is typically used in day-to-day interactions, often in dialogues (Clark, 1996; Du Bois & Giora, 2014; Linell, 2009). Writing, on the other hand, is usually described as a monologic activity, but this traditional view should perhaps be challenged given how writing is often used in everyday computer-mediated communication (Brandt, 2015). However, there are some inherent differences between the modalities that constrain them in different ways.

First, speaking is instantaneous – the listener is typically present when the message is produced – whereas writing is delayed – the reader typically reads the text in a different time and place from when it was produced. Second, speaking is auditory – produced with our vocal organs and perceived auditorily – whereas writing is visual – it is produced with a writing tool external to our bodies. Third, speaking is fast – we need only our vocal organs to speak – whereas writing is slow – it relies on an ability to encode meaning visually by using, for example, pen and paper or computer and keyboard. Lastly, speaking is ephemeral – it disappears when it has been uttered – whereas writing is lasting – it records meaning and lasts over time to be read repeatedly (Chafe & Danielwicz, 1987; Johansson, 2009).

These variances give rise to differences in how speakers and writers manage their cognitive resources during production. The fleeting nature of speaking allows for only a small window of opportunity for corrections or additions (Christiansen & Chater, 2016; Clark & Wasow, 1998), whereas the lasting, visual nature of writing provides writers with the possibly to visually attend to their text: delete, add or move different parts. Importantly, writers are not constrained by the immediate reception of their linguistic output, which allows for jotting down ideas and revise them later in a way that is not possible in speaking. Such revisions in writing will normally not leave traces in the final written text. Contrarily, speakers typically operate under pressing time constraints and are often observed by listeners in real time, making pausing and reformulation publicly available. Further, as Clark (1996) has shown, pauses serve a functional role in speaking; it allows for planning while also facilitating the listener's comprehension, aiding the perceptive processing of the message. No such joint function exists in written communication, where instead pauses can be assumed to serve the writers' needs. Importantly, despite the communicative function of pauses in speaking, both silent and filled pauses are still present even in contexts with no present listener. This indicates that dialogic features are characteristic of speaking independent of the listeners' needs, and the pressing time constraint of speaking remains even without a listener present; what has been uttered cannot be edited (Christiansen & Chater, 2016).

1.4. Verbal deceit

In forensic settings, methods for assessing credibility of, for example, witness statements have been developed, such as criteria-based content analysis and statement

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validity assessment (cf. e.g. Amado et al., 2016; Steller & Köhnken, 1989). However, as argued by Nicklaus and Stein (2020), linguistic perspectives can supplement these findings, as shown by Adams and Jarvis (2006) who examined longer written statements made to police from a forensic linguistic perspective. The methods to assess creditability through language includes, for example, examinations of deceptive texts to find out if lies show certain syntactic structures (Newman et al., 2003), specific vocabulary (Johansson et al., 2025; Zuckerman et al., 1981) or other discerning phenomena. Such studies have mainly focused on investigating finished texts rather than speaking and writing processes. From a cognitive perspective, beyond finished texts, deception is expected to lead to increased processing demands since liars must remember the truth while coming up with a lie (Granhag et al., 2015). Research has tried to identify processing cues for deception, for example, through response time studies showing that answering autobiographical yes/no questions take longer when lying than when telling the truth (Suchotzki et al., 2017; Walczyk et al., 2003; Williams et al., 2013). This increase in response time has been attributed to response inhibition, as liars must suppress true facts and generate a conflicting response (Williams et al., 2013), reflecting the involvement of cognitive control and increased processing demands.

Further, Mann et al. (2002) examined cues of deception in interviews by police officers and revealed a significant increase in the number of pauses in lies compared to truths. However, in a meta-analysis of deception cues by DePaulo et al. (2003), the 116 reports did not reveal a difference in disfluencies in the form of pausing or hesitation in lies compared to truths, but an increase in verbal disfluencies, such as word repetitions, was reported in deceptive texts. Oftentimes, deception studies have examined disfluencies in speech in a wider perspective, not differentiating between verbal (i.e. word repetitions and reformulations) and non-verbal (pausing behaviour, including both silent and filled pauses) disfluencies. For example, Bond et al. (1985) and DePaulo et al. (1982) used the wider concept of speech hesitations, including both repetitions and filled pauses in the same category, and found that hesitations increased in lies. The findings in relation to disfluencies in spoken deception are inconsistent, and part of this is probably explained by different operationalisations of disfluencies in speech. In writing, Banerjee et al. (2014) examined real-time writing of short deceptive and truthful reviews and showed an increase in the number of pauses and edits during deception.

Deception has also been studied across modalities, for instance, Leins et al. (2012) asked participants to report the same information across different report modes (e.g. verbal and pictorial) and found that liars were less consistent across the modes, suggesting that this was due to an increase in cognitive load when lying. Similarly, Vrij et al. (2008) examined the effect of increasing cognitive load during deception by instructing participants to recount events in reverse order, showing that signs of heightened cognitive load increased more in lies. Likewise, Vrij et al. (2010) found that even simple concurrent tasks, such as maintaining eye-contact while lying, imposed additional processing demands and amplified behavioural indicators of deception.

Further, self-regulating behaviours, such as avoiding mannerisms associated with lying (e.g. fidgeting, moving ones' legs) during spoken deception, are also expected to lead to altered processing demands (DePaulo, 1992). Additionally, self-regulation during deception is linked to ideas about what a lie sounds or looks like since liars try to control behaviours that they *believe* liars exhibit rather than *actual* cues to

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deception. Hartwig and Granhag (2015) reported that that common beliefs are that liars show behaviours such as gaze aversion, increased hesitations and increased fidgeting.

1.5. Aim and present study

The present study is conducted against the backdrop of previous research linking deception to altered processing demands across a range of tasks and modalities – from increased inhibitory control in simple lie paradigms (Bott & Williams, 2019; Suchotzki et al., 2017; Walczyk et al., 2003) to broader effects such as reduced consistency (Leins et al., 2012), and greater strain when performing concurrent tasks while lying, mainly in speaking (Vrij et al., 2008, 2010). While these studies provide important insights, they often focus on isolated moments of deception – brief instances where participants are instructed to lie about a specific detail in their response, often within stimulus–response paradigms.

In contrast, the present study investigates the effects of adopting a *deceptive stance* – a sustained communicative orientation towards deception – during the production of multi-sentence texts in speaking and writing, here narrative accounts. This approach assumes that producing a narrative with deceptive intent imposes altered processing demands that influence planning, monitoring and revision processes throughout the task. Here, lying is not treated as a momentary act, but as a mode of engagement that permeates the speakers' or writers' approach to the communicative goal. This deceptive stance is assumed to affect speaking and writing processes regardless of the severity of the lie or of the amount of information that is altered in relation to the actual events that form the base for the narratives.

This distinction between transient acts of lying and a sustained deceptive stance is especially important in the context of extended narrative production where speakers and writers must continuously coordinate linguistic content and form within the limits of working memory and attention. A deceptive stance is expected to modify these processing demands by engaging different forms of monitoring and control (DePaulo, 1992), such as inhibition of truthful representations (Williams et al., 2013), and shifts in planning effort (DePaulo et al., 2003; Mann et al., 2002; Vrij, 2015; Zuckerman et al., 1981).

Furthermore, while prior research has linked deception to specific linguistic cues in speech (Leal et al., 2024; Vrij et al., 2006), relatively little is known about how deceptive intent affects writing processes. By comparing the production of narrative texts in both modalities, the present study addresses a critical gap in the literature and broadens our understanding of how communicative stance shapes the processing dynamics of real-time language production. In doing so, this study contributes to theoretical models of language production by examining how truthfulness versus deception influences the coordination of planning, monitoring and revision processes during extended discourse. It also offers practical implications for applied settings, such as forensic linguistics where the ability to identify markers associated with deception is of significant value.

The aim of this study is to explore how adopting a deceptive stance influences the overarching speaking/writing processes involved in language production and to determine whether deceptive intent exerts an observable influence on these processes. The influence on speaking and writing processes is investigated through the

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examination of disfluencies in speaking, that is, pausing behaviour (non-verbal disfluencies) and repetitions and reformulations (verbal disfluencies), as well as pauses and revisions in writing, at a global level across modalities. Data consist of narrative accounts, collected in an experimental setting where participants retold the events of four short films. This resulted in two truthful and two deceitful narratives, in both speaking and writing, from each participant. Importantly, the study does not assess participants' memory accuracy for the film events. Rather, it assumes that truthful recall of the events in the films provides a valid basis for adopting a deceptive stance, whereby participants intentionally modify otherwise accurate narratives to conceal or alter key details.

The first guiding research question is if adopting a deceptive stance (as opposed to a truthful stance) leads to observable changes in speaking and writing processes. The present study focuses on verbal and non-verbal disfluencies in speaking, and pauses and revision in writing, as these measures offer well-established means of capturing the temporal dynamics of language production. Disfluency measures have long been shown to be sensitive indicators of planning and monitoring demands in speech (Clark & Wasow, 1998; Goldman Eisler, 1968), and corresponding measures of pausing and revision behaviour provide comparable insights into the temporal and structural dynamics of written composition (Matsuhashi, 1981; Spelman Miller, 2006). In both speaking and writing, these processes vary systematically with factors such as expertise, genre and task demands (Cislaru et al., 2025; Clark, 1996), supporting their role as plausible markers of how a deceptive versus a truthful stance may alter processing demands during language production across modalities. The expectation is that adopting a deceptive stance will alter the processing demands of language production, resulting in measurable adjustments in disfluency behaviour in speaking and in pausing and revision behaviour in writing.

The second guiding research question is whether these observable changes will be more salient in one modality than the other. The expectation is that such alterations will be more pronounced in writing than in speaking given that writers can distribute processing over time, whereas speakers are constrained by the immediacy of the message formulation.

2. Method

Data in the present study were obtained in an online experimental setup where participants re-told events they witnessed in four elicitation films in their first language Swedish (henceforth, L1). The data are part of *The Lund Corpus on True and Invented Narratives in Speech and Writing* that is planned to be made publicly available in 2026.

2.1. Design

The experimental setup was a 2 × 2 study with modality (speaking/writing) and veracity (truthful/deceitful) as the conditions. All participants completed four different tasks where they re-told the events from one of the four films: one truthfully in speaking, one truthfully in writing, one deceitfully in speaking and one deceitfully in writing. The tasks were counterbalanced through a Latin squares design across

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veracity, modality and film so that all possible orders for truthful/deceitful and spoken/written narratives occurred for each film.

2.2. Participants

Inclusion criteria for participants were to be 18–40 years old, to have Swedish as an L1 and to have completed at least 1 year of university studies (= 60 ECTS). These criteria were used to avoid declining working memory due to age, to avoid effects of L2 due to, for example, delayed lexical retrieval or grammar (Barkaoui, 2019; Chenoweth & Hayes, 2001), and to ensure a comparable baseline concerning writing skills across participants. Exclusion criteria were any self-reported speaking, reading or writing difficulties to avoid possible impact on language processes. Participants were recruited through social media and posters at different universities in Sweden.

A total of 47 participants between 18 and 40 were recruited. Three participants were removed from the data set due to technological issues or data corruption, five for failing to follow the instructions to alter the narrative in the deceitful condition and eight for lying by omission (i.e. opting to not address the event that we prompted them to change). This left 31 participants (F = 15) between 20 and 37 years old (*mean = 26.935, SD = 5.013*) who produced 124 narratives in their L1.

2.2.1. Ethical considerations

As established by Swedish authorities and specified in the Swedish Act concerning the Ethical Review of Research involving Humans (2003:460), the present study does not require specific ethical review due to the following reasons: (1) it does not deal with sensitive personal data, (2) it does not use methods that involve a physical intervention, (3) it does not use methods that pose a risk of mental or physical harm, and (4) it does not study biological material taken from a living or dead human that can be traced back to that person. The data collection was conducted in accordance with the ethical act, and informed consent was obtained prior to participation in the study through a written form containing information about the data that would be collected and how it would be stored. All participants were informed that they had the right to withdraw from the study without consequences at any time. Participants were given compensation for their time.

2.3. Materials

Data were collected remotely through Zoom on participants' own computers due to the Covid-19 pandemic. Out of the 31 participants in the sample, 16 used a Windows computer and 15 a Mac computer. For the spoken tasks, 22 participants used a laptop-internal microphone and 9 participants an external microphone. For the written tasks, 27 participants used a laptop keyboard and trackpad and 4 participants an external keyboard and mouse. Spoken accounts were recorded using Audacity(R) (version 3.0.2, Audacity, 2021), and written accounts were recorded using the keystroke logging program ScriptLog, recording all keypresses during writing (Wengelin & Johansson, 2023).

The experimental stimuli consisted of four wordless elicitation films depicting minor misdemeanours. Each film had three characters with distinct roles: a witness, a perpetrator and a victim. English summaries of the films can be found in Appendix A.

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2.4. Copytask

In the preparation phase, participants performed a copytask in ScriptLog with the purpose of establishing a baseline for typing proficiency (Van Waes et al., 2021), and this revealed an average transition time of 0.127 ms between keypresses within words (SD = 0.022, min 0.085, max = 0.171), indicating a typing proficiency typical for L1 adults as demonstrated in other studies (Wengelin et al., 2024).

2.5. Procedure

The experimental procedure had three main parts: preparation, experimental tasks and debriefing. In the preparation, the software Audacity and ScriptLog were tested to ensure that they were correctly installed on participants' computers. Then, the copytask and a short test sample of audio recording took place, and the resulting files were transferred through a safe repository server.

In all four tasks, participants first watched a film and were then asked to *re-tell what happened, from start to finish with as many details as possible.* In the truthful condition, they were told to re-tell things *just as it happened*, and in the deceitful condition, they were told to *imagine that you want to protect person X (perpetrator) and lay blame on person Y (witness) instead.* They were not given a time or word limit for their narratives and were told that they were allowed to speak/write until they were done. These instructions were designed to elicit a sustained deceptive stance while allowing participants to produce naturalistic narratives at their own pace.

The experimental setup differs from real-life settings where people can be assumed to be more invested lying, for example, to profit or to help someone else – something which may influence the linguistic processes. To compensate for this and to motivate participants to be convincing, the study raised the stakes of the situation (Vrij, 2015) by informing participants that their accounts would be listened to/read by someone who would guess if they were true or not. During the debriefing, participants were informed that there would not be anybody who would guess if their narratives were true or not. See Appendix B for a translation of the complete instructions.

2.6. Transcription of spoken data

Transcriptions followed the CHAT-format (MacWhinney, 2000), and an example of this can be seen in Example 1. The transcriptions of the spoken data followed Modified Swedish Orthography inspired by Nivre et al. (1999) to ensure comparability across veracity conditions as well as to streamline measures across modalities (Gullberg et al., 2024). Silences of 200 ms or longer were coded as pauses, and filled pauses (e.g. saying 'eh') were also identified. Repetitions, repetitions with small changes and reformulations were also annotated in the transcripts.

2.7. Data sample and data curation

The data used in this study are openly available through the OSF repository at https://doi.org/10.17605/OSF.IO/7RQ9G. The final data sample consisted of 124 narrative accounts: 31 spoken truthful narratives, 31 spoken deceitful narratives, 31 written

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Example 1. Example from one of the transcripts. Parentheses with a punctuation mark indicate silent pauses and 'eh' indicates filled pauses. Pronunciation variations are followed by a lexeme correction in square brackets

eh ja eh yes	(.) eh de [: det] (.) eh it	Är be.PRS	då then	ett INDEF.C.SG		
trädgårdscafé garden.café	(.) eh och (.) eh and	eh (.) eh de [: det] eh (.) eh there	sitt-er sit-PRS			
en INDEF.N.SG	tjej girl	på (.) on (.)	en INDEF.N.S	stol chair	och and	läs-er read-PRS
en INDEF.N.SG	tidning magazine	å [: och] and	ha-r have-PRS	sin eh 3SG.REFL.POSS.C	väska bag	
bredvid next-to	sig 3SG.REFL					

'Eh, yes (.) eh so it is a garden café then (.) eh and eh (.) eh a girl sits on (.) a chair and reads a magazine, and she has her eh bag next to her'.

truthful narratives and 31 written deceitful narratives. These data differ from previous studies where, in speaking, data have often been in the form of answers in interview settings (Vrij et al., 2006; Walczyk et al., 2003), as well as in writing, where elicited texts have been shorter (Banerjee et al., 2014). As a contrast, our data sample consists of longer, un-interrupted narratives in both speaking and writing. Table 1 offers an overview of the measures used in this study. Important to note is that the measures are not compared across modalities due to methodological challenges related to differences between speaking and writing (Gullberg et al., 2024).

Text length is measured as the number of characters in the text, and this is divided into two categories: final text length and linear text length, as can be seen in Table 2. This is a useful distinction when examining written language production, since in writing, **the final text** (i.e. the text that the writer hands over to the reader) will differ from **the linear text** (i.e. the text that is produced during the writing process). The linear text is usually longer and includes all characters that were produced during writing, that is, all characters in the final text plus the deleted characters. For speaking, the final text length was measured as the number of characters in the transcripts minus the characters that were involved in repetitions and reformulations. Characters reflecting repetitions and reformulations were then instead included in the measure for linear text length.

Typically, text length has been measured as the number of words in both speaking and writing, but when examining real-time language production, measuring the number of words poses challenges. For instance, it is not clear how to deal with word fragments in both speaking and writing and how to deal with word repetitions in speaking and deleted words in writing. Instead, number of characters allows for a dynamic measurement of on the one hand how much that was produced in total (linear text) as well the length of the message (final text) without having to set up criteria for what constitutes a word (Gullberg et al., 2024).

Different pause criteria for speaking and writing were adopted due to modality differences where speaking is faster than writing. In speaking, non-verbal-disfluencies in the form of pauses were categorised into silent pauses and filled

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Table 1. Measures used for examining cognitive load during speaking and writing

Text length	Final text length	*Speaking*: the total number of characters in the spoken text excluding characters involved in speech that were repeated or reformulated *Writing*: the total number of characters in the final written product. Characters include letters, numbers, punctuation and space.
	Linear text length	*Speaking*: the number of characters in the spoken text including characters that are repeated and reformulated *Writing*: the total number of characters written during the writing process. Characters include letters, numbers, punctuation and space.
	Time on task	The total speaking or writing time, measured in seconds and milliseconds. *Speaking*: from the first vocalisation to the last. *Writing*: from the first keypress to the last keypress.
Pauses	Silent pauses (speaking only)	The number of silent pauses in speaking, defined as 200 ms of silence or longer.
	Filled pauses (speaking only)	The number of filled pauses in speaking, any 'eh' or 'mm' sound during speech.
	Total number of pauses	The total number of pauses. *Speaking*: silent and filled pauses counted together. *Writing*: this include pauses/inactivities between keypresses of 2000 ms or longer.
	Verbal disfluency length/deleted characters	The difference between the number of characters in the final text and the linear text. *Speaking*: the total number of repeated, changed or reformulated characters. *Writing*: the number of deleted characters in writing.

Note: The different rows show the different measures that are used in this study, and how this was operationalised.

pauses. **Silent pauses** were operationalised as silences of 200 ms or longer (Goldman Eisler, 1968), and **filled pauses** were operationalised as hesitations with vocal markers such as 'eh' or 'mm'. The **total number of pauses** in speaking include the sum of the number of silent and filled pauses. The operationalisation of pauses in speaking differs from some of the previous studies that have examined pausing in relation to deception, commonly, mainly filled pauses (or speech hesitations) have been considered (see DePaulo et al., 2003 for an overview). However, some have also used thresholds for silent pause identification, like Mann et al. (2002) who used a pause threshold of 500 ms.

In writing, a pause was operationalised as an inactivity between keypresses of 2000 ms or longer. Importantly, pauses always occur between each keypress during keyboard writing. To manage the vast amount of pause data that is produced during a data collection with keystroke logging, the common procedure in writing studies is to apply ad hoc criteria to explore pausing behaviour. A commonly used ad hoc criterion is 2000 ms (Wengelin, 2006). There are writing studies that have adopted more dynamic pause thresholds that take into consideration individual variations between writers or across the writing session (Chenu et al., 2014; Olive, 2014), but such approaches are more appropriate in between-subject designs, where they serve the purpose to eliminate variations between writers (van Waes et al., 2021). Here, a

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Table 2. Final and linear text length examples

	Speaking	Length
Final text	*och så finns det en ingång in till vad som verkar vara ett soprum eller garage där det kan finnas cyklar på den här garageuppfarten som består av grus*	150
English translation	*and then there is an entrance to what seems to be a garbage room or garage where there could be bicycles on this driveway that is made of gravel*	
Linear text	*och så finns det **lite** [///] < **en liten** > [/] en ingång in till vad som verkar vara ett soprum eller garage där det kan finnas cyklar på den här garageuppfarten som **är** [//] består av grus*	167
English translation	*and then there is **little** [///] < **a little** > [/] an entrance to what seems to be a garbage room or garage where there could be bicycles on this driveway that **is** [//] is made of gravel*	
Verbal disfluency		17
	Writing	**Length**
Final text	*Väskan välter ner på marken och vad som verkar vara en flaska solskyddsmedel ramlar ut.*	87
English translation	*The bag falls down on the ground and what seems to be a bottle of sunscreen lotion falls out.*	
Linear text	*<MOUSECLICK > Väskan välter ner på marken och ut ramlar **de** < BACKSPACE2 > **en** < BACKSPACE3 > vad som verkar vara en **sol** < 6.383 > **d** < BACKSPACE4 > flaska sol**k** < BACKSPACE1 > skyddsme**l** < BACKSPACE1 > del ramlar **u** < BACKSPACE1 > <MOUSECLICK > <BACKSPACE8 > .*	107
English translation	*<MOUSECLICK > The back falls down on the ground and out falls **the** < BACKSPACE2 > **one** < BACKSPACE3 > what seems to be a **sun** < 6.383 > **d** < BACKSPACE4 > bottle sunk < BACKSPACE1 > screen lo**t** < BACKSPACE1 > tion falls **u** < BACKSPACE1 > <MOUSECLICK > <BACKSPACE8 > .*	
Deleted characters		20

Note: The right-most column *Length* shows the calculated number of characters for a final text sample and a linear text sample in both writing and speaking. Translations are made as close as possible to the original Swedish, hence the non-idiomatic expressions.

fixed pause threshold is assumed to be sufficient for comparing the writing processes in the within-subject design that is used, especially since the participants are adults with high typing proficiency, meaning that the fluctuation in pausing due to low-level processes related to transcription and orthography can be expected to be very low.

Following from these different pause criteria across speaking and writing is an expectation that pausing behaviour will differ across the modalities. Such differences are also expected based on the inherent constraints that characterise speaking and writing, respectively, especially the fact that speaking is produced much faster than writing.

The **verbal disfluency length/deleted characters** is the difference between the final text length and the linear text length, that is, calculated by subtracting the number of characters in the final text from the number of characters in the linear text. In speaking, this measure is extracted from the transcripts and measures the number of characters that were repeated, changed or reformulated; in writing, this measures the number of characters that were deleted.

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2.8. Analyses

All narratives were manually checked to ensure that the truthful condition only contained narratives that were truthfully accounting for the events in each film, respectively, and that the narratives in the deceitful condition had been altered according to the instructions. In the analytical approach, increased planning was operationalised as the total number of pauses for both speaking and writing, as well as the verbal disfluency length in speaking and number of deleted characters in writing. Previous studies on deception, as well as studies of language production processes in both speaking and writing, often use proportional measures (Barkaoui, 2019) – such as number of disfluencies in speaking and number of pauses and deletions in writing divided by text length – to account for variability in output. In contrast, the present study adopts a different analytical approach.

Generalised mixed effect models (GLMMs) were fitted using the *lme4 package* (version 1.1.35.3, Bates et al., 2015) and *lmerTest* (version 1.1-3, Kuznetsova et al., 2017) in R (version 2024.12.1.563, RStudio Team, 2020). Because the dependent variables represented count data (e.g. number of pauses, disfluences or deletions), models with a Poisson distribution were used as the default. When the Poisson models exhibited overdispersion or failed to converge, a Negative Binomial distribution was employed instead, as it provides more flexible variance structure suitable for over-dispersed count data. All models were checked for overdispersion using *performance* (version 0.15.2, Lüdecke et al., 2021). Model assumptions were evaluated through visual inspection of residual plots (normality, homoscedasticity, linearity and independence). All models, except one, revealed no apparent violations. In the model for filled pauses, the inspection of residuals revealed a deviation from linearity for the predictor *final text length.* To address this, a log transformation was applied to this predictor. Post-transformation, the residual diagnostics indicated that model assumptions were adequately met. Participants and film were added as random effects, and random slopes were added following the recommendations of Matuschek et al. (2017) and retained if they improved model fit and did not cause convergence issues. The full statistical analyses can be found in a markdown document available in the Open Science Framework at https://doi.org/10.17605/OSF.IO/7RQ9G.

Data summaries were made with *vtable* (version 1.4.7, Huntington-Klein, 2024) and data wrangling performed with *tidyverse* (version 2.0.0, Wickham et al., 2019), *dplyr* (version 1.1.4, Wickham et al., 2023), *datawizard* (version 0.13.0, Patil et al., 2022) and broom (version 1.0.6, Robinson et al., 2024). Further *sjPlot* (version 2.8.16, Lüdecke, 2024) was used to print models, *ggeffects* (version 2.0.0, Lüdecke, 2018) to make initial regression graphs and *ggplot2* (version 3.5.1, Wickham, 2016) to make graphs.

3. Results

The results are presented in two sections: first follows the results for speaking and then the results for writing. In both sections, first we the report the results for the pause analyses, that is, in speaking, the non-verbal disfluencies and then the results for the verbal disfluencies (speaking) and revisions (writing). Note that no comparisons across the modalities are conducted, only between the veracity conditions within the modalities. Table 3 shows the descriptive statistics for the different outcome variables in the truthful and deceitful condition for both speaking and writing.

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Table 3. Data sample in speaking and writing

	Spoken modality							
	Truthful condition				Deceitful condition			
Measure	Mean	St. Dev.	Min.	Max.	Mean	St. Dev.	Min.	Max.
Final text length (characters)	1332	575	651	2999	1296	684	457	3429
Linear text length (characters)	1392	614	671	3221	1344	706	476	3480
Time on task (s)	160.3	69.2	69	338	151.2	75	51	359
Number of silent pauses	48	24	15	115	46	24	14	111
Number of filled pauses	26	16	2	66	24	18	0	79
Total number of pauses	74	34	36	181	70	34	20	178
Verbal disfluency length	60.2	62.8	0	223	48.2	46.5	0	186
	Written modality							
	Truthful condition				Deceitful condition			
	Mean	St. Dev.	Min.	Max.	Mean	St. Dev.	Min.	Max.
Final text length (characters)	1435	785	523	3838	1390	723	721	4246
Linear text length (characters)	1685	1018	559	4610	1587	825	782	4723
Time on task (s)	531.9	327	169.5	1369	501.7	272.2	212	1256.8
Total number of pauses	38	30	5	119	35	28	5	125
Total number of deleted characters	249.4	274.6	7	1351	196.9	146.7	11	601

Note: The top half of the table shows the descriptive statistics for the spoken data sample, and the bottom half of the table shows the descriptive statistics for the written data sample.

3.1. Spoken modality

3.1.1. Non-verbal disfluencies

The non-verbal disfluencies are divided into the total number of pauses, the number of silent pauses and the number of filled pauses. The best-fit model for total pauses included an interaction between veracity and text length, with participant as a random intercept. For silent pauses, the best-fit model included text length as a covariate with participant as a random intercept. For filled pauses, the best-fit model included an interaction between veracity and text length, with participant intercepts. Full model results are presented in Table 4.

For total and filled pauses, veracity was a significant predictor showing a decrease in the number of pauses in the deceitful condition (see Figure 1). However, veracity was not a significant predictor of the number of silent pauses. Final text length was a significant predictor in all three models.

A significant interaction between veracity and text length was also observed for filled pauses (see Figure 2), where longer final text length in the deceitful condition showed an increase in the number of filled pauses, whereas shorter deceitful texts had fewer filled pauses than truthful ones.

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Table 4. Result table of the generalised linear mixed effects model for non-verbal disfluencies, divided in total pauses, silent pauses and filled pauses in speaking

	Total pauses (R^2 = 0.918)				
	Incidence rate ratio	*SE*	*CI*	*z-value*	*p-value*
Intercept (truthful)	38.959	3.957	31.928–47.540	36.064	**<0.001**
Deceitful	0.857	0.065	0.739–0.994	-2.046	**0.041**
Final text length	1.529	0.097	1.350–1.731	6.692	**<0.001**
Deceitful x Final text length	1.077	0.049	0.986–1.178	1.642	0.101
	Silent pauses (R^2 = 0.887)				
	Incidence rate ratio	*SE*	*CI*	*z-value*	*p-value*
Intercept (truthful)	21.559	1.900	18.138–25.625	34.838	**<0.001**
Deceitful	0.967	0.036	0.899–1.040	-0.903	0.367
Final text length	1.713	0.092	1.541–1.903	9.982	**<0.001**
	Filled pauses (R^2 = 0.934)				
	Incidence rate ratio	*SE*	*CI*	*z-value*	*p-value*
Intercept (truthful)	19.215	2.623	14.705–25.108	21.655	**<0.001**
Deceitful	0.871	0.055	0.769–0.986	-2.174	**0.030**
Final text length	1.535	0.313	1.030–2.288	2.103	**0.035**
Deceitful × Final text length	1.358	0.172	1.060–1.740	2.419	**0.016**

Note: The columns show the incidence rate ratios, the standard error, the confidence interval, the z-value and the p-value. The different outcome variables are given in the rows under each heading. Significant p-values are in bold.

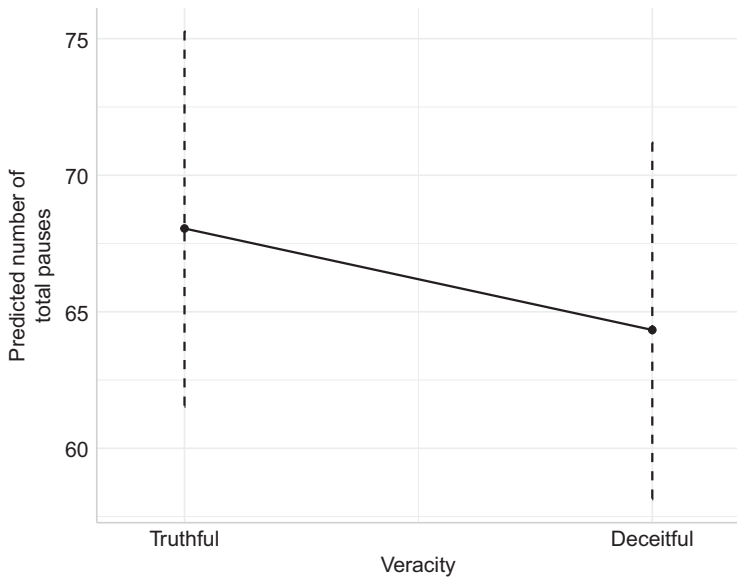

Figure 1. Model predictions for the total number of pauses in truthful vs deceitful narratives in speaking. The *y*-axis shows the predicted number of filled pauses, and the *x*-axis shows the two veracity conditions. The error bars show the 95% confidence interval.

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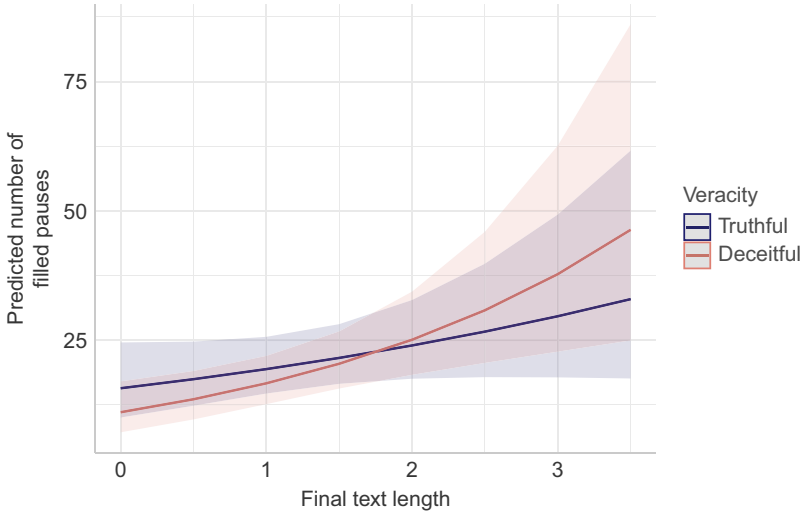

Figure 2. Predicted number of filled pauses in the deceitful vs truthful condition on final text length in speaking. The *y*-axis shows the total number of filled pauses, and the *x*-axis shows the final text length. The ribbons show the 95% confidence interval.

3.1.2. Verbal disfluencies

The best-fit model included text length as a co-variate to veracity, with no interactions and with participant as a random intercept. The full model results are presented in Table 5. Veracity did not predict the total length of verbal disfluencies, but final text length did predict the verbal disfluency length.

3.2. Written modality

3.2.1. Pauses

The best-fit model included a three-way interaction between veracity, final text length and time on task, with participant as random intercepts. The full model results can be seen in Table 6. While neither veracity nor text length alone significantly predicted the number of pauses, time on task did. Further, there was significant interactions between all predictors, showing that (1) writers who spend more time on task tend to have more pauses in the deceptive condition, (2) writers who spend relatively short time on task typically do not show any pausing differences between

Table 5. Result table of the generalised linear mixed-effects model for the total length of verbal disfluencies in speaking

	Number of disfluent characters (R^2 = 0.671)				
	Estimates	*SE*	*CI*	*t-value*	*p-value*
Intercept (truthful)	16.352	6.255	7.726–34.609	7.305	**<0.001**
Deceitful	0.827	0.149	0.581–1.178	-1.052	0.293
Final text length	1.954	0.500	1.183–3.227	2.617	**0.009**

Note: The columns show the incidence rate ratio, the standard error, the confidence interval, the z-value and the p-value. The different outcome variables are given in the rows under each heading. Significant p-values are in bold.

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Table 6. Result table of the generalised linear mixed-effects model for the number of pauses in writing

	Number of pauses (R^2 = 0.940)				
	Incidence rate ratio	*SE*	*CI*	*z-value*	*p-value*
Intercept (truthful)	31.525	2.738	26.591–37.375	39.737	**<0.001**
Deceitful	0.922	0.056	0.819–1.038	-1.349	0.177
Final text length	1.278	0.172	0.981–1.665	1.819	0.069
Time on task	1.169	0.027	1.118–1.223	6.821	**<0.001**
Deceitful × Final text length	0.684	0.089	0.530–0.882	-2.924	**0.003**
Deceitful × Time on task	1.050	0.024	1.004–1.097	2.150	**0.032**
Final text length × Time on task	0.939	0.022	0.896–0.984	-2.651	**0.008**
Deceitful × Final text length × Time on task	1.051	0.023	1.007–1.096	2.304	**0.021**

Note: The columns show the incidence rate ratio, the standard error, the confidence interval (95%), the z-value and the p-value. The different outcome variables are given in the rows. Significant p-values are in bold face.

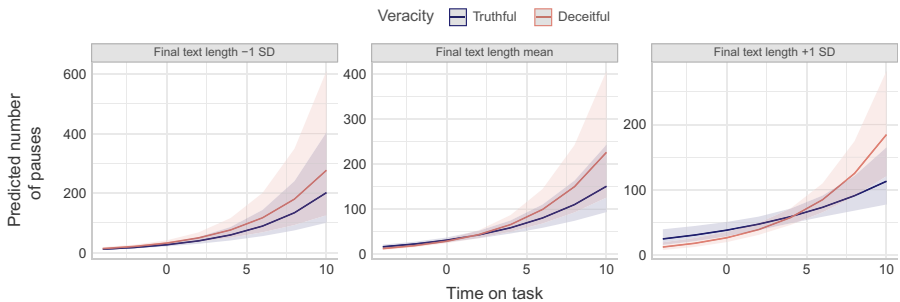

Figure 3. Predicted number of pauses in the deceitful vs truthful condition in writing for shorter final text length (left), mean final text length (centre) and longer final text length (right) on time on task. The *y*-axis shows the predicted number of pauses, and the *x*-axis of each plot shows the time on task, divided by different final text length (the three plots). The ribbons show the 95% confidence interval.

the truthful and the deceitful condition, and (3) writers who produce longer final texts tend to have differences between truthful and deceitful production moderated by time on task; see Figure 3 for an illustration of this.

3.2.2. Revisions

The best-fit model included veracity, text length and time on task as predictors, as well as interactions between veracity and text length and veracity and time on task and random intercepts for participants. The full result of the model can be seen in Table 7.

The results revealed no significant main effect of veracity on the number of deleted characters. However, both final text length and time on task significantly predicted the number of deleted characters. There was also a significant interaction between veracity and final text length, where longer final text lengths in the truthful condition were associated with a higher number of deleted characters, illustrated in Figure 4.

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Table 7. Result table of the generalised linear mixed-effects model for the number of deletions in writing

	Number of deleted characters (R^2 = 0.810)				
	Incidence rate ratio	*SE*	*CI*	*z-value*	*p-value*
Intercept (truthful)	158.761	16.094	130.152–193.657	49.987	**<0.001**
Deceitful	1.009	0.106	0.821–1.239	0.082	0.934
Final text length	1.594	0.315	1.082–2.347	2.359	**0.018**
Time on task	1.157	0.053	1.057–1.266	3.175	**0.001**
Deceitful × Final text length	0.586	0.128	0.382–0.900	-2.439	**0.015**
Deceitful × Time on task	1.091	0.063	0.974–1.221	1.508	0.132

Note: The columns show the incidence rate ratio, the standard error, the confidence interval (95%), the z-value and the p-value. The different predictors are given in the rows. Significant p-values are in bold.

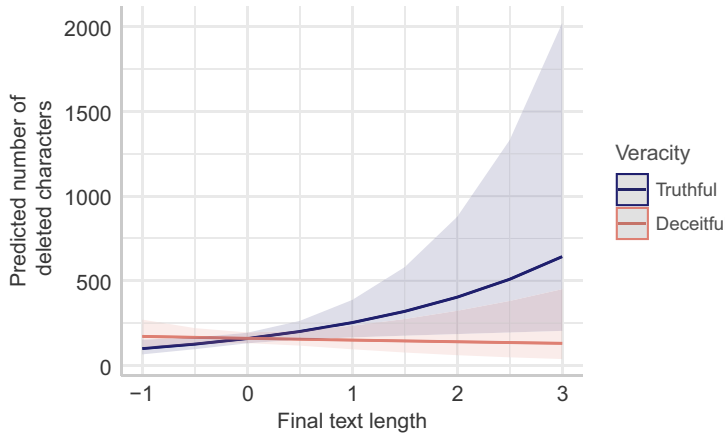

Figure 4. The predicted number of deleted characters as modulated by final text length in writing. The *y*-axis shows the predicted number of deleted characters, and the *x*-axis shows the log transformed text length. The ribbons show the 95% confidence interval.

4. Discussion and conclusions

The aim of this study was to examine the effect of adopting a deceptive stance, that is, a sustained communicative orientation towards deception during extended language production, in real-time speaking and writing. To summarise, the first research question asked whether adopting such a stance would lead to observable alterations in the language production processes. Based on previous research, we expected deception to affect markers of processing such as verbal and non-verbal disfluencies in speaking, pausing and revisions in writing (Mann et al., 2002; Vrij, 2015). The results revealed that these processes were indeed influenced by deception, though not in a uniform pattern: in some cases, there were no differences between the veracity conditions, and in some cases, pausing and revision increased during deception, while other findings revealed that those behaviours occurred less during deception. The second research question addressed whether observable traces of deception during language production would be more salient in one modality than the other. It was expected that alterations in processing demands would be more evident in writing, given that writers can distribute writing processes over time, whereas

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speakers must manage planning and monitoring under more immediate temporal constraints. Moreover, spoken production involves consideration of a possible listener's perspective, a listener who in a real-life setting can interrupt, but also be helpful through interactions, feedback and questions. While there was no listener present during the data collection, all participants were aware of that their spoken accounts would be listened to afterwards and that the experimental leader was nearby. From this, it is reasonable to expect that similar aspects of communicative monitoring persisted although no actual listener was present. The results were consistent with this expectation, indicating more processing adjustments during deceptive writing than during deceptive speaking.

4.1. Deceptive stance and language production

Regarding the first question, the results showed that in speaking, there was a main effect of deception on the non-verbal disfluencies, operationalised as the total number of pauses. This effect was also present when limiting the analysis to only filled pauses, but no main effect was found when limiting the analysis to the number of silent pauses, in line with the findings in the meta-analysis by DePaulo et al. (2003). The total number of pauses and the number of filled pauses, analysed separately, revealed that deceptive speech was found to contain fewer total and fewer filled pauses. The importance of distinguishing filled pauses from silent pauses is supported by previous studies, which has identified increases in speech hesitations (e.g. Feeley & deTurck, 1998; Knapp et al., 1974; Mann et al., 2002) and speech disturbances (Bond et al., 1985; DePaulo et al., 1982; Kasl & Mahl, 1965) during deception. These constructs overlap with filled pauses in their operationalisation but may also include features of verbal disfluencies, such as false starts and word repetition.

Notably, an interaction effect showed that an increase in filled pauses occurred primarily in longer deceptive texts, whereas shorter texts revealed the opposite pattern. This suggests that the sustained effort required to maintain a deceptive stance may dynamically shape processing demands and influence how speakers regulate monitoring and control during speech planning. Specifically, speakers may suppress filled pauses in shorter narratives to regulate overt cues to deception, whereas in longer narratives, the extended maintenance of deceptive stance may tax these control processes, resulting in an increased number of filled pauses (cf., Hartwig & Granhag, 2015).

In writing, the results showed no main effect of veracity on the number of pauses. However, a significant interaction emerged: when writers spent more time on task in the deceitful condition, the number of pauses increased more than in truthful texts. This finding partly supports our expectation of an increase in the number of pauses and aligns with previous findings (Banerjee et al., 2014). Conversely, when writers spent less time on the task, deceitful texts were associated with fewer pauses compared to truthful ones. This could be explained by the deception being short enough to not incur increased processing demands. In contrast, during longer writing sessions, the sustained effort required to maintain a deceptive stance may heighten processing demands and challenge writers' ability to regulate the production process effectively. This interpretation is consistent with the self-presentation theory of deception (DePaulo, 1992), which posits that successful deception relies on continuous monitoring and control to suppress cues that might reveal the lie.

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There was also an interaction between text length and veracity, where longer deceitful texts contained fewer pauses than truthful ones. One explanation is that during deception, the extra effort of fabricating content alters how writers allocate processing resources for planning and editing. As a result, they may focus on producing a coherent narrative flow rather than engaging in extensive revision, such as evaluation and re-readings to refine the text. In contrast, when writing truthfully, they may pause more frequently to evaluate, re-read and ensure that their descriptions are as clear and detailed as possible.

Collectively, the pause-related results in the written modality suggest that deceptive intent alters how writers regulate processing demands over time. Rather than reflecting a uniform increase in difficulty, pausing appears to be strategically adjusted depending on the duration and length of the writing task.

In terms of verbal disfluencies in speaking, there was no effect of veracity on the length of verbal disfluencies. Important to note is that the operationalisation of verbal disfluencies used in this study differs from previous studies such as Bond et al. (1985) and DePaulo et al. (1982), where the number of disfluencies were measured, instead of here where the characters in the transcript involved in repetitions and reformulations were calculated.

In writing, there was no main effect of veracity on the number of deletions in writing, but there was an interaction effect between final text length and veracity showing that there were fewer deleted characters in longer final texts. These findings suggest that writing deceitfully does not result in more revisions; rather, it may reflect tighter control over the production process and increased pre-planning, whereby writers delete less because they generate less content overall. Although the instructions emphasised that the writers should be as detailed as possible, it is possible that, to manage the altered processing demands during deception, writers adopt a strategy focused on conveying only the central and necessary elements of the events. In contrast, truthful writing may allow for greater elaboration, reflection and revision of less central details. This interpretation aligns with previous findings that deceptive accounts tend to be less detailed (DePaulo et al., 2003) and that deceptive tasks are associated with reduced cognitive flexibility (Leins et al., 2012; Vrij et al., 2008).

4.2. Deceptive stance and modality differences

Regarding the second research question, the results show that there are cross-modality similarities, but also important differences. In speaking, a deceptive stance was associated with fewer total and filled pauses. In writing, a deceptive stance led to an increase in pausing with longer writing times and a decrease in pausing in longer texts. Additionally, deceivers showed a reduction in the number of deleted characters in longer final texts.

While deception influenced both speaking and writing through changes in pause dynamics and revision behaviour – suggesting that adjustments in control and monitoring processes occur across both modalities to regulate planning and editing – these effects were more salient and appeared across a greater number of markers in the written modality. One possible explanation is the more immediate time pressure in speaking: speakers must monitor and produce output in real time, limiting opportunities for reflection and adjustment. In contrast, writers can distribute processing demands more flexibly throughout the writing session. However, this

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does not necessarily mean that deception is easier to detect in writing, given the complex interplay between writing time, text length and deceptive intent.

Taken together, these results suggest that writing was more readily influenced by deceptive intent than speaking, with effects appearing across a greater number of process markers. Yet, the results suggests that the direction of these effects is difficult to predict, as they likely reflect a dynamic interaction between adjustments in control and monitoring to regulate deceptive output and the sustained processing demands that vary with task duration and text length.

4.3. Theoretical implications

The study set out to explore how speakers and writers solved the problem of deciding what to say and how to say it while operating under the additional constraint of adopting a deceptive stance during language production. As the results show, deception influenced both speaking and writing, leaving traces of altered processing demands across both modalities. In speaking, this was reflected in a decreased number of total pauses, specifically driven by a decrease in the number of filled pauses. In writing, the frequency of pausing interacted with both time on task and text length, indicating that the influence of deception varied dynamically with these factors. One observation is that when faced with altered processing demands, speakers and writers adapt their production processes differently to maintain communicative coherence. These adjustments depend on inherent characteristics of the modalities. Speaking leaves little room for reflection, typically involves real-time monitoring of their own language output under strict temporal constraints, which may limit opportunities for overt disfluencies during deception. In contrast, the written modality offers the opportunity to pause, evaluate and plan, whenever this is needed, resulting in different patterns of processing adjustments that unfold over longer time scales. Theoretically, these findings contribute to our understanding of how control and monitoring processes regulate language production under competing communicative goals. They suggest that while the same underlying systems for planning and execution are engaged across modalities, their temporal organisation and flexibility differ, offering insight into how speakers and writers manage processing demands when communicative intent is constrained by deception.

4.4. Limitations and future directions

Several methodological limitations should be considered when interpreting the findings of this study. First, participants' motivation to deceive was relatively low: their only incentive was to make an unknown recipient believe their account. In real-world contexts, deception often occurs under high pressure with strong personal or social consequences. Moreover, in speaking, participants did not engage with a live listener, which may have reduced the social and cognitive demands typically involved in face-to-face communication. Future research could introduce higher stakes deception scenarios or interactive settings to better approximate real-world communicative contexts.

Second, this study focused exclusively on the production side of deception and did not evaluate the quality, credibility or perceived believability of the deceptive output. As such, it remains unclear whether the observed linguistic patterns correspond to

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successful or unsuccessful deception. Future studies could address this by incorporating rating tasks or lie-detection accuracy measures to examine the relationship between production markers and deception outcomes.

Third, this study is based on elicited data, and as such, there might be differences in how language production processes are affected in real-world cases when people lie. However, by examining elicited data collected in a controlled environment, a baseline for possible alterations in language production processes can be established and then built upon in future research, for example, in ecologically valid contexts – such as forensic interviews or written witness statements – could also help bridge experimental and applied perspectives on deception.

Finally, while this study examined how adopting a deceptive stance influences language production at a global level, future research could move towards a more fine-grained analysis by comparing deceptive and truthful segments within the same narrative. Such an approach would allow for a better understanding of how linguistic and cognitive strategies fluctuate within deceptive accounts and how local shifts in veracity affect production processes. For example, individual or dynamic pause thresholds could be used in a future study.

5. Conclusion

This study demonstrates that adopting a deceptive stance in language production leads to measurable alterations in linguistic processes in both speaking and writing. These findings indicate that deception influences processing demands in complex and modality-specific ways, rather than through a uniform pattern across conditions. The results point to a dynamic interplay between control, monitoring and evolving processing requirements shaped by modality and task characteristics. In speaking, deceptive intent was associated with fewer total pauses – particularly in longer texts – suggesting that speakers adjust their production processes to regulate markers of uncertainty. In writing, deception manifested more consistently across multiple markers, including interactions between pausing, writing time and text length, alongside reduced revision activity. This pattern suggests that writers manage the demands of deception by modulating how planning, monitoring and revision unfold over time.

Together, these findings contribute to our over-arching understanding of language production processes and how this is manifested during speaking and writing. It further underscores the role of modality in shaping deceptive language production and highlights how processing demands are dynamically regulated under competing communicative goals. Rather than being simple indicators of strain, markers of linguistic processing, such as pauses and revisions, appear to reflect ongoing adjustments that align with the communicative intent.

These insights carry important implications for forensic linguistics. Recognising how deceptive behaviour manifests differently in speech and writing can inform the evaluation of suspect statements, witness accounts and testimonies in legal settings. Notably, while more observable markers emerged in written language, these patterns were complex rather than consistent, suggesting that written accounts offer a rich but nuanced window into deception-related processing dynamics and hold potential for advancing forensic analysis.

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Data availability statement. The data that support the findings of this study are openly available in the Open Science Framework at https://doi.org/10.17605/OSF.IO/7RQ9G.

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Author contribution. Kajsa Gullberg: conceptualisation, data curation, formal analysis, investigation, methodology, validation, visualisation, writing – original draft, writing – review and editing.
Victoria Johansson: conceptualisation, funding acquisition, methodology, project administration, supervision, validation, writing – original draft, writing – review and editing.
Roger Johansson: conceptualisation, formal analysis, funding acquisition, methodology, supervision, validation, writing – review and editing.

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References

Adams, S. H., & Jarvis, J. P. (2006). Indicators of veracity and deception: An analysis of written statements made to police. *The International Journal of Speech, Language and the Law*, 13(1), 1–22. https://doi.org/10.1558/sll.2006.13.1.1.

Amado, B. G., Arce, R., Fariña, F., & Vilariño, M. (2016). Criteria-based content analysis (CBCA) reality criteria in adults: A meta-analytic review. *International Journal of Clinical Health Psychology*, 16, 201–210. https://doi.org/10.1016/j.ijchp.2016.01.002.

Audacity. (2021). *Audacity(R): Free audio editor and recorder*. https://www.audacityteam.org/

Baddeley, A. D. (2007). *Working memory, thought, and action*. Oxford University Press.

Banerjee, R., Feng, S., Kang, J. S., & Choi, Y. (2014). Keystroke patterns as prosody in digital writing: A case study with deceptive reviews and essays. In A. Moschotti, B. Pang, & W. Daelemans (Eds.), *2014 conference on empirical methods in natural language processing, 1469–1473*. Association for Computational Linguistics. https://doi.org/10.3115/v1/D14-1155.

Barkaoui, K. (2019). What can L2 writers' pausing behavior tell us about their L2 writing processes? *Studies in Second Language Acquisition*, 41(3), 529–554. https://doi.org/10.1017/S027226311900010X.

Bates, D., Maechler, M., Bolker, B., & Walker, S. (2015). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software*, 67(1), 1–48. https://doi.org/10.18637/jss.v067.i01.

Bond, C. F., Kahler, K. N., & Paolicelli, L. M. (1985). The miscommunication of deception: An adaptive perspective. *Journal of Experimental Social Psychology*, 21(4), 331–345. https://doi.org/10.1016/0022-1031(85)90034-4.

Bott, L., & Williams, E. (2019). Psycholinguistic approaches to lying and deception. In J. Meibauer (Ed.), *The Oxford handbook of lying* (pp. 71–82). Oxford University Press.

Brandt, D. (2015). *The rise of writing: Redefining mass literacy*. Cambridge University Press.

Chafe, W., & Danielwicz, J. (1987). *Properties of spoken and written language*. California University, Berkeley Center for the Study of Writing.

Chenoweth, N. A., & Hayes, J. R. (2001). Fluency in writing: Generating texts in L1 and L2. *Written Communication*, 18, 80–98.

Chenu, F., Pellegrino, F., Jisa, H., & Fayol, M. (2014). Interword and intraword pause threshold in writing. In *Frontiers in Psychology* (Vol. 5). https://doi.org/10.3389/fpsyg.2014.00182

Christiansen, M. H., & Chater, N. (2016). The now-or-never bottleneck: A fundamental constraint on language. *Behavioral and Brain Sciences*, 39, 1–72. https://doi.org/10.1017/S0140525X1500031X.

Cislaru, G., Doquet, C., & Olive, T. (2025). Introduction to the special issue | operating units in written language performance: Linguistic and behavioral perspectives. *Journal of Writing Research*, 16(3), 359–375. https://doi.org/10.17239/jowr-2025.16.03.01.

Clark, H. H. (1996). *Using language*. Cambridge University Press.

Clark, H. H., & Wasow, T. (1998). Repeating words in spontaneous speech. *Cognitive Psychology*, 37, 201–242. https://doi.org/10.1006/cogp.1998.0693.

Cowan, N. (2010). The magical mystery four: How is working memory capacity limited, and why? *Current Directions in Psychological Science*, 19(1), 51–57. https://doi.org/10.1177/0963721409359277.

DePaulo, B. M. (1992). Nonverbal behavior and self-presentation. *Psychological Bulletin*, 111(2), 203–243. https://doi.org/10.1037/0033-2909.111.2.203.

DePaulo, B. M., Kashy, D. A., Kirkendol, S. E., Wyer, M. M., & Epstein, J. A. (1996). Lying in everyday life. *Journal of Personality and Social Psychology*, 70(5), 979–995. https://doi.org/10.1037/0022-3514.70.5.979.

DePaulo, B. M., Lindsay, J. J., Malone, B. E., Muhlenbruck, L., Charlton, K., & Cooper, H. (2003). Cues to deception. *Psychological Bulletin*, 129(19), 74–118. https://doi.org/10.1037/0033-2909.129.1.74.

DePaulo, B. M., Rosenthal, R., Rosenkrantz, J., & Green, C. R. (1982). Actual and perceived cues to deception: A closer look at speech. *Basic & Applied Social Psychology*, 3(4), 291–312.

Du Bois, J. W., & Giora, R. (2014). From cognitive-functional linguistics to dialogic syntax. *Cognitive Linguistics*, 25(3), 351–357. https://doi.org/10.1515/cog-2014-0023.

Feeley, T. H., & deTurck, M. A. (1998). The Behavioral correlates of sanctioned and unsanctioned deceptive communication. *Journal of Nonverbal Behavior*, 22(3), 189–204. https://doi.org/10.1023/A:1022966505471.

Fromkin, V. S. (1973). *Speech errors as linguistic evidence*. Mouton.

Goldman Eisler, F. (1968). *Psycholinguistics; Experiments in spontaneous speech*. Academic Press.

Granhag, P. A., Vrij, A., & Verschuere, B. (2015). *Detecting deception: Current challenges and cognitive approaches*. Wiley-Blackwell.

Gullberg, K., Johansson, V., & Johansson, R. (2024). In scriptura Veritas? Exploring measures for identifying increased cognitive load in speaking and writing. *Language*, 9(3), 1–32. https://doi.org/10.3390/languages9030085.

Hartsuiker, R. J., & Strijkers, K. (2023). *Language production*. Routledge.

Hartwig, M., & Granhag, P. A. (2015). Exploring the nature and origin of beliefs about deception: Implicit and explicit knowledge among lay people and presumed experts. In *Detecting deception: Current challenges and cognitive approaches* (pp. 125–154). Wiley-Blackwell.

Hayes, J. R., & Flower, L. S. (1980). Identifying the organization of the writing process. In L. Gregg & E. Steinberg (Eds.), *Cognitive processes in writing* (pp. 3–33). Lawrence Erlbaum Associates.

Huntington-Klein, N. (2024). *vtable: Variable table for variable documentation*. https://CRAN.R-project.org/package=vtable

Johansson, V. (2009). *Developmental aspects of text production in writing and speech*. Department of Linguistics and Phonetics, Centre for Languages and Literature, Lund University.

Johansson, V., Gullberg, K., & Johansson, R. (2025). *Lies in the lexicon: A corpus-based exploration of lexicon in truthful and deceitful narrative accounts*. Linguistic Vanguard.

Kasl, S. V., & Mahl, G. F. (1965). Relationship of disturbances and hesitations in spontaneous speech to anxiety. *Journal of Personality and Social Psychology*, 1(5), 425–433. https://doi.org/10.1037/h0021918.

Kellogg, R. T. (2001). Competition for working memory among writing processes. *The American Journal of Psychology*, 114(2), 175–191. https://doi.org/10.2307/1423513.

Knapp, M. L., Hart, R. P., & Dennis, H. S. (1974). An exploration of deception as a communication construct. *Human Communication Research*, 1(1), 15–29. https://doi.org/10.1111/j.1468-2958.1974.tb00250.x.

Kuznetsova, A., Brockhoff, P. B., & Christensen, R. H. B. (2017). lmerTest package: Tests in linear mixed effects models. *Journal of Statistical Software*, 82(13), 1–26. https://doi.org/10.18637/jss.v082.i13.

Leal, S., Vrij, A., Deeb, H., & Fisher, R. (2024). Verbal cues in omission lies: The effect of informing sources about the essential part of the event. *Applied Cognitive Psychology*, 38. https://doi.org/10.1002/acp.4232.

Leins, D. A., Fisher, R. P., & Vrij, A. (2012). Drawing on liars' lack of cognitive flexibility: Detecting deception through varying report modes. *Applied Cognitive Psychology*, 26(4), 601–607. https://doi.org/10.1002/acp.2837.

Levelt, W. J. M. (1989). *Speaking: From intention to articulation*. MIT Press.

Linell, P. (2009). *Rethinking language, mind, and world dialogically: Interactional and contextual theories of human sense-making*. Information Age Publications.

Lüdecke, D. (2018). Ggeffects: Tidy data frames of marginal effects from regression models. *Journal of Open Source Software*, 3(26), 772. https://doi.org/10.21105/joss.00772.

https://doi.org/10.1017/langcog.2025.10051 Published online by Cambridge University Press

Lüdecke, D. (2024). *sjPlot: Data visualization for statistics in social science*. https://CRAN.R-project.org/package=sjPlot

Lüdecke, D., Ben-Shachar, M.S., Patil, I., Waggoner, P., & Makowski, D. (2021). Performance: An R package for assessment, comparison and testing of statistical models. *Journal of Open Source Software*, 6(60), 31–39. https://doi.org/10.21105/joss.03139.

MacWhinney, B. (2000). *The CHILDES project: Tools for analyzing talk* (3rd ed.). Lawrence Erlbaum Associates.

Mann, S., Vrij, A., & Bull, R. (2002). Suspects, lies, and videotape: An analysis of authentic high-stake liars. *Law and Human Behavior*, 26(3), 365–376.

Matsuhashi, A. (1981). Pausing and planning: The tempo of written discourse production. *Research in the Teaching of English*, 15(2), 113–134.

Matuschek, H., Kliegl, R., Vasishth, S., Baayen, H., & Bates, D. (2017). Balancing type I error and power in linear mixed models. *arXiv*. https://doi.org/10.1016/j.jml.2017.01.001

McCutchen, D. (1996). A capacity theory of writing: Working memory in composition. *Educational Psychology Review*, 8(3), 299–325.

McCutchen, D. (2000). Knowledge, processing, and working memory: Implications for a theory of writing. *Educational Psychologist*, 35(1), 13–23. https://doi.org/10.1207/S15326985EP3501_3.

Newman, M. L., Pennebaker, J. W., Berry, D. S., & Richards, J. M. (2003). Lying words: Predicting deception from linguistic styles. *Personality and Social Psychology Bulletin*, 29(5), 665–675. https://doi.org/10.1177/0146167203029005010.

Nicklaus, M., & Stein, D. (2020). The role of linguistics in veracity evaluation. *International Journal of Language & Law*, 9, 23–47. https://doi.org/10.14762/JLL.2020.023.

Nivre, J., Allwood, J., Grönqvist, L., Ahlsen, E., Gunnarsson, M., Hagman, J., Larsson, S., & Sofkova Hashemi, S. (1999). *Göteborg transcription standard*. https://data.flov.gu.se/gslc/transcription_standard.pdf

Olive, T. (2014). Toward a parallel and cascading model of the writing system: A review of research on writing processes coordination. In *Journal of Writing Research* (Vol. 6, Issue 2, pp. 173–194). https://doi.org/10.17239/jowr-2014.06.02.4

Patil, I., Makowski, D., Ben-Shachar, M. S., Wiernik, B. M., Bacher, E., & Lüdecke, D. (2022). Datawizard: An R package for easy data preparation and statistical transformations. *Journal of Open Source Software*, 7(78), 4684. https://doi.org/10.21105/joss.04684.

Robinson, D., Hayes, A., & Couch, Si. (2024). *broom: Convert statistical objects into tidy tibbles*. https://CRAN.R-project.org/package=broom

RStudio Team. (2020). *RStudio: Integrated development for R* (Version 2024.12.1+563) http://www.rstudio.com/

Spelman Miller, K. (2006). The pausological study of written language production. In K. P. H. Sullivan & E. Lindgren (Eds), *Studies in writing*, vol 18, Computer Keystroke Logging: Methods and Apllications (pp. 11–30). Elsevier.

Steller, M., & Köhnken, G. (1989). Criteria-based statement analysis. In D. C. Raskin (Ed.), *Psychological methods in criminal investigation and evidence* (pp. 217–245). Springer Publishing Company.

Suchotzki, K., Verschuere, B., Van Bockstaele, B., Ben-Shakhar, G., & Crombez, G. (2017). Lying takes time: A meta-analysis on reaction time measures of deception. *Psychological Bulletin*, 143(4), 428–453. https://doi.org/10.1037/bul0000087.

Torrance, M. (2016). Understanding planning in text production. In C. A. MacArthur, S. Graham, & J. Fitzgerald (Eds.), *Handbook of writing research*. Guilford.

Van Waes, L., Leijten, M., Roeser, J., Olive, T., & Grabowski, J. (2021). Measuring and assessing typing skills in writing research. *Journal of Writing Research*, 13(1), 107–153.

Vrij, A. (2015). A cognitive approach to lie detection. In *Detecting deception: Current challenges and cognitive approaches* (pp. 205–229). Wiley-Blackwell.

Vrij, A., Fisher, R., Mann, S., & Leal, S. (2006). Detecting deception by manipulating cognitive load. *Trends in Cognitive Sciences*, 10(4), 141–142. https://doi.org/10.1016/j.tics.2006.02.003.

Vrij, A., Leal, S., Deeb, H., & Fisher, R. P. (2025). Omission lies: The effect of omitting little or much information on verbal veracity cues. *European Journal of Psychology Applied to Legal Context*, 17(1), 25–37.

Vrij, A., Mann, S., Leal, S., & Fisher, R. (2010). 'Look into my eyes': Can an instruction to maintain eye contact facilitate lie detection? *Psychology, Crime and Law*, 16(4), 327–348.

Vrij, A., Mann, S. A., Fisher, R. P., Leal, S., Milne, R., & Bull, R. (2008). Increasing cognitive load to facilitate lie detection. *The Benefit of Recalling an Event in Reverse Order. Law and Human Behavior*, 32(3), 253–265.

https://doi.org/10.1017/langcog.2025.10051 Published online by Cambridge University Press

Walczyk, J. J., Roper, K. S., Seemann, E., & Humphrey, A. M. (2003). Cognitive mechanisms underlying lying to questions: Response time as a cue to deception. *Applied Cognitive Psychology*, 17(7), 755–774. https://doi.org/10.1002/acp.914.

Wengelin, Å. (2006). Examining pauses in writing: Theory, methods and empirical data. In K. P. H. Sullivan & E. Lindgren (Eds.), *Computer key-stroke logging: Methods and applications* (pp. 107–130). Elsevier.

Wengelin, Å., Johansson, R., Frid, J., & Johansson, V. (2024). Capturing writers' typing while visually attending the emerging text: A methodological approach. *Reading and Writing: An Interdisciplinary Journal*, 37, 265–289. https://doi.org/10.1007/s11145-022-10397-w.

Wengelin, Å., & Johansson, V. (2023). Investigating writing processes with keystroke logging. In O. Kruse, C. Rapp, C. M. Anson, K. Benetos, E. Cotos, A. Devitt, & A. Shibani (Eds.), *Digital writing technologies: Impact on theory, research, and practice in higher education*. Springer.

Wickham, H. (2016). *ggplot2: Elegant graphics for data for data analysis*. Springer-Verlag.

Wickham, H., Averick, M., Bryan, J., Chang, W., McGowan, L. D., François, R., Grolemund, G., Hayes, A., Henry, L., Hester, J., Kuhn, M., Pedersen, T. L., Miller, E., Bache, S. M., Müller, K., Ooms, J., Robinson, D., Seidel, D. P., Spinu, V., … Yutani, H. (2019). Welcome to the tidyverse. *Journal of Open Source Software*, 4(43), 1686. https://doi.org/10.21105/joss.01686.

Wickham, H., François, R., Müller, K., & Vaughan, D. (2023). *dplyr: A grammar of data manipulation.* https://CRAN.R-project.org/package=dplyr

Williams, E. J., Bott, L. A., Patrick, J., & Lewis, M. B. (2013). Telling lies: The irrepressible truth? *PLoS One*, 8(4), 1–14. https://doi.org/10.1371/journal.pone.0060713.

Zuckerman, M., DePaulo, B. M., & Rosenthal, R. (1981). Verbal and nonverbal communication of deception, 14, 1–59. https://doi.org/10.1016/S0065-2601(08)60369-X.

A. Appendix A: Summaries of the elicitation films

A.1. The beach

02:49 minutes long.

Three persons are on a beach: a man in black, a woman in white and a woman in a bikini and sunhat. The woman in the sunhat sits in a sun lounger reading a magazine and eating an ice cream, and the woman in white sits on a picnic blanket reading a book. The man in black sits on a picnic blanket just looking around, and after a while, he gets up and grabs his tote bag. As he does this, he drops his phone and puts it back in the bag again. But, when he gets up, it falls out again! This time he does not notice and heads off without the phone.

The woman in white notices that he has dropped his phone, she looks around and then gets up and walks to the man's blanket to grab his phone quickly. She walks back and collects her book, thermos and other belongings and puts them in her bag before grabbing her picnic blanket and shoes to leave. The woman in the sunhat has been watching her this whole time. When the thief has left, the sun lounging woman continues to read.

The man returns with an ice cream in one hand and his tote bag in his other hand. He sits down and continues to look out towards the sea while eating his ice cream. Suddenly, he starts looking for his phone but can find it in his bag, he looks around, feels his pockets and checks the bag again but cannot seem to find it. Finally, he gets up again and heads back in the same direction where he got the ice cream – presumably to see if he has dropped it somewhere on the way.

A.2. The driveway

02:02 minutes long.

A man in a black suit and sunglasses is standing outside a brick house holding a present and some flowers. He is looking around as if he is searching for someone and looks at his wristwatch and makes a rushed phone call; it is not possible to hear what he is saying but he does not look happy. While he is standing there, a young girl comes out from the side of the house with a red bike. She leans the bike against the door to the garage and heads back in before quickly re-emerging with a helmet in hand. She puts her helmet in the basket attached to the bike and then heads back in on the side of the house once again.

While she is gone, the man is still waiting, and he looks more and more annoyed. A hiker wearing a big backpack comes walking along the road. He stops for a moment to look at a map, then looks around to try and figure out where he should go next. He sees the bike and suddenly takes a few quick strides up to the bike and

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pulls it out to the road, gets on the bike and rides of. The man in a suit sees this and looks in the direct the man went off; he seems perplexed but soon after he waves at someone in the opposite direction and heads off.

When the girl comes out to the driveway again, both her bike and the man in a suit are gone and, in her hand, she has a bike lock that she was going to bring on her ride. She runs up to the street and looks both ways but does see anyone. She steps back again, looking confused and upset.

A.3. The exam

03:09 minutes long.

Two girls are in a classroom, sat across each other writing an exam. At the front of the classroom, a teacher sits watching over them. He has brown hair and is wearing a flannel shirt. The girl to the right is wearing a black shirt and has brown hair, and the other girl is wearing a yellow t-shirt and has blonde hair put up in a ponytail.

The girls are occupied with their exams, and the teacher gets up from his desk to walk around. He brings his green thermos with him and walks in front of the students' desk looking down at their papers, making sure they are on track and not cheating. When he's satisfied with the inspection, he heads back to his desk to sit down. He puts his thermos on the desk, and when he corrects his posture after sitting down, he accidentally knocks it over. Coffee spills everywhere! Luckily, he has some napkins in his bag, so he quickly grabs some napkins and kneels to wipe up the spilled coffee.

While he is busy, the girl with the black shirt looks around and then pulls out a note from her pencil case. She looks stressed as she unfolds the note and starts to copy text to her exam paper. She then quickly folds it up again and hides it in her sleeve. The other girl has been looking over at her, shocked, but when the teacher comes back up to the desk, both girls are once again busy writing.

After a short while, the teacher looks up from his desk and exclaims 'C'est fini' in French, the exam time is over. The girl in yellow heads up to hand in her exam first before collecting her things to leave. The girl in black packs up and brings all her stuff when she hands in her exam. When she turns around, the note that she had folded up in her sleeve falls out without her noticing. With both girls are gone, the teacher packs up all his things and starts walking towards the door. On his way, he notices a note on the floor and picks it up, he unfolds it and starts reading…

A.4. The garden café

01:58 minutes long.

A young girl reading a magazine at a table while enjoying a cup of coffee and some cake at a garden café. Another young girl, wearing a blue hoodie, comes walking into the café. She walks up to the serving tables where cakes, biscuits and all sorts of drinks are presented. Here, she stops and looks at the different options before heading over to a payment information sign. While she is paying, a man enters the café. He seems stressed and walks quickly, knocking over a chair next to the reading girl, accidentally tipping over her bag.

The man continues to the table, and just as the girl in the hoodie is going to pour her coffee, he cuts in front of her and pours himself a cup and puts on the table. He then proceeds to grab all sorts of cakes and biscuits, overloading his plate, and does not pay for anything. Meanwhile, the reading girl has packed up everything that fell out of her bag and walks up to the table, she sneaks in behind the girl in the hoodie and grabs a pepper mill and quickly grinds some pepper into his cup before quickly leaving the café.

The girl in the hoodie notices this but just grabs her own coffee and sits down at a table. Once the man has collected all his cake and collected his coffee, he sits down at a table. The young girl quickly hurries away as he sits down, and when he takes his first sip of coffee, he instantly spits it out.

B. Appendix B: Instructions

Before the film was shown, participants were informed of the task and which modality it would be in:

> *'In this task you will see an events with three persons and then you will re-tell what happened in **speech** with as many details as possible, from start to finish'*

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After the film, the instructions were repeated and information about the veracity of the narrative was added.

Both conditions

You have seen an event with three persons on a beach. Two of these persons were active in the events and one saw the events. I would now like you to re-tell what happened with as many details as possible, from start to finish…

Truthful condition

… just as it happened.

Deceitful condition

… but imagine that you for some reason want to protect the person in white and instead lay blame on the person in the sun chair.

Both conditions

Remember that there is a person who has not seen this who will guess if your story is invented or not. There is no right or wrong in how you tell the story, and it is okay to think before you start if you want to.

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