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Feeling of Certainty and the Shiftiness of Knowledge Utterances

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Abstract This paper provides new data on the shiftiness of knowledge utterances (the phenomenon by which our inclination to ascribe knowledge shifts with the mentioning of non-epistemic factors). We confirm two hypotheses. The first one is that people's inclination to ascribe knowledge correlates highly with their feeling of confidence in the target proposition. The second one is that the shiftiness of knowledge utterances exists only in cases in which the assessor of the knowledge utterance does not feel certain about the target proposition. These results provide support for a certainty condition on assessments of knowledge utterances, as well as some pressure on some of the existing theories of the shiftiness of knowledge utterances, like semantic contextualism or various forms of sensitivism.

0. Introduction

Talking and thinking about knowledge have a very curious property: they are influenced by non-epistemic factors (factors that do not affect how evidentially likely it is that the to-be-known-proposition is true)[1]. Let us call this *the shiftiness of knowledge utterances*, given that the non-epistemic factors seem to produce a *shift* in our willingness to utter knowledge sentences of the form '*S* knows that *p*' and in our assessments of such utterances. Here, a knowledge utterance is the speech act of physically producing a

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[1] By *evidential likelihood* we understand the subjective measure of how likely it is that a proposition is true, given the evidence that the subject possesses. This is to be distinguished from more objective senses of probability cashed out in terms of frequency or propensity. See Williamson 2000: 211, or Eder 2023: 2.

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particular knowledge sentence (of the form '*S* knows that *p*') in order to communicate a knowledge proposition[2].

The best way to introduce the shiftiness of knowledge utterances is by looking at an example that illustrates it. The *BANK CASE* is the best-known illustration from the literature. We use an adapted version of it (adapted from DeRose 1992: 913; Stanley 2005: 3-4):

> *BANK CASE A.* Keith and his wife Nicole are driving home on a Friday afternoon. They plan to stop at the bank on the way home to deposit their paychecks. It is not important that they do so, as they have no impending bills. But as they drive past the bank, they notice that the lines inside are very long, as they often are on Friday afternoons. Realizing that it isn't very important that their paychecks are deposited right away, Keith says: 'I know the bank will be open tomorrow, since I was there just two weeks ago on Saturday morning. So we can deposit our paychecks tomorrow morning.'

> *BANK CASE B.* Keith and his wife Nicole are driving home on a Friday afternoon. They plan to stop at the bank on the way home to deposit their paychecks. Since they have an impending bill coming due, and very little in their account, it is very important that they deposit their paychecks by Saturday. Keith notes that he was at the bank two weeks before on a Saturday morning, and it was open. But, as Nicole points out, banks do change their hours, so this bank might have changed its hours too. Keith says: 'I guess you're right. I don't know that the bank will be open tomorrow.'

A couple of observations are in place. Firstly, notice that Keith has the same evidential support for his belief that the bank is open on Saturday in both cases (he was there two weeks ago, and it was open). From an evidential point of view, therefore, nothing changes from the first case to the other. On the other hand, the difference between the two cases consists in: (i) the fact that in *CASE B* the stakes are higher than in *CASE A* (it is *really* important for Nicole and Keith to deposit their paychecks), and (ii) the possibility that the bank might have changed its opening hours is mentioned (by Nicole) in *CASE B*, but not in *CASE A*.

The existence of high-stakes and the mentioning of error possibilities are traditionally considered non-epistemic factors (see Stanley, 2005; Fantl and McGrath, 2009; DeRose, 2009; Grimm, 2015). Epistemic factors influence how likely it is, evidentially, that a belief is true, and it concerns features like the reliability of the belief forming mechanism. Non-epistemic factors, by contrast, do not affect this likelihood, whether viewed subjectively or objectively (DeRose 2009: 24). For example, in *BANK CASE B*, considering error-possibilities or facing high stakes does not affect how likely it is that Keith's belief about the bank's hours is true. Were he not to be in a high-stakes

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[2] Which particular proposition is expressed through a knowledge utterance can be a matter of dispute (see the discussion about semantic contextualism below).

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situation, or were he not to be thinking about these error-possibilities, the likelihood of Keith's belief being true would remain the same, given his total evidence[3].

Secondly, notice that the conclusion drawn by Keith about whether he knows that the bank is open on Saturday is different in *CASE A* than in *CASE B*, despite the fact that his evidence is the same. *CASE A* ends with a knowledge ascription, 'I [Keith] know that the bank will be open tomorrow', while *CASE B* ends with a knowledge denial, 'I [Keith] don't know that the bank will be open tomorrow'. The two conclusions appear to contradict each other. But, it seems, they are both intuitively correct in their respective contexts.

BANK CASE illustrates the shiftiness of knowledge utterances because it presents a pair of cases that differ only in non-epistemic factors (the mentioning of error-possibilities and the existence of high stakes), but which yield shifting intuitions concerning whether the subject knows the target proposition or not. It therefore shows that knowledge utterances and assessments of knowledge utterances are influenced by non-epistemic factors.

While the *BANK CASE* involves both the mentioning of error-possibilities and the mentioning of high stakes, these effects can and have been analyzed separately:

- *Error-possibility effect.* While A considers whether S knows that p, the mere presentation of an error-possibility with regard to p leads A to be less inclined to utter 'S knows that p' or to assess such a knowledge ascription as true.[4]
- *High-stakes effect.* While A considers whether S knows that p, the mere mentioning of a high-stakes situation with regard to p leads A to be less inclined to utter 'S knows that p' or to assess such a knowledge ascription as true.[5]

This kind of effects has led some to believe that non-epistemic factors (like the mentioning of error-possibilities or the existence of high stakes) influence either the meaning of sentences containing the predicate 'know', or the very standards for knowledge that need to be met in order for this predicate to be correctly applied. On the semantic side, according to various forms of *semantic contextualism*, what proposition is expressed through a given knowledge utterance (of the form 'S knows that p') is determined by the context of use, depending in part on what non-epistemic factors are

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[3] It is relevant to distinguish between the existence of an error-possibility and the mentioning of such a possibility. The fact that an error-possibility exists might indeed be relevant for the evidential likelihood of the target proposition. The fact that somebody mentions (or thinks about) an error-possibility does not affect the evidential likelihood of the target proposition.

[4] While the first studies on error-possibility effects gave inconclusive results (Buckwalter, 2010; May et al., 2010), subsequent studies provided plenty of empirical evidence that such effects truly exist (*inter alia*, Schaffer & Knobe, 2012; Nagel et al., 2013; Alexander et al., 2014; Grindrod et al., 2019; Gerken et al., 2020).

[5] The experimental results concerning high-stakes effects are much more diverse than those for error-possibility effects. While some studies failed to confirm such an effect on knowledge utterances (Buckwalter, 2010; Feltz & Zarpentine, 2010; Rose et al., 2019), or presented a very modest effect (Sripada & Stanley, 2012), other studies succeeded in doing this (Pinillos, 2012; Pinillos & Simpson, 2014; Dinges, 2019; Dinges & Zakkou, 2021), but by using very different methodologies (evidence-seeking framework instead of evidence-fixed framework).

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present in that context.[6] On the metaphysical side, according to various forms of *sensitivism*, it is the epistemic standards for knowledge that change relative to the non-epistemic context of the subject, the ascriber, or the assessor of a knowledge ascription.[7]

In this paper, we want to add two further data points regarding the shiftiness of knowledge utterances. It turns out that our feelings of confidence and (un)certainty[8] with regard to a target proposition p play a significant role in how we judge a knowledge ascription of the form 'S knows that p', or in whether our intuitions about such an utterance shift with non-epistemic factors at all.

On the one hand, it appears that the less confident one feels that p, the less likely it is that one will utter or assess as true a knowledge utterance claiming that p is known. Ascribing knowledge that p seems to be in tension with feeling uncertain about whether p – e.g., it sounds infelicitous to utter "Petra knows that the house is open, but I feel doubtful that it is" – such that the farther one is from feeling certain that p, the less inclined will one be to judge that p is known. Call this the Correlation Hypothesis:

Correlation Hypothesis	If the knowledge judger A has an epistemic feeling with regard to the target proposition p, the less confident feels A that p, the less inclined is A to judge that S knows that p.

On the other hand, it appears that the shiftiness of knowledge utterances happens only when the judger of the target knowledge utterance feels *uncertain* about whether p. If one feels certain that p even after being presented with the error-possibilities or high stakes, then one is less inclined to be affected by these non-epistemic factors in one's knowledge ascribing behavior. Call this the Cancelation Hypothesis:

Cancelation Hypothesis	The error-possibility effect and/or the high-stakes effect on A's judgement of whether S knows that p can be canceled if A maintains a feeling of certainty that p is the case.

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[6] For influential defenses of semantic contextualism, see DeRose, 1995, 2009; Cohen, 1999; Lewis, 1996; Blome-Tillmann, 2014; Ichikawa, 2017, with slight differences based on the authors' understanding of knowledge.

[7] With regard to an utterance of the form 'S knows that p' made by an utterer U and assessed by an agent A, there are three non-epistemic contexts of interest: that of the subject S, that of the utterer U, and that of the assessor A. Sensitivism posits that the epistemic standards for knowledge are determined by one of these contexts. For defenses of subject-sensitivism, see Hawthorne, 2004; Stanley, 2005; Fantl & McGrath, 2009; Weatherson 2011; Pinillos & Simpson 2014. For defenses of utterer-sensitivism, see DeRose, 1995; Kompa, 2002, 2014. Note that all existing forms of contextualism involve some type of utterer-sensitivism (given that the different meanings of 'knowledge' pick up different epistemic standards for knowledge corresponding to the utterer's context; see DeRose 1995), but not all forms of utterer-sensitivism involve semantic conxtualism (the meaning of 'knowledge' might remain the same in all contexts, but the standards of evaluation might change with the utterer's context; see Kompa 2014). For defenses of assessor-sensitivism (also called 'relativism'), see MacFarlane, 2005, 2014.

[8] These affective states are usually conceptualized as *epistemic* or *noetic feelings*, alongside other affective states like feeling of familiarity, surprise, curiosity, feeling of knowledge, tip-of-the-tongue feeling etc. (Arango-Muñoz 2014; Dokic, 2012, 2014; Goupil et al., 2016; Koriat, 2000; Proust, 2013); see Arango-Muñoz & Michaelian, 2014; Deigan & Piñeros Glasscock, 2023, for overviews. We assume that the feeling of certainty is the highest form of the feeling of confidence and is characterized by the total absence of the feeling of uncertainty / doubt (Luttrell et al., 2013).

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As we will show in section 5, the confirmation of these two hypotheses provides support for what might be called a *Certainty condition on Knowledge Assessments (CKA),*[9] according to which, if *A* judges that *S* knows that *p*, then *A* deems it appropriate to feel certain that *p*, given *S*'s epistemic position with regard to *p*. Moreover, as we will again see in more detail in section 5, the Correlation and Cancelation hypotheses pose some problems for some of the mainstream accounts of the shiftiness of knowledge utterances on the market.

In what follows, we provide empirical evidence for the Correlation and the Cancelation hypotheses, based on a large-scale study of the relation between the participants' feelings of confidence and their inclination to accept as true a knowledge ascription on the topic at hand.

1. Method

In order to answer the question of how considerations of error-possibilities or high-stakes affect the way we talk and think about knowledge, experimental epistemologists devise experiments in which groups of participants are asked to make or assess various knowledge utterances linked to scenarios in which one or both of the non-epistemic factors mentioned above is present, while the evidence for the target proposition remains always the same (see Feltz & Zarpentine 2010; Schaffer & Knobe 2012; Rose et al. 2019). Our study follows this tradition. We tested the Correlation and Cancelation hypotheses using both types of non-epistemic factors, although strictly differentiated, with different groups being exposed to different non-epistemic factors and combinations thereof (akin to Buckwalter 2014).

An important differentiating feature of our study is the use of propositions pertaining to the real world. The cases used in existing studies involve propositions on which participants have no prior belief and no evidence to corroborate with. In the BANK CASE, for example, there is no way for the reader to corroborate the evidence for the target proposition (that the bank is open). The only evidence that the reader has is provided in the description of the case. This makes it challenging to identify and measure the participants' epistemic feelings of certainty on the matter. It is easier for the participants to assess certainty about familiar facts with corroborative evidence than about the opening hours of a fictitious bank, of which they learn solely from the case description. Thus, in order to test our Cancelation Hypothesis, we designed a study using factual propositions from the real world, likely to elicit clearer and more defined epistemic feelings.

1.1. Participants and procedure

A total of 889 participants were recruited via Prolific Academic and compensated financially. All participants were required to give their informed consent and to complete a short questionnaire that included a vignette, corresponding to the condition they were assigned to, and the measures of the study. An attention check item was inserted in the questionnaire, which was failed by five participants. The data of these five participants together with that of one underage participant were not considered in all further analysis, resulting thus in a final sample of 883 persons. The distribution of

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[9] A form of this claim has been defended in Spatan 2024.

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participants in terms of gender was 64.2% female, 35% male, 0.8% other, while in terms of age was 25.8% 18-24 years, 35% 25-34 years, 20.9% 35-44 years, 12.7% 45-54 years, 5.6% 55-64 years, 0.8% 65-74 years, and 0.1% 75-84 years.

1.2. Measures and design

We had three independent variables: *error* (whether an error-possibility is mentioned or not), *stakes* (whether a high-stakes situation is mentioned or not), and *certainty* (whether the participants feel certain of the target proposition or not). This resulted in eight conditions (see *Table 1*). For instance, condition 3 (U_LE_HS) is the condition in which the participants are categorized as feeling uncertain about the target proposition, have received a vignette in which no error-possibility is explicitly mentioned, but in which a high-stakes situation is mentioned.

Table 1. The conditions of the study

	Con 1	Con 2	Con 3	Con 4	Con 5	Con 6	Con 7	Con 8
Certainty	U	U	U	U	C	C	C	C
Error	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
Stakes	LOW	HIGH	HIGH	LOW	LOW	HIGH	HIGH	LOW

Notes: U = uncertain; C = certain

Variables *error* and *stakes* were manipulated through the information presented in the vignettes. The scenarios concerned a student, Tracy, who was taking a geography oral exam. In order to show the difference between *HIGH* and *LOW* between both *error* and *stakes*, we will use as an example two vignettes, one with LE_LS (low *error,* low *stakes*), and one with HE_HS (high *error,* high *stakes*). The first one will be called *LOW_EX*, while the second one will be called *HIGH_EX*. It should be noted that it is not clear from this description alone if *LOW_EX* corresponds to Condition 1 or Condition 5, and if *HIGH_ EX* corresponds to Condition 2 or Condition 6. As we will see, determining the value of *certainty* is more complex than determining the values of *error* and *stakes*[10].

To distinguish between the various conditions, we introduce the following convention: we write in grey the description corresponding to LE (low *error*), in **bold** the description corresponding to HE (high *error*), and we underline with solid line the description corresponding to LS (low *stakes*), and with dashed line the description corresponding to HS (high *stakes*). We use the target proposition that Vilnius is the capital of Lithuania, for exemplification. Therefore, the differences between LE_LS and HE_HS are the following:

> *LOW_EX:* Tracy is taking a geography oral exam. This is Tracy's last exam of the semester, right before the Christmas break. The exam is based on questions randomly drawn on various topics. The question Tracy draws for World Capitals is "What is the

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[10] To be sure that the participants feel either certain or uncertain about the target proposition, we made three interventions (described below). With *error* and *stakes*, mentioning an error-possibility or a high-stakes situation was sufficient.

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capital of Lithuania?" Tracy is a very diligent student, so she bought a huge political map of the world that she studied very carefully for the last two weeks, reviewing every world capital. Based on her rigorous and in-depth research, Tracy confidently tells the professor, "I know that the capital of Lithuania is Vilnius". Unbeknownst to Tracy, the geography professor has a very peculiar rule, of giving a small globe to every student who answers correctly to a question about world capitals. The professor used to run a company that produced globes, and now he is left with thousands of small plastic globes, which he happily donates to students. In any case, it is not very important for Tracy that she receive such a globe.

HIGH_ EX: Tracy is taking a geography oral exam based on questions randomly drawn on various topics. The question Tracy draws for World Capitals is "What is the capital of Lithuania?" Tracy is a very diligent student, so she bought a huge political map of the world that she studied very carefully for the last two weeks, reviewing every world capital. Based on her rigorous and in-depth research, Tracy confidently tells the professor, "I know that the capital of Lithuania is Vilnius". **It goes without saying that even political maps like the one bought by Tracy might sometimes contain mistakes**. Unbeknownst to Tracy, the geography professor has a very strict rule of failing anybody who does not give the correct answer to a question about world capitals. If Tracy does not pass the exam, she will lose her scholarship and will have to move to another school, which would be an awful prospect for her. It is therefore very important for Tracy that she answers correctly.

Moving now to the value of *certainty*, we must note that this is a bit more difficult to determine. We take it that certainty refers to the feeling one has when one is maximally confident that something is the case and lacks any doubt on the matter (Luttrell et al. 2013). Such a feeling likely arises from sub-personal evaluations of cues like ease of processing and fluency (Alter and Oppenheimer, 2009; Proust, 2013), and its key characteristic is that one's mind feels settled on the issue (Peirce 1877; Hookway, 2008; Dokic 2014).

To obtain the values for *certainty*, three measures were taken. First, in order to obtain a fair split of cases between U and C, half of the vignettes included a target proposition that we thought most people would feel certain about (that Paris is the capital of France, call this proposition p), while the other half included a target proposition that we thought most people would feel uncertain about (that Vilnius is the capital of Lithuania, call this proposition v). Given that these propositions are an essential part of the case-description, and given that we wanted to have an even distribution of all the independent variables, we used the same matrix as in *Table 1* to distribute p and v. The resulting design contained 8 conditions that participants were randomly allocated to *(see Table 2).*

Table 2. The distribution of target propositions across the conditions of the study

	Con 1	Con 2	Con 3	Con 4	Con 5	Con 6	Con 7	Con 8
Prop.	v	v	v	v	p	p	p	p
Error	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
Stakes	LOW	HIGH	HIGH	LOW	LOW	HIGH	HIGH	LOW

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Second, before reading any scenario, we asked all the participants a preliminary Trivia question pertaining to their knowledge of *p* or *v*, respectively. Thus, the participants in conditions 1-4 were presented with the following prompt *(Figure 1)*. Analogously, participants in conditions 5-8 were presented with a similar prompt: "Which of the following cities is the capital of France?", and the response options "a) Berlin", "b) London", "c) Paris", "d) Marseille" and "I am not absolutely certain".[11] In all blocks, those participants that answered anything else than "c) Vilnius" and "c) Paris" were automatically categorized as feeling uncertain of the target proposition.[12] To be noted that this happened irrespectively of whether the participants received a block with *p* as the target proposition or a block with *v* as the target proposition. Of the 440 participants who were presented with the prompt from *Figure 1*, 106 answered "c) Vilnius", while the great majority of them, 307, answered "I am not absolutely certain". On the other hand, of the 449 participants who answered the question about the capital of France, 431 answered "c) Paris", while only 16 answered "I am not absolutely certain".

Figure 1

Quiz Question

Please answer the following trivia question (only one answer is correct). If you have even the slightest doubt about which is the correct answer, then mark the option "I am not absolutely certain".

Which of the following cities is the capital of Lithuania?

a) Tallinn

b) Riga

c) Vilnius

d) Kaunas

I am not absolutely certain

The third criterion for determining the value of *certainty* was to ask at the end of the survey, after participants already read the target scenario in their respective condition, the following question: "On a scale from 1 (not confident at all) to 5 (very confident),

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[11] We used the phrase "I am not absolutely certain", instead of the more common phrase "I don't know" because we wanted to make sure that it is because of their lack of the feeling of certainty that the participants choose this option.

[12] One might object that those individuals who did not give the correct answer, but did not answer "I am not absolutely certain" either should be categorized as feeling certain as well. At the end of the day, they did avoid the "I am not absolutely certain" option, which means that they have been certain of their (incorrect) answer. By ruling them from the certainty category, we are not implying that the feeling of certainty has to be factual. It is just that later on these individuals read a vignette in which *p* or *v* (the correct answers to the Trivia questions) are explicitly mentioned, so this might confuse them and make them feel less confident of the target proposition when answering the question about knowledge ascription, or even change their mind completely. We thought that, in light of all of this, the better option is to categorize these individuals as not feeling certain with regard to the target propositions.

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how confident are you that the capital of Lithuania [France] is Vilnius [Paris]?" with the options 1 = not confident at all, 2 = slightly confident, 3 = moderately confident, 4 = fairly confident and 5 = very confident. The scores from this question constituted the values of the variable *confidence*. Those participants who answered correctly to the Trivia question from the first prompt and answered "5 - very confident" to this last question were categorized as feeling certain of the target proposition. All the others were categorized as feeling uncertain of the target proposition, resulting in an approximately equal distribution across conditions (see *Table 3*).

Table 3. Distribution of participants across conditions

	Con 1	Con 2	Con 3	Con 4	Con 5	Con 6	Con 7	Con 8
Certainty	U	U	U	U	C	C	C	C
Error	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
Stakes	LOW	HIGH	HIGH	LOW	LOW	HIGH	HIGH	LOW
N	96	96	96	105	123	124	126	117

Finally, *Knowledge ascription* was the dependent variable and was assessed with one item on a 7-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = neither agree nor disagree, 5 = somewhat agree, 6 = agree, 7 = strongly agree): "Please rate how strongly you agree or disagree that Tracy's statement, 'I know that the capital of [Lithuania / France] is [Vilnius / Paris]', is true".

2. Predictions

While the Correlation Hypothesis can be tested straightforwardly, given that it simply involves evaluating whether the scores for *confidence* positively correlate with the scores for *knowledge ascription*, the Cancelation Hypothesis can be split into a number of predictions that can help us have a better grasp of the influence of the different values of *certainty* for *knowledge ascription*. We have therefore made five predictions in this study (*Table 4*). The first prediction concerns the Correlation Hypothesis, while the next four concern the Cancelation Hypothesis.

Table 4

Correlation Hypothesis	Prediction 1	The participants' scores for *knowledge ascription* positively correlate with the participants' scores for *confidence*.
Cancelation Hypothesis	Prediction 2	The scores for *knowledge ascription* are significantly higher in Conditions 5, 6, 7 and 8 (in which the participants feel certain about the target propositions) than in Conditions 1, 2, 3 and 4 (in which the participants feel uncertain about the target propositions), respectively.
	Prediction 3	There is no significant difference between Conditions 5, 6, 7 and 8 (in which the participants feel certain about the target propositions) in *knowledge ascription*, while there are such differences between Conditions 1, 2, 3 and 4 (in which the participants feel uncertain about the target

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		propositions).
	Prediction 5	In the U conditions (1, 2, 3 and 4), the difference in *error* determines significant differences in *knowledge ascription*, irrespective of stakes.
	Prediction 4	In the U conditions (1, 2, 3 and 4), the difference in *stakes* determines significant differences in *knowledge ascription*, irrespective of *error*.

Let us say a few more words about Predictions 2-5. Prediction 2 concerns the influence of the feeling of certainty on the willingness to ascribe knowledge. We predict that the very fact that the participants feel certain of the target proposition will lead to higher scores on the knowledge ascription scale than the participants that do not feel certain of the target proposition. Prediction 3 tests the Cancelation Hypothesis most directly, because we predict that the feeling of certainty cancels any non-epistemic effect regarding *error* or *stakes*. Finally, Predictions 4 and 5 specify the second part of Prediction 3, in that we predict, on the one hand, that there will be both an error-possibility effect and a high-stakes effect on *knowledge ascription* in the U conditions.

3. Results
The descriptive statistics for both *knowledge ascription* and *confidence* for all 8 conditions are presented in *Table 5*.

Table 5. Descriptive statistics for knowledge ascription and confidence

Condition	N	Knowledge ascription		Confidence	
		M	SD	M	SD
Con 1 (U_LE_LS)	96	5.41	1.23	2.70	1.32
Con 2 (U_HE_HS)	96	5.04	1.38	2.62	1.33
Con 3 (U_LE_HS)	96	5.63	1.15	3.05	1.34
Con 4 (U_HE_LS)	105	5.20	1.39	2.95	1.16
Con 5 (C_LE_LS)	123	6.93	0.33	5.00	0.00
Con 6 (C_HE_HS)	124	6.86	0.40	5.00	0.00
Con 7 (C_LE_HS)	126	6.92	0.27	5.00	0.00
Con 8 (C_HE_LS)	117	6.87	0.88	5.00	0.00

Notes: *M* = mean score; *SD* = standard deviation.

4. Analysis[13]
To test the first prediction, a Pearson correlation coefficient was computed between *knowledge ascription* and *confidence*.[14] The correlation between the two variables was very

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[13] In order to enhance the readability of this section, we provided more descriptive details of the measures used in the footnotes. We thank an anonymous reviewer of this journal for pushing us to do so.

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high and significant, $r = 0.76$, $p < 0.001$, indicating a very strong association between the variables.

To test the second prediction, an independent samples t-test was conducted with *certainty* as the predicting variable and *knowledge ascription* as dependent variable.[15] The difference in *knowledge ascription,* between the *certain* ($M = 6.90$, $SD = 0.49$) and *uncertain* ($M = 5.32$, $SD = 1.31$) subsamples was significant, $t(881) = -24.59$, $p < 0.001$, evidencing a very large effect of Cohens'$d = 1.60$.[16]

To test the third prediction, the dataset was split based on *certainty*, in certain and uncertain individuals, based on participants' answer to the Trivia question and their response to the confidence question, as previously described. As anticipated, there were significant differences between the four conditions in the *uncertain* subsample, $F(3,389) = 3.68$, $p = 0.012$, $\eta^2 = 0.03$ (small effect). Post-hoc tests with Bonferroni correction[17] revealed that the significant differences were between Condition 2 (U_HE_HS) ($M = 5.04$, $SD = 1.38$) and Condition 3 *(U_LE_HS)* ($M = 5.63$, $SD = 1.15$), $t(389) = -3.12$, $p = 0.012$, while the rest of the differences were non-significant (see *Figure 2*). In the *certain* subsample, there were no significant differences between the four conditions $F(3,486) = 0.64$, $p = 0.59$, $\eta^2 = 0.004$, as anticipated. We identified therefore no statistically significant differences between any of the *certain* conditions (conditions in which the participants feel certain of the target proposition), while we did identify statistically significant differences between the *uncertain* conditions (more precisely, between Condition 2, U_HE_HS and Condition 3, U_LE_HS), which can be observed in *Figure 2*.[18]

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[14] Person correlation coefficient (denoted as *r*) is a measure of the linear relationship between two variables. Its values range from -1 (perfect negative relationship - as one variable increases, the other decreases proportionally) to +1 (perfect positive relationship - as one variable increases, the other increases proportionally), with 0 indicating no relationship at all.

[15] An independent samples t-test is a statistical test used to determine whether there is a significant difference between the means of two independent groups. It assesses whether the difference observed in sample means is likely to reflect a true difference in the population means or if it can be attributed to random chance, by comparing the resulting p – value of the test – with a benchmark α value (0.05 in social sciences). If $p < a$, we say that the difference in means is statistically significant. If $p > a$, we say that the difference in means is non-significant.

[16] Cohen's *d* is a statistical measure used to quantify the size of an effect, providing insight into the practical significance of a result beyond its statistical significance. Cohen's *d* is interpreted based on thresholds proposed by Cohen (1988): $d = 0.2$ (small effect), $d = 0.5$ (medium effect), $d = 0.8$ (large effect).

[17] The Bonferroni correction is a statistical method used to correct for inflating *a*-value when multiple tests are performed. It is a conservative measure that reduces the *a*-value, reducing thus the likelihood of incorrectly identifying significant differences between groups.

[18] Interestingly, the error-possibility effect was identified between conditions that both have high stakes (Condition 2 and 3), but not between conditions with low stakes (Conditions 1 and 4). This might mean that the acknowledgment of the high-stakes makes more salient the mentioned possibility of error, leading to the error-possibility effect.

Figure 2
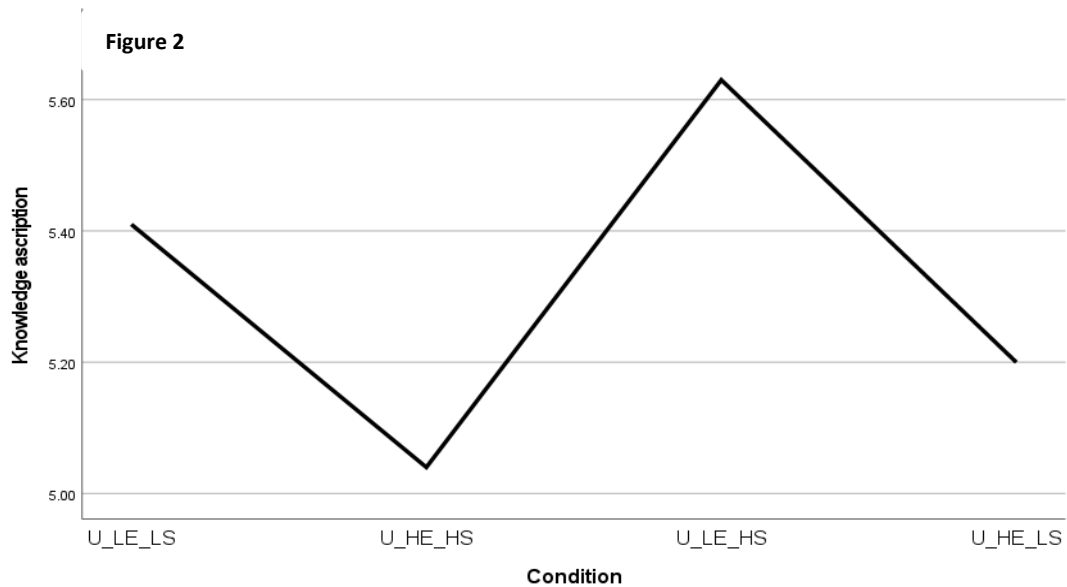
To test the fourth prediction, an independent samples t-test was conducted on the subsample of uncertain individuals and the two *error* conditions were compared on *knowledge ascription*. As anticipated, the difference between the *low error* ($M = 5.52$, $SD = 1.20$) and *high error* ($M = 5.13$, $SD = 1.38$) was significant, $t(391) = 2.99$, $p = 0.001$, $d = 0.30$, although only in the *high stakes* conditions (see above). As expected, the same comparison was non-significant for *certain* individuals, $t(488) = 1.36$, $p = 0.175$, $d = 0.12$.

To test the fifth prediction, an independent samples t-test was conducted on the subsample of uncertain individuals and the two *stakes* conditions were compared on *knowledge ascription*. Unlike anticipated, the difference between the *low stakes* ($M = 5.31$, $SD = 1.32$) and *high stakes* ($M = 5.33$, $SD = 1.30$) was non-significant, $t(391) = -0.19$, $p = 0.575$, $d = 0.02$.[19] As expected, the same was true for the *certain* individuals $t(488) = 0.27$, $p = 0.785$, $d = 0.02$.

5. Discussion

The results from the present study have strongly confirmed the Correlation Hypothesis. We have seen above that there is a very high correlation between participants' inclination to ascribe knowledge and their feeling of confidence in the target proposition. Moreover, the results have tentatively confirmed the Cancelation Hypothesis (except Prediction 5 and parts of Prediction 4; see above). We have observed no error- or stakes-effects on knowledge utterances when the participants feel certain of the target proposition, while some of these effects were present when the participants feel uncertain on the matter.[20] In what follows, we will discuss two upshots of these results: the support for what might be called a Certainty condition on

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[19] This result follows a long line of disconfirming studies of the high-stakes effect in which researchers had difficulties confirming a high-stakes effect in what was later called evidence-fixed paradigm (Buckwalter, 2010; Feltz & Zarpentine, 2010; Rose et al., 2019). At the time of developing this experiment, we thought that conflating *stakes* and *error* might help improve the chances of discovering high-stakes effects in this type of evidence-fixed paradigm. In the meantime, we came to the realization that there are other circumstances that help elicit this sort of effect Spatan 2024: 236ff. We hope that future research can bring more light on this matter.

[20] See fn. 18 and 19 for qualifications.

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Knowledge Ascriptions, and a possible challenge for some of the established theories of the shiftiness of knowledge utterances.

First, let us define the Certainty condition on Knowledge Ascriptions (CKA).

> CKA   If an agent A judges that S knows that p, then A deems it appropriate to feel certain that p, given S's epistemic position with regard to p.

The basic idea behind CKA is that one cannot ascribe knowledge that p to oneself or to others without deeming it appropriate to feel certain that p. If one feels certain that p, then one presumably deems it appropriate to feel certain that p and thus meets the Certainty condition for Knowledge Ascriptions. If one feels doubtful that p (which presumably means that one does not deem it appropriate to feel certain that p), then one will be disinclined to judge that p is known. If I doubt that John's uncle is alive, then I will be disinclined to judge that John knows that his uncle is alive. Feeling uncertain about a proposition p and judging that p is known simply do not seem to go well with each other. Deeming it appropriate to feel certain that p is a precondition for judging that p is known.[21]

The confirmation of the Correlation and the Cancelation hypotheses give support to CKA. Consider first the Cancelation Hypothesis. The confirmation of Prediction 2 shows that the difference in knowledge ascription scores between when the participants feel certain about the target proposition and when they do not feel certain about the target proposition is substantial. The feeling of certainty, therefore, has an important role to play in our assessments of knowledge utterances, as claimed by CKA. Furthermore, the confirmation of Prediction 3 shows that the shiftiness of knowledge utterances really exists only when people feel uncertain about the target proposition. When the participants feel certain that, e.g., Paris is the capital of France (and therefore deem it appropriate to have this feeling), their assessment of the claim that Tracy knows that Paris is the capital of France does not change, no matter how the scenario with regard to the presentation of error-possibilities and high-stakes is changed from one context to another.

Consider, then, the Correlation Hypothesis. The confirmation of Prediction 1, which claims that the inclination of people to ascribe knowledge correlates to a very high degree with their feeling of confidence about the target proposition, offers an *indirect* support for CKA. An analogy might illustrate why. If the feeling of maximal aesthetic pleasure is a prerequisite for judging a work of art as a masterpiece, then, presumably, the less aesthetic pleasure one feels with regard to a particular piece of art, the less inclined one is to judge that piece of art as a masterpiece. Similarly, if deeming it

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[21] Note that CKA does not make the stronger claim that A must feel certain that p in order to judge that p is known; only that A must deem it appropriate to feel certain that p. There are presumably cases in which A does not really care about p – and therefore has no epistemic feeling with regard to p – but nevertheless judges that S knows that p (and deems it appropriate to feel certain that p). Or there might be cases in which A does not fully understand what p entails (e.g., p might be a complicated mathematical result), and thus does not feel certain that p. Nevertheless, A might recognize S as an expert with regard to p, and thus might claim that S knows that p, while also deeming it appropriate to feel certain that p. Importantly, even in such cases, A would not feel *doubtful* that p. If that were the case, A would not judge that p is known.

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appropriate to feel certain that *p* is a prerequisite of ascribing knowledge that *p*, as CKA suggests, then the farther away one is from feeling certain that *p*, the less inclined one will be to judge that *p* is known. The confirmation of the Correlation hypothesis thus offers an indirect support for CKA.

The second point we want to make here is that the tentative confirmation of the Cancelation Hypothesis can pose problems for some of the established theories of the shiftiness of knowledge ascriptions on the market. For instance, semantic contextualism (see DeRose 2009; Lewis 1996; Blome-Tillmann 2014) predicts that the shift in the participants' knowledge ascription must be similar in both the Uncertain and the Certain conditions. According to semantic contextualism, the meaning of the predicate *know* changes with the context of its utterance. E.g., in some contexts, in which the standards for knowledge are low, the utterance of 'Keith knows that the bank is open on Saturday' is true, given the available evidence. In more demanding contexts, on the other hand, in which the standards for knowledge are high, the utterance of the same sentence might come out as false, given the evidence. The standards for knowledge, in turn, are fixed by the non-epistemic factors from the utterer's context. The most discussed such factors are the stakes of one's context and the mentioning of possibilities of error with regard to the target proposition (DeRose 2009).

Semantic contextualism is threatened by our results in two ways. First, given that semantic contextualism explains the shift in our inclination to ascribe knowledge by a change in the standards for knowledge, and those standards are taken to be influenced by non-epistemic factors (like the mentioning of error-possibilities or the existence of high stakes), it should be the case that the shiftiness of knowledge utterances exists both in the Uncertain and in the Certain conditions from above, given that the change in non-epistemic factors exists in all those conditions. But as we have seen above with the Cancelation hypothesis, the shiftiness of knowledge utterances exists only in the Uncertain conditions and it is canceled in the Certain conditions. This result puts pressure on sematic contextualism, indicating that their explanation of the shiftiness of knowledge utterances might not be the correct one. Moreover, this problem extrapolates to all the other sensitivist accounts that explain the shiftiness of knowledge utterances by a shift in the standards for knowledge. If the non-epistemic effects on knowledge utterances are canceled while the standards for knowledge are presumably *still high* – according to these accounts – then it is not the shifty standards that explain the shiftiness of knowledge utterances.

The results of this study support, in this sense, a form of *insensitivism* about knowledge utterances. According to insensitivism, the standards for knowledge do not change in a meaningful way with one's non-epistemic context, but are fixed by epistemic features alone (see Williamson 2005; Brown, 2005; Dinges 2019). Insensitivists have proposed a variety of linguistic or psychological mechanisms that would explain the shiftiness of knowledge utterances that do not involve a change in the standards for knowledge. The analysis of these proposals and their connection to CKA goes beyond the aims of this paper[22]. For our purpose, it is sufficient to note that the change in

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[22] For reviews, see DeRose, 2009; Gerken, 2017; Dinges, 2019. See also Spatan 2024 for a detailed defense of insensitivism and criticism of sensitivism.

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standards for knowledge could not explain alone the shiftiness of knowledge utterances, given that such a shiftiness does not exist in cases in which sensitivism predicts it should exist.

Second (see also Dinges 2019), the tentative confirmation of the Cancelation Hypothesis poses a problem for any theory that explains the shiftiness of knowledge utterances by appealing to the context of the *subject* or of the *utterer* of a knowledge utterance. In the present study, Tracy is both the subject and the utterer of the knowledge utterance 'I know that X is the capital of Y', while the participants in the study are assessing the truth value of this utterance. If their feeling of certainty, or lack thereof, is the factor that influences the existence of a non-epistemic effect on knowledge ascriptions, then it is the assessor context that really matters in explaining the shiftiness of knowledge utterances, not the subject context (as subject-sensitive invariantists would have it; (Hawthorne 2004; Stanley, 2005; Fantl & McGrath 2009), nor the utterer context (as contextualists or pragmatic invariantists would have it; see Lewis 1996; DeRose 1995; Rysiew 2001; Brown, 2005; Pritchard 2010).

6. Conclusion

In this paper, we have provided new relevant data on the shiftiness of knowledge utterances. The findings strongly confirm the Correlation Hypothesis, demonstrating that people's inclination to ascribe knowledge correlates highly with their feeling of confidence in the target proposition, indirectly supporting the Certainty condition on Knowledge Ascriptions (CKA). Additionally, the tentative confirmation of the Cancelation Hypothesis underscores the role of the feeling of uncertainty on the part of the assessor of knowledge utterances in facilitating the shiftiness of those utterances. The study showed substantial differences in knowledge ascription scores based on the participants' confidence levels, revealing that assessments of knowledge utterances remain stable when participants feel certain, regardless of error possibilities or high-stakes contexts. These results challenge established theories like semantic contextualism, which attribute shifts in knowledge ascriptions to changes in utterer's epistemic standards influenced by non-epistemic factors. The study suggests that it is the assessor's context that primarily impacts the shiftiness of knowledge utterances. Moreover, the study might pose problems for sensitivism about knowledge ascriptions, given the limitation of the latter in explaining the Cancelation Hypothesis.

Of course, much more work needs to be done to supplement these initial results. While we observed effects of non-epistemic factors in the Uncertain conditions, these effects were not uniform. For instance, we observed no statistically significant high-stakes effects (somehow following the tradition of not noticing such effects in evidence-fixed paradigm; see Francis et al. 2019), and no significant error-possibility effects between the low-stakes conditions (see fn. 18 and 19 above). These results call for future replications, as well as for more narrowly targeted studies (looking, e.g., solely at error-possibility effects).

Moreover, more work needs to be done to explore the consequences of the Certainty condition on Knowledge Ascriptions (CKA), seemingly supported by our results.[23]

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[23] We thank an anonymous reviewer of this journal for prompting us to mention these applications.

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CKA could have significant applications in epistemology, including the lottery paradox, Gettier cases, or the knowledge norm of action, where intuitions about knowledge attribution play a key role. Using CKA to explain these intuitions could prove highly insightful.[24]

A more detailed exploration of CKA, if proven correct, could also yield significant insights for real-life scenarios. For example, CKA might help explain why some individuals are reluctant to recognize established scientific beliefs – despite their strong evidential support – as knowledge. Non-epistemic factors, such as group pressure or cognitive biases, could instill feelings of uncertainty about the target proposition, leading to hesitation in ascribing knowledge. The metacognitive literature highlights that feelings of certainty and uncertainty are often influenced by cues like cognitive fluency, familiarity, and ease of processing (e.g., the fluency with which a memory is recalled; see Alter and Oppenheimer 2009). Social factors may shape these cues significantly. For instance, repeated exposure to fake news within close social networks might make such misinformation feel more cognitively fluent than scientific truths, thereby undermining trust in factual information. The implication for science communication, if CKA holds true, would be to address these sub-personal mechanisms that influence people's feelings of (un)certainty. By targeting how individuals process and perceive information at this level, communicators could more effectively counter misinformation and foster trust in scientific knowledge. We leave the exploration of these possible applications for other occasions.

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[24] Some of these possible applications are sketched in Spatan 2024: 348ff.

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