NOÛS

NOÛS 00:0 (2014) 1–32
doi: 10.1111/nous.12064

Knowledge in and out of Contrast

MIKKEL GERKEN
University of Edinburgh

JAMES R. BEEBE
University at Buffalo

Abstract

We report and discuss the results of a series of experiments that address a *contrast effect* exhibited by folk judgments about knowledge ascriptions. The contrast effect, which was first reported by Schaffer and Knobe (2012), is an important aspect of our folk epistemology. However, there are competing theoretical accounts of it. We shed light on the various accounts by providing novel empirical data and theoretical considerations. Our key findings are, firstly, that belief ascriptions exhibit a similar contrast effect and, secondly, that the contrast effect is systematically sensitive to the content of what is in contrast.

We argue that these data pose significant challenges to contrastivist accounts of the contrast effect. Furthermore, some of the data set provides, in conjunction with some non-empirical epistemological arguments, some limited evidence for what we call a *focal bias* account of the data (Gerken 2012, 2013). According to the focal bias account, the contrast effects arise at least in part because epistemically relevant facts are not always adequately processed when they are presented in certain ways.

1. Introduction

We report and discuss the results of a series of experiments that address a *contrast effect* on folk knowledge ascriptions: Folk inclinations to agree with ascription of knowledge to a subject depend not only on the subject's epistemic position but also on what aspects of it are "in contrast." The contrast effect appears to be an important aspect of our folk epistemology. But there are competing theoretical accounts of it. We shed light on the various accounts by providing novel empirical data and theoretical considerations.

In Sect. 2, we introduce the contrast effect in folk knowledge ascriptions and some interesting theoretical approaches to the existing data. In Sect. 3, we contribute to the data set supporting a contrast effect and supplement it with two baseline conditions. In Sect. 4, we produce a contrast effect for *belief* ascriptions and consider the ramifications of this finding for the theoretical approaches. In Sect. 5, we present a series of experiments in which a key manipulation of the original experiment is altered and discuss how the results bear on the various theoretical approaches. In Sect. 6, we note some null results of our experiments, and in Sect. 7, we conclude by discussing how the data set constrains future theorizing about knowledge ascriptions.

We conclude that the data set presents challenges for every theoretical approach to the contrast effect. However, we argue that the challenges it raises seem to be most serious for *contrastivist* accounts, according to which the contrast effects straightforwardly reflect the truth-conditions of 'knows.' But we emphasize that the data set remains limited and that both further experiments and further epistemological theorizing are called for.

2. The Contrast Effect and Theoretical Approaches to Explaining It

We introduce the contrast effect on knowledge ascriptions by outlining the existing evidence for it and we sketch some interesting theoretical approaches to it.

2.1 The contrast effect

Schaffer and Knobe (2012: 689) first produced evidence of a contrast effect by three different manipulations, each of which was based upon the following vignette:

> Last night, Peter robbed the jewelry store. He smashed the window, forced open the locked safe, and stole the rubies inside. But Peter forgot to wear gloves. He also forgot about the security camera. Today, Mary the detective has been called to the scene to investigate. So far she has the following evidence. She has been told that there was a theft, she has found and identified Peter's fingerprints on the safe, and she has seen and recognized Peter on the security video, filmed in the act of forcing open the safe. She has no further information.

Participants in the *thief contrast condition* were asked to what extent they agreed with the following knowledge ascription:

> K1: Mary now knows that Peter rather than anyone else stole the rubies. (rather than)[1]

Participants in the *jewel contrast condition* were given the knowledge ascription:

> K2: Mary now knows that Peter stole the rubies rather than anything else. (rather than)

Participants in the thief contrast condition were more inclined to agree with the knowledge ascription than those in the jewel contrast condition. Mean ratings on a seven-point Likert scale with '1' labeled as 'Disagree' and '7' labeled as 'Agree' were 4.6 for the thief contrast (K1), compared to 3.1 for the jewel contrast (K2). Schaffer and Knobe also produced the contrast using 'knowledge wh-' constructions in a pair of task probes:

> K3: Mary knows who stole the rubies. (knows-wh)
> K4: Mary knows what Peter stole. (knows-wh)

Participants were more inclined to agree with K3 ($M = 4.91$) than K4 ($M = 2.62$).

Finally, Schaffer and Knobe generated the contrast by manipulating the reported conversational context for a knowledge ascription that appears in the vignette. Here

the conditions were manipulated by an addition to the vignette above (henceforth 'the newspaper manipulation'). The jewel contrast condition was generated by the following addition (Schaffer and Knobe: 962):

> Everyone is now asking the big question: Who stole the rubies? The news reporter is about to write a story about Mary. He is wondering if Mary now knows who stole the rubies. He writes: "Mary now knows that Peter stole the rubies."
>
> K5: Please tell us whether you agree or disagree with the news reporter's claim, "Mary now knows that Peter stole the rubies." (newspaper manipulation)

The thief contrast condition for the newspaper manipulation was generated by the following addition to the vignette (Schaffer and Knobe 2012: 963):

> Everyone is now asking the big question: What did Peter steal? The news reporter is about to write a story about Mary. He is wondering if Mary now knows what Peter stole. He writes: "Mary now knows that Peter stole the rubies."
>
> K6: Please tell us whether you agree or disagree with the news reporter's claim,
>
> "Mary now knows that Peter stole the rubies." (newspaper manipulation)

The mean rating was 5.24 for K5 versus 2.97 for K6. All of these differences were statistically significant (see Schaffer and Knobe 2012 for details).

2.2 Theoretical approaches to the contrast effect

The initial data suggest that the contrast effect is a robust feature of folk knowledge ascriptions. However, this assumption is compatible with a wide range of theoretical explanations. In this section, we briefly survey some theoretical approaches. The approaches we consider do not constitute an exhaustive list, and several of them may be developed in different directions. Moreover, some of them may be combined. However, each of the approaches is independently interesting and has traction with some of our novel data.

2.2a Semantic accounts

Schaffer and Knobe argue that the contrast effect provides evidence for a contrastivist theory of the term 'knows.' Roughly, whether a sentence of the form 'S knows that p' is *true* depends on certain contextual factors—specifically, the explicit or implicit contrast class. So, 'knows' does not denote a two-place relation between a subject and a proposition but a three-place relation between a person, a proposition, and a contrast proposition (Schaffer 2005, Schaffer and Knobe 2012). Thus, all knowledge ascriptions are (tacitly or explicitly) of the form *S knows that p rather than q*. Since the contrast proposition (viz., *q*) is contextually determined, contrastivism is a brand of contextualism according to which the truth-conditions of 'knows' vary with contextual variances (DeRose 2009, Schaffer 2004). Such a

view is a revisionist one. Traditionally it has been presupposed that whether a knowledge ascription is true is independent of such contextual factors.

A contrastivist account provides a fairly straightforward account of the contrast effect data. According to Schaffer and Knobe, the knowledge ascriptions in each thief contrast condition involve a different contrast proposition than the knowledge ascriptions in each jewel contrast condition—even when no contrast proposition explicitly appears in any knowledge ascription. Because Mary's evidence points to Peter being the thief but does not indicate what items he may have stolen, contrastivism issues the verdict that the knowledge ascriptions are true in the thief contrast conditions (where the identity of the thief is the central issue) but not in the jewel contrast conditions (which focus on what items were stolen). This assessment accords with the data. Thus, according to contrastivism, the participants' responses exhibit a semantic competence with the word 'knows' that should be reflected in the truth-conditions of the term.[2]

Opposition to contrastivism's explanation of the contrast effect is motivated by further reflection on the case. The evidential requirements for knowing that Peter stole the rubies are higher than for knowing that Peter stole something. Since Mary has no evidence about what was stolen (and even lacks relevant beliefs about it), it seems that Mary does not know that Peter stole the rubies. Gerken offers the following line of reasoning (Gerken 2013):

> M1: In every case, Mary knows that Peter stole the rubies only if Mary is in a position to know that the rubies were stolen.
> M2: In the present case, Mary is not in a position to know that the rubies were stolen.
> M3: In the present case, Mary does not know that Peter stole the rubies.

Gerken takes the argument to support *strict invariantism,* which is the traditional view that the *truth* of a knowledge ascription does not depend on contextual or conversational factors such as contrast class. DeRose (who defends a non-contrastivist brand of contextualism about 'knows') suggests that a similar argument applies to the knowledge-wh case by highlighting the plausibility of the following conditional: "If Mary knows who stole the rubies, then Mary knows that Peter stole the rubies" (DeRose 2011: 107). There is thus a conflict between contrastivism's account of the contrast data and epistemological theorizing. Anti-contrastivists may regard Gerken's and DeRose's arguments as examples of how epistemological theorizing may constrain the interpretation of the experimental data.

2.2b Psychological bias accounts

Schaffer and Knobe criticize "a shallow processing" account according to which the participants' responses mark a performance error (Schaffer and Knobe, 2012: 700). We will focus on psychological *bias* accounts such as Gerken's epistemic focal bias account. It differs from the shallow processing view that Schaffer and Knobe criticize by postulating a systematic *psychological bias*, rather than a mere *performance error*, in the participants' judgments.[3]

The focal bias account presupposes strict invariantism about 'knows' (i.e., the view that the truth conditions of 'knows' do not vary with context.) The account regards the positive knowledge attributions as *false positives* on the basis of the arguments outlined above (Gerken 2012a, 2013). According to the focal bias hypothesis, the participants in the thief contrast conditions fail to adequately process epistemically relevant facts that are not in focus. Instead, they form the judgment about the knowledge ascription in question on the basis of considering whether Mary's evidence allows her to rule out the alternatives that are in focus—i.e., the alternatives to Peter being the thief (Gerken 2012a: 160ff, 2013). Hence, they do not adequately consider that if Mary knows that Peter stole the rubies, her evidence must also indicate that it was rubies that were stolen.

The focal bias hypothesis can take the form of a *cognitive invisibility* account, according to which participants completely fail to register an epistemically relevant fact, or an *inadequate processing* account, according to which epistemically relevant facts are not adequately processed (Gerken 2013: 164). Gerken suggests that the focal bias only partly accounts for the contrast effect and that it should be integrated with other psychological considerations and with pragmatic accounts (Gerken 2012a: 163ff, 2013: Sect. 6.2). However, he does not develop such integrations but considers the focal bias account in isolation. So, for the present purpose, we will also consider the focal bias hypothesis as a pure psychological bias account.

The focal bias account of the initial contrast effect data is not as straightforward as the contrastivist account. It regards participants as making a systematic mistake in their judgments about the knowledge ascriptions. In order for this claim to be vindicated, additional evidence must be produced in support of it. In Sect. 4 and 5 below, we provide some of the requisite evidence.[4]

2.2c Pragmatic approaches

Schaffer and Knobe consider and dismiss a pragmatic account of the contrast effect that is based on Grice's maxims of Relevance and Quality (Grice 1989. See also Gerken 2012b, Blome-Tillmann 2013). The account they consider has it that knowledge ascriptions K1 through K6 are all true although the jewel contrast "generates the *false implicature* that Mary can eliminate alternatives in which Peter stole something else" (Schaffer and Knobe 2012: 698).

Schaffer and Knobe argue against such a pragmatic account. However, they do not argue against a version of the view according to which all the relevant knowledge ascriptions are *false*. Given that this is the conclusion of the a priori arguments noted above, we take this to be the strongest version of the pragmatic approach to the finding of a contrast effect (DeRose 2011: 107, Gerken: 2013, Sect. 3). A pragmatic defense of this type of invariantism must explain why participants are inclined to agree with a false knowledge ascription. Among the resources for such an approach is the independently motivated idea of presupposition accommodation (Stalnaker 1974, Karttunen 1974, Beaver 1997). Thus, it may be argued that the participants in the thief condition are reasonable in accommodating the false presupposition that Mary knows what was stolen (Gerken 2013 Sect. 6.2,

Steglich-Petersen *forthcoming*). Such an approach is not prone to Schaffer and Knobe's objections although it still faces the challenges of explaining why participants readily accommodate a *false* presupposition.

The pragmatic approach noted above is compatible with a psychological account. Moreover, independently motivated frameworks of cognitive pragmatics, such as relevance theory, seek to integrate psychological and pragmatic elements (Sperber and Wilson 1986/1995, Carston 2002). According to such accounts, communication is constrained by our cognitive capacities. So, what is conveyed by a sentence in a given conversational context is partly determined by how ordinary speakers process information. This bears on what is conveyed by knowledge ascriptions as well (Gerken *forthcoming*). On the other hand, pragmatic facts concerning conversational significance partly determine what information is processed or how it is processed.

Cognitive pragmatics offers resources for addressing the challenges associated with pure psychological and pure pragmatic accounts. The program of cognitive pragmatics is sometimes criticized for failing to yield clear predictions. But given that it aims to combine psychological and pragmatic approaches, it may be worth considering in the present context.

The above list of approaches is not exhaustive, but it marks some important distinctions that are important for theorizing about folk epistemology. For example, the basic distinction between contrastivism (Schaffer's brand of contextualism) and the traditional view, strict invariantism. Among the defenses of strict invariantism, we find pragmatic accounts as well as psychological accounts. Among the latter, we find accounts that postulate *performance error* (e.g., the brand of the shallow processing approach criticized by Schaffer and Knobe) and those that postulate a *systematic bias* (e.g., Gerken's focal bias account). Psychological bias accounts, in turn, may appeal to *cognitive invisibility*, *inadequate processing* or to *mindware gaps*. Finally, there are undeveloped combinations of these approaches.

We will contribute to the debates by providing a range of new data and discussing their bearing on the various approaches. We will both highlight cases in which the data provide a challenge for a given approach and engage in constructive work by pointing out when the data support a given approach. Although all of the approaches sketched above should be considered, we will focus primarily on the how the data bear on Schaffer's contrastivism and Gerken's focal bias approach. This is in part due to considerations of space and in part because these accounts are comparatively well developed. Moreover, by considering these accounts, we consider the issue as an instance of the broader invariantist-contextualist dispute. It is reasonable to address this major dispute before turning, for example, to in-house disputes among invariantists.

2.3 Methodological considerations

All of the accounts sketched above are consistent with the presence of contrast effects in a wide variety of knowledge ascriptions. In consequence, further epistemological reflection and further empirical data are called for. We aim to provide novel empirical data that may serve as input for further reflection. We do not

assume that the issue can be settled by empirical investigation alone. Both theorizing from the relative isolation of the armchair and reflection on the sort of empirical data that we will consider are important for the theory of knowledge as well as for an account of our folk epistemology.

Hence, we regard our experimental findings as contributing to an overlap between philosophy and cognitive psychology. In contrast, we eschew experimental philosophy's *negative program*, according to which empirical data is invoked to cast doubt on or replace traditional philosophical methodology (see, e.g., Nagel 2012b, 2013). Just as empirical investigations may shed light on traditionally philosophical subject matters, traditional philosophy may shed light on empirical matters. For example, traditional epistemology may (on a good day) provide the "gold standard" response to a task which is required for interpreting participant responses to it. We will not claim that the data that we present provide decisive evidence for or against any one of the approaches sketched above. Theoretical virtues that go beyond consistency with experimental data must figure in the choice of epistemological theory. Despite these qualifications, some of the data we are about to present will provide explanatory challenges for some theoretical approaches and thus form a part of an abductively based theory choice.

3. Study 1: Replications, Supplementations, and Baselines

We attempted to replicate and supplement the results obtained by Schaffer and Knobe in the K1 through K6 conditions by a minor change in the stimuli and obtained some baseline measures.

3.1 Methodology

In a between-subjects design, participants in Study 1 read either Schaffer and Knobe's original vignette or one of the supplemented vignettes used in the newspaper manipulation described above. Each participant was then asked to indicate the extent to which they agreed or disagreed with the relevant knowledge ascription. While Schaffer and Knobe used the temporal qualifier 'now' in some of their prompts (K1, K2, K5, and K6) but not in others (K3 and K4), we omitted the term from each of the target knowledge ascriptions for the sake of uniformity.[5]

We also attempted to generate an additional contrast by constructing a pair of knowledge ascriptions that only mentioned either the jewel or the thief aspect of the vignette:

> K7: Mary knows that Peter stole something from the jewelry store.
> K8: Mary knows that rubies were stolen from the jewelry store.

Schaffer and Knobe's initial study did not involve a baseline condition that would provide evidence as to whether to the contrast effect should be seen as increasing or decreasing the likelihood of agreeing with a simple knowledge ascription without an overt contrast. So, in Study 1, we also provided two differently worded baseline prompt questions to be used with the original vignette:

K9: Mary knows that Peter stole the rubies. (baseline)
K10: Mary knows that Peter stole rubies from the jewelry store. (baseline)

Four hundred participants (average age = 33, 43% female, 77% Anglo-American, 83% with at least some college education) were recruited through Amazon's Mechanical Turk (www.mturk.com) and were assigned to exactly one of the experimental conditions K1 through K10.[6]

Participants were asked to indicate the extent to which they agreed or disagreed with the target knowledge ascription on a seven-point scale marked with the labels 'Completely Disagree,' 'Mostly Disagree,' 'Slightly Disagree,' 'Neither Agree nor Disagree,' 'Slightly Agree,' 'Mostly Agree,' and 'Completely Agree.' Each participant was asked two comprehension questions after responding to the target question.[7] Those who failed to answer both questions correctly were excluded. Participants were also asked if they had any comments. Participants indicated their gender, age, ethnicity, and highest educational level attained. Finally, participants completed the Cognitive Reflection Task (Frederick 2005, Toplak, West and Stanovich 2011).

3.2 Results

The data depicted in Figure 1 reveal a contrast effect similar to that found by Schaffer and Knobe in the three contexts represented by conditions K1 through K6. A statistically significant difference in mean knowledge attributions was found between K1 and K2 (the 'rather than' pair, small effect size), between K3 and K4 (the 'knowledge wh-' pair, large effect size), and between K5 and K6 (the newspaper manipulation pair, medium effect size).[8] When we reran some conditions with 'Master Workers'[9] from Mechanical Turk in an effort to obtain further confirmation of the reliability of our most important results, a larger difference between the mean knowledge attributions in the K1 (5.93) and K2 (4.12) condition was found.[10] Mean knowledge ratings fell significantly above the neutral midpoint in four of the six conditions.[11] Notably, all of the mean knowledge ratings we obtained appear to be significantly higher than their counterparts in Schaffer and Knobe's study.[12]

The results from K7 through K10 are represented in Figure 2. The means in three of the four conditions fell significantly above the midpoint.[13] The manipulations in which only 'Peter' (K7) or only 'rubies' (K8) figured in the target knowledge ascription generated a statistically significant contrast effect with a medium effect size.[14]

There was no statistically significant difference between the two baseline conditions (K9 and K10). Moreover, there was no statistically significant difference between either of the baseline conditions and any of the thief contrast conditions (i.e., K1, K3, K5, or K7). In other words, participants were no less likely to agree that that Mary knows that Peter stole the *rubies* from the jewelry store (K10) than they were to agree Mary knows that Peter stole *something* from the jewelry store (K7). However, there was a statistically significant difference between each of the baseline conditions and each of the jewel contrast conditions (i.e., K2, K4, K6, and K8), with medium to large effect sizes in every case.[15] That is, participants were

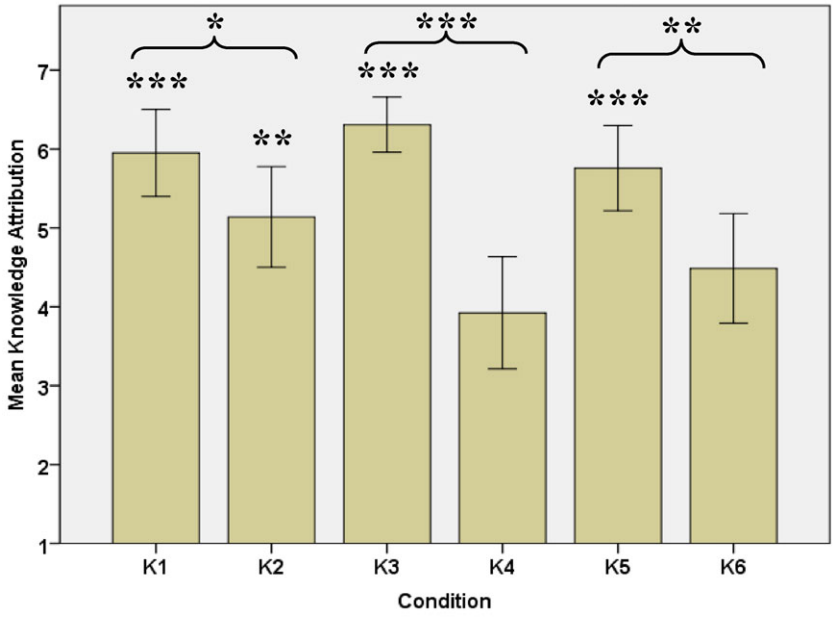

Figure 1. Mean knowledge attributions in the 'rather than' manipulation (K1 = 5.95, K2 = 5.14), knowledge-wh (K3 = 6.31, K4 = 3.92), and newspaper manipulation (K5 = 5.76, K6 = 4.49) pairs of conditions in Study 1. An '*,' '**,' or '***' indicates that the mean differs significantly from the neutral midpoint at the .05, the .01, or the .001 level, respectively. An '*,' '**,' or '***' with a bracket indicates a statistically significant difference between pairs of conditions at the .05, the .01, or the .001 level, respectively. Error bars represent 95% confidence intervals in all figures.

more likely to agree that Mary knows that Peter stole the rubies (K9) than they were to agree that Mary knows what Peter stole (K4).

There were no effects of gender or level of education. However, there was a medium-sized positive correlation between the number of items a participant answered correctly on the Cognitive Reflection Task and that participant's inclination to attribute knowledge in the thief contrast conditions K1, K3, and K5.[16] There was no significant correlation between CRT score and knowledge attributions in the jewel contrast conditions K2, K4, and K6. In other words, high CRT participants were more inclined than low CRT participants to agree that Mary had knowledge when the focus of the prompt was on who committed the crime; but high CRT participants were not any more or less inclined than low CRT participants to agree with the attribution of knowledge to Mary when the focus of the prompt was on what was stolen.

Above we noted that all of the mean knowledge ratings that appear in Figure 1 were significantly higher than their counterparts in Schaffer and Knobe's original study. Relatedly, the lowest mean knowledge attribution we obtained in Study 1 was 3.92, even though both Schaffer and Knobe's contrastivism and Gerken's focal

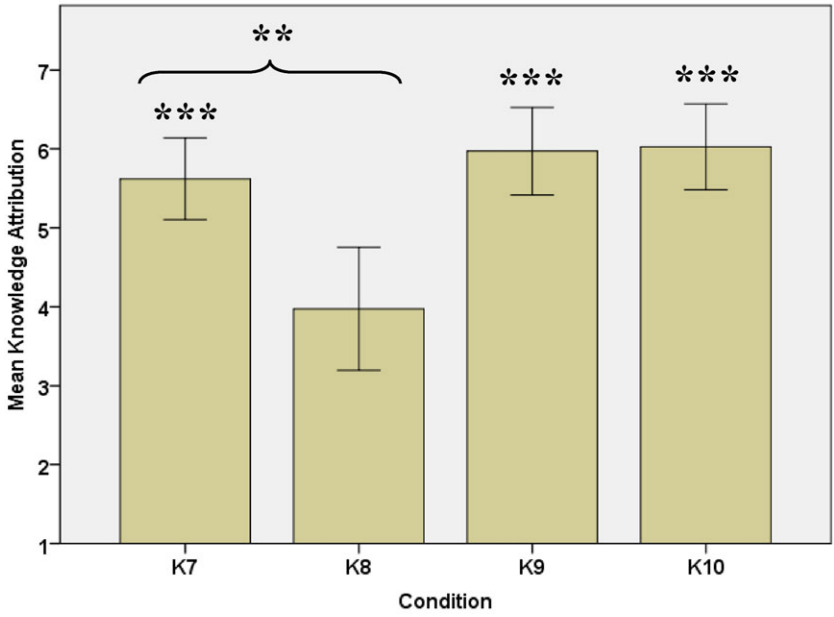

Figure 2. Mean knowledge attributions in the 'Peter only' (K7 = 5.62), 'rubies only' (K8 = 3.95), and baseline (K9 = 5.97, K10 = 6.03) conditions in Study 1.

bias account contend that the correct verdict in these conditions is that knowledge should be denied to Mary.

3.3 Discussion

Our findings support the robustness of a contrast effect in ordinary assessments of knowledge ascriptions and provide some perspectives on the nature of this contrast effect.

Consider that the participants' tendency to agree with the knowledge ascriptions in the baseline conditions were significantly higher than in the jewel contrast conditions but *not* significantly higher than in in the thief contrast conditions. This raises explanatory challenges to contrastivist accounts. The fact that we found no difference between mean participant agreement with K1 ('Mary knows that Peter rather than anyone else stole the rubies') and K9 ('Mary knows that Peter stole the rubies') using the same vignette may indicate that a *general* inclination to agree with a knowledge ascription is diminished only given a focus on a certain epistemic alternative. So, the contrastivist owes an account of why there is no difference between the thief contrast case and the baseline case. Contrastivists might try to claim that the responses in the baseline conditions are at the "ceiling" of agreement with any knowledge ascriptions, and so the inclination to agree could not be stronger in the thief contrast. A competing contrastivist account has it that the baseline condition involves an *unarticulated contrast* that is equivalent to the contrast in the

thief condition.[17] But the latter response should include a principled account of what generates the implicit contrast in the baseline cases.

Consider also the fact that we found no significant difference between mean participant responses to K7 ('Mary knows that Peter stole something from the jewelry store') and K9 ('Mary knows that Peter stole the rubies'). Even contrastivists should admit that the evidential requirements for being in a position to know that Peter stole the rubies are higher than for being in a position to know that Peter stole something. If contrastivists wish to maintain that participant responses to contrast effect cases exhibit semantic competence with the word 'knows' that should be reflected in its truth conditions, they must find a way to accommodate these unfavorable data.

According to what we regard as the most promising version of strict invariantism, the 'rubies' component of the complement clause of the knowledge ascription is epistemically relevant. So, invariantists who postulate a psychological bias may gain modest support from the fact that there were significant differences between participant responses in the baseline conditions and the jewel contrast conditions but not between the baseline and thief contrast conditions. According to the focal bias account, the epistemically relevant 'rubies' component is not adequately processed unless it is in focus. Hence, participants who fail to adequately consider the epistemic relevance of the jewel component will be generally inclined to agree with the knowledge ascription.

Pragmatic invariantist accounts are compatible with this finding although they too face an explanatory challenge. The general challenge to pure pragmatic accounts is to explain why the false presupposition that Mary knows what was stolen is accommodated. Pure pragmatic accounts may appeal to syntactic features of the knowledge ascriptions—i.e., to the 'rather than' and 'wh-' phrases (Steglich-Petersen *forthcoming*). But such an account must then explain why the presupposition is also accommodated in the baseline knowledge ascriptions despite the apparent absence of such syntactic features. Consider, in addition, the difference between the two baseline knowledge ascriptions. Recall that one, K9, read "Mary knows that Peter stole the rubies," whereas the other, K10, read "Mary knows that Peter stole rubies from the jewelry store." The former might be thought to lend more easily to an accommodation of the presupposition that Mary knows that rubies were stolen insofar as the determiner phrase "the rubies" may be taken to indicate that the object of theft is common knowledge. However, there was no statistically significant difference between these two baseline conditions. This is a further data point that a pure pragmatic account must explain.

Let us turn to the lack of significant disagreement with the knowledge ascriptions in any of the conditions. The "high floor" might be taken to suggest a problem with the stimuli that has been noted by, among others, DeRose (DeRose 2011: 99ff). DeRose argues that experimental participants must always presuppose some aspects of Mary's background information. For example, they must presuppose that she knows where the theft took place. So, according to DeRose, it may, given the narrative, be natural to suppose that Mary is informed about what was stolen. We may add that this is particularly so in the vignette in which participants are told

that "Everyone is now asking the big question: Who stole the rubies?" (Schaffer and Knobe: 692). It would be odd to suppose that everybody *but the detective* knew what was stolen. So, particularities of the vignette might partly explain the general lack of disagreement. This candidate explanation presupposes an aspect of pragmatic accounts—namely, presupposition accommodation. It does not, however, provide direct evidence for such pragmatic views insofar as they do not predict a high "floor" any more than the competing theories. For example, on a focal bias account may have it that the fact that an epistemically relevant alternative is salient in the knowledge ascription is insufficient for adequate processing. It may also need to be salient for the participants that it is an epistemically relevant alternative. If so, the fact that the epistemic relevance of the object of theft is not salient in Schaffer and Knobe's *vignette* may contribute to an explanation of the high floor.[18]

Furthermore, Schaffer has found a lower floor in a replication with a new version of the jewel thief vignette which is more explicit about Mary's evidence. Given this manipulation, participants in the jewel contrast condition tended to disagree in a manipulation mirroring the newspaper addition (Thief: $M = 5.05$. Jewel: $M = 2.13$). A within-subject design with the modified vignette resulted in a comparable pattern for a range of knowledge ascriptions. (These results are cited from Schaffer and Szabo, 2014.) These findings may be taken to support the interpretation according to which the high floor of the original data is explained by insufficiently explicit stimuli.

In sum, the original data and the present replication provide empirical reason to assume that there is a robust contrast effect in folk assessment of knowledge ascriptions. Our supplementations provide some explanatory challenges for some of the theoretical approaches to the data.

4. Study 2: A Contrast Effect for Belief Ascriptions

In order to shed light on whether the contrast effect is a distinctive feature of knowledge ascriptions or whether it is a more general feature of mental state ascriptions, we reran most of the conditions from Study 1 replacing 'knows' with 'believes.'

4.1 Methodology

It was unproblematic to substitute 'believes' for 'knows' in K1, K2, K5, K6, K9, and K10 to yield the following prompts:

B1: Mary believes that Peter rather than anyone else stole the rubies. (rather than)
B2: Mary believes that Peter stole the rubies rather than anything else. (rather than)
B5: Mary believes that Peter stole the rubies. (newspaper manipulation)
B6: Mary believes that Peter stole the rubies. (newspaper manipulation)
B9: Mary believes that Peter stole the rubies. (baseline)
B10: Mary believes that Peter stole rubies from the jewelry store. (baseline)

However, the same substitution in K3 and K4 would have resulted in ungrammatical belief ascriptions, such as "Mary believes who stole the rubies." So, instead, we constructed the following pair of 'belief-about-wh' prompts:

B3: After considering the evidence, Mary has a belief about who stole the rubies. (belief-about-wh)
B4: After considering the evidence, Mary has a belief about what Peter stole. (belief-about-wh)

In addition, data for the following two conditions were collected:

B7: After considering the evidence, Mary has a belief about who stole what. (who stole what)
B8: After considering the evidence, Mary has a belief about what was stolen by whom. (what was stolen by whom)

Apart from these variations in the target belief ascriptions, the methodology did not differ from the methodology described in Sect. 3.1. The syntactic and semantic differences between the 'belief-about-wh' and the 'knows-wh' ascriptions will be considered below.

In a between-subjects design, 520 participants (average age = 34, 54% female, 75% Anglo-American, 85% with at least some college education) were recruited through Amazon's Mechanical Turk and were assigned to one of the experimental conditions B1 through B10.

4.2 Results

The results of Study 2 reveal a contrast effect for 'believes' that is similar to the contrast effect for 'knows.' There was a statistically significant difference between the mean belief attributions in each of the three pairs of conditions represented in Figure 3.[19] When we reran the B1 and B2 conditions with Master Workers from Mechanical Turk, a somewhat larger difference was found between the mean belief attribution ratings (B1 = 6.33, B2 = 5.30).

We obtained a medium-sized contrast effect for 'believes' in the 'who stole what' (B7) and 'what was stolen by whom' (B8) conditions (cf. Figure 4).[20] As in Study 1, there was no statistically significant difference between the means in the two baseline conditions in Study 2.[21] There were no effects of gender or level of education on belief ascriptions in Study 2, and there was no significant correlation between participants' CRT score and their inclination to ascribe belief.

4.3 Discussion

The data set provides evidence for a contrast effect for belief ascriptions. We emphasize that the 'belief-about-wh' conditions do *not* amount to analogs of the 'knowledge-wh' conditions. This mode of ascription differs both syntactically and semantically from a simple '-wh' ascription. These differences are substantive and may impact participant responses. For example, one can have a belief about who stole the rubies without having any belief about Peter. For example, a belief that a male stole the rubies will satisfy the 'belief-about-wh' ascription. So, we do *not*

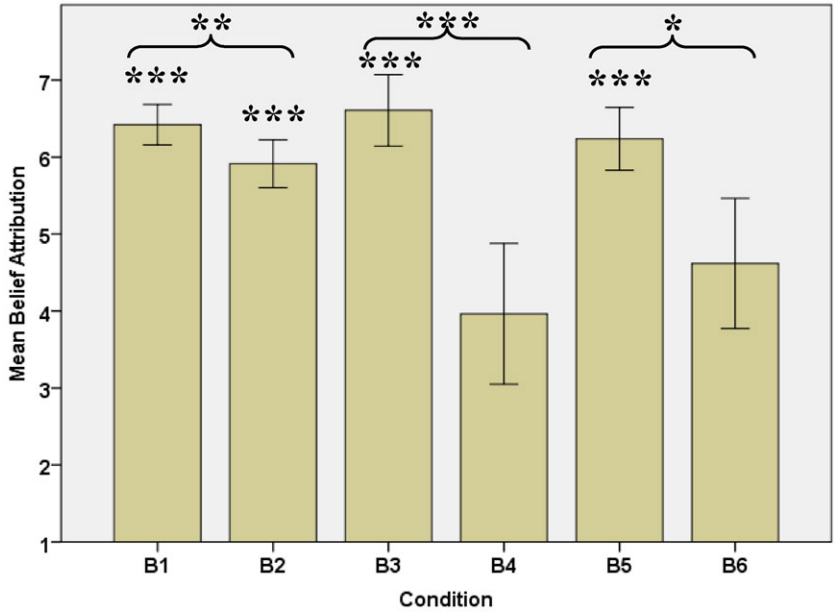

Figure 3. Mean belief attributions in the 'rather than' (B1 = 6.42, B2 = 5.91), 'belief-about-wh' (B3 = 6.61, B4 = 3.96), and newspaper manipulation (B5 = 6.24, B6 = 4.62) pairs of conditions in Study 2.

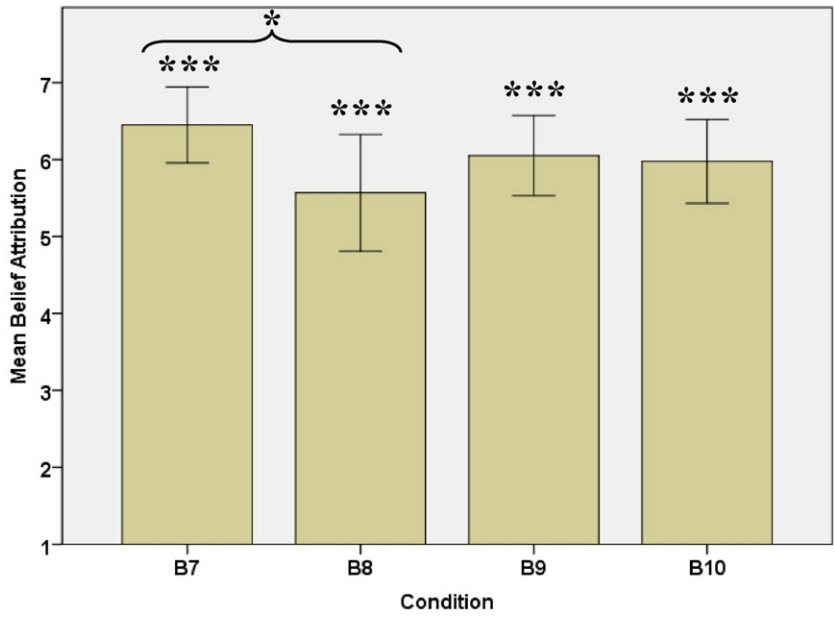

Figure 4. Mean belief attributions in the 'who stole what' (B7 = 6.45), 'what was stolen by whom' (B8 = 5.57), and baseline (B9 = 6.05, B10 = 5.98) conditions in Study 2.

conclude that the 'belief-about-wh' finding provides evidence for a contrast effect for 'belief-wh' ascriptions. Our claim is rather that the finding suggests independent but related and important contrast effects for belief. Along with the data that duplicate the 'rather than' and 'newspaper' contrast for 'knows,' the 'belief-about-wh' contrast effect provides converging but defeasible evidence for a pervasive contrast effect for belief ascriptions. The question, then, is what such an effect shows about the original contrast effect for knowledge ascriptions.

It has been suggested that a contrast effect for belief would raise a challenge for epistemic contrastivism and provide evidence for the focal bias account given some auxiliary premises (Gerken 2013: fn. 18). More generally, the finding could be taken to provide evidence for a psychological account according to which knowledge ascriptions share the biases that are *generally* found in mental state ascriptions (see Nagel 2010, 2012a, although she does not address contrast effects). To assess these suggestions, the positive and negative arguments should be spelled out.

Let us first consider the negative argument against contrastivism. In general, if some effect that is first found for some type of mental verb X is also found for a broader range of mental verbs, this is generally taken to suggest that the effect is not particular to X. For example, the finding of a Knobe effect for belief and knowledge is taken to suggest that the Knobe effect does not reflect particular properties of intention (Beebe and Buckwalter 2010, Beebe 2013). Likewise, finding a stakes effect for belief has led to the suggestion that such an effect does not tell us much about knowledge (Buckwalter and Schaffer *forthcoming*). A more specific challenge may be set forth as a dilemma: the epistemic constrastivist either rejects or adopts doxastic contrastivism—i.e., contrastivism about 'believes.' Let us consider the two horns of the dilemma in turn.

First horn: The trouble with rejecting doxastic contrastivism is that the epistemic contrastivist then owes an account of why the experimental data is evidence for contrastivism in the case of 'knows' but not in the case of 'believes.' The experimental set-up is the same in the two cases. So, it seems odd to postulate a pragmatic or psychological explanation of the belief case but retain a semantic explanation of the knowledge case.

Second horn: Part of the trouble with accepting doxastic contrastivist concerns its motivation. Schaffer has done much to motivate contrastivism about 'knows' on epistemic grounds (Schaffer 2005, Knobe and Schaffer 2012). But much of this motivation appears to be distinctively epistemic. For example, it appeals to a contextualist version of a widely accepted relevant alternatives program in epistemology (Dretske 1970, 1971). So, in the case of knowledge ascriptions, there is an independently motivated idea of what a contrast proposition is—i.e., a relevant alternative that the subject must be able to rule out. But in the case of belief, it is less clear what the contrast proposition is supposed to be. Hence, it is unclear that the motivation of epistemic contrastivism is applicable to belief. Epistemic contrastivism is interesting because it may be given independent motivation from epistemological theory. In the absence of a similar motivation, contrastivism for belief appears to be troublesome.

Schaffer and Szabo (2014) address the issue within a general discussion of whether their comparativist semantics for 'knows' generalizes to other attitude verbs.[22] They argue that it generalizes to *specific epistemics* such as 'see' and 'remember' as well as to *emotive factives* such as 'regret' and 'care.' However, with regard to 'belief' and other attitude verbs, they "leave the prospect of generalizing comparativism to other attitude verbs unsettled" (Schaffer and Szabo, 2014).

The present findings do not settle the issue pertaining to 'belief.' There are, as Schaffer and Szabo note, a range of relevant behaviors of the verb to be considered. Nevertheless, our findings suggest that the contrast effect generalizes at least to 'belief' despite other asymmetries between 'believes' and 'knows.' So, the contrastivist faces the challenge of either motivating doxastic contrastivism or explaining the contrast effect as a merely pragmatic quasi-association (as Schaffer and Szabo mentions (following Beaver and Clark (2008)). Whether the finding is damaging for contrastivism about 'knows' depends on the plausibility of a developed contrastivist view. So, we only conclude that the data raises a challenge for such a development.

Let us consider whether a contrast effect for belief may be taken to provide evidence for a psychological account. As mentioned, the broad rationale for psychological approaches to knowledge ascriptions is that they should be expected to exhibit biases that apply to other mental states as well (Spicer 2005, Nagel 2010, 2012, Gerken 2012a). So, evidence of contrast effects for 'believes' supports this broad rationale. Moreover, the finding of a *word order* effect between the 'who-what' and 'what-who' conditions (B7 and B8) is important because order effects are often explained by reference to the agents' processing patterns and limitations.

These considerations motivate the pursuit of a psychological account. But they are too broad to provide evidence for any particular version of it. Since the focal bias account is a specific psychological account of the contrast effect, we will briefly consider how the data bear on it. The focal bias account does not by itself predict a contrast effect for belief. A couple of auxiliary assumptions are required. One such auxiliary is the assumption that participants take the subject of the knowledge ascription to be epistemically rational. In the present case, this involves the more specific presumption that Mary is responsive to her evidence. Yet more specifically, that she forms beliefs in accordance with her total set of evidence. The second, associated, assumption is that folk ascription of belief is constrained by principles similar to the ones that characterize epistemic focal bias for knowledge ascriptions. Roughly, the analog of Gerken's *Principle of Contextual Salience* claims that for an agent, q is normally a salient alternative to S's belief that p just in case the agent processes q as such (Gerken 2012a: 155, 2013: 50). Likewise, a rough belief-analog of Gerken's *Principle of Epistemic Satisficing* is that agents normally form epistemic judgments based on processing a limited part of the available evidence (Gerken 2012a: 155, 2013: 51). Given analogs of these principles, a focal bias account of the contrast effect for belief ascriptions ensues. Since the auxiliary assumptions seem reasonable, the present finding is congenial to the focal bias account.[23]

The foregoing argument is not conclusive. As emphasized above, arguments from empirical data provide parts of an overall abductive argument. The considerations based on the present data appear to do just that. They raise a challenge for contrastivist accounts and provide limited but notable evidence for psychological approaches.[24]

5. Study 3: Contrast Effects for Alternative Objects of Theft

In a third study, we replaced the original object of theft in Schaffer and Knobe's vignettes (i.e., rubies) with alternative objects of theft.

5.1 Methodology

The methodology was identical with the methodology described in Sect. 3.1 above. The experimental manipulations differed only in that the word 'rubies' in some of the prompt questions from Study 1 was replaced with either the word 'sapphires' or the phrase 'the 4.76 carat diamond set on an amethyst encrusted platinum necklace from the 17th century' (henceforth abbreviated 'diamond'). The prompt questions from the 'rather than' condition (K1 and K2), the first 'knowledge-wh' condition (K3), the two newspaper manipulation conditions (K5 and K6), and the two baseline conditions (K9 and K10) from Study 1 were transformed into two sets of prompts for Study 3:

S1: Mary knows that Peter rather than anyone else stole the sapphires. (rather than)
S2: Mary knows that Peter stole the sapphires rather than anything else. (rather than)
S3: Mary knows who stole the sapphires. (knowledge-wh)
S4: Mary knows that Peter stole the sapphires. (newspaper)
S5: Mary knows that Peter stole the sapphires. (newspaper)
S6: Mary knows that Peter stole the sapphires. (baseline)
S7: Mary knows that Peter stole sapphires from the store. (baseline)
D1: Mary knows that Peter rather than anyone else stole the 4.76 carat diamond set on an amethyst encrusted platinum necklace from the 17th century. (rather than)
D2: Mary knows that Peter stole the 4.76 carat diamond set on an amethyst encrusted platinum necklace from the 17th century rather than anything else. (rather than)
D3: Mary knows who stole the 4.76 carat diamond set on an amethyst encrusted platinum necklace from the 17th century. (knowledge-wh)
D4: Mary knows that Peter stole the 4.76 carat diamond set on an amethyst encrusted platinum necklace from the 17th century. (newspaper)
D5: Mary knows that Peter stole the 4.76 carat diamond set on an amethyst encrusted platinum necklace from the 17th century. (newspaper)
D6: Mary knows that Peter stole the 4.76 carat diamond set on an amethyst encrusted platinum necklace from the 17th century. (baseline)

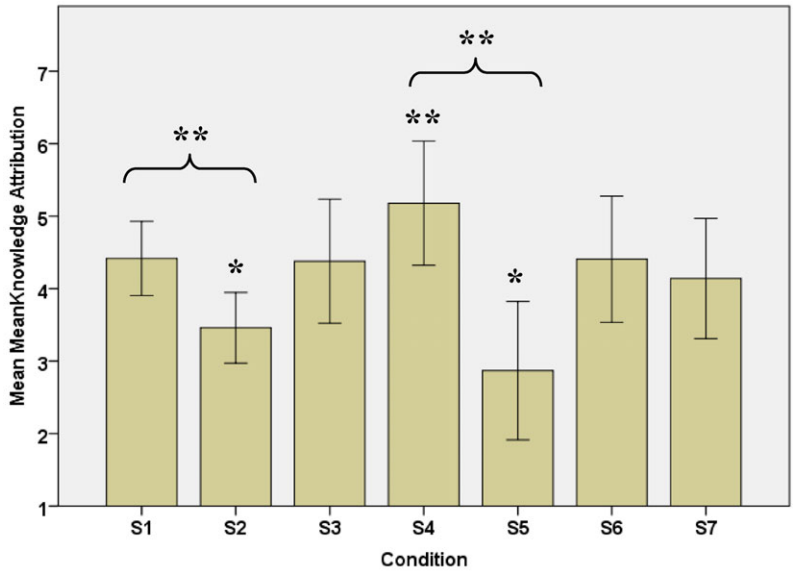

Figure 5. Mean knowledge attributions in the 'rather than' (S1 = 4.42, S2 = 3.46), 'knowledge-wh' (S3 = 4.38), newspaper manipulation (S4 = 5.18, S5 = 2.87), and baseline (S6 = 4.41, S7 = 4.14) pairs of sapphire conditions in Study 3.[30]

D7: Mary knows that Peter stole the 4.76 carat diamond set on an amethyst encrusted platinum necklace from the 17th century from the store. (baseline)

Because the second 'knowledge-wh' prompt (K4) from Study 1 did not contain 'rubies,' there was no substitution to be made. We eliminated the following sentence from the original newspaper manipulation vignettes "He [i.e., the reporter] writes: 'Mary now knows that Peter stole the rubies'" Importantly, the occurrences of 'rubies' in the vignettes that accompanied each of these prompts were left unchanged. In other words, the vignettes in Study 3 were about rubies, but the prompts that involved the target knowledge ascriptions were about sapphires or the 17th century necklace.

In a between-subjects design, 760 participants (average age = 31, 48% female, 56% Anglo-American, 84% with at least some college education) were recruited through Mechanical Turk and were assigned exactly one of the experimental conditions represented by S1- S7 and D1-D7.

5.2 Results

The main results of Study 3 are represented in Figures 5 and 6. For both the sapphire and the diamond prompts, there was a significant difference between the means in the contrasting pairs of 'rather than' conditions (S1 vs. S2 and D1 vs. D2) and between the means in the newspaper manipulation conditions (S4 vs. S5 and D4

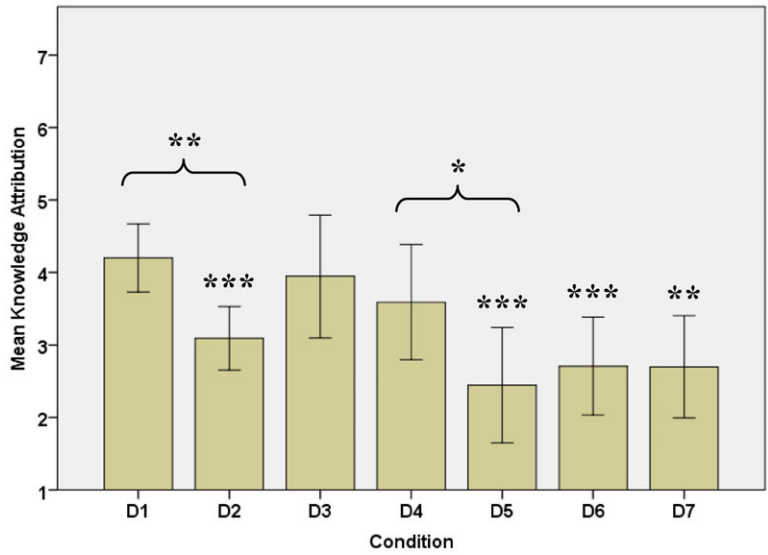

Figure 6. Mean knowledge attributions in the 'rather than' (D1 = 4.20, D2 = 3.09), 'knowledge-wh' (D3 = 3.95), newspaper manipulation (D4 = 3.59, D5 = 2.45), and baseline (D6 = 2.71, D7 = 2.70) pairs of diamond conditions in Study 3.[31]

vs. D5).[25] When the S1 and S2 conditions were rerun with Master Workers from Mechanical Turk, the difference between the means obtained was even larger.[26] Using K4 ('Mary knows what Peter stole') as the knowledge-wh foil to S3 and D3, no significant differences were observed between K4 and S3 or between K4 and D3.

There was a small effect of gender in the sapphires cases, with females (M = 3.54) being less inclined than males (M = 4.52) to attribute knowledge, but there was no effect of gender in the diamond cases.[27] There was an effect of level of education in both the sapphires and the diamond conditions, with education level being negatively correlated with an inclination to attribute knowledge.[28] In other words, the higher the level of education attained, the less likely participants were to attribute knowledge in these cases. There was also a negative correlation between participants' CRT scores and their inclination to attribute knowledge in the diamond cases.[29] However, there was no significant correlation between CRT scores and knowledge attributions in the sapphires cases.

Table 1 and Figure 7 combines data from Studies 1 and 3 and reveal that there is a clear overall trend of decreasing knowledge attributions across the rubies, sapphires, and diamond conditions. Comparing the mean in each rubies cell with its sapphires counterpart and the latter with its diamond counterpart reveals that in every case, the mean decreases. In nine out of fourteen such cases, the differences between the means were statistically significant.[32] Collapsing the data in each of the three columns in Table 1 reveals that the differences in mean knowledge attributions between the three condition categories are indeed statistically significant (Figure 7).[33]

Table 1. Mean knowledge attributions from the most important rubies (K1, K2, K3, K4, K5, K6, K9, K10), sapphires (S1, S2, S3, S4, S5, S6, S7), and diamond (D1, D2, D3, D4, D5, D6, D6) conditions in Studies 1 and 3.

		Rubies	Sapphires	Diamond
Rather than	Thief contrast	5.95	4.42	4.20
	Jewel contrast	5.14	3.46	3.09
Knowledge-wh	Thief contrast	6.31	4.38	3.95
	Jewel contrast	3.92	(3.92)	(3.92)
Newspaper	Thief contrast	5.76	5.18	3.59
	Jewel contrast	4.49	2.87	2.45
Baseline	Baseline1	5.97	4.41	2.71
	Baseline2	6.03	4.14	2.70

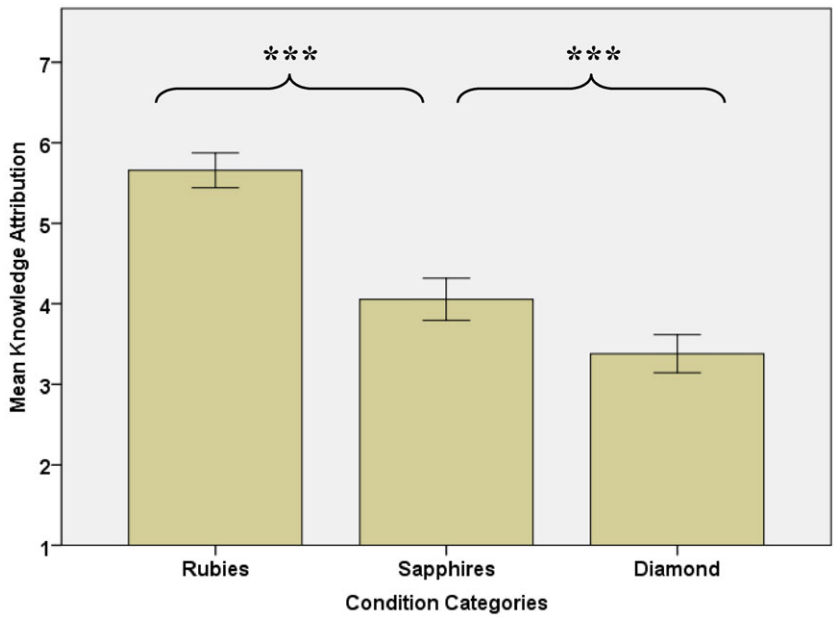

Figure 7. Mean knowledge attributions across the collapsed rubies (5.66), sapphires (4.06), and diamond (3.38) conditions represented in Table 1.[34]

5.3 Discussion

The sapphire conditions involve a simple substitution—one that insufficiently attentive individuals might miss. In contrast, the diamond condition is designed to make the substitution easily detectable due to added complexity and specificity.

An overall trend suggested by the present data set is that the inclination to agree with the knowledge ascription decreases when the jewelry in the complement

clause is not the object of theft described in the vignette. Moreover, the data set suggests that agreement with the knowledge ascription decreases *more* in the diamond case in which the substitution is easier to detect. For brevity we let 'rubies>sapphires>diamond' denote the trend according to which the means are higher in the rubies conditions than the means in the sapphires conditions which, in turn, are higher than the means in the diamond conditions.

Let's consider how the rubies>sapphires>diamond trend and these contrast effects bear on semantic, psychological and pragmatic accounts, respectively.

5.3a Semantic approaches

The rubies>sapphires>diamond trend raises a challenge to contrastivist accounts of the original data. Here we only consider contrastivist views that assume that the knowledge ascriptions in the sapphire and diamond conditions are *not true* in both the thief and jewel conditions—i.e., we only consider views that assume the factivity of 'knows.'[35]

Given factivity, it is not clear how a contrastivist may account for the rubies>sapphires>diamond trend. The motivation for contrastivism presupposes that the participants' responses reflect a semantic competence that, in turn, reflects the truth-conditions of 'knows.' But the factivity-respecting contrastivist assumes the knowledge ascriptions to be false (not true) in *all* the thief contrast conditions—regardless of the object of theft. However, if the participants' responses reflect the truth-conditions of 'knows,' the gradual decrease in inclination to agree with the thief contrast knowledge ascriptions is surprising. Contrastivism appears to lack the resources to explain this trend. Of course, a contrastivist could appeal to psychological or pragmatic resources. But if such an appeal is required, the question for the contrastivist is this: Why are such explanations good in some cases (when the explanandum is the trend under discussion) and bad in others (when the explanandum is the original contrast effects)?

Related challenges arise from the contrast effects in both the sapphires and diamond versions of the 'rather than' and 'newspaper' conditions. Given factivity, these knowledge ascriptions are false (or not true) in *both* the thief and jewel conditions. So, if participant responses reliably track the truth of contrasting knowledge ascriptions, no contrast effect should be expected. If factivity is invariably epistemically relevant, whereas it is contrast-sensitive whether the subject must have evidence bearing on the jewel-component, then contrast effects should only be expected in the latter cases. That is, contrast effects should *only* be expected in cases like Schaffer and Knobe's original ones. So, unless the contrastivist accepts that the truth-value of the jewel-component is *also* contrast-sensitive (and thereby rejects factivity of 'knows'), the account lacks the resources to explain the contrast effects reported above.[36]

There is a methodological aspect to these challenges. The motivation for contrastivism presupposes that the contrast effects reflect semantic competence. But the present findings suggest otherwise. Contrasts can make participants agree with knowledge ascriptions that are false (or not true). Moreover, participants' ability to respond correctly—i.e., to disagree with false (not true) knowledge ascriptions—is

affected by the various manipulations. For example, participants were most inclined to disagree with the 'diamond' in the baseline and newspaper 2 conditions.

Thus, the 'sapphires' and 'diamond' data raise serious challenges to epistemic contrastivism and the methodology involved in motivating the view by the original contrast effects.

5.3b Psychological bias approaches

Psychological bias approaches are motivated by the present findings since they claim that participants' responses are *generally* affected by the contrast conditions. Because the 'sapphires' and 'diamond' conditions are false (or not true) in both thief and jewel conditions, the contrast effects cannot be explained by appeal to the participants' semantic competence. So, given that there is some *principled* explanation of the contrast effects in these conditions, a psychological bias approach deserves consideration. Indeed, the data reveal the participants' mistake to be systematically influenced by the alleged object of theft and the way it is presented. So, the data provides evidence for a *bias* as opposed to a mere *performance error*.

However, the above findings are interesting not only because they provide general evidence for a psychological bias approach but also because they challenge particular brands of it. For example, a *cognitive invisibility* account faces a challenge.[37] If participants were completely blind to the jewel component in the thief conditions, the responses should be on a par in those conditions. Since they are not, the present findings give proponents of a psychological account a reason to favor an approach postulating *inadequate processing* or a *mindware gap* over one that postulates cognitive invisibility.

Let us consider the rubies>sapphires>diamond trend. According to the focal bias account, the epistemic relevance of the jewel alternative is less likely to be adequately processed if it is out of focus—even if it is not unnoticed altogether.[38] Such an approach may be motivated by the present findings given two auxiliary assumptions. First, the epistemic relevance of the sapphires-component is easier to notice and process than the epistemic relevance of the rubies-component. The latter requires reflection on relevant alternatives. The former only requires appreciation of factivity. Moreover, the mismatch between the actual object of theft and what is mentioned in the 'sapphires' case gives the participants a clue to critically assess the knowledge ascription that the participants in the 'rubies' conditions do not have available. Second, the epistemic relevance of the sapphires-component is not as easy to notice and process as the epistemic relevance of the diamond-component. After all, the 'diamond' definite description is longer and more specific than the simple 'sapphires.'

Given these two assumptions, the rubies>sapphires>diamond trend supports an *inadequate processing* version of the focal bias account. In the 'rubies' cases, it is very hard to adequately appreciate the epistemic relevance of the rubies. Indeed, it requires sophisticated epistemological reflection about relevant alternatives to realize that the knowledge ascription is false in the thief conditions. But in the 'sapphires' cases, the participants are aided by the switch in jewelry and the fact that it does *not* require sophisticated reflection to disagree with a knowledge

ascription on the basis of factivity violation. In the 'diamond' conditions, the switch is—because of the long definite description—even easier to notice than in the 'sapphires' conditions. This increases the likelihood that the switch is not missed by the participants. Thus, participants' overall performance on the contrasted knowledge ascription task should, according to the focal bias account in question, be expected to improve in the manner of the rubies>sapphires>diamond trend. So, if the trend is robust, the inadequate processing version of the focal bias account gains evidential support.[40]

The focal bias account explains the contrast effects in the 'sapphires' and 'diamond' conditions in the same manner that it explains the original 'rubies' contrast effects. According to the focal bias account, the aspects of the knowledge ascription that are not in focus are less likely to be adequately processed. While the violation of factivity may be easier to notice and process than the violation of the evidential requirement that Mary knows that rubies were stolen, it nevertheless requires processing. So, if aspects of the knowledge ascriptions that are out of focus are less likely to be adequately processed, the 'sapphires' and 'diamond' components may not be adequately processed in the thief contrasts. This explanation is consistent with the above account of the rubies>sapphires>diamond trend. To say that the 'sapphires' and 'diamond' components are more likely to be adequately processed than the 'rubies' component is consistent with the suggestion that they are less likely to be adequately processed in the thief than in the jewel contrast condition. In fact, these two suggestions are uniform insofar as both appeal to the cognitive demands on adequately processing the jewel alternative.

Thus, the focal bias account provides a uniform account of the contrast effects for the original contrast effects and the contrast effects for 'sapphires' and 'diamond' Hence it gains evidential support from the present findings.

5.3c Pragmatic approaches

As with the psychological bias approaches, pragmatic approaches do not require that the participants' responses align with the truth-conditions of 'knows.' This is compatible with the fact that the data suggest a discrepancy between the response patterns and the truth-conditions. The 'sapphires' and 'diamond' are both false (not true) in both the thief and jewel conditions. But the rubies>sapphire>diamond trend and the contrast effects reveal differences in response patterns. Of course, this motivation is mainly negative. It merely suggests that something other than the truth-conditions of 'knows' explains the response patterns. So, the pragmatic approaches' plausibility depends on their positive account of the data. In this regard, pragmatic approaches have explanatory potential, but they also face some challenges.

A central challenge to a pure pragmatic account of the rubies> sapphires>diamond trend is to explain why participants are *more* willing to mistakenly accommodate one false presupposition (i.e., that Mary knows that the rubies were stolen) than another (i.e., that she knew that sapphires were stolen). Worse yet, why are participants more inclined to mistakenly presuppose that sapphires were

stolen than that the diamond was stolen? A pure pragmatic account may be unable to explain these findings. But, as noted, pragmatic approaches may *combine* with psychological approaches. In the present case, a pragmatic account might explain how the contrasting formulations generate mistaken presupposition accommodation. In turn, a psychological bias approach might explain why some mistaken presuppositions are more likely to be accommodated than others.

It is a major task to develop such a division of explanatory labor in a principled manner. As mentioned, frameworks of *cognitive pragmatics* may be of interest. But such frameworks require considerable development themselves. So, we only conclude that pragmatic approaches may gain broad motivation from the present data but that *pure* pragmatic accounts are faced with explanatory challenges suggesting that they should be integrated with psychological approaches.

6. Some Null Results

In the present section, we briefly report some null results that we obtained in an effort to shed light on the nature of the candidate psychological accounts.

As noted, every participant in Studies 1 through 3 was directed to complete the Cognitive Reflection Task (henceforth: CRT). If a focal bias account fully explained the contrast effect, it might be hypothesized that more reflective participants would be less likely to agree with knowledge ascriptions that (according to the account) were false (Toplak, West and Stanovich 2011, Stanovich 2011). We found tidbits of data that accorded with this prediction. For example, the tendency to ascribe knowledge was negatively correlated with the CRT in the diamond cases and negatively correlated with higher education level in both sapphires and diamond cases (cf. Sect. 5.2). However, there was no general pattern within the data that supported the prediction in question.

We also performed various manipulations in a controlled laboratory setting that failed to generate significant results. Three hundred six undergraduate students from a large public university in the northeastern United States were randomly assigned to either the K1 or the K2 conditions, each of which was coupled with one of the following four manipulations:

> *Manipulation 1:* Participants read Schaffer and Knobe's original vignette and responded to either K1 or K2 *before* completing the cognitive reflection task, along with a need for cognition test (Cacioppo & Petty 1982; Cacioppo, Petty & Kao 1984).
> *Manipulation 2:* Participants read Schaffer and Knobe's original vignette and responded to either K1 or K2 *after* completing the cognitive reflection task, and then completed a need for cognition test.
> *Manipulation 3:* Participants read Schaffer and Knobe's original vignette and responded to either K1 or K2 before completing the cognitive reflection task, along with a need for cognition test; the research materials were printed in a very faint, light grey font that was difficult to read.

> *Manipulation 4:* Participants read Schaffer and Knobe's original vignette and responded to either K1 or K2 before completing the cognitive reflection task, along with a need for cognition test; participants were told beforehand that they would need to justify the answers they gave and were directed to sign their names and initial each page.

We hypothesized that having participants complete the CRT before considering contrast effect cases might put them in a more reflective frame of mind than those who completed the CRT after responding to the vignettes. We wanted to see if this reflective priming might induce participants to think more critically about the cases and thus give fewer false positives. We also hypothesized that having the research materials printed in a faint font might induce a similarly reflective frame of mind (following Alter et al 2007, Oppenheimer and Frank 2007, Oppenheimer 2008).

In the fourth manipulation—an accountability manipulation—participants received the following instruction prior to the task (Simonson and Nye 1992, Lerner and Tetlock 1999):

> Please read the following story and answer the questions below, providing a short written justification for the answer you give to Question 3. Please be advised that you may be invited by the researchers conducting the study to explain and justify your choices at a later time. Furthermore, you should be aware that the researchers may include the choices and justifications you make in the present study in a booklet that will serve as the basis for class discussion in a research methods course.
>
> Please be sure to enter your name on the first page of the study and initial each subsequent page.

On the second page, the instruction for the post hoc task read: "In the space below, please explain why you answered Question 3 on the other side as you did." Again, the hypothesis was that the predecisional accountability condition would induce more reflective thinking which, in turn, has been shown to debias certain cognitive illusions (following Simonson and Nye 1992, Lerner and Tetlock 1999).

No significant differences were found between participants in K1 and K2 in any of the four manipulations described above. 'Need for cognition' refers to an individual's tendency to engage in and enjoy effortful cognitive endeavors and is correlated with general intelligence (Cacioppo and Petty 1982; Cacioppo, Petty & Kao 1984). There were no significant correlations between participants' need for cognition scores and their agreement or disagreement with K1 or K2.

6.3 Discussion

It is generally problematic to draw strong conclusions from null results because they represent failures to find evidence. The present case is no exception to the rule that *absence of evidence is not evidence of absence*. For example, the disfluency and predecisional accountability results do not provide evidence against a general psychological bias account of the contrast effects. Some biases are debiased by such manipulations and some are not (Simonsen and Nye 1992, Lerner and Tetlock 1999, Oppenheimer 2008). Likewise, the lack of a correlation between performance

and the CRT or the need-for-cognition does not provide evidence against a bias account. Not all biases correlate with the need-for-cognition test, the CRT or general intelligence (Stanovich and West 2008, Stanovich 2011). Furthermore, the effects of the above manipulations may be somewhat fragile and fail to manifest themselves in every experimental setting. However, Toplak et al. argue that the CRT constitutes "a unique predictor of performance on heuristics-and-biases tasks" (Toplak, West and Stanovich 2011). More specifically, they claim that " . . . the CRT is a measure of the tendency toward the class of reasoning error that derives from miserly processing" (Toplak, West and Stanovich 2011).

In the context of discovery, then, the converging null results may be suggestive of the *types* of biases that proponents of a bias approach should consider. For example, accounts which postulate a heuristic process of a type that is debiased by an accountability manipulation should explain why the present studies failed to indicate any debiasing effect. In particular, *cognitive invisibility* accounts according to which participants simply overlook the rubies component in the thief conditions face such an explanatory challenge. Likewise, the failure to find a correlation between knowledge ascriptions and CRT scores should be explained, given the latter's correlation with a wide array of heuristics-and-biases tasks. In the context of discovery, the converging null results may be suggestive with regard to the types of biases that should be considered. So, we will conclude with some speculative considerations.

Consider bias approaches according to which the contrast effect has similarities with, for example, the Levesque task (discussed in Gerken 2012a: 146ff. cf. Levesque 1986). Here is a Levesque task: "*Jack is looking at Ann but Ann is looking at George. Jack is married but George is not. Is a married person looking at an unmarried person?*" The answer possibilities are: *A: Yes, B: No, C: Cannot be determined.*

The Levesque task is demanding in part because the participants, in order to give the correct answer (*A: Yes*), must provide information that is not provided—namely the disjunction that Ann is either married or not married (for this reason the task is also called 'the disjunctive insight task'). Eighty-six per cent of participants fail to do so, giving the wrong answer *C: Cannot be determined* (Toplak and Stanovich 2002: 203). Importantly, the Levesque task does not correlate with high intelligence (Toplak and Stanovich 2002, Stanovich 2011).

In the contrast effect cases, the participants must also contribute substantive assumptions in order to respond correctly (i.e., negatively, according to strict invariantism). However, the Levesque task only requires that the participants contribute the assumption that someone is either married or not. This is a fairly simple assumption that most participants are aware of. But according to anti-contrastivism, the contrast effects require that the participants contribute several fairly complex conditionals. Consider DeRose's argument that the knowledge ascription "Mary knows who stole the rubies" is false. This involves the conditionals "Mary knows who stole the rubies only if Mary knows that Peter stole the rubies" and "Mary knows that Peter stole the rubies only if Mary knows that the rubies were stolen." (DeRose 2011). Gerken provides two similar arguments. As mentioned in Sect. 2.2a, one involves the conditional "In every case, Mary knows that Peter stole the rubies

only if Mary is in a position to know that the rubies were stolen" (Gerken 2013: 45). The other involves the conditional "If Mary does not believe anything about rubies (as far as her beliefs about the theft go), Mary does not believe that Peter stole the rubies" (Gerken 2013: 47).

In contrast to the simple disjunctive assumption that is required by the Levesque task, such conditionals are complex and unlikely to be accessible to lay participants. They are overtly theoretical assumptions that epistemologists may not even agree about. The null results are consistent with assuming that a simple debiasing manipulation is insufficient to put the participants in a position to supply such conditionals and go through the required reasoning. Lerner and Tetlock put the point as follows: "Predecisional accountability to an unknown audience will have no effect on bias if, even after increased attention to one's decision process, no new ways of solving the problem come into awareness (Lerner and Tetlock 1999: 263).

As mentioned, most participants in the Levesque task may be attributed the relevant background assumption. In contrast, the relevant assumption is not clearly attributable to the participants receiving the present cases: The participants are not epistemologists. We conjecture that many participants would agree with the relevant conditionals if they were presented to them.[41] But it is unclear that participants can themselves contribute them without specific probing. If participants are generally unable to do so, the contrast effects should be expected to be robust against simple debiasing manipulations. This assumption may be articulated by claiming that the participants have a "mindware gap" (Stanovich 2009, 2011. See also Boyd and Nagel 2014).

But, as mentioned, null results are generally compatible with a wide array of psychological accounts—including ones that postulate a complex interaction between focal bias, mindware gaps and other factors such a pragmatic ones (Gerken 2012a, Sect. 7.5.2, Gerken 2013, Sect. 6.2). So, since we are keen on respecting the difference between positive evidence and mere lack thereof, we remain content with presenting the null results and the above speculations.

In short, the null results do not provide positive evidence for or against any account. But perhaps they may be said to be compatible with *inadequate processing* or *mindware gap* approaches, whereas simple *cognitive invisibility* approaches owe an explanation of them.

7. Conclusions

The present series of experiments contribute data to the empirical study of knowledge ascriptions and, more generally, to the developing field of *folk epistemology*. Our results raise some challenges for each of the approaches to the original contrast effect for knowledge ascriptions. However, the data set raises several serious challenges for a contrastivist account. We noted at the outset that the contrastivist owes a response to the armchair arguments set forth by DeRose and Gerken (DeRose 2011, Gerken 2013). Likewise, the contrastivist owes a response to the present findings. The tenability of the view depends on the plausibility of the responses to this growing list of challenges.

We take the present data set to provide some evidence for approaches according to which the contrast effects are explained by more general facts about mental state ascriptions. Both pragmatic and psychological bias approaches may provide resources for such an explanation, and we have noted that these approaches may be combined. However, we have specifically considered how psychological bias approaches such as the focal bias account may account for the present data. Interestingly, the data provide some support for pursuing an *inadequate processing* version of this approach over a *cognitive invisibility* approach. So, apart from providing negative evidence and a broad motivation, the present findings may also contribute positively to the development of a theory about contrastive knowledge ascriptions. Such a theory should account for the participant response patterns in a manner that is both empirically realistic and epistemologically sound. Both the empirical data and the theorizing provided here seek to contribute to this ambition.

Future work in the emerging field of *folk epistemology* should be integrated with existing accounts of folk psychology. The present study indicates that research on knowledge ascriptions should be integrated with research on belief ascriptions and empirical accounts of the nature of cognitive processing. On the other hand, we also hope that the present investigation exemplifies that epistemological theorizing is required for fruitful empirical work on folk knowledge ascriptions.[42]

Notes

[1] The names 'K1,' 'K2,' etc. were labels we used for our convenience and were not seen by participants. Likewise, the parenthetical characterizations are added here in order to make it easier for the reader to remember the conditions.

[2] A semantic approach need not be contextualist. For example, Aloni and Egré outline an invariantist semantics of 'knows' which may account for the contrast effect (Aloni and Egré 2010). According to such an account, the propositions expressed by the thief and jewel conditions differ due to differences that have nothing to do with 'knows.'

[3] Knobe and Schaffer cite (Sanford and Sturt 2002; Sanford *et al* 2006) as proponents of the shallow processing account. But it is inaccurate to regard them as postulating mere performance error. Shallow processing research consists, in part, in identifying the factors (e.g., sentential load, perspective, mood and focus) that modulate depth of processing in sentence comprehension (Sanford and Sturt 2002, Sanford 2002, Sturt *et al* 2004). So, we only contrast a psychological bias account with the version of the shallow processing account that Knobe and Schaffer criticize.

[4] Furthermore, strict invariantism may be defended by arguing that participants' responses are mistaken due to inadequate conceptual resources—sometimes called "mindware gaps" (Stanovich 2009, 2011, Lerner and Tetlock 1999). The armchair arguments contra contrastivism are fairly complex (Kelp 2011, DeRose 2011, Gerken 2013). Such arguments may require conceptual resources that participants lack. Likewise, participants are insensitive to the pragmatics-semantics distinction (Rysiew 2007). As these candidate examples of mindware gaps indicate, this approach may be combined with psychological or pragmatic approaches.

[5] The omission also helps to prevent the prompt question from being interpreted as asking whether Mary knew more after her investigation than before. Furthermore, it avoids confusion that may arise from the fact that 'now' figures in each of the newspaper manipulation vignettes but not in their accompanying prompt questions. Despite this change in the stimuli, we will continue to use 'K1-K6' as labels for the conditions in question.

[6] Workers were paid $.25 for their participation and were not allowed to participate in more than one condition.

[7] The first was: "What is Mary's job?" (Answer possibilities: Store manager, Detective, Photographer, Thief). The second was: "What did Peter rob?" (Bank, Palace, Jewelry store, Museum).

[8] K1 vs. K2: Mann-Whitney $U = 599$, $z = -2.037$, $p < .05$, $r = -.23$. K3 vs. K4: $U = 261.5$, $z = -5.16$, $p < .001$, $r = -.58$. K5 vs. K6: $U = 438$, $z = -2.882$, $p < .01$, $r = -.33$.

[9] According to the Mechanical Turk help pages (https://requester.mturk.com/help/faq), "Masters are elite groups of Workers who have demonstrated accuracy on specific types of HITs [i.e., Human Intelligence Tasks] on the Mechanical Turk marketplace. Workers achieve a Masters distinction by consistently completing HITs of a certain type with a high degree of accuracy across a variety of Requesters. Masters must continue to pass our statistical monitoring to remain Mechanical Turk Masters." Master workers were each paid $1 for their participation.

[10] $U = 225.5$, $z = -3.136$, $p < 0.01$, $r = -0.41$, medium effect size.

[11] All statements about mid-points are supported by one-sample t-tests. K1: $t(39) = 7.154$, $p < .001$, $r = .75$ (large effect size). K2: $t(39) = 3.615$, $p < .01$, $r = .50$ (large effect size). K3: $t(38) = 13.346$, $p < .001$, $r = .91$ (large effect size). K4: $t(38) = -0.219$, $p > .05$, $r = .04$. K5: $t(36) = 6.602$, $p < .001$, $r = .74$ (large effect size). K6: $t(37) = 1.42$, $p > .05$, $r = .23$.

[12] A proper statistical analysis would require Schaffer and Knobe's raw data.

[13] K7: $t(36) = 6.356$, $p < .001$, $r = .73$ (large effect size). K8: $t(39) = -0.134$, $p > .05$, $r = .02$. K9: $t(36) = 7.613$, $p < .001$, $r = .79$ (large effect size). K10: $t(37) = 7.561$, $p < .001$, $r = .78$ (large effect size).

[14] $U = 448$, $z = -2.763$, $p < 0.01$, $r = -.32$.

[15] K9 vs. K2: $U = 520$, $z = -2.010$, $p < .05$, $r = -.23$ (small effect size). K9 vs. K4: $U = 285$, $z = -4.426$, $p < 0.001$, $r = -.51$ (large effect size). K9 vs. K6: $U = 362$, $z = -3.452$, $p < .01$, $r = -.40$ (medium effect size). K9 vs. K8: $U = 363.5$, $z = -3.452$, $p < .01$, $r = -.40$ (medium effect size). K10 vs. K2: $U = 552$, $z = -2.195$, $p < .05$, $r = -.25$ (small effect size). K10 vs. K4: $U = 299$, $z = -4.659$, $p < .001$, $r = -.53$ (large effect size). K10 vs. K6: $U = 379.5$, $z = -3.689$, $p < .001$, $r = -.42$ (medium effect size). K10 vs. K8: $U = 397$, $z = -3.512$, $p < .001$, $r = -.40$ (medium effect size).

[16] $r = .31$, $p < .01$.

[17] Indeed, given a contrastivist account, it is misguided to speak of "baseline" conditions since every knowledge ascription involves a tacit contrast.

[18] Thanks to Schaffer and Turri for discussion of this issue.

[19] B1 vs. B2: $U = 5256$, $z = -3.456$, $p < .01$, $r = -.23$ (small effect size). B3 vs. B4: $U = 116$, $z = -4.750$, $p < .001$, $r = -.64$ (large effect size). B5 vs. B6: $U = 438.5$, $z = -2.489$, $p < .05$, $r = -.29$ (small to medium effect size). Mean belief attributions also fell significantly above the midpoint in four of the six conditions: B1: $t(116) = 18.229$, $p < .001$, $r = .86$ (large effect size). B2: $t(115) = 12.165$, $p < .001$, $r = .75$ (large effect size). B3: $t(27) = 11.526$, $p < .001$, $r = .91$ (large effect size). B4: $t(26) = -.083$, $p > .05$, $r = .02$. B5: $t(37) = 11.122$, $p < .001$, $r = .88$ (large effect size). B6: $t(33) = 1.485$, $p > .05$, $r = .25$.

[20] B7 vs. B8: $U = 296.5$, $z = -2.365$, $p < .05$, $r = -.31$.

[21] All four means differed significantly from the midpoint. B7: $t(28) = 10.158$, $p < .001$, $r = .89$ (large effect size). B8: $t(29) = 4.230$, $p < .001$, $r = .62$ (large effect size). B9: $t(38) = 7.981$, $p < .001$, $r = .79$ (large effect size). B10: $t(39) = 7.339$, $p < .001$, $r = .76$ (large effect size).

[22] Comparativism is a genus under which contrastivism is a species. We will focus on Schaffarian contrastivism.

[23] Further support may be provided by research on "good enough representations," but in the interest of space, we set it aside for future consideration (Ferreira *et al* 2002, Sturt *et al* 2004, Sanford 2002).

[24] We focus on the ramifications of the findings for contrastivism and the focal bias account because the proponents of these approaches have explicitly addressed the issue (Schaffer and Szabo 2014, Gerken 2012a, fn. 18).

[25] S1 vs. S2: $U = 3645.5$, $z = -2.793$, $p < .01$, $r = -.20$ (small effect size). S4 vs. S5: $U = 226$, $z = -3.157$, $p < .01$, $r = -.41$ (medium effect size). D1 vs. D2: $U = 3385$, $z = -3.241$, $p < .01$, $r = -.23$ (small effect size). D4 vs. D5: $U = 261.5$, $z = -2.204$, $p > .05$, $r = -.29$ (small to medium effect size).

[26] $U = 196.5$, $z = -3.767$, $p < .001$, $r = -.49$ (medium to large effect size).

[27] Sapphires: $U = 12.534$, $z = -3.828$, $p < .001$, $r = -.20$. Diamond: $U = 15.034$, $z = -1.391$, $p > .05$, $r = -.07$.

[28] Sapphires: $r = -.11$ (small effect size), $p < .05$. Diamond: $r = -.13$ (small effect size), $p < .05$

[29] $r = -.18$ (small effect size), $p < .05$.

[30] The mean knowledge attributions differed significantly from the midpoint in three out of the seven conditions. S1: $t(95) = 1.615$, $p > .05$, $r = .16$. S2: $t(97) = -2.204$, $p < .05$, $r = .22$ (small effect size). S3: $t(36) = .898$, $p > .05$, $r = .15$. S4: $t(27) = 2.819$, $p < .01$, $r = .48$ (medium effect size). S5: $t(29) = -2.429$, $p < .05$, $r = .41$ (medium effect size). S6: $t(36) = .945$, $p > .05$, $r = .16$. S7: $t(35) = .340$, $p > .05$, $r = .06$.

[31] The mean knowledge attributions differed significantly from the midpoint in four out of the seven conditions. D1: $t(96) = .852$, $p > .05$, $r = .09$. D2: $t(94) = -4.106$, $p < .001$, $r = .39$ (medium effect size). D3: $t(36) = -.130$, $p > .05$, $r = .02$. D4: $t(26) = -1.056$, $p > .05$, $r = .20$. D5: $t(28) = -3.984$, $p < .001$, $r = .60$ (large effect size). D6: $t(37) = -3.873$, $p < .001$, $r = .54$ (large effect size). D7: $t(39) = -3.721$, $p < .01$, $r = .51$ (large effect size).

[32] K1 vs. S1: $U = 1283.5$, $z = -3.164$, $p < .01$, $r = -.27$ (small effect size). K2 vs. S2: $U = 1161.5$, $z = -3.834$, $p < .001$, $r = -.33$ (medium effect size). K3 vs. S3: $U = 435.5$, $z = -3.139$, $p < .01$, $r = -.36$ (medium effect size). K5 vs. S4: $U = 451.5$, $z = -.929$, $p > .05$, $r = -.12$. K6 vs. S5: $U = 354.5$, $z = -2.733$, $p < .01$, $r = -.33$ (medium effect size). K9 vs. S6: $U = 431.5$, $z = -2.559$, $p < .05$, $r = -.30$ (medium effect size). K10 vs. S7: $U = 367$, $z = -3.580$, $p < .001$, $r = -.42$ (medium effect size). S1 vs. D1: $U = 4239.5$, $z = -1.098$, $p > .05$, $r = -.08$. S2 vs. D2: $U = 4344$, $z = -.830$, $p > .05$, $r = -.06$. S3 vs. D3: $U = 614.5$, $z = -.780$, $p > .05$, $r = -.09$. S4 vs. D4: $U = 200$, $z = -3.059$, $p < .01$, $r = -.41$ (medium effect size). S5 vs. D5: $U = 433.5$, $z = -.025$, $p > .05$, $r = -.00$. S6 vs. D6: $U = 442.5$, $z = -2.868$, $p < .01$, $r = -.33$ (medium effect size). S7 vs. D7: $U = 480.5$, $z = -2.594$, $p < .01$, $r = -.30$ (medium effect size).

[33] One-way ANOVA: $F(2, 989) = 76.639$, $p < .001$, partial $\eta^2 = .139$ (large effect size). Post-hoc Tukey's HSD tests reveal significant differences (at the .001 level) between the overall means in the collapsed rubies conditions the collapsed sapphires conditions and between the overall means in the sapphires and diamond conditions. Of course, we are collapsing data across different experiments in order to consider the overall trend. It should be noted that the statistical analysis reported here does not represent the central statistical analysis for Study 3 and was performed primarily for heuristic reasons.

[34] The knowledge-wh rubies jewel contrast condition was omitted from this figure because it did not have sapphires or diamond counterparts.

[35] We say 'not true' rather than 'false' in order to leave room for views according to which the knowledge ascriptions in question involve a type of presupposition failure that renders them truth-valueless (Strawson 1964).

[36] In correspondence, Schaffer has hypothesized that participants who noted the sapphires-substitution were more inclined to interpret it to be a typo than participants who noted the diamond-substitution. We looked at the comments section and found nothing to support this hypothesis. Participants who indicated that they had noted the rubies-substitution were not more inclined to agree with the knowledge ascription. On the contrary, they appeared to be more inclined to strongly disagree, and some participants cited the substitution as their reason for doing so. A proper analysis would require a coding of the comments, and it would methodologically irresponsible to provide one post hoc. So, we remain content with noting that we have found no evidence for Schaffer's hypothesis.

[37] It is not trivial how to articulate the idea that a participant is "blind" to the jewel alternative. One suggestion is that the participant is blind to the jewel alternative just in case she cannot *post hoc* correctly articulate the kind of jewelry figuring in the knowledge ascription. While the suggestion is rough, it has the advantage of being empirically testable.

[38] Such an account may still postulate a *cognitive illusion*. Although it does not postulate that the jewel-component is "invisible" to participants, it still claims that their judgments are illusory. There is a discrepancy between what the knowledge ascription's truth-value *appears* to be and what it in fact *is*. Such a discrepancy is characteristic of the phenomena typically referred to by the umbrella term 'cognitive illusions.'

[39] It is remarkable that the "floor" remains fairly high in the cases in which factivity is violated. One explanation may be that some participants do overlook the replacement of 'rubies' with 'sapphires.'

[40] There are reasons to be cautious about concluding anything stronger. The present data set provides only limited defeasible evidence for the trend in question and should be replicated with other stimuli.

[41] A problem for testing this conjecture experimentally is that the experiments might be confounded by experimenter bias. Furthermore, participant agreement with an epistemological principle is insufficient evidence for upholding it.

[42] Early ideas for the study were presented at Institute Jean Nicod (2009), Lund University (2009), Metro Experimental Research Group, CUNY (2011). The data was collected in the fall of 2012. Ancestors of the paper were presented at the Canadian Society for Epistemology (2012) and the Danish Philosophical Society Annual Meeting (2013). We are grateful to all the audiences. For helpful written comments, we are grateful to Wesley Buckwalter, Joshua Knobe, Jonathan Schaffer, Asbjørn Steglich-Petersen and John Turri. Special thanks to Julie Brummer for both substantive criticism and proof-reading.

References

Aloni, Maria and Égré, Paul (2010). Alternative Questions and Knowledge Attributions. *Philosophical Quarterly* 60 (238): 1–27.

Alter, A. L., Oppenheimer, D. M., Epley, N., and Eyre, R.N. (2007). Overcoming Intuition: Metacognitive Difficulty Activates Analytic Reasoning. *Journal of Experimental Psychology: General* 136: 569–576.

Beaver, David I. (1997). Presupposition. In Johan van Bentham and Alice Ter Muelen (eds.), *Handbook of Logic and Language*: 939–1008. Elsevier.

Beaver, David and Clark, Brady (2008). *Sense and Sensitivity: How Focus Determines Meaning*. Wiley-Blackwell.

Beebe, James R. (2013). A Knobe Effect for Belief Ascriptions. *Review of Philosophy and Psychology* 4: 235–58.

Beebe, James and Buckwalter, Wesley (2010). The Epistemic Side-Effect Effect. *Mind & Language* 25: 474–498.

Blome-Tillmann, Michael (2013). Conversational Implicatures (and How to Spot Them). *Philosophy Compass* 8 (2):170–185.

Boyd, Kenneth and Nagel, Jennifer (2014). The Reliability of Epistemic Intuitions. In Edouard Machery & Elizabeth O'Neill (eds.), *Current Controversies in Experimental Philosophy*. Routledge: 109–127.

Buckwalter, Wesley and Schaffer, Jonathan (*forthcoming*). Knowledge, Stakes and Mistakes. *Noûs*. DOI: 10.1111/nous.12017.

Cacioppo, John T., and Petty, Richard E. (1982). The Need for Cognition. *Journal of Personality and Social Psychology* 42: 116–31.

Cacioppo, John T., Petty, Richard E., and Kao, Chuan Feng. (1984). The Efficient Assessment of Need for Cognition. *Journal of Personality Assessment* 48: 306–7.

Carston, Robyn (2002). *Thoughts and Utterances. The Pragmatics of Explicit Communication*, Oxford: Blackwell.

DeRose, Keith (2009). *The Case for Contextualism*. Oxford University Press.

DeRose, Keith (2011). Contextualism, Contrastivism, and X-Phi Surveys. *Philosophical Studies* 156 (1): 81–110.

Dretske, Fred. (1970). Epistemic Operators, *Journal of Philosophy* 67: 1007–23.

Dretske, Fred. (1971). Conclusive Reasons, *Australian Journal of Philosophy* 49: 1–22.

Ferreira, F, Ferraro, V., and Bailey, K.G.D. (2002). Good-Enough Representations in Language Comprehension. *Current Directions in Psychological Science* 11: 11–15.

Frederick, S. (2005). Cognitive Reflection and Decision Making. *Journal of Economic Perspectives* 19 (4): 25–42.

Gerken, Mikkel. (2012a). On the Cognitive Bases of Knowledge Ascriptions. In Jessica Brown and Mikkel Gerken (eds.), *Knowledge Ascriptions*. Oxford University Press: 140–170.

Gerken, Mikkel. (2012b). Discursive Justification and Skepticism. *Synthese* 189 (2): 373–394.
Gerken, Mikkel (2013). Epistemic Focal Bias. *Australasian Journal of Philosophy* 91 (1): 41–61.
Gerken, Mikkel (*forthcoming*). The Roles of Knowledge Ascriptions in Epistemic Assessment. *European Journal of Philosophy*. DOI: 10.1111/ejop.12026.
Levesque, H. J. (1986). Making Believers out of Computers. *Artificial Intelligence* 30: 81–108.
Lerner, J.S. and Tetlock, P.E. (1999). Accounting for the Effects of Accountability. *Psychological Bulletin* 108 (3): 255–275.
Karttunen, Lauri (1974). Presupposition and Linguistic Context. *Theoretical Linguistics* 1: 181–94.
Kelp, Christoph (2011). A Problem for Contrastivist Accounts of Knowledge. *Philosophical Studies* 152: 287–92.
Nagel, Jennifer (2010). Knowledge Ascriptions and the Psychological Consequences of Thinking about Error. *Philosophical Quarterly* 60 (239): 286–306.
Nagel, Jennifer (2012). Mindreading in Gettier Cases and Skeptical Pressure Cases. In Brown and Gerken (eds.), *Knowledge Ascriptions*. Oxford University Press.
Nagel, Jennifer (2012b). Intuitions and Experiments: A Defense of the Case Method in Epistemology. *Philosophy and Phenomenological Research* 85 (3): 495–527.
Nagel, Jennifer (2013). Defending the Evidential Value of Epistemic Intuitions: A Reply to Stich. *Philosophy and Phenomenological Research* 86 (1): 179–199.
Oppenheimer, D. M. (2008). The Secret Life of Fluency. *Trends in Cognitive Science* 12(6): 237–241.
Oppenheimer, D. M., and Frank, M. F. (2007). A Rose in Any Other Font Would Not Smell as Sweet: Effects of Perceptual Fluency on Categorization. *Cognition* 106 (3): 1178–1194.
Rysiew, Patrick (2007). Speaking of Knowing. *Noûs* 41 (4): 627–662.
Sanford, A., Sanford, A., Molle, J. and Emmott, C. (2006). Shallow Processing and Attention Capture in Written and Spoken Discourse. *Discourse Processes* 42: 109–30.
Sanford, Anthony and Sturt, Patrick (2002). Depth of Processing in Language Comprehension: Not Noticing the Evidence," *Trends in Cognitive Sciences* 6: 382–6.
Schaffer, Jonathan (2004). From Contextualism to Contrastivism. *Philosophical Studies* 119 (1–2): 73–104.
Schaffer, Jonathan (2005). Contrastive Knowledge. In Tamar Szabó Gendler and John Hawthorne (eds.), *Oxford Studies in Epistemology 1*. Oxford University Press.
Schaffer, Jonathan, and Knobe, Joshua (2012). Contrastive Knowledge Surveyed. *Noûs* 46 (4): 675–708.
Schaffer, Jonathan and Szabó, Zoltán Gendler (2014). Epistemic Comparativism: A Contextualist Semantics for Knowledge Ascriptions. *Philosophical Studies* 168: 491–543.
Simonson, I. and Nye, P. (1992). The Effect of Accountability on Susceptibility to Decision Errors. *Organizational Behaviour and Human Decision Processes* 51 (3): 416–446.
Sperber, Dan and Wilson, Deirdre (1986/1995). *Relevance: Communication and Cognition*, Oxford: Blackwell. (2nd revised edition Wiley-Blackwell, 1995.)
Stalnaker, Robert C. (1974). Pragmatic Presupposition. In Munitz et al (eds.), *Semantics and Philosophy: Essays*. New York University Press.
Stanovich, K. (2009). Distinguishing the Reflective, Algorithmic and Reflective Minds: Time for a Tripartite Theory? In (Evans and Frankish 2009): 89–107.
Stanovich, Keith (2011). *Rationality and the Reflective Mind*. Oxford University Press.
Steglich-Petersen (*forthcoming*). Knowing the Answer to a Loaded Question. *Theoria*. DOI: 10.1111/theo.12045.
Strawson, P. F. (1964). Identifying Reference and Truth-Values. *Theoria* 30, 96–118 (Reprinted in P. F. Strawson Logico-Linguistic Papers, Ashgate, London 1971).
Sturt, P, Sanford, A., Stewart, A, and Dawydiak, E. (2004). Linguistic Focus and Good-Enough Representations: An Application of the Change-Detection Paradigm. *Psychonomic Bulletin & Review* 11 (5): 882–888.
Toplak M. E. and Stanovich, K. E. (2002). The Domain Specificity and Generality of Disjunctive Reasoning: Searching for a Generalizable Critical Thinking Skill. *Journal of Educational Psychology* 94: 197–209.
Toplak, M. E., West, R. F., and Stanovich, K. E. (2011). The Cognitive Reflection Test as a Predictor of Performance on Heuristics-and-Biases Tasks. *Memory and Cognition* 39: 1275–1289.