When Linguistic and Internal Confidence Diverge in Large Language Models

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Abstract

Users often ask large language models (LLMs) to report how confident they are, but it is unclear whether such *linguistic* confidence tracks the model's *internal* confidence. We study this question across 8 classification tasks, 2 generation tasks and 30 models from three families. For classification, we compare linguistic confidence with logits-based confidence along three axes: association, magnitude agreement and calibration. For generation, we test whether linguistic confidence tracks semantic-entropy-based uncertainty. The axes frequently diverge. Instance-level association is weak on average, although it improves on easier items and for stronger base models. Instruction-tuned models often report higher confidence and sometimes show higher association, but they also have larger confidence gaps and worse calibration. Prompt design mostly changes the distribution of reported confidence. Attitude cues inflate confidence without improving alignment, while score exemplars can preserve rank-order signal when they avoid collapsed confidence values. Regression analyses show that distributional properties of confidence scores explain much of the observed alignment pattern, with model metadata playing a smaller role after controls. These results support a lossy-channel view of linguistic confidence. A more dispersed verbal confidence distribution can carry useful rank information, but it does not make the scores calibrated. Linguistic confidence should therefore be evaluated with multi-axis diagnostics before being used in downstream reliability pipelines.

1 Introduction

Large language models (LLMs) are increasingly used not only for their answers, but also for confidence signals that help decide when an answer should be trusted, filtered, abstained from, or combined with other samples (Geng et al., 2023; Liu et al., 2025). Internal signals such as token-level probabilities can support confidence-weighted voting, selective prediction and test-time selection (Fu et al., 2025). In many deployed systems, however, these internal signals are not available. Users and practitioners are left with linguistic confidence, the model's self-reported confidence in language or as a numeric score.

Prior work has shown that verbalized confidence is fragile. It can be sensitive to prompting and often becomes overconfident after instruction tuning (Mielke et al., 2022; Xiong et al., 2023; Groot and Valdenegro-Toro, 2024; Xu et al., 2025). Much of this work evaluates confidence as an estimator of correctness. This is important, but it leaves a separate question open. When a model says it is confident, is that statement aligned with the model's own internal probability signal, or is it a separate user-facing behavior?

We study this cross-channel question. Our goal is not to treat logits-based confidence as ground-truth uncertainty. Softmax probabilities are themselves imperfect and often miscalibrated. Instead, we use them as an internally accessible confidence channel and ask when linguistic confidence agrees with that channel. For generation tasks, where answer-token probabilities are not always well defined, we use semantic entropy as the internal uncertainty proxy (Kuhn et al., 2023).

We evaluate linguistic confidence along three axes. Association measures whether linguistic and internal confidence move together across instances. Magnitude agreement measures whether the two scores are close on a common scale. Calibration measures whether reported confidence agrees with empirical correctness. These axes are not interchangeable. A model can have high association while still being overconfident, or it can have small average distance while carrying little instance-level information.

Across 10 tasks and 30 models, we find that

instance-level association is weak on average. At the same time, the weakness is structured rather than random. Easier tasks and stronger base models tend to show higher association. Instruction-tuned models often report higher confidence, but their apparent gains in association do not reliably produce better calibration. Prompt changes also have limited leverage. They can shift the mean and variance of linguistic confidence, but attitude cues that raise verbal confidence do not make it more grounded in internal probabilities.

The main empirical pattern is distributional. When linguistic confidence collapses into a narrow range, often near high values, it cannot express instance-level differences. When it is more dispersed, it can preserve rank-order information and improve association. This does not mean that more dispersion fixes calibration. The same dispersion that helps correlation can also increase magnitude mismatch if the scores are shifted or nonlinear. We therefore interpret linguistic confidence as a lossy channel from internal confidence to user-facing text. The channel can carry useful rank signal in some regimes, but it should not be read as a calibrated probability without validation.

This paper makes three contributions. We provide a systematic cross-channel evaluation of linguistic and internal confidence across model families, tasks and prompting regimes. We show that association, magnitude agreement and calibration diverge in important cases, especially for instruction-tuned models. We identify distributional properties of confidence scores as dominant observable drivers of alignment and translate this finding into practical guidance for reliability pipelines. Code is available at `https://anonymouslink`.

2 Related Work

Uncertainty estimation in LLMs. Confidence and uncertainty estimation are central to reliable LLM deployment (Huang et al., 2024; Liu et al., 2025). Existing methods can be grouped into logits-based, linguistic and consistency-based approaches (Geng et al., 2023). Logits-based methods use white-box access to output distributions, including softmax probabilities, entropy or logit margins (Duan et al., 2023; Kuhn et al., 2023; Huang et al., 2023). Linguistic methods ask the model to express confidence directly in words or scores (Mielke et al., 2022; Xiong et al., 2023). Consistency-based methods estimate uncertainty from output stability under sampling or perturbation (Manakul et al., 2023; Lin et al., 2023). These signals differ in access requirements and in what part of the model behavior they measure.

Verbalized confidence and calibration. Prior work has shown that linguistic confidence can be overconfident and prompt-sensitive (Xiong et al., 2023; Groot and Valdenegro-Toro, 2024). Other studies connect language-model confidence to human confidence or propose calibration interventions for verbalized scores (Mielke et al., 2022; Xu et al., 2025). These studies usually judge confidence by its relationship to correctness, often through ECE, AUROC, or related calibration metrics. Our work builds on this literature but asks a different question. We study the relationship between confidence channels, not only their relationship to correctness. This lets us separate cases where linguistic confidence preserves rank-order information from cases where it is calibrated as a probability.

This distinction matters because calibration alone does not identify how a confidence signal fails. A verbal score can be unreliable because it is shifted upward, because it collapses into a narrow range, or because it fails to preserve the ordering of examples. These cases require different deployment choices. A shifted score may be recalibrated, a collapsed score should not drive fine-grained abstention, and a score that preserves rank but not magnitude may still be useful for weighting samples. Our multi-axis evaluation is designed to separate these regimes.

Internal signals and downstream use. For white-box models, internal confidence is often used in downstream decision procedures. It can support Best-of-N selection, confidence-weighted voting, abstention, re-ranking and selective prediction (Brown et al., 2024; Cobbe et al., 2021; Kamath et al., 2020; Cole et al., 2023; Fu et al., 2025). Recent work also combines internal and verbal uncertainty to detect or reduce hallucinations (Ji et al., 2025). These applications motivate our setting. In black-box systems, linguistic confidence may be the only available signal. The key question is therefore not whether verbal confidence is perfect, but when it carries enough information to be useful and when it should be discounted.

3 Confidence Measurements and Evaluation

We compare linguistic confidence with internal confidence proxies. For classification tasks, the internal proxy is logits-based confidence over the candidate answers. For generation tasks, the internal proxy is semantic entropy over sampled responses.

3.1 Linguistic Confidence

We obtain linguistic confidence by asking the model to answer the task and report a confidence score for its own answer (Groot and Valdenegro-Toro, 2024; Xiong et al., 2023). The prompt defines 0 as no belief in the answer and 10 as full confidence. We extract the generated score and divide it by 10 when comparing it with probabilities. Prompt templates are described in Appendix A.

3.2 Internal Confidence Proxies

For classification tasks, output formats constrain the answer to a fixed candidate set. We extract logits for the option tokens and compute a softmax over the candidate set. We use the resulting probability of the selected answer as logits-based confidence.

This quantity should not be interpreted as ground-truth uncertainty. Softmax probabilities can be miscalibrated, and they do not capture every form of epistemic uncertainty. In this work, they serve as an internal confidence proxy that can be measured in white-box models. The study is therefore about fidelity between two available channels, internal probability signals and linguistic self-reports.

For generation tasks, the key answer is not always tied to one token. We therefore use semantic entropy (Kuhn et al., 2023). Given a prompt x, we sample M responses and cluster semantically equivalent outputs using an NLI model. The probability of a semantic cluster is estimated by summing the sequence probabilities of its members,

$$p(c \mid x) = \sum_{s \in c} \prod_{i} p(s_i \mid s_{<i}, x). \qquad (1)$$

Semantic entropy is then computed over the clusters,

$$SE(x) \approx -|C|^{-1} \sum_{i=1}^{|C|} \log p(C_i \mid x), \qquad (2)$$

where C is the set of semantic equivalence classes. Higher entropy means lower confidence, so we use negated semantic entropy when computing association with linguistic confidence.

3.3 Evaluation Axes

We evaluate confidence alignment along three axes. Association is measured with Pearson correlation and Spearman correlation. It captures whether two confidence signals vary in the same direction across instances. Magnitude agreement is measured by Euclidean distance after mapping linguistic confidence to $[0, 1]$. It captures whether the two scores are close in value. Calibration is measured with expected calibration error (ECE) (Guo et al., 2017). It captures whether reported confidence matches empirical accuracy.

The three-axis analysis applies directly to classification tasks, where logits-based confidence and empirical accuracy are defined on the same prediction. For generation tasks, semantic entropy is not on the same probability scale as linguistic confidence and correctness is less uniform across free-form responses. We therefore use association with negated semantic entropy as the primary cross-channel metric for generation, and use distance and ECE for the classification setting.

These axes answer different questions. Correlation can be high even when linguistic confidence is systematically too large. Distance can be small when both scores are concentrated, even if neither carries much instance-level information. ECE measures agreement with correctness rather than agreement between confidence channels. We report these metrics jointly to avoid treating one form of agreement as full reliability.

4 Experimental Setting

We evaluate 8 classification tasks and 2 generation tasks. The classification tasks cover syntactic judgment, natural language inference, paraphrasing, causal reasoning, lexical reasoning, temporal reasoning and broad knowledge. They are *CoLA*, *QNLI*, *QQP* (Wang et al., 2018), *Cause And Effect*, *Conceptual Combinations*, *Ruin Names*, *Temporal Sequences* (Suzgun et al., 2022), and *MMLU* (Hendrycks et al., 2021). The generation tasks are *CoQA* (Reddy et al., 2019) and *TriviaQA* (Joshi et al., 2017). Datasets with more than 200 examples are downsampled to 200 instances. As a sanity check, we compare the 200-sample CoLA

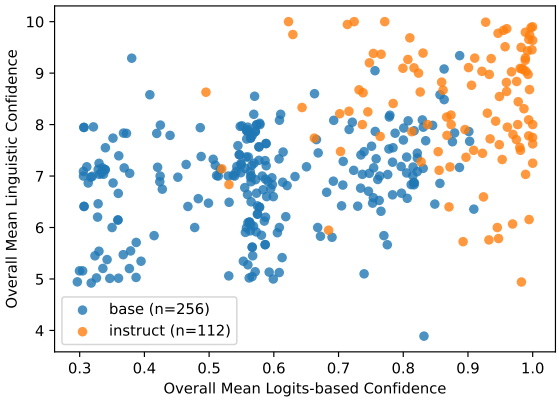


Figure 1: Mean logits-based confidence and mean linguistic confidence across task, model and prompt settings. Each point is one setting. Instruction-tuned models tend to have higher values on both axes. The overall association is statistically significant, but the split by model type shows that base models have weak positive association while instruction-tuned models have almost no aggregate association.

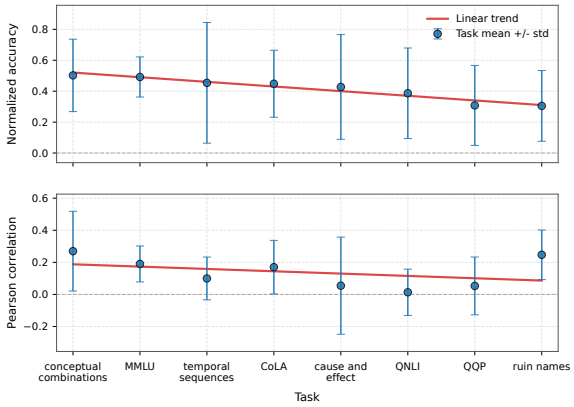


Figure 2: Task difficulty and confidence association. Tasks are ordered by decreasing normalized accuracy in the top panel. The bottom panel shows the Pearson correlation between linguistic confidence and logits-based confidence. Markers show per-task means and error bars show ± 1 standard deviation across models. Association tends to weaken as task difficulty increases.

subset with the full CoLA test set and find no statistically significant difference for the primary association metric. Details are in Appendix B.

We use 30 publicly available models from the LLaMA, Mistral and Qwen families (Touvron et al., 2023a,b; Grattafiori et al., 2024; Jiang et al., 2023, 2024; Qwen et al., 2025; Yang et al., 2025). The models cover different sizes, versions and tuning types. Table 6 lists all models.

We use standardized prompt templates for classification and generation. For base models, we use two-shot examples to constrain the answer and confidence format. For instruction-tuned models, we place the output format requirement in the system prompt. We also test prompt robustness through confidence-exemplar search, confidence-elicitation ablation and attitude-based perturbations. The details are in Appendix A and Appendix G.

5 Confidence Measures Align Weakly

We first average logits-based confidence and linguistic confidence for each task, model and prompt setting. Figure 1 shows that instruction-tuned models generally produce higher values on both axes than base models. The overall Pearson correlation is $r = 0.4830$ with $p = 1.14 \times 10^{-22}$. The corresponding Spearman correlation is $\rho = 0.4711$ with $p = 1.65 \times 10^{-21}$.

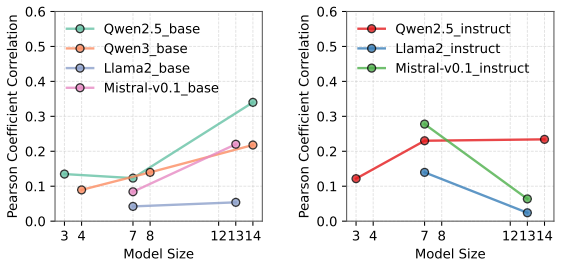
This aggregate trend hides an important split. Base models show a weak but significant positive association, with $r_b = 0.2607$ and $p = 2.40 \times 10^{-5}$, and $\rho_b = 0.2161$ with $p = 4.98 \times 10^{-4}$. Instruction-tuned models show negligible association, with $r_i = -0.0048$ and $p = 0.961$, and $\rho_i = 0.0422$ with $p = 0.665$.

The split suggests that instruction tuning changes how confidence is expressed. Instruction-tuned models often have logits-based probabilities concentrated near 1 and linguistic confidence concentrated near high values. This compression reduces observable association because many distinct examples receive similar confidence values. The result is not that base models are reliable. Rather, base models retain more variation in both channels, which allows weak association to remain visible.

At the instance level, association is weaker than the aggregate plot suggests. Across settings, the average Pearson correlation is $r = 0.135$. This gap between aggregate and instance-level behavior is central to our findings. Linguistic and internal confidence can move together in broad averages while diverging on individual examples, which is the level needed for abstention, filtering and selection.

6 Task Difficulty Affects Association

We next examine whether task difficulty affects the relationship between linguistic and logits-based confidence. Since tasks have different num-



(a) Base models (b) Instruction-tuned models

Figure 3: Model size and association between linguistic and logits-based confidence. Association tends to rise with model size for base models, but it plateaus or decreases for instruction-tuned models.

bers of answer choices, we use normalized accuracy, which subtracts the random-guess baseline and rescales by the maximum possible improvement.

Figure 2 shows that easier tasks tend to have stronger association. This means that when the model performs better on a task, its linguistic confidence more often tracks the variation in its logits-based confidence.

We also compute correlations separately for correct and incorrect predictions. When the prediction is correct, the average Pearson correlation is $r = 0.113$ and the average Spearman correlation is $\rho = 0.150$. When the prediction is wrong, the values drop to $r = 0.098$ and $\rho = 0.105$. The significance pattern follows the same direction. Among correct predictions, 32.4% of the correlations are significant at $p < 0.05$. Among incorrect predictions, only 16.9% are significant. These results suggest that incorrect answers are not only wrong in content, but also less reliable in how confidence is expressed.

Ruin Names is an outlier. It has relatively low accuracy but high association between linguistic and logits-based confidence. We avoid interpreting this as good calibration. The task is built around humorous edits of names, so confidence may track surface familiarity or orthographic similarity even when the model chooses the wrong option. This shows why association must be read together with accuracy and calibration.

7 Model Properties Affect Alignment

We compare confidence association across model configurations. Figure 3 shows different scaling trends for base and instruction-tuned models. For base models, larger models tend to have higher association. For instruction-tuned models, association is flat or decreases.

Metric	$\text{mean}_{\text{instruct}}$	$\text{mean}_{\text{base}}$	t	p
r	0.172	0.118	1.95	5.4e-02
Distance	0.271	0.241	2.03	<u>4.4e-02</u>
ECE(linguistic)	0.287	0.191	6.02	<u>2.5e-08</u>

Table 1: Paired t-test results comparing instruction-tuned and base models. Underlined values indicate significant differences with $p < 0.05$.

A distributional explanation fits this pattern. Smaller base models often output linguistic confidence concentrated around 8 or 10, which leaves little instance-level signal. Larger base models produce more varied linguistic confidence, which can preserve more rank-order information. In contrast, larger instruction-tuned models often have logits-based confidence values near 1. This saturation reduces internal variation and weakens correlation with linguistic confidence. Representative distributions are shown in Appendix E.

Table 1 shows the same point from another angle. Instruction-tuned models have slightly higher Pearson correlation than base models, but the difference is not significant at the 0.05 level. Their distance and linguistic ECE are significantly larger. Thus, instruction tuning can make the confidence channels appear more associated in some settings while making the reported scores less calibrated.

Across families, we observe a general increase in association from LLaMA to Mistral and Qwen, together with lower distance and ECE. Within-family version updates are less consistent. LLaMA-3.1 improves association over LLaMA-3, while Qwen3 shows lower association and larger distance than Qwen2.5. The appendix analysis (Appendix F) suggests that these changes are closely tied to shifts in confidence dispersion rather than family or version alone.

8 Generative Tasks

For generation tasks, we compare linguistic confidence with negated semantic entropy. We sample five responses per prompt, cluster semantically equivalent responses with `DeBERTa-xlarge-MNLI` (He et al., 2021), compute semantic entropy and average the linguistic confidence across the sampled responses. As noted in Section 3.3, these results are evaluated through association because semantic entropy is an uncertainty score rather than a

calibrated probability on the linguistic-confidence scale.

The full results are in Appendix H.2. The main pattern is that instruction-tuned models usually show stronger association than their base counterparts on generation tasks. TriviaQA also shows higher association than CoQA. This likely reflects the difference between factoid questions with clearer answers and conversational questions with more context-dependent answer forms. These generation results support the same general conclusion as the classification results. Linguistic confidence can carry some rank-order information, but this does not establish calibrated uncertainty.

9 Prompt Design Mainly Changes Score Distributions

We test three prompt-related factors. First, we search over few-shot confidence exemplars. Second, we remove confidence elicitation to test whether asking for confidence perturbs logits. Third, we prepend attitude cues such as criticism, approval and irrelevant text.

The exemplar search shows that confidence examples affect both task performance and association. Adjacent but non-identical scores work better than identical scores. Identical exemplars tend to collapse the produced confidence distribution, which weakens instance-level association. Very large exemplar scores push outputs toward high confidence values and also reduce useful variation. This supports the distributional view that linguistic confidence needs enough spread to preserve rank information.

The ablation study shows that confidence elicitation does not meaningfully perturb the internal probability signals. Removing the confidence query does not change accuracy, and it has limited effects on logits statistics. For instruction-tuned models, no tested metric changes significantly.

The attitude perturbation results are more concerning. Criticism, approval and irrelevant cues all raise reported linguistic confidence, but they reduce association with logits-based confidence. A calibration instruction asking the model to reflect final-layer probabilities does not significantly improve the relationship. Prompt tone therefore changes how confident the model sounds without making the confidence more grounded in internal probabilities. Full results are in Appendix G.

Outcome	n	Predictors	R^2	Adj. R^2
DIST	363	28	0.570	0.536
ECE	363	28	0.644	0.615
CORRELATION	363	28	0.498	0.459

Table 2: OLS fit statistics for distance, confidence-to-confidence ECE and correlation between linguistic and logits-based confidence.

10 Distributional Properties Explain Much of the Pattern

10.1 Regression Modeling

We fit regression models to identify which variables predict confidence alignment. We model three outcomes. The first is the correlation between linguistic and logits-based confidence, where higher is better. The second is the distance between the two scores, where lower is better. The third is a confidence-to-confidence ECE that replaces accuracy with logits-derived confidence, where lower is better. For each outcome, we fit ordinary least squares and ridge regression with standardized features and five-fold cross-validation. OLS coefficients are descriptive because one-hot encodings and correlated features introduce collinearity. Ridge coefficients are used for stable effect ranking.

Table 2 shows that the predictors explain a large fraction of the variance for distance and confidence-to-confidence ECE, and a smaller but still substantial fraction for correlation. Full coefficients are in Appendix I.

The main result is that distributional statistics dominate. Larger linguistic dispersion increases correlation, which means it helps preserve rank-order signal. The same dispersion also increases distance and confidence-to-confidence ECE. This means dispersion is not a universal fix. It can improve association while hurting magnitude agreement or calibration. Linguistic mean has a similar role. Higher mean confidence often increases mismatch because reported scores become too high relative to the internal proxy or empirical correctness.

Logits statistics also matter. Higher average logits-based confidence is associated with smaller distance and lower confidence-to-confidence ECE in the regression results. This does not mean logits are ground truth. It means that when the internal proxy and reported scores occupy compatible ranges, magnitude agreement is easier to obtain.

Model metadata are secondary after these controls. Size, family, version and instruction tuning contribute, but their effects are smaller and less stable than distributional statistics. This explains why version updates can move in different directions. A model update that increases linguistic dispersion can improve association, while another update that collapses the score distribution can weaken it.

10.2 A Lossy-Channel Interpretation

These results suggest a simple interpretation. Linguistic confidence is a lossy channel from internal confidence to a user-facing score. If the output channel maps many internal states to the same verbal score, the score cannot preserve instance-level distinctions. This occurs when linguistic confidence collapses near a few high values. If the channel uses a broader range of scores, it can preserve more rank-order information, which increases association.

This interpretation also explains why dispersion is not enough. A broader score range can still be shifted upward, be nonlinear, or be poorly matched to correctness. In that case, correlation may improve but calibration can remain poor. This is why we do not claim that increasing dispersion improves alignment in general. The more precise claim is that dispersion can improve association and make confidence useful for ranking or weighting, but calibration still requires separate validation.

11 Linguistic Confidence as a Weighting Signal

To connect the analysis to a downstream use case, we conduct a small aggregation study with `gpt-4.1-nano` (OpenAI, 2025) on the eight classification tasks. For each prompt, we sample 16 outputs and aggregate predictions by voting. We compare three settings. In answer-only voting, no confidence is elicited and every prediction has weight 1. In level-confidence voting, the model reports *Very confident*, *Moderately confident*, or *Uncertain*, which are mapped to weights 3, 2 and 1. In score-confidence voting, the model reports a numeric score from 0 to 10. For each candidate answer, we sum the weights across samples and select the answer with the highest total weight.

Table 3 shows that confidence-weighted aggregation improves over majority voting in this setting, and numeric confidence performs best. We interpret this as an illustrative downstream use of rank-order signal, not as evidence that linguistic confidence is calibrated. The result is consistent with our main analysis. A more diverse confidence distribution can help weight samples, but it should be validated on the target setting before deployment.

Method	Accuracy	Entropy
Majority voting	0.7311	N/A
Level confidence	0.7531	0.4362
Score confidence	0.7830	1.6896

Table 3: Confidence-weighted aggregation on eight classification tasks using `gpt-4.1-nano`. Finer-grained confidence gives a more dispersed weighting signal and improves accuracy in this setting.

12 Operational Guidance

The empirical results imply a simple use policy as shown in Table 4. Linguistic confidence should first be treated as a signal to be validated, not as a probability. Before using it for abstention, filtering, or sample weighting, one should check whether the reported scores have enough spread, whether they correlate with correctness or an internal proxy on held-out data, and whether high verbal confidence occurs in cases where other evidence suggests uncertainty.

For white-box systems, the most useful signal is often the mismatch between channels. High linguistic confidence paired with low internal confidence identifies cases where the model sounds certain despite weak probability support. For black-box systems, internal confidence is unavailable, so the safer procedure is to validate linguistic confidence on held-out examples from the same task. If reported scores are collapsed or prompt-sensitive, they should not control abstention thresholds. If they remain dispersed and validated, they can support weak ranking decisions such as confidence-weighted voting.

13 Discussion

The main lesson is that linguistic confidence is not a transparent readout of internal uncertainty. It is a separate confidence channel with its own distributional behavior. In some regimes, it carries rank-order information. In other regimes, especially when scores collapse near high values, it becomes uninformative at the instance level. This explains

Regime	Diagnostic	Recommended use
Collapsed verbal scores	Scores cluster near 9–10, or have low standard deviation	Avoid using verbal confidence for fine-grained decisions
High verbal confidence with weak internal confidence	Linguistic confidence is much higher than logits-based confidence	Flag, abstain, rerank, or sample additional answers
Dispersed verbal scores with validated association	Held-out data show positive association with correctness or internal confidence	Use as a ranking or weighting signal, not as a calibrated probability
Prompt-induced confidence shifts	Tone or framing raises confidence without improving association	Treat as confidence inflation, not improved reliability

Table 4: Practical interpretation of linguistic confidence under different diagnostic regimes.

why aggregate plots can look encouraging while instance-level correlations remain weak.

The distinction between association and calibration is central. A model can vary linguistic confidence in the same direction as logits-based confidence and still be systematically overconfident. This pattern appears often for instruction-tuned models. Conversely, a model can have small distance because both signals are concentrated, while still providing little useful ranking information. Reliability claims should therefore report association, magnitude agreement and calibration together.

The results also clarify what prompt design can and cannot do. Prompting can alter the distribution of reported confidence, and careful exemplar choices can avoid complete score collapse. This may help when confidence is used as a weak ranking signal. But prompt tone can inflate confidence without improving alignment. A prompt that asks the model to reflect its internal probabilities does not by itself make verbal confidence track those probabilities.

Our analysis is diagnostic rather than causal. We do not claim to identify the training changes that create a given confidence distribution, and we do not claim that manipulating variance alone will fix confidence. The evidence shows that many alignment patterns attributed to family, size, or instruction tuning are better understood through the mean, variance and saturation of the two confidence channels. This is the main reason to evaluate linguistic confidence as a channel with measurable failure modes, rather than as a direct probability estimate.

14 Conclusion

We study whether linguistic confidence aligns with internal confidence signals in LLMs. Across 10 tasks and 30 models, instance-level alignment is weak. Association improves on easier tasks and for stronger base models, but instruction-tuned models often remain overconfident. Prompting can change reported confidence distributions, but attitude cues inflate confidence without improving alignment. Regression analyses show that distributional properties explain much of the observed pattern. Linguistic dispersion can preserve rank-order signal, but it does not guarantee magnitude agreement or calibration.

Linguistic confidence is best treated as a lossy confidence channel. It can be useful for downstream weighting when validated, but it should not be treated as a calibrated probability. We recommend reporting multi-axis confidence diagnostics, checking for collapsed or inflated confidence distributions, and using linguistic confidence only with distribution-aware validation or held-out calibration.

Limitations

Our study focuses on a limited set of open-source models and two internal confidence proxies. Logits-based confidence is not ground-truth uncertainty, and semantic entropy is also an estimate with modeling choices such as sampling and NLI-based clustering. Our goal is to compare available confidence channels, not to identify true uncertainty.

Most experiments are correlational. The regression analysis controls for observable factors such as confidence mean, variance, task structure and performance, but it does not establish a causal mechanism. We also do not have access to the training details needed to explain why a particular model version changes its confidence distribution.

The main experiments use downsampled datasets for computational reasons. The full CoLA check suggests that the primary association metric is stable in that case, but this does not prove

that every task is equally stable. The aggregation experiment is also small and uses one black-box model. It should be read as an example of how linguistic confidence may help as a weighting signal, not as a general recipe.

Future work should evaluate more model families, more deployment prompts and more internal uncertainty proxies. It should also study calibration methods that connect user-facing confidence to internal signals without encouraging superficial confidence inflation.

Ethical Considerations

This work studies when user-facing confidence statements from LLMs can be misleading. The main ethical risk is that confidence scores may create unwarranted trust, especially in settings where users cannot inspect internal uncertainty signals. Our results suggest that high linguistic confidence should not be presented as a calibrated probability unless it has been validated for the specific task and deployment context.

The study uses existing NLP benchmarks and publicly available models, with no human-subject data collection. The practical recommendations are intended to reduce overreliance on unsupported confidence claims by encouraging multi-axis reporting, mismatch detection and held-out calibration. However, these diagnostics can also be misused if presented as guarantees of reliability. We therefore caution against using linguistic confidence as the sole basis for decisions in high-stakes applications.

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A Prompt Design and Robustness Analyses

This appendix provides detailed prompting setups and additional robustness analyses omitted from the main paper. We describe the confidence elicitation prompts used for both classification and generation tasks, followed by analyses of prompt sensitivity, including few-shot confidence exemplar search, confidence-elicitation ablation, and attitude-based prompt perturbations.

A.1 Classification Prompt Design

For classification tasks, we design prompts to elicit linguistic confidence while maintaining consistent output formats across model types. We employ two prompt templates for base models. Prompt 1 is adapted from Xiong et al. (Xiong et al., 2023) and directly elicits linguistic confidence alongside the answer. Prompt 2 additionally explains the meaning of confidence scores before elicitation. For instruction-tuned models, confidence reporting and format constraints are specified through the system prompt.

We explore multiple confidence exemplar settings and select $(5, 6)$ for Prompt 1 and $(4, 5)$ for Prompt 2 on base models, while score 2 is used as the format example for instruction-tuned models. The rationale and quantitative comparison of different exemplar scores are reported in Appendix G.1.

Prompt examples on the *Ruin Names* task are shown in Figures 4, 5, 6, and 7.

```
Read the question, provide your answer and your confidence in this
answer. Note: The confidence indicates how likely you think your
answer is true. 0 means you don't believe this answer at all, 10 means
you trust this answer must be true. Your answer must be one of the
option letters (a, b, c, or d).  Do not output any number or word
other than the option letter. Use the following format to answer: A:
<(a)/(b)/(c)/(d)>. Confidence: <Your confidence level, please only
include the numerical number in the range of 0-10>.
Only the answer and confidence, don't give me the explanation. If
unsure, still pick the closest option among (a-d). Do not output a
number as the answer.

Q: Which of the following is a humorous edit of this artist or movie
name: 'the guns of navarone'?
        (a): the guns of mavarone
        (b): the gins of navarone
        (c): the guns of ngvarone
        (d): the gun of navarone
A: (b); Confidence: 5.

Q: Which of the following is a humorous edit of this artist or movie
name: 'the avengers'?
        (a): toe avengers
        (b): the avjngers
        (c): thes avengers
        (d): the avengegs
A: (a); Confidence: 6.

Q: Which of the following is a humorous edit of this artist or movie
name: 'the rolling stones'?
        (a): the polling stones
        (b): tce rolling stones
        (c): the rollvng stones
        (d): thea rolling stones
A:
```

Figure 4: Base Prompt 1 example.

```
Q: Which of the following is a humorous edit of this artist or movie
name: 'the guns of navarone'?
        (a): the guns of mavarone
        (b): the gins of navarone
        (c): the guns of ngvarone
        (d): the gun of navarone
What's your answer and your confident score (0-10) of this answer? (0
means you don't believe this answer at all, 10 means you trust this
answer must be true.)
A: (b); Confidence: 4.

Q: Which of the following is a humorous edit of this artist or movie
name: 'the avengers'?
        (a): toe avengers
        (b): the avjngers
        (c): thes avengers
        (d): the avengegs
What's your answer and your confident score (0-10) of this answer? (0
means you don't believe this answer at all, 10 means you trust this
answer must be true.)
A: (a); Confidence: 5.

Q: Which of the following is a humorous edit of this artist or movie
name: 'the rolling stones'?
        (a): the polling stones
        (b): tce rolling stones
        (c): the rollvng stones
        (d): thea rolling stones
What's your answer and your confident score (0-10) of this answer? (0
means you don't believe this answer at all, 10 means you trust this
answer must be true.)
A:
```

Figure 5: Base Prompt 2 example.

```
system
You will be given a question. Answer the question and give a confident
score (0-10) to your answer. 0 means you don't believe this answer at
all, 10 means you trust this answer must be true. Answer as the
format: '{answer}; Confidence: {score}.' such as '(b); Confidence: 2.'
without any other words

user
Q: Which of the following is a humorous edit of this artist or movie
name: 'the rolling stones'?
        (a): the polling stones
        (b): tce rolling stones
        (c): the rollvng stones
        (d): thea rolling stones
What's your answer and your confident score (0-10) of this answer? (0
means you don't believe this answer at all, 10 means you trust this
answer must be true.)
A:
```

Figure 6: Instruct prompt with example confidence score.

A.2 Generation Prompt Design

For generation tasks, we follow the prompting setup of Kuhn et al. (Kuhn et al., 2023) and append linguistic confidence elicitation instructions following Xiong et al. (Xiong et al., 2023). We evaluate two representative generation benchmarks, *CoQA* and *TriviaQA*.

For CoQA, each instance consists of a context paragraph and several question-answer pairs, where we adopt a zero-shot prompting setup. For TriviaQA, we employ a ten-shot prompting strategy to improve response accuracy. In both settings, linguistic confidence is elicited alongside generated responses and averaged across the five sampled generations used for semantic-entropy estimation.

Representative prompts are shown in Figures 8 and 9.

A.3 Confidence-Elicitation Ablation

To examine whether confidence elicitation itself perturbs internal probability distributions, we

```
system
Read the question, provide your answer and your confidence in this
answer. Note: The confidence indicates how likely you think your
answer is true. 0 means you don't believe this answer at all, 10 means
you trust this answer must be true. Your answer must be one of the
option letters (a, b, c, or d).  Do not output any number or word
other than the option letter.Use the following format to answer: A:
<(a)/(b)/(c)/(d)>. Confidence: <Your confidence level, please only
include the numerical number in the range of 0-10>.
Only the answer and confidence, don't give me the explanation. If
unsure, still pick the closest option among (a-d). Do not output a
number as the answer.

user
Q: Which of the following is a humorous edit of this artist or movie
name: 'the rolling stones'?
        (a): the polling stones
        (b): tce rolling stones
        (c): the rollvng stones
        (d): thea rolling stones
What's your answer and your confident score (0-10) of this answer? (0
means you don't believe this answer at all, 10 means you trust this
answer must be true.)
A:
```

Figure 7: Instruct prompt without example confidence score.

```
It was only in the 1980s that ...<context>... in the conference.

Read the question, provide your answer and your confidence in this
answer. Note: The confidence indicates how likely you think your
answer is true. 0 means you don't believe this answer at all, 10 means
you trust this answer must be true. Use the following format to
answer: A: <your answer>. Confidence: <Your confidence level, please
only include the numerical number in the range of 0-10>.
Only the answer and confidence, don't give me the explanation.
Q: Company one did have Em IPO 1984? A: PictureTel Corp. Confidence:
10.
Q: Em What does them doing? A: commercial videoconferencing systems.
Confidence: 1.
Q: When digital telephony transmission networks one began? A: in the
1980s. Confidence: 0.
Q: What-all was a 1st network them? A: ISDN networks. Confidence: 4.
Q: What-what had been that minimum a bit a rate? A:
```

Figure 8: Example prompt for CoQA.

```
Read the question, provide your answer and your confidence in this
answer. Note: The confidence indicates how likely you think your
answer is true. 0 means you don't believe this answer at all, 10 means
you trust this answer must be true. Use the following format to
answer: A: <your answer>. Confidence: <Your confidence level, please
only include the numerical number in the range of 0-10>.
Only the answer and confidence, don't give me the explanation.
Question: Which American-born Sinclair won the Nobel Prize for
Literature in 1930? Answer: Sinclair Lewis Confidence: 9.
Question: Where in England was Dame Judi Dench born? Answer: York
Confidence: 5.
Question: In which decade did Billboard magazine first publish and
American hit chart? Answer: 30s Confidence: 2.
Question: From which country did Angola achieve independence in 1975?
Answer: Portugal Confidence: 0.
Question: Which city does David Soul come from? Answer: Chicago
Confidence: 5.
Question: Who won Super Bowl XX? Answer: Chicago Bears Confidence: 5.
Question: Which was the first European country to abolish capital
punishment? Answer: Norway Confidence: 7.
Question: In which country did he widespread use of ISDN begin in
1988? Answer: Japan Confidence: 3.
Question: What is Bruce Willis' real first name? Answer: Walter
Confidence: 8.
Question: Which William wrote the novel Lord Of The Flies? Answer:
Golding Confidence: 9.
Question: Rincewind and 'The Luggage' appear in which series of books?
Answer:
```

Figure 9: Example prompt for TriviaQA.

```
Q: Which of the following is a humorous edit of this artist or movie
name: 'the guns of navarone'?
        (a): the guns of mavarone
        (b): the gins of navarone
        (c): the guns of ngvarone
        (d): the gun of navarone
A: (b).

Q: Which of the following is a humorous edit of this artist or movie
name: 'the avengers'?
        (a): toe avengers
        (b): the avjngers
        (c): thes avengers
        (d): the avengegs
A: (a).

Q: Which of the following is a humorous edit of this artist or movie
name: 'the rolling stones'?
        (a): the polling stones
        (b): tce rolling stones
        (c): the rollvng stones
        (d): thea rolling stones
A:
```

Figure 10: Base Prompt without asking for linguistic confidence.

conduct ablation experiments removing linguistic confidence instructions while keeping all other prompt settings unchanged. For base models, we retain the original two-shot examples without confidence elicitation, while instruction-tuned models preserve the same formatting constraints.

Representative prompts without confidence elicitation are shown in Figures 10 and 11. Quantitative comparisons of accuracy, logits statistics, and calibration are reported in Appendix G.2.

A.4 Attitude-Based Prompt Perturbation

To investigate whether user attitude affects reported confidence, we prepend criticism, approval, and irrelevant cues before the original task prompt. Each attitude category contains three cue variants. These perturbations are designed to test whether linguistic confidence reflects underlying model uncertainty or is sensitive to conversational framing.

The attitude cues used in our experiments are shown in Figure 12. Full quantitative results are reported in Appendix G.3.

B Dataset Stability Analysis

To verify that our downsampling strategy does not affect the conclusions, we compare results on the 200-sample CoLA subset used in the main experiments with the full CoLA test set (n=1042). We perform paired t-tests across three models (Qwen3-8B-Base, Mistral-7B-v0.3, and LLaMA-3.1-8B) and two prompt variants (Base Prompt 1 and Base Prompt 2), resulting in six paired observations. In this sanity check, the primary association metric r shows no statistically significant difference ($p = 0.98$). We use this result only as evidence that the CoLA subset is stable under this comparison, not as proof that all downsampling is harmless.

C Model Selection

We select 30 models from the LLaMA, Mistral and Qwen families. The full list is shown in Table 6. For the small-scale aggregation study, we use `gpt-4.1-nano` through the OpenAI API, ac-

```
system
You will be given a question. Answer the question as the format:
'{answer}.' such as '(d).' without any other words

user
Q: Which of the following is a humorous edit of this artist or movie
name: 'the rolling stones'?
        (a): the polling stones
        (b): tce rolling stones
        (c): the rollvng stones
        (d): thea rolling stones
A:
```

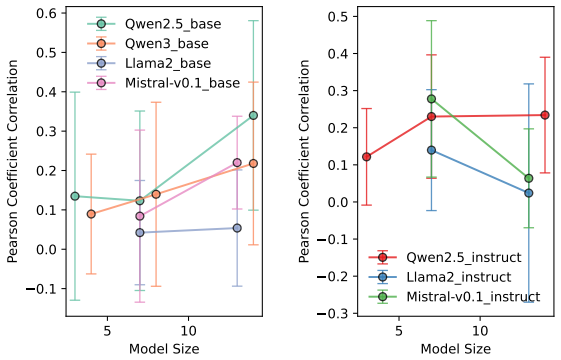
Figure 11: Instruct prompt without asking for linguistic confidence.

```
Criticism
Your last answer was full of mistakes.
You previously generated some responses. That responses were totally
wrong.
You don't know anything about logic, reasoning, math or grammar.
That's total crap.

Approval
Your last answer was perfect.
You previously generated some responses. That responses were
absolutely correct.
You are a genius. You are very reliable at solving this task.

Irrelevant
I am just writing this sentence before asking you a question.
Yesterday I talked to my toaster about philosophy.
Square circles can run faster than triangles.
```

Figure 12: Attitude cues for prompt perturbation.

cessed May 4, 2026, with temperature 0.7.

D Distance and ECE trends by Model Size



(a) Base Model. (b) Instruction-tuned Model.

Figure 13: Effect of model size on the correlation between linguistic and logits-based confidence, with error bars indicating the standard deviation of correlation values within each model group. Correlation tends to rise with model size for base models but plateaus for instruction-tuned ones.

For completeness, we present the error-bar version of the model-size correlation plot in Figure 13. The error bars indicate the standard deviation of correlation values within each model group. Figures 14 and 15 show how model size affects distance and ECE for base and instruction-tuned models. These plots illustrate why one metric cannot replace the others. Base models often show higher correlation with scale, while distance and ECE may move differently. Instruction-tuned models can also show lower distance or ECE as accuracy improves, even when correlation does not improve. This supports our main claim that association, magnitude agreement and calibration measure different aspects of confidence reliability.

Metric	n	CoLA	$\text{CoLA}_{\text{full}}$	p
r	6	0.176 ± 0.165	0.175 ± 0.132	0.982
Acc.	6	0.705 ± 0.139	0.710 ± 0.098	0.802
ECE_{ling}	6	0.142 ± 0.068	0.127 ± 0.065	0.268
Dist.	6	0.195 ± 0.029	0.202 ± 0.031	0.064

Table 5: Comparison between 200-sample CoLA subset and full test set.

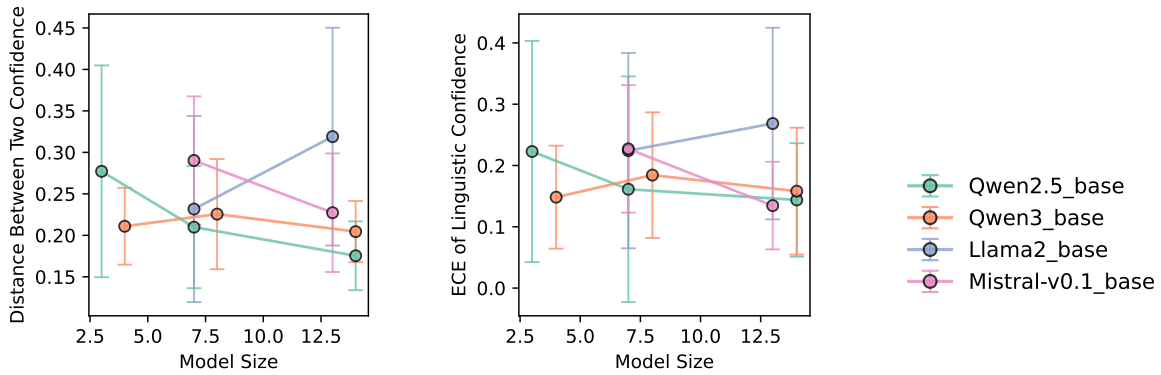
Base Model	**Instruction-tuned / Chat**
Llama-2-7b-hf	Llama-2-7b-chat-hf
Llama-2-13b-hf	Llama-2-13b-chat-hf
Llama-3.1-8B	Meta-Llama-3.1-8B-Instruct
Llama-3.2-3B	Llama-3.2-3B-Instruct
Meta-Llama-3-8B	Meta-Llama-3-8B-Instruct
Mistral-7B-v0.1	Mistral-7B-Instruct-v0.1
Mistral-7B-v0.2	Mistral-7B-Instruct-v0.2
Mistral-7B-v0.3	Mistral-7B-Instruct-v0.3
Mistral-Nemo-Base-2407	Mistral-Nemo-Instruct-2407
Mixtral-8x7B-v0.1	Mixtral-8x7B-Instruct-v0.1
Qwen2.5-3B	Qwen2.5-3B-Instruct
Qwen2.5-7B	Qwen2.5-7B-Instruct
Qwen2.5-14B	Qwen2.5-14B-Instruct
Qwen3-4B-Base	Qwen3-4B-Instruct-2507
Qwen3-8B-Base	–
Qwen3-14B-Base	–

Table 6: List of models used in our experiments, categorized by version and type.

E Distribution of Logits-based and Linguistic Confidence

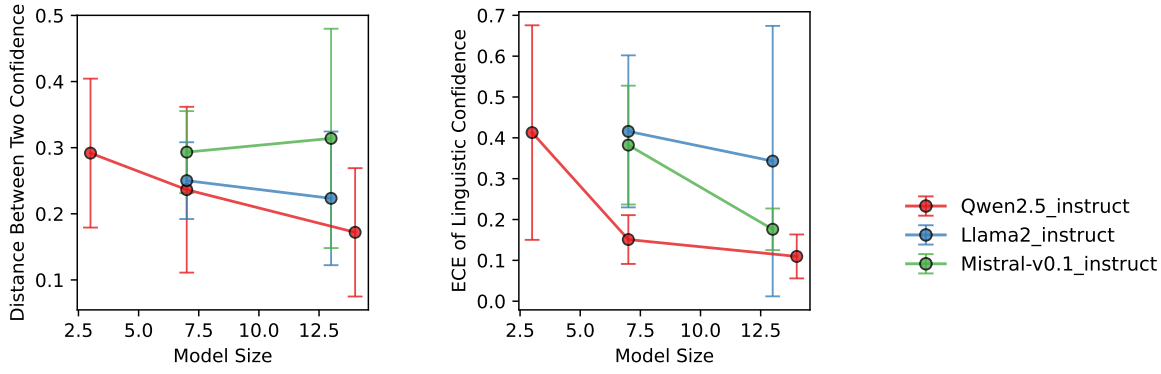
As discussed in Section 7, the correlation generally increases with model size for base models, but decreases for instruction-tuned models. To illustrate this pattern in detail, we examine the *CoLA* task. As shown in Figures 17, 18, and 19, linguistic confidence in base models exhibits greater diversity and a less concentrated distribution. An exception occurs with `Qwen2.5` (Figure 16), where the 7B model produces more monotonous linguistic confidence compared to the 3B model, consistent with the overall trend observed in Figure 3.

For instruction-tuned models (Figures 20, 21, and 22), the logits-based confidence values become larger and often approach 1 as model size



(a) Distance (b) ECE(linguistic)

Figure 14: Base models: model size (x-axis, in B) vs. (a) Distance between two confidence measures and (b) ECE of linguistic confidence.



(a) Distance (b) ECE(linguistic)

Figure 15: Instruction-tuned models: model size (x-axis, in B) vs. (a) Distance between two confidence measures and (b) ECE of linguistic confidence.

increases. This saturation of logits leads to a reduction in the correlation between the two confidence measures.

F Distribution of Correlation Scores and Paired t-Test Analyses

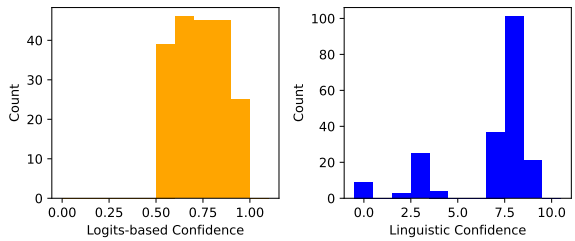
To further examine how model confidence alignment evolves across different architectures and training versions, we conducted independent-sample t-tests on both **model families** and **model versions**. For the family-level comparison, we selected representative base models from the LLaMA, Mistral, and Qwen series, and evaluated whether their overall correlation, confidence-logit distance, and ECE differ significantly (Table 7). For the version-level comparison, we tested multiple generations within each family (e.g., LLaMA3→LLaMA3.1, Mistral-v0.1→v0.2→v0.3, and Qwen2.5→Qwen3), to investigate whether improvements in alignment and calibration persist as the models evolve (Table 8).

Across model families (Table 7), we observe a general increase in correlation from LLaMA to Mistral and Qwen, together with lower distance and ECE. This suggests stronger aggregate alignment for Qwen in our setting. Within-family comparisons in Table 8 are less uniform. LLaMA3.1 improves correlation over LLaMA3, while Qwen3 shows lower correlation and larger distance than Qwen2.5. The Mistral versions show only small changes.

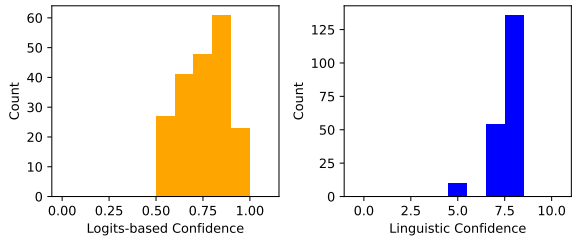
We analyze the effect of model updates on the distributional properties of linguistic confidence and find that dispersion plays a central role in determining alignment. Specifically, LLaMA-3.1 has higher linguistic variance than LLaMA-3, with standard deviation changing from 1.16 to 1.32 on 8B base models. Qwen3 shows a substantial variance collapse relative to Qwen2.5, with standard deviation changing from 1.23 to 0.71 on 14B

Metric	LLaMA	Mistral	Qwen	$p_{L\to M}$	$p_{M\to Q}$	$p_{L\to Q}$
r	0.081	0.137	0.180	0.033	0.102	<u>0.0004</u>
Distance	0.274	0.259	0.218	0.287	<u>0.0009</u>	<u>0.00002</u>
ECE(linguistic)	0.261	0.219	0.186	<u>0.024</u>	0.070	<u>0.0003</u>

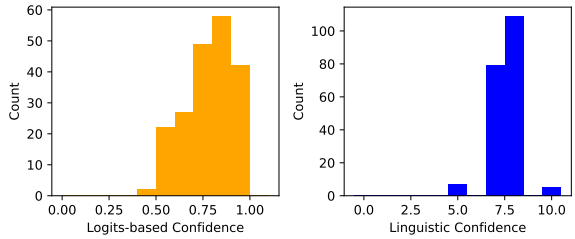
Table 7: Independent t-tests across model families. Mean value of the three families and p between them are reported. Underlined values indicate significant differences ($p < 0.05$).



(a) Qwen2.5-3B

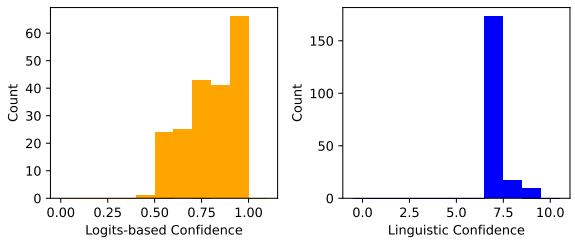


(b) Qwen2.5-7B

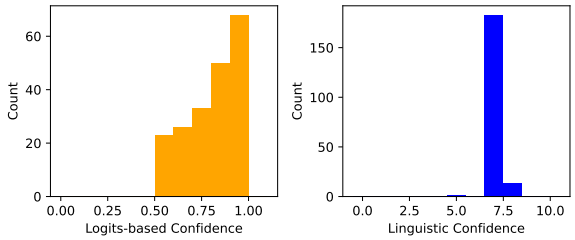


(c) Qwen2.5-14B

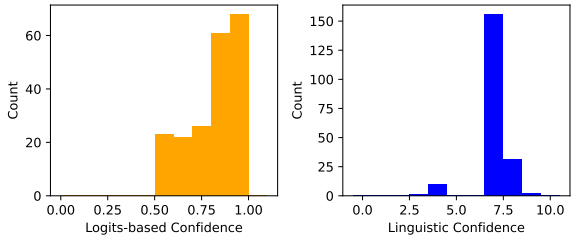
Figure 16: Distribution of Logits-based and Linguistic Confidence on CoLA (Base Prompt 1) for Qwen2.5 Base Models.



(a) Qwen3-4B



(b) Qwen3-8B



(c) Qwen3-14B

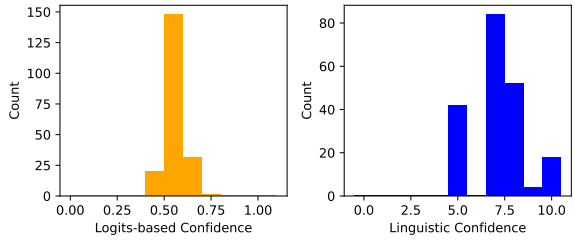
Figure 17: Distribution of Logits-based and Linguistic Confidence on CoLA (Base Prompt 1) for Qwen3 Base Models.

base models. This contrast aligns with their divergent correlation trends, where LLaMA models show improved alignment and Qwen models degrade. Higher dispersion can preserve instance-level rank information, whereas compressed distributions reduce expressivity and weaken association. While we do not make causal claims, these differences may be related to broader shifts in training and post-training objectives across model updates. For example, LLaMA3.1 introduces changes in data scale and alignment procedures (Grattafiori et al., 2024), while newer models such as Qwen3 place increasing emphasis on reasoning and structured generation (Yang et al., 2025). Such changes may influence how confidence is expressed in language, potentially affecting its dispersion. However, establishing a direct causal link between training strategies and confidence distribution remains an important direction for future work. These results suggest that model identity alone does not explain alignment. Distributional changes in the confidence scores account for much of the observed pattern.

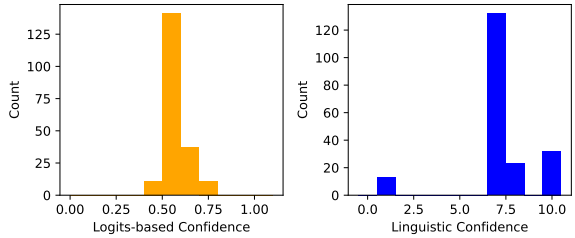
G Effects of Prompt Design

G.1 Hyperparameter Search

We exhaustively explore few-shot example confidence scores to quantify how exemplar settings affect both the association between linguistic and

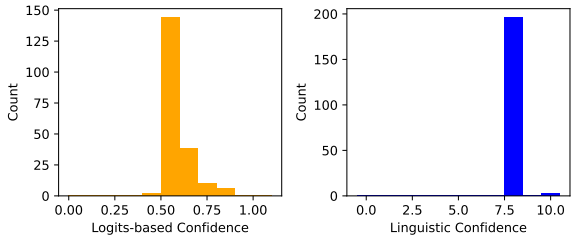


(a) Llama-2-7b-hf

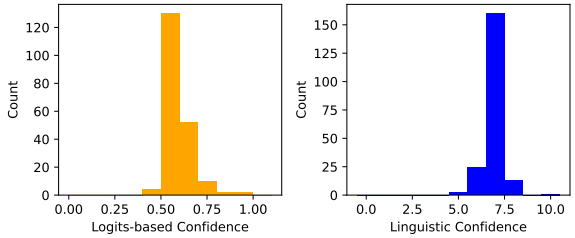


(b) Llama-2-13b-hf

Figure 18: Distribution of Logits-based and Linguistic Confidence on CoLA (Base Prompt 1) for Llama2 Base Models.



(a) Mistral-7B-v0.1



(b) Mixtral-8x7B-v0.1

Figure 19: Distribution of Logits-based and Linguistic Confidence on CoLA (Base Prompt 1) for Mistral-v0.1 Base Models.

Metric	**mean_a**	**mean_b**	p
LLaMA3 → LLaMA3.1			
r	0.057	0.126	<u>0.028</u>
Distance	0.272	0.281	0.527
ECE (linguistic)	0.197	0.234	0.058
Mistral-v0.1 → v0.2			
r	0.125	0.116	0.741
Distance	0.291	0.261	0.088
ECE (linguistic)	0.258	0.204	<u>0.011</u>
Mistral-v0.2 → v0.3			
r	0.114	0.129	0.570
Distance	0.261	0.271	0.495
ECE (linguistic)	0.204	0.209	0.537
Qwen2.5 → Qwen3			
r	0.340	0.218	<u>0.00064</u>
Distance	0.175	0.205	<u>0.00038</u>
ECE (linguistic)	0.144	0.151	0.261

Table 8: Independent t-tests across model versions within each family. Underlined values indicate significant differences ($p < 0.05$). Metrics include overall correlation (r), distance between linguistic and logits-based confidence, and ECE based on linguistic confidence.

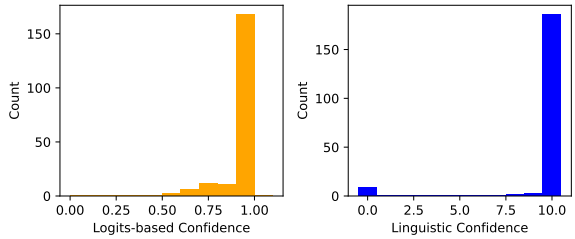
internal confidence and task performance. Experiments cover three tasks (Conceptual Combinations, Ruin Names, Temporal Sequences) and three models (`LLaMA-3.1-8B`, `Mistral-7B-v0.1`, `Qwen2.5-7B`). Weighted averages (by task sample size) of correlation and accuracy are shown in Figures 23 and 24. For base models, we consider two prompt templates and assign a pair of example scores (i, j) per template (Figures 4, 5). For instruction-tuned models, we assign a single example score in $1, \ldots, 10$ and include a random baseline (Figure 6). We also test the instruction prompt from Xiong et al. (Xiong et al., 2023) without explicit example scores (Figure 7).

Two regularities emerge. First, performance and correlation tend to increase when the two exemplar scores are close, but not identical. Identical scores reduce the variance of produced linguistic confidence, which lowers instance-level association. Second, including a very large exemplar score pushes the model toward high outputs (often 8–10) and compresses variability. Balancing correlation and accuracy, the selected settings are $(5, 6)$ for Base Prompt 1, $(4, 5)$ for Base Prompt 2, and a single score of 2 for the Instruct prompt.

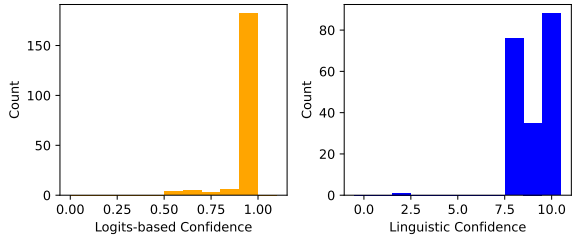
G.2 Ablation Studies

We test whether eliciting linguistic confidence perturbs final-layer logits. For every model and all eight tasks, we repeat the main setup without requesting confidence, holding all other settings fixed. For base models, each prompt still contains two in-context QA exemplars. Representative prompts are shown in Figures 10 and 11. Paired comparisons of normalized accuracy, average logits, logits variance, and ECE are reported in Table 9.

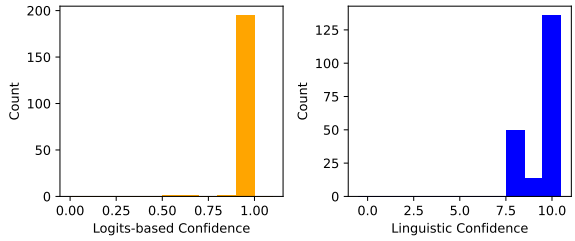
As shown in Table 9, removing the confidence query does not change accuracy and has limited effects on logits. For base models, differences in



(a) Qwen2.5-3B-Instruct

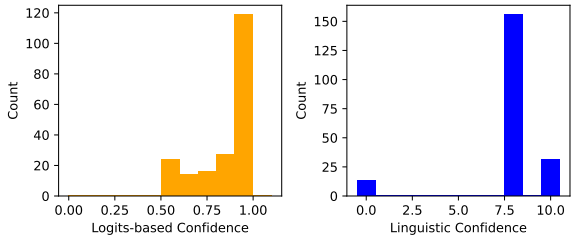


(b) Qwen2.5-7B-Instruct

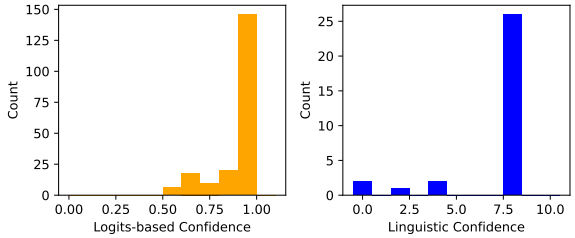


(c) Qwen2.5-14B-Instruct

Figure 20: Distribution of Logits-based and Linguistic Confidence on CoLA for Qwen2.5 Instruct-tuned Models.



(a) Llama-2-7b-chat-hf



(b) Llama-2-13b-chat-hf

Figure 21: Distribution of Logits-based and Linguistic Confidence on CoLA for Llama2 Instruction-tuned Models.

average logits and variance are largely attributable to structural differences between the two base prompts rather than to confidence elicitation. Variance tends to be slightly lower when confidence is requested, which suggests a mild concentration of the distribution, but calibration and accuracy remain unchanged. For instruction-tuned models, no metric shows a significant difference. We conclude that eliciting confidence does not meaningfully perturb the internal probability signals used in our comparisons.

G.3 Prompt Perturbation

To test sensitivity to user attitude, we prepend short cues that convey criticism, approval, or irrelevance. Each attitude uses three variants inserted before the main QA examples. We evaluate eight tasks on three diverse models (Qwen2.5-7B, Mistral-7B-v0.3, Llama-3.1-8B) and average within attitude type. We also include a calibration variant that appends "Make sure the confidence you report reflects the softmax probabilities from your final-layer logits." The cue sets are listed in Figure 12 (Appendix A). Results appear in Table 10.

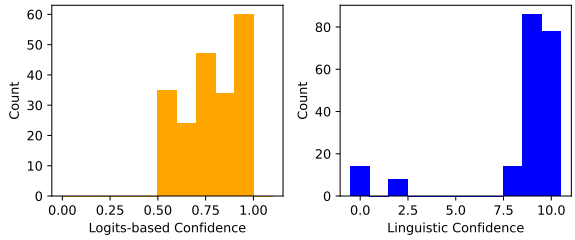
As shown in Table 10, attitude cues consistently raise reported linguistic confidence. Approval has the largest effect, criticism is also positive, and even irrelevant cues increase averages. At the same time, the association with logits decreases, which indicates that inflation in reported confidence is not grounded in internal probabilities. The calibration instruction does not change either average confidence or correlation. These results support the conclusion that prompt tone influences stated confidence levels but leaves the core alignment properties essentially unchanged.

H Generation Task Details

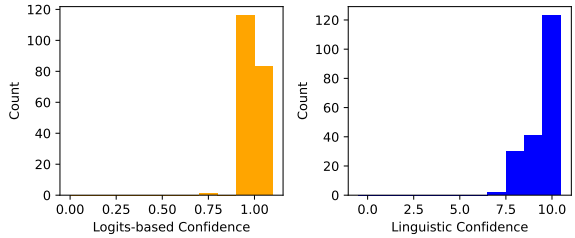
H.1 Prompt Design for Generation Tasks

We follow the prompting setup of Kuhn et al. (Kuhn et al., 2023). To elicit linguistic confidence, we additionally append a confidence query instruction following Xiong et al. (Xiong et al., 2023). Specifically, we include random example confidence scores ranging from 0 to 10 after each question-answer pair in CoQA or after each demonstration example in TriviaQA. The model-generated confidence is extracted and averaged across the five sampled generations for each prompt.

Prompt examples are shown in Figure 8 and Figure 9.



(a) Mistral-7B-Instruct-v0.1



(b) Mixtral-8x7B-Instruct-v0.1

Figure 22: Distribution of Logits-based and Linguistic Confidence on CoLA for Mistral-v0.1 Instruction-tuned Models.

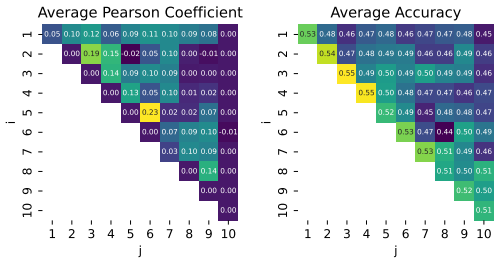
H.2 Full Results on Generation Tasks

We calculate the semantic entropy and the average linguistic confidence of the five generated sequences for each prompt, and then compute the Pearson correlation between them (the semantic entropy is negated when computing the correlation, since a higher entropy indicates lower model confidence). The results are presented in Table 11.

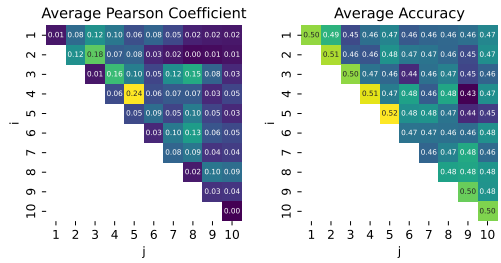
Unlike logits-based confidence, which directly reflects the model's internal probability distribution over tokens, *semantic entropy* is designed to capture uncertainty in generative tasks where the exact answer span or key token positions are difficult to pinpoint. It measures how semantically diverse the generated responses are rather than how peaked the token-level probabilities appear. To further illustrate the distinction between these two uncertainty measures, we also compare logits-based confidence and semantic entropy on several classification tasks, as detailed in Appendix H.3.

H.3 Semantic Entropy and Logits-Based Confidence

Unlike logits-based confidence, which directly reflects token-level probability distributions, semantic entropy captures uncertainty in generative settings where exact answer spans or salient token positions are difficult to identify. It quantifies uncertainty through semantic diversity among gener-



(a) Prompt 1



(b) Prompt 2

Figure 23: Comparison of average Pearson correlation and accuracy across different confidence score pairs (i, j) on two base prompt settings. Each heatmap shows how the model's linguistic confidence and task performance vary with score combinations.

Figure 24: Average correlation (top) and task performance (bottom) across different confidence scoring schemes. The x-axis indicates the index of linguistic confidence scores (1–10), a random choice, or no confidence used.

Metric	mean_a	mean_b	t	p
Base Prompt 2 → Base Prompt 1				
Normalized Accuracy	0.413	0.405	0.55	5.9e-01
Average Logits	0.596	0.569	8.22	2.1e-13
Logits Variance	0.112	0.108	3.08	2.5e-03
ECE(logits)	0.129	0.140	-1.51	1.3e-01
Base Prompt 1 → Base without Confidence				
Normalized Accuracy	0.405	0.405	0.00	9.9e-01
Average Logits	0.569	0.617	-11.58	1.3e-21
Logits Variance	0.108	0.125	-7.76	2.4e-12
ECE(logits)	0.140	0.122	2.96	3.7e-03
Base Prompt 2 → Base without Confidence				
Normalized Accuracy	0.413	0.405	0.49	6.2e-01
Average Logits	0.596	0.617	-5.56	1.5e-07
Logits Variance	0.112	0.125	-6.29	4.7e-09
ECE(logits)	0.129	0.122	1.18	2.4e-01
Instruct Prompt → Instruct without Confidence				
Normalized Accuracy	0.367	0.370	-0.17	8.7e-01
Average Logits	0.875	0.881	-0.89	3.7e-01
Logits Variance	0.119	0.112	1.50	1.4e-01
ECE(logits)	0.286	0.294	-0.57	5.7e-01

Table 9: Paired t-test results comparing logits-based statistics under different prompting conditions. Mean values (a, b), t-statistics, and p-values are reported. Underlined values indicate significant differences ($p < 0.05$).

Metric	mean_a	mean_b	t	p
Origin → Criticism				
$\text{Avg}(\text{Conf}(li))$	8.428	8.612	-2.34	0.028
r	0.266	0.146	3.07	0.0056
Origin → Approval				
$\text{Avg}(\text{Conf}(li))$	8.428	8.807	-3.75	0.0011
r	0.266	0.130	2.43	0.0235
Origin → Irrelevant				
$\text{Avg}(\text{Conf}(li))$	8.428	8.654	-2.47	0.0213
r	0.266	0.178	3.14	0.0047
Origin → Calibration Variant				
$\text{Avg}(\text{Conf}(li))$	8.428	8.396	0.27	0.793
r	0.266	0.223	1.25	0.226

Table 10: Paired t-test results comparing the effect of different attitude and calibration variants on average linguistic confidence $\text{Avg}(\text{Conf}(li))$ and its Pearson correlation with logits-based confidence r. Underlined values indicate significant differences ($p < 0.05$).

ated responses rather than probability concentration over tokens.

To further illustrate the distinction between these uncertainty measures, we additionally compare logits-based confidence and semantic entropy on several classification tasks.

For an N-option classification task, we first obtain the softmax probabilities from the model's final-layer logits, denoted as $p_1, p_2, \ldots, p_N$. The semantic entropy is then computed as

$$SE = -\sum_{i=1}^{N} p_i \log(p_i). \tag{3}$$

The corresponding linguistic confidence for entropy is the average score obtained by inserting each candidate option into the prompt and asking the model for its confidence individually. We use `Qwen2.5-14B` to compute correlations between linguistic confidence and (1) logits-based confidence and (2) negated semantic entropy under two prompt templates. Results are shown in Table 12.

Across tasks, logits-based confidence consistently shows a positive correlation with linguistic confidence, while negated semantic entropy is weaker or negative. This suggests that token-probability confidence and entropy capture different internal views of reliability. Linguistic confidence is closer to the former in these classification settings.

I Regression Model

Outcomes and Predictors. We independently model three continuous outcomes: DIST_LINGUISTIC-LOGITS, ECE_LINGUISTIC-LOGITS, and CORRELATION.

Predictors include model metadata (Model_family, Model_version, Model_type, Model_size), task characteristics (Task, Num_choices), distributional statistics of linguistic and logits confidence (Linguistic_mean, Linguistic_std, Logits_mean, Logits_std), and performance-related measures (Accuracy, Norm_acc, ECE_linguistic, ECE_logits).

Categorical fields, including Model_family, Model_version, Model_type and Task, are one-hot encoded with a dropped reference. Zero-variance columns are removed and an intercept is included.

The full OLS coefficients for the three outcomes are shown in Tables 13, 14, and 15. We also report ridge standardized effects for each outcome in Tables 18, 16, and 17 to rank effect sizes under collinearity.

Llama Family					Mistral / Mixtral Family				
Model	CoQA (r)		TriviaQA (r)		Model	CoQA (r)		TriviaQA (r)	
	Base	Instruct	Base	Instruct		Base	Instruct	Base	Instruct
Llama-2-7B	0.056	**0.063**	0.211	**0.433**	Mistral-7B-v0.1	−0.040	**−0.017**	0.288	**0.392**
Llama-2-13B	−0.148	**0.064**	0.224	**0.469**	Mistral-7B-v0.2	−0.008	**0.213**	0.251	**0.338**
Llama-3.1-8B	−0.015	**0.161**	0.004	**0.318**	Mistral-7B-v0.3	−0.048	**0.012**	0.033	**0.549**
Llama-3.2-3B	0.000	**0.245**	0.261	**0.591**	Mistral-Nemo-2407	−0.050	**−0.015**	0.355	**0.472**
Llama-3-8B	**0.008**	−0.006	−0.034	**0.153**	Mixtral-8×7B-v0.1	−0.024	**0.077**	**0.346**	0.334

Table 11: Pearson correlation (r) between semantic-entropy-based and linguistic confidence on CoQA and TriviaQA. Higher correlations within each base/instruction-tuned pair are highlighted in bold; underlined values indicate statistical significance ($p < 0.05$).

Task	**Base Prompt 1**		**Base Prompt 2**	
	Logits Corr.	**Entropy Corr.**	**Logits Corr.**	**Entropy Corr.**
Conceptual Combinations	**0.4441**	-0.3111	**0.8189**	-0.1970
Ruin Names	**0.4479**	-0.1096	**0.4142**	-0.3364
Temporal Sequences	**0.1246**	0.0103	**0.0431**	-0.0401
CoLA	**0.4469**	0.2283	**0.5672**	0.1077
Cause and Effect	**0.1413**	0.0133	**-0.0853**	-0.3545
MMLU	**0.3909**	-0.1662	**0.3345**	-0.1089
QNLI	**0.1786**	-0.0469	**0.1142**	0.0389
QQP	**0.5777**	-0.3634	**0.6227**	-0.1375

Table 12: Correlation between linguistic confidence and internal metrics (logits-based confidence vs. negated semantic entropy) on `Qwen2.5-14B` under two base prompt templates.

Predictor	Coef	Std.β	SE	t	p	$\text{CI}_{2.5}$	$\text{CI}_{97.5}$
Linguistic_std	0.080817	0.780064	0.005486	14.733	3.02e-38	0.070026	0.091607
Num_choices	0.029610	0.286977	0.005590	5.297	2.14e-07	0.018613	0.040606
Logits_mean	-0.281884	-0.558972	0.053266	-5.292	2.19e-07	-0.386661	-0.177108
Linguistic_mean	0.019635	0.227861	0.005047	3.890	1.21e-04	0.009707	0.029563
Task_QNLI	0.041021	0.131019	0.015235	2.693	0.0074	0.011053	0.070989
Model_version_3	0.031787	0.127700	0.015214	2.089	0.0374	0.001860	0.061713
Norm_acc	0.159594	0.434841	0.080033	1.994	0.0469	0.002165	0.317022
Task_MMLU	-0.035128	-0.113260	0.017947	-1.957	0.0511	-0.070430	0.000173
Model_version_2	0.029361	0.091958	0.015618	1.880	0.0610	-0.001361	0.060083
Task_conceptual_combinations	-0.031565	-0.100818	0.018539	-1.703	0.0896	-0.068033	0.004902
Model_family_mistral	0.025996	0.118525	0.015467	1.681	0.0937	-0.004427	0.056420
Task_QQP	0.024429	0.078764	0.015129	1.615	0.1073	-0.005330	0.054188
Accuracy	-0.203839	-0.373949	0.127119	-1.604	0.1098	-0.453889	0.046210
ECE_linguistic	0.066674	0.095053	0.044742	1.490	0.1371	-0.021336	0.154685
Task_temporal_sequences	-0.027931	-0.089210	0.019908	-1.403	0.1615	-0.067090	0.011229
Model_version_3.2	0.024137	0.058129	0.017625	1.369	0.1718	-0.010532	0.058805
Task_ruin_names	-0.019467	-0.062176	0.021312	-0.913	0.3617	-0.061389	0.022455
Model_version_3.1	0.013335	0.032116	0.018014	0.740	0.4597	-0.022100	0.048770
Task_cause_and_effect	0.010221	0.032647	0.015239	0.671	0.5028	-0.019754	0.040196
Model_version_0.3	0.009882	0.023799	0.018287	0.540	0.5893	-0.026089	0.045853
Model_version_nemo	-0.009373	-0.022573	0.018757	-0.500	0.6176	-0.046268	0.027522
Model_version_0.2	0.007431	0.017895	0.018672	0.398	0.6909	-0.029298	0.044159
Model_family_qwen	0.007809	0.036160	0.022527	0.347	0.7291	-0.036503	0.052121
Logits_std	0.025886	0.015045	0.085453	0.303	0.7621	-0.142205	0.193976
Model_type_instruct	0.005372	0.023738	0.021440	0.251	0.8023	-0.036802	0.047546
Model_version_2.5	0.004281	0.016544	0.019168	0.223	0.8234	-0.033423	0.041985
Model_size	-0.000230	-0.007926	0.001373	-0.168	0.8669	-0.002931	0.002471
ECE_logits	0.004661	0.006237	0.041906	0.111	0.9115	-0.077770	0.087091
const	0.128896		0.064189	2.008	0.0454	0.002633	0.255160

Table 13: Full OLS coefficients for DIST_LINGUISTIC-LOGITS under specified predictors.

Predictor	Coef	Std.β	SE	t	p	$\text{CI}_{2.5}$	$\text{CI}_{97.5}$
Logits_mean	-0.457089	-0.911912	0.045934	-9.951	1.29e-20	-0.547444	-0.366734
Linguistic_mean	0.033871	0.395460	0.004352	7.782	8.89e-14	0.025309	0.042432
Linguistic_std	0.032748	0.318015	0.004731	6.923	2.26e-11	0.023443	0.042053
Logits_std	-0.365030	-0.213445	0.073691	-4.954	1.16e-06	-0.509985	-0.220076
Num_choices	0.021411	0.208775	0.004821	4.441	1.22e-05	0.011928	0.030894
ECE_linguistic	0.159993	0.229478	0.038584	4.147	4.28e-05	0.084096	0.235890
Model_family_mistral	0.034745	0.159377	0.013338	2.605	0.0096	0.008509	0.060981
Model_version_2	0.030157	0.095024	0.013468	2.239	0.0258	0.003664	0.056650
Task_MMLU	-0.033979	-0.110219	0.015476	-2.196	0.0288	-0.064422	-0.003536
Task_temporal_sequences	-0.035044	-0.112611	0.017168	-2.041	0.0420	-0.068814	-0.001275
Model_version_nemo	-0.032071	-0.077707	0.016175	-1.983	0.0482	-0.063888	-0.000254
Model_size	0.002269	0.078583	0.001184	1.917	0.0561	-0.000060	0.004598
Model_version_3.2	0.029128	0.070575	0.015199	1.916	0.0562	-0.000769	0.059024
ECE_logits	-0.068931	-0.092804	0.036138	-1.907	0.0573	-0.140016	0.002154
Norm_acc	0.119477	0.327515	0.069017	1.731	0.0843	-0.016283	0.255237
Task_QNLI	0.022519	0.072360	0.013138	1.714	0.0875	-0.003325	0.048362
Model_version_3	0.020161	0.081486	0.013120	1.537	0.1253	-0.005647	0.045968
Task_conceptual_combinations	-0.023002	-0.073915	0.015988	-1.439	0.1512	-0.054450	0.008446
Model_version_0.2	-0.021393	-0.051835	0.016102	-1.329	0.1849	-0.053067	0.010280
Model_family_qwen	0.025702	0.119743	0.019426	1.323	0.1867	-0.012511	0.063915
Accuracy	-0.114829	-0.211939	0.109622	-1.048	0.2956	-0.330462	0.100803
Model_version_0.3	-0.016109	-0.039032	0.015770	-1.022	0.3078	-0.047129	0.014911
Model_version_3.1	0.014661	0.035523	0.015535	0.944	0.3460	-0.015897	0.045219
Task_ruin_names	-0.016377	-0.052627	0.018379	-0.891	0.3735	-0.052529	0.019774
Task_QQP	0.010294	0.033392	0.013046	0.789	0.4306	-0.015369	0.035957
Model_version_2.5	-0.009743	-0.037882	0.016530	-0.589	0.5560	-0.042257	0.022772
Task_cause_and_effect	0.006342	0.020379	0.013141	0.483	0.6297	-0.019507	0.032191
Model_type_instruct	0.004896	0.021766	0.018489	0.265	0.7913	-0.031473	0.041265
const	0.119108		0.055354	2.152	0.0321	0.010224	0.227992

Table 14: Full OLS coefficients for ECE_LINGUISTIC-LOGITS under specified predictors.

Predictor	Coef	Std.β	SE	t	p	$\text{CI}_{2.5}$	$\text{CI}_{97.5}$
Task_QNLI	-0.155245	-0.251365	0.038621	-4.020	7.27e-05	-0.231227	-0.079263
Model_size	0.011347	0.194214	0.003532	3.213	0.0014	0.004398	0.018296
Linguistic_std	0.041036	0.194311	0.014786	2.775	0.0058	0.011945	0.070126
Task_cause_and_effect	-0.107774	-0.171142	0.039022	-2.762	0.0061	-0.184544	-0.031003
Task_QQP	-0.102290	-0.167177	0.038298	-2.671	0.0080	-0.177638	-0.026943
Linguistic_mean	0.028679	0.164087	0.013086	2.192	0.0291	0.002934	0.054423
Model_family_qwen	0.124865	0.289072	0.059373	2.103	0.0362	0.008055	0.241674
Task_temporal_sequences	-0.093571	-0.145567	0.052304	-1.789	0.0746	-0.196474	0.009332
Norm_acc	0.349829	0.466761	0.209766	1.668	0.0963	-0.062861	0.762519
Accuracy	-0.541172	-0.476354	0.335281	-1.614	0.1075	-1.200797	0.118454
Task_MMLU	-0.074955	-0.121363	0.046563	-1.610	0.1084	-0.166562	0.016653
ECE_linguistic	-0.176518	-0.115766	0.115576	-1.527	0.1277	-0.403899	0.050864
Model_version_nemo	-0.072938	-0.083811	0.049779	-1.465	0.1438	-0.170872	0.024995
Model_family_mistral	0.054200	0.122749	0.039799	1.362	0.1742	-0.024100	0.132500
Logits_mean	-0.183698	-0.182976	0.139718	-1.315	0.1895	-0.458576	0.091181
ECE_logits	-0.142873	-0.091102	0.109132	-1.309	0.1914	-0.357577	0.071832
Model_version_3.1	0.055296	0.067613	0.046194	1.197	0.2322	-0.035586	0.146178
Model_type_instruct	0.063561	0.139207	0.055246	1.151	0.2508	-0.045129	0.172252
Model_version_3.2	0.049355	0.057957	0.045985	1.073	0.2840	-0.041116	0.139825
Task_conceptual_combinations	0.033876	0.052701	0.048393	0.700	0.4844	-0.061331	0.129084
Model_version_0.3	0.026995	0.032363	0.047290	0.571	0.5685	-0.066042	0.120032
Logits_std	0.112563	0.032396	0.227371	0.495	0.6209	-0.334763	0.559889
Model_version_3	-0.015929	-0.031757	0.039442	-0.404	0.6866	-0.093527	0.061669
Num_choices	0.004230	0.020402	0.014322	0.295	0.7679	-0.023946	0.032407
Model_version_2.5	-0.013040	-0.025490	0.049900	-0.261	0.7940	-0.111212	0.085131
Task_ruin_names	0.013881	0.021594	0.055952	0.248	0.8042	-0.096199	0.123960
Model_version_2	-0.006998	-0.010770	0.041111	-0.170	0.8649	-0.087878	0.073883
Model_version_0.2	0.004411	0.005393	0.047652	0.093	0.9263	-0.089340	0.098161
const	0.122884		0.167205	0.735	0.4629	-0.206073	0.451841

Table 15: Full OLS coefficients for CORRELATION under specified predictors.

Predictor	Std.(β)
Model_size	-0.012746
Num_choices	0.143658
Linguistic_mean	0.201203
Linguistic_std	0.741303
Logits_mean	-0.496499
Logits_std	0.009902
ECE_logits	-0.006060
Norm_acc	0.227175
ECE_linguistic	0.123461
Accuracy	-0.158557
Model_family_mistral	0.017754
Model_family_qwen	0.014370
Model_version_0.2	0.013036
Model_version_0.3	0.020893
Model_version_2	0.015764
Model_version_2.5	-0.057565
Model_version_3	0.037234
Model_version_3.1	-0.021622
Model_version_3.2	-0.002226
Model_version_nemo	-0.030178
Model_type_instruct	0.011662
Task_MMLU	0.034117
Task_QNLI	0.121791
Task_QQP	0.063017
Task_cause_and_effect	0.023452
Task_conceptual_combinations	0.043844
Task_ruin_names	0.086675
Task_temporal_sequences	0.053004

Table 16: Full ridge (CV) standardized coefficients for DIST_LINGUISTIC-LOGITS.

Predictor	Std.(β)
Model_size	0.071043
Num_choices	0.080202
Linguistic_mean	0.381558
Linguistic_std	0.302399
Logits_mean	-0.843727
Logits_std	-0.215614
ECE_logits	-0.099016
Norm_acc	0.232477
ECE_linguistic	0.240305
Accuracy	-0.118653
Model_family_mistral	0.063824
Model_family_qwen	0.083243
Model_version_0.2	-0.055676
Model_version_0.3	-0.041310
Model_version_2	0.028802
Model_version_2.5	-0.102369
Model_version_3	0.001939
Model_version_3.1	-0.013762
Model_version_3.2	0.016518
Model_version_nemo	-0.077676
Model_type_instruct	-0.011264
Task_MMLU	0.004494
Task_QNLI	0.068909
Task_QQP	0.028014
Task_cause_and_effect	0.017697
Task_conceptual_combinations	0.038977
Task_ruin_names	0.069560
Task_temporal_sequences	0.008612

Table 17: Full ridge (CV) standardized coefficients for ECE_LINGUISTIC-LOGITS.

Predictor	Std.(β)
Model_size	0.113674
Num_choices	0.109605
Linguistic_mean	0.092039
Linguistic_std	0.087174
Logits_mean	-0.007872
Logits_std	0.036264
ECE_logits	-0.071479
Norm_acc	0.075122
ECE_linguistic	-0.038211
Accuracy	-0.030490
Model_family_mistral	0.029550
Model_family_qwen	0.079445
Model_version_0.2	-0.003542
Model_version_0.3	0.023032
Model_version_2	-0.052616
Model_version_2.5	0.030971
Model_version_3	-0.029987
Model_version_3.1	0.023491
Model_version_3.2	-0.013133
Model_version_nemo	-0.061904
Model_type_instruct	0.056131
Task_MMLU	-0.009412
Task_QNLI	-0.155651
Task_QQP	-0.099535
Task_cause_and_effect	-0.099387
Task_conceptual_combinations	0.114804
Task_ruin_names	0.112571
Task_temporal_sequences	-0.047692

Table 18: Full ridge (CV) standardized coefficients for CORRELATION.