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The linguistic butterfly effect: the hidden cost of ambiguous translations in consumer decisions

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Abstract

Purpose – This paper examines the impact of ambiguous product descriptions resulting from translation on perceived product quality, analyzing how this relationship varies between offline and online purchase contexts.
Design/methodology/approach – The study relies on data collected between 2023 and 2025 in Italy through a 2×2 experiment.
Findings – Results indicate that ambiguous product descriptions reduce consumers' perceived product quality. Moreover, as hypothesized, such a negative effect is stronger among online participants as compared to those offline.
Originality/value – By bridging consumer language research with the signaling theory and construal level theory, this paper contributes to the literature at the intersection of marketing, information processing and consumer language research, as well as to linguistic and managerial practice.

Keywords Product descriptions, Signaling theory, Perceived product quality, Translation quality, Textual ambiguity, Online shopping

Paper type Research paper

1. Introduction

Imagine stepping into a shop and finding yourself captivated by an unusual product—be it a muscle massager, a UV nail lamp, a vegetable slicer or a Chinese checkers board. Intrigued, you examine the item further, noticing that it appears to be an imported product. As you read the product description, something seems slightly off—an awkward phrase, a mismatched term or a sentence that does not flow quite right. It might appear trivial at first glance, but such linguistic imperfections, often introduced during the translation process, can significantly alter how a product is perceived and how much consumers are willing to pay for it. And what changes if we switch into an online shopping context? In an era where global retail e-commerce sales reached an estimated six trillion U.S. dollars in 2024 (Statista, 2025), how product information is communicated appears more critical than ever.

In a marketplace where consumer decisions hinge on details as subtle as wording (Berger and Packard, 2022), these translation ambiguities act like the proverbial butterfly flapping its wings (Lorenz, 1972), triggering a chain reaction that impacts perceived quality and, ultimately, willingness to pay. This is particularly true for imported goods, as reports show 76% of consumers prefer to buy products presented in their native language (DePalma and O'Mara, 2020) and 9 out of 10 of them are more likely to purchase when product descriptions are in their language, even if they understand English (Karandysovsky, 2020). Despite the possibilities offered by digital channels in the current globalized era, consumers tend still to perceive imported products as spatially and psychologically distant (Håkanson, 2014), challenging established globalness/localness consumer attribute preferences (Balzano and

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Vianelli, 2022; Davvetas *et al.*, 2022) and underlining the relevance of recent Country-Of-Origin research (Rahman *et al.*, 2024).

These insights underscore the strategic importance of clear and culturally appropriate language of product information in shaping consumers' and product perceptions and behaviors (Araghi *et al.*, 2023; Fritze *et al.*, 2023; Packard and Berger, 2024). This also includes product descriptions, which serve to synthesize product attributes and can affect consumers' product evaluations (Chen *et al.*, 2024; Gök *et al.*, 2019; Mou *et al.*, 2019).

In the present paper, we refer to poorly translated product descriptions as ambiguous textual information of product descriptions derived from a translation process. Ambiguity is here intended as a key dimension of information accuracy (Gao *et al.*, 2021) and in terms of interpretive uncertainty (Kennedy, 2019). Importantly, our conceptualization of poor translation includes both the observable linguistic flaws in the final text and the underlying process, namely, the fact that consumers recognize the description as a translation from another language.

Nevertheless, the effects of linguistic ambiguity of product descriptions differ in online and offline contexts (Mou *et al.*, 2019; Zeng and Richardson, 2015, 2016). While offline consumers can physically interact with products—touching, testing and directly evaluating their attributes in retail stores— the psychological distance associated with the online shopping context, characterized by the absence of direct sensory interaction with the product, can exacerbate these effects (Darke *et al.*, 2016; Duong *et al.*, 2023; Xu *et al.*, 2021).

Yet, existing approaches in the literature often fail to capture the complexity of the current scenario, between the shift to digital technologies and globalization challenges (Davvetas *et al.*, 2022). Recent studies tend to focus narrowly on linguistic cues and micro-persuasive effects (Berger and Packard, 2022; Schoenmakers *et al.*, 2023), often considering either the online or offline context and neglecting the role of product descriptions. Conversely, other scholars address the impact of product description linguistic features but without considering the cross-linguistic translation process (Mou *et al.*, 2019; Pryzant *et al.*, 2017), particularly for imported goods. Moreover, few studies integrate translation quality into broader international marketing research, rather referring to language fluency and accuracy in other terms (Jin *et al.*, 2017; Kim and Park, 2023). Among these, signaling theory is a well-established marketing theory especially in international cross-linguistic contexts, where "Language and symbols play a vital role in reducing information asymmetry. However, current literature on the application of signaling theory in global marketing has not investigated the use of language and symbols as signals for information asymmetry" (Shahid *et al.*, 2024, p. 553), leaving noticeable gaps in current international marketing research. In light of these challenges, this paper delves into these hidden costs, uncovering how seemingly minor linguistic missteps in product descriptions can reshape consumer perceptions in online and offline shopping contexts.

This paper investigates how the linguistic ambiguity of translated product descriptions influences perceived product quality and, in turn, willingness to pay, with attention to how online versus offline contexts moderate this relationship. We pose the following research question:

RQ. How do poorly translated product descriptions affect consumers' perceived product quality and willingness to pay, and how do online and offline contexts differently contribute to such a relationship?

To address this research question, we bridge consumer language research with signaling theory and construal level theory to explain how consumers rely on informational cues to assess product quality. To test our hypotheses, we set up a 2×2 design experiment involving 1,107 participants, 695 of which online and 412 offline, collectively providing a total of 2,671 distinct product assessments. To this goal, we made use of five assorted products and alternated for each two different versions of translated product descriptions, that is one with ambiguous and one with high-quality textual content. Regression analysis corroborates our theoretical predictions.

Our paper makes multiple contributions to academic literature and managerial practice. First, we contribute to signaling theory by shedding light on the impact of ambiguous product descriptions, as negative signals, on consumers' perceived product quality. Second, we engage with consumer language research by showing how poorly translated product descriptions lead to a nonlinear, "butterfly effect" on consumers' perceived product quality. Third, we offer insights into how consumers perceive product quality when exposed to ambiguous product descriptions in online and offline contexts.

2. Background and hypotheses development

2.1 The negative effects of poorly translated product descriptions

In consumer settings, perceived product quality is defined as a consumer's evaluation of a product's superiority or excellence relative to alternatives (Zeithaml, 1988). Unlike objective product quality, which is determined by quantifiable attributes such as durability, performance or material composition, perceived quality arises from consumers' holistic evaluation of available information, including brand reputation, marketing messages, past experiences and peer reviews (Akdeniz *et al.*, 2012; Tsiotsou, 2005). Because consumers lack direct access to intrinsic product characteristics, they rely on these external signals to form quality judgments (Biswas and Biswas, 2004; Miyazaki *et al.*, 2005).

From a signaling perspective, product descriptions serve as key informational cues that help consumers to infer product quality. They fit the definition of a signal as "an easy-to-acquire, extrinsic informational cue [that] can be used to form inferences concerning quality and value" (Herbig, 1996, p. 35). Consumers use such signals to navigate information asymmetries, particularly when other indicators like brand or price are less salient or inconsistent (Dunham, 2011; Wells *et al.*, 2011).

When the signal is strong, namely clear, coherent and professional, it enhances consumer confidence in the product and the seller (Connelly *et al.*, 2011, 2025; Etzion and Pe'Er, 2014; Lampel and Shamsie, 2000), as "an advertising message must be detectable, discriminable and memorable in order to be effective" (Dunham, 2011, p. 250). Conversely, poorly translated product descriptions function as weak or negative signals. Consumers tend to give more weight to negative information (Rozin and Royzman, 2001) and ambiguous or flawed descriptions can trigger uncertainty and skepticism, potentially undermining confidence in both the product and the seller.

Moreover, the linguistic style affects consumer evaluations and purchase intentions (Gök *et al.*, 2019; Kakaria *et al.*, 2023). Minor linguistic variations, such as verb tense shifts, can also significantly influence consumer attitudes and decision-making (Longa, 2004; Packard *et al.*, 2023). Linguistic disfluency increases cognitive effort, triggers negative emotions and reduces product preference (Kim and Park, 2023; Pogacar *et al.*, 2018). Indeed, scholars show "some signals [. . .] are relatively complex in nature, and this creates difficulty in interpretation" (Shahid *et al.*, 2024, p. 517). Poor translations introduce noise into the signaling process, making it difficult for consumers to extract meaningful information. This complexity is particularly detrimental when compounded by translation errors that disrupt clarity. As a result, poorly translated descriptions can reduce the predictive and confidence value of other product cues, amplifying consumers' feelings of uncertainty.

These effects are especially pronounced in cases involving unfamiliar brands or imported goods, where consumers are already more attentive to potential issues regarding trust, compliance and reliability. This aligns with signaling theory's premise that ambiguous or misleading signals cause receivers to question the sender's credibility (Connelly *et al.*, 2025; Etzion and Pe'Er, 2014). As noted, "Conflicting signals confuse the receiver, making communication less effective" (Connelly *et al.*, 2011, p. 54). Consequently, consumers may perceive poorly translated descriptions as indicators of unprofessional or unreliable products (Andrews and Shimp, 1990), which can lead to frustration and negatively affect purchase attitudes.

In turn, these perceptions extend to price evaluations. When consumers perceive quality uncertainty, they adjust their willingness to pay downward to account for increased risk (Dodds *et al.*, 1991). The weaker the signal, the greater the skepticism and the more likely consumers are to justify lower prices. Conversely, precise and unambiguous product descriptions reinforce perceived quality and support higher willingness to pay.

H1. Ambiguous product descriptions resulting from poor translations negatively affect perceived product quality, which, in turn, reduces consumers' willingness to pay.

2.2 The impact of online-offline contexts on consumer quality perceptions

Marketing research highlights how online and offline contexts differ in the richness and accessibility of sensory and informational cues, shaping consumer decision-making in distinct ways. In offline settings, consumers can directly interact with the product, physically inspect its attributes and seek clarifications from the sales personnel, all of which contribute to reducing uncertainty in product evaluations. Conversely, online shopping environments inherently limit access to these compensatory cues, increasing consumers' reliance on written product descriptions to assess quality (Gao *et al.*, 2012; Jin *et al.*, 2017). Accordingly, prior studies have shown that information is processed differently in online versus offline contexts (Duong *et al.*, 2023; Dzyabura *et al.*, 2019).

In line with the construal level theory, scholars suggest that "when consumers shop online (vs. offline), their psychological distance increases (vs. decreases)" (Duong *et al.*, 2023, p. 990). This distance is conceived in spatial, temporal and experiential terms (Liberman *et al.*, 2007; Xu *et al.*, 2021). Online consumers lack direct sensory interaction with products and rely instead on mediated representations such as images, descriptions and reviews (Zhou *et al.*, 2018). As Xu *et al.* (2021, p. 975) put it, "when consumers are shopping online, they perceive products from a distance", which compels them to depend mostly on provided information for evaluating product quality.

This dynamic becomes particularly critical when product descriptions are poorly translated. In such cases, the linguistic ambiguity of product descriptions becomes more noticeable and also more consequential, as "Informational asymmetry is amplified on the internet and this increases risks associated with purchase decisions. The Internet has reduced the cost of information search; however, it makes it difficult for consumers to evaluate product quality" (Shahid *et al.*, 2024, p. 544). Research supports that perceived "risk is more prominent in online shopping than in traditional store shopping because of the spatial and temporal separation between the consumers and e-vendors" (Zhou *et al.*, 2018, p. 916), prompting individuals to more carefully scrutinize product information (Riquelme *et al.*, 2016). Given that product descriptions are one of the few available cues in online shopping, their clarity plays a critical role in shaping perceptions of product quality. When consumers encounter ambiguous descriptions, they must invest greater cognitive effort, which can trigger skepticism and reduce confidence in the product (Berger *et al.*, 2023; Jin *et al.*, 2017). Poor translations can exacerbate this process by introducing uncertainty, requiring consumers to mentally reconstruct product meaning without the possibility to concretely verify it (Cheema and Papatla, 2009; Trope *et al.*, 2007). Without the ability to compensate for translation deficiencies through direct product interaction (Mavlanova *et al.*, 2012), consumers are more likely to assume the worst, reducing their perceived product quality.

Conversely, we contend that this relationship is weaker in offline contexts. Here consumers have the opportunity to directly examine products, which reduces their reliance on textual descriptions and mitigates the impact of poor translations. As Maheswaran and Chaiken (1991) suggest, the alignment of multiple cues, such as tactile product experience and textual information, can soften the effect of contradictory signals. In offline settings, where consumers can touch and evaluate products firsthand, they are less likely to rely solely on language to assess quality, thereby softening the negative influence of ambiguous product descriptions on perceived product quality.

All in all, we expect poorly translated product descriptions will have a stronger negative impact on perceived product quality in online contexts than in offline ones. In online contexts, the role of textual cues is magnified, making their translation quality a more influential factor. When product descriptions are ambiguous, the absence of compensatory signals increases consumers' uncertainty and lowers their quality evaluations. Thus, we argue for the following:

H2. The negative relationship between ambiguous product descriptions resulting from poor translations and the perceived product quality is strengthened (i.e. made more negative) when consumers are in online rather than offline contexts.

3. Methods

3.1 Context, sample and procedures

To test our hypotheses, we obtained data for our experiment from two distinct sources: online and offline. Data from offline participants were gathered in the Northeast of Italy, at the crossroads of the Latin, Germanic and Slavic cultures. We gathered data both online and offline for both poor and good translations of product descriptions. Participation was voluntary and individuals were informed they could withdraw at any point in time.

After reading the assigned product description, hence after all participants were either exposed to the poorly or well-translated product descriptions, we introduced them to the survey stage, composed by close-ended questions. Academic literature suggests that combining experiments with survey-based studies enhances precision, generalizability and reliability of results (Lavrakas *et al.*, 2019). In the same survey context, we randomly collected some qualitative insights from some survey participants through an open question, to better identify the impact of ambiguous product information elements on their shopping experience and product perceptions. Participants could autonomously fill in the survey sheet, either in a written form or online.

Data were collected in three waves. In all such waves we randomly assigned poor and good translations for each product of the study. In the first wave, in July 2023, we conducted a pilot study with a restricted group of participants, to ensure the understandability of the survey and identify critical points to be improved. Shortly after this first wave, we proceeded with our data collection, which spanned between August 2023 and February 2024 and involved 716 people overall. More specifically, 310 participants were engaged in offline contexts, such as diverse public spaces in different cities, to ensure the widest possible demographic representation. We randomly engaged students and people of all ages in open spaces, such as the main avenues, squares and points of interest of urban and peripheral areas. The remaining 406 people were randomly recruited thanks to a snowball sampling technique in digital contexts, namely messaging platforms, social media messages and email. We contacted people on an individual basis and through a standardized message text, asking them to participate in the survey and forward it to other contacts. It is worth noting that during these first waves, the experiment only included a single product (i.e. the Chinese checkers game). In the third wave, based on the received feedback from reviewers, we decided to further expand our data collection. Leveraging this opportunity, we included four additional items (i.e. a muscle massager designed for deep tissue relief, a UV nail lamp for gel curing, a vegetable spiralizer and a portable Bluetooth speaker). It is worth noting that this wave, unlike the first two, was characterized by a convenience sampling strategy to gather offline data. Specifically, we primarily gathered data in presence at the University of Trieste, inviting academics, staff and students to participate in our study. Moreover, we gathered data online through the Prolific research platform. The third wave of the study spanned between November 2024 and January 2025, involving 391 additional participants (289 online, 102 in presence). Importantly, to address concerns about potential duplication across waves, in each wave participants were recruited through different channels to reduce the likelihood of repeated participation. We ensured that all survey responses were collected anonymously and that no personally identifiable information was requested or stored.

In total, 1,107 participants were involved, providing a total of 2,671 distinct product assessments. An overview of the collected sample characteristics is reported in Table 1.

3.2 Measures

3.2.1 Dependent variables. The main dependent variable in our study is perceived product quality, assessed during the survey stage of the study. The scale, adapted from Dodds *et al.* (1991), comprises 4 items on respondents' perceptions of the quality of products, such as "The likelihood that the product would be reliable is" and "This product would seem to be durable". We asked participants to express their perceptions on aspects of the product quality or their rate of agreement with each statement on a 7-point Likert scale, with higher scores indicating higher perceived quality or stronger agreement with each item. Based on the prescriptions on congeneric approaches (McNeish and Wolf, 2020), we used the CLC Estimator to estimate the construct (Marzi *et al.*, 2023). The CLC Estimator is a tool designed to estimate unidimensional latent constructs using congeneric approaches in survey research. It is implemented as a Shiny app in R, allowing users to easily estimate latent constructs in survey-based research. We selected maximum likelihood as the estimation method. The coefficients of the items and the construct statistics present adequate values, as shown in Table 2 (Hair *et al.*, 2010). Discriminant validity is supported as the Fornell–Larcker criterion is met (Fornell and Larcker, 1981).

Moreover, we constructed a price variable by asking participants to indicate, in the same survey stage of the study, the amount they were willing to pay for each presented product (in euros) (Weisstein *et al.*, 2016). This was meant to assess whether higher perceived product quality translates into greater willingness to pay. To enhance the reliability of the responses and reduce hypothetical bias, we informed participants that their stated willingness to pay could eventually be binding, meaning there was a chance they might be required to purchase the product at the indicated price.

3.2.2 Language quality of product descriptions. The independent variable is the language quality of the translated product descriptions, which was operationalized within the experimental design of our study. For each of the five products, we manipulated the independent variable across two conditions: well-translated and poorly translated product descriptions. Respondents were informed that all products were imported from China to Italy, thus that the original language of the descriptions was Chinese and the translations were into Italian. While evaluating the products, participants were randomly assigned to either well-translated or poorly translated product descriptions. For the analyses, we assigned a dummy variable to each version, namely 0 for the well-translated product description (i.e. our control group) and 1 for the poorly translated one (i.e. our treatment group). The well-translated version of the product description was directly translated from the original Chinese version by a Chinese Italian professional whose native language is Chinese. The low-quality version of translated product descriptions consisted in a linguistic manipulation of the former version, produced and evaluated with the support of the same Chinese Italian expert with Chinese as native language. The manipulation involved replacing the original terms with imprecise or inappropriate ones that lacked their precise meaning within the reference context. This alteration implied awkward phrasing, ill-suited terms and disruptions in the logical flow of the text, ultimately distorting its coherence and intended description clarity. According to the principles of Xìn Dà Yǎ (信达雅) in Chinese translation, a good translation must be faithful (Xìn), precise (Dà) and elegant (Yǎ). A translation that lacks Yǎ can still be acceptable if it preserves Xìn and Dà, but when it fails even to maintain Xìn, it is entirely ambiguous. In this case, the Chinese expert defined the manipulated version as overall ambiguous on all the three aspects, starting from the Xìn, as the meaning was imprecise and uncertain despite being still understandable. As a consequence, the manipulated version was evaluated as ambiguous as it lacked elegance, was imprecise and, despite not being deceptive, missed some elements of the original content, making its meaning still traceable but the overall understanding compromised.

Table 1. Sample characteristics

Study's participants $n = 1{,}107$	n	%		n	%
Gender			*Children (binary)*		
Male	506	45.71	Yes	264	76.15
Female	581	52.48	No	843	23.85
Other/Prefer not to say	20	1.81			
			Hours spent doing online shopping daily		
Age			Up to 30 min	685	61.88
			Up to an hour	231	20.87
18–30	620	56.01	Up to 2 h	112	10.12
31–40	176	15.90	Up to 4 h	67	6.05
41–50	113	10.21	More than 4 h	12	1.08
51–60	113	10.21			
61+	85	7.68	*Shopping channel preference*		
Educational attainment			Clear preference for offline shopping	129	11.65
Primary school or below/Prefer not to say	12	1.08	Moderate preference for offline shopping	259	23.40
Middle school	135	12.20	Neutral	498	44.99
High school diploma	498	44.99	Moderate preference for online shopping	198	17.89
Bachelor's degree or MBA	212	19.15	Clear preference for online shopping	23	2.08
Master's degree	183	16.53			
Doctoral degree	67	6.05	*Family income*		
			Up to 15,000 €	172	15.54
Current job position			Up to 25,000 €	557	50.32
			Up to 35,000 €	135	12.20
Not employed	50	4.52	Up to 45,000 €	97	8.76
Other occupations	33	2.98	Up to 45,000 €	97	8.76
Student	383	34.60	More than 45,000 €	146	13.19
Employee	409	36.95			
Manager or executive	19	1.72	*Italian as primary language*		
Teacher or educator	44	3.97			
Teacher or educator	44	3.97	Yes	1,029	92.95
Self-Employed or entrepreneur	104	9.39	No, but good understanding	78	7.05
Retired	58	5.24			
			Single product assessment	716	64.68
			Multiple product assessments	391	35.32
Administered poor translations	1,417	53.05	Online participant	695	62.78
Administered good translations	1,254	46.95	Offline participant	412	37.22

		Translation quality		Prior awareness of the product					
				Never heard about it		Aware but not sure about the instructions		Used and/or perfectly aware about instructions	
Products' assessments $n = 2{,}671$		Poor							
n	Product	n	%	n	%	n	%	n	%
1,107	Chinese checkers game	645	58.27	606	54.74	414	37.40	87	7.86
391	Muscle massager	193	49.36	184	47.06	198	50.64	9	2.30
391	UV nail lamp	193	49.36	142	36.32	242	61.89	7	1.79
391	Vegetable spiralizer	193	49.36	283	72.38	96	24.55	12	3.07
391	Portable bluetooth speaker	193	49.36	31	7.93	355	90.79	5	1.28

Source(s): Authors' own elaboration

Table 2. Items and reliability of latent variables

	Omega	AVE	Factor loadings
Perceived product quality (adapted from Dodds *et al.*, 1991)	0.92	0.73	
1. The likelihood that the product would be reliable is: (very high to very low)			0.80
2. The workmanship of product would be: (very high to very low)			0.90
3. This product should be of: (very good quality to very poor quality)			0.90
4. This product would seem to be durable (strongly agree to strongly disagree)			0.81

Source(s): Authors' own elaboration

3.2.3 Online/offline participation. To operationalize the online/offline variable, we applied a similar approach to that used for measuring the translation quality of the product descriptions. This variable captures the mode of interaction participants had with the product(s), distinguishing between online and offline engagement. Particularly, we coded the variable as a dummy, with 1 representing offline participation and 0 online participation.

Online participants viewed images of the products along with their respective descriptions, while offline participants were able to physically examine the objects and read printed versions of the product descriptions. To ensure that any observed effects stemmed from the mode of participation rather than differences in the product descriptions themselves, the textual content remained identical across both conditions. Similarly, the survey text was presented in the same format online and offline, with the latter provided on a printed sheet.

3.2.4 Control variables. To account for alternative explanations in our model, we included four categories of control variables: demographic characteristics, shopping-related factors, methodological controls and product-related variables. These controls helped isolate the effect of translation quality on perceived product quality by accounting for potential confounding factors.

For demographics, we collected data on gender, age, highest educational attainment, job position, parental status, family income and whether Italian was the participant's primary language. These variables are relevant because individual differences in education and language proficiency may influence participants' sensitivity to translation accuracy. For instance, we expected people with higher education to be more sensitive to language details, while native language speakers may be more discerning of translation flaws (Kim and Park, 2023; Pogacar *et al.*, 2021), potentially amplifying or mitigating the impact of low-quality language on perceived product quality.

Shopping-related variables account for participants' general purchasing behaviors, which could shape how they interpret product descriptions. We measured shopping context preference (online vs. offline shopping) by asking survey participants to respond to a five-point semantic differential scale, as individuals who predominantly shop online may rely more on textual descriptions (Liao *et al.*, 2006) and thus be more affected by their translation quality. Additionally, participants assessed the average number of hours they spend shopping online per day, as frequent online shoppers may develop greater familiarity with well-structured product descriptions and thus be more likely to notice inconsistencies or errors (Zhou *et al.*, 2018).

As a methodological control, we recorded whether participants completed a single product assessment (coded as 0) or multiple assessments (coded as 1) (Wang *et al.*, 2025), as according to the first and second, and the third participants' wave, respectively. This distinction is important because exposure to multiple product descriptions could heighten participants' awareness of linguistic quality variations, leading to potential contrast effects or increased sensitivity to inconsistencies. We also included a categorical variable to differentiate participants' assessment for each of the five products examined in the study (Wang *et al.*,

2025), namely the Chinese checkers board, the muscle massager, the UV nail lamp, the vegetable spiralizer and the portable Bluetooth speaker. This process was meant to ensure that any observed effects were not driven by product-specific characteristics rather than the linguistic quality of translated product descriptions.

For product-related variables, we asked participants to assess their prior awareness of each evaluated product. This control variable was categorized as (1) never heard of it, (2) aware but unsure about its use and (3) already used the product and/or fully familiar with its instructions. Prior familiarity could influence how participants approach the product (Duong *et al.*, 2023), as those with prior knowledge may rely less on textual explanations, reducing the influence of product descriptions on their perceptions of product quality.

3.3 Analytical technique

We analyzed the data using regression analysis (Allison, 1977, 1999), which was selected based on the nature of the dependent variable, perceived product quality. To mitigate collinearity, all non-categorical variables included in the model were standardized (Aiken *et al.*, 1991). The analysis was conducted using STATA MP 18.0.

To present the results clearly, we estimated multiple regression models. Model 1 includes only the control variables, establishing a baseline for comparison. Model 2 reports only the hypothesized direct effects. Model 3 incorporates all main effects. Model 4 extends Model 2 by adding the interaction term between poor translation and offline context. Model 5 represents the full model, incorporating all variables. Lastly, Model 6 examines the relationship between perceived product quality and price while controlling for all other factors. To ensure the robustness of our findings, we assessed multicollinearity through variance inflation factors (VIF) and verified heteroskedasticity-consistent standard errors. Model fit was evaluated using R-squared and adjusted R-squared, while sensitivity analyses were conducted to check for consistency across different model specifications.

4. Results

We report the descriptive statistics and the correlation coefficients in Table 3 below. Some correlation coefficients among the variables included in our models are above 0.5. Nevertheless, the VIF values of our key variables for all the regression models are below the threshold of 10, indicating low risks of multicollinearity (Gujarati, 2004).

Table 4 reports the estimated coefficients of the regression models. First, the estimated coefficient of the independent variable shows a significantly negative effect of poorly translated product descriptions on perceived product quality across all the related models (in Model 5, $\beta = -0.485$, $p = 0.000$). Thus, the claim (Hypothesis 1) that poorly translated product descriptions would negatively affect product quality perceptions is supported by our data. Moreover, as Model 6 shows, perceived product quality positively affects the price levels that participants are willing to pay ($\beta = 0.212$, $p = 0.000$). Collectively, such results provide strong support to our first hypothesis.

Regarding Hypothesis 2, which proposes that online contexts exacerbate the negative relationship between low-quality product descriptions and perceived product quality, Table 4 supports this effect. The interaction term is positive and statistically significant across all models, with Model 5 showing $\beta = 0.738$, $p = 0.000$, providing strong support for our second hypothesis.

The likelihood-ratio tests confirm the progressive improvement in model fit with the inclusion of additional variables. Comparing Model 1 and Model 3 ($\chi^2 = 136.75$, $p < 0.001$) shows that adding poor linguistic quality and offline context significantly enhances the model explanatory power. Further, the inclusion of the interaction term poor translation X offline context in Model 5 provides an additional improvement over Model 3 ($\chi^2 = 85.65$, $p < 0.001$), underscoring the value of the interaction effect in explaining the perceived product quality.

Table 3. Descriptive statistics

	Mean	SD	Min	Max	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) Perc. quality	4.014	1.330	1.000	7.000	1.000														
(2) Price	17.547	12.362	0.000	130.000	0.235***	1.000													
(3) Poor quality	–	–	0.000	1.000	−0.180***	−0.055**	1.000												
(4) Offline context	–	–	0.000	1.000	0.138***	0.004	−0.145***	1.000											
(5) Gender	–	–	1.000	3.000	0.033+	0.003	−0.013	0.038+	1.000										
(6) Age	34.685	15.166	18.000	84.000	−0.090***	−0.078***	−0.009	0.107***	−0.079***	1.000									
(7) Education	3.560	1.118	1.000	6.000	−0.048*	0.021	−0.038+	0.035+	0.026	0.026	1.000								
(8) Job position	–	–	0.000	8.000	−0.063**	−0.038*	0.035+	0.060**	−0.018	0.473***	0.087***	1.000							
(9) Children (dummy)	0.238	0.426	0.000	1.000	−0.033+	−0.014	0.041*	0.035+	0.028	0.662***	−0.025	0.343***	1.000						
(10) Hours online shop	0.944	1.201	0.000	10.000	0.085***	0.102***	−0.062**	0.041*	0.034+	−0.094***	0.003	0.002	−0.010	1.000					
(11) Online channel pref	2.753	0.950	1.000	5.000	0.016	0.001	−0.055**	−0.029	−0.146***	−0.182***	0.139***	−0.045*	−0.133***	0.289***	1.000				
(12) Family income	28568.58	29324.41	0.000	500,000.000	−0.020	−0.023	0.053**	−0.041*	−0.079***	0.041*	0.144***	0.072***	0.100***	0.099***	0.052**	1.000			
(13) Italian as primary	–	–	0.000	1.000	−0.087***	−0.008	0.007	−0.074***	−0.159***	0.101***	0.021	0.001	−0.003	−0.090***	−0.011	−0.077***	1.000		
(14) Multiple prod. assessed	–	–	0.000	1.000	0.189***	0.043*	−0.122***	−0.165***	−0.090***	−0.184***	0.170***	−0.074***	−0.144***	0.130***	0.341***	0.120***	−0.103***	1.000	
(15) Prior prod. awareness	0.578	0.578	0.000	2.000	0.024	0.111***	0.041*	0.025	0.058**	0.000	0.008	0.004	0.004	0.041*	−0.027	−0.007	0.005	−0.092***	1.000
(16) Prod. type	–	–	1.000	5.000	−0.064***	−0.106***	−0.072***	−0.098***	−0.053**	−0.108***	0.101***	−0.044*	−0.085***	0.077***	0.202***	0.070***	−0.061**	0.591***	−0.094***

Note(s): $^{+}p < 0.10$, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$. Values are based on unstandardized variables. Means and SD of individual-level variables (i.e. 6, 7, 9–12) are computed without duplication to ensure an accurate representation of individual characteristics. However, in the database, a participant may have multiple entries when assessing multiple products, resulting in repeated information across observations

Source(s): Authors' own elaboration

Table 4. Multiple regression analysis

	Model 1 Perceived quality	Model 2 Perceived quality	Model 3 Perceived quality	Model 4 Perceived quality	Model 5 Perceived quality	Model 6 Price
Constant	−0.374***	0.191***	−0.366**	0.218***	−0.302**	−0.054
	(0.110)	(0.028)	(0.115)	(0.035)	(0.113)	(0.098)
Poor translation		−0.360***	−0.265***	−0.536***	−0.485***	
		(0.038)	(0.037)	(0.045)	(0.043)	
Offline context			0.335***	−0.072	−0.008	−0.043
			(0.041)	(0.056)	(0.055)	(0.036)
Poor translation × Offline context				0.682***	0.738***	
				(0.082)	(0.080)	
Gender	Included		Included		Included	Included
Age	−0.082*		−0.109***		−0.093**	−0.080**
	(0.032)		(0.031)		(0.031)	(0.028)
Education	−0.083***		−0.092***		−0.090***	0.037*
	(0.021)		(0.021)		(0.021)	(0.018)
Job position	Included		Included		Included	Included
Children (dummy)	0.131*		0.180**		0.143*	0.103+
	(0.065)		(0.063)		(0.062)	(0.056)
Hours of online shopping	0.061**		0.046*		0.041*	0.097***
	(0.020)		(0.019)		(0.019)	(0.017)
Online channel orientation	−0.072***		−0.075***		−0.059**	−0.053**
	(0.021)		(0.021)		(0.020)	(0.018)
Income	−0.043*		−0.029		−0.019	−0.037*
	(0.019)		(0.019)		(0.018)	(0.016)
Italian as primary language	−0.178**		−0.122+		−0.118+	0.088
	(0.064)		(0.063)		(0.062)	(0.056)
Multiple prod. assessed	0.834***		0.857***		0.903***	−0.431***
	(0.064)		(0.063)		(0.062)	(0.057)
Prior product awareness	0.018		0.021		0.019	0.014
	(0.020)		(0.019)		(0.019)	(0.017)
Product type	Included		Included		Included	Included
Perceived quality						0.212***
						(0.017)
n	2,671	2,671	2,671	2,671	2,671	2,671
R-squared	0.118	0.032	0.162	0.069	0.189	0.351

Note(s): Standard errors in parentheses. $^{+}p < 0.10$, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$. Non-categorical variables have been standardized

Source(s): Authors' own elaboration

To enhance the rigor and the validity of our analyses, we run some additional robustness checks. The results of these tests conducted on control variables show that our analyses are solid and consistent, supporting the reliability of our results. Furthermore, we relied on Jackknife Resampling techniques, whose results are consistent with those of the regression analysis. This shows that our results are not contingent on specific subsamples (Efron and Tibshirani, 1994; Miller, 1974). We also reassessed the robustness of our latent variable estimates (McNeish and Wolf, 2020), where the results of these additional tests within alternative models exhibited similar patterns as our regression analyses.

5. Discussion

5.1 Theoretical contributions

The findings of the present study shed light on the importance of ensuring high-quality product descriptions and enrich current evidence on the distinct mechanisms of online and offline

shopping contexts, addressing the academic literature on the signaling theory, consumer language research and the construal level theory.

First, our study extends available evidence on the signaling theory to the international marketing field, by showing that poorly translated product descriptions function as complex signals that hinder consumer interpretation, negatively affecting perceived product quality. The research responds to calls for deeper investigation into language as a signal in presence of information asymmetry in global marketing (Shahid *et al.*, 2024). In doing this, our study contributes to the broader discussion on the impact of negative signals (Connelly *et al.*, 2011; Rozin and Royzman, 2001; Yasar *et al.*, 2020), extending their scope to include linguistically ambiguous product information as product descriptions. While previous scholars show mixed results on the impact of ambiguous or disfluent product information on consumers' product evaluations (Jain *et al.*, 2020; Sung *et al.*, 2022), our results suggest ambiguous product descriptions are not neutralized or ignored by consumers. Instead, they are actively interpreted as signals of low product quality, reinforcing the notion that even subtle linguistic flaws can convey unreliability. This means negative linguistic signals are actively processed and not passively dismissed.

Our study also enriches the signaling literature by shifting focus from the sender to the receiver, highlighting the active role of consumers in interpreting and reacting to signals (Connelly *et al.*, 2011, 2025). While much of the signaling literature has focused on senders' crafting and delivering signals to reduce information asymmetry, our study delves deeper into how consumers interpret and respond to negative signals, as well as how contextual factors may influence them (Dunham, 2011). This implies consumers play an active role in processing, interpreting and reacting to negative signals as ambiguous product descriptions. Consumers are not passive receivers but become "signalers" themselves through the inferences they draw and the decisions they make. This is illustrated by participants' responses: *"Lack of attention to linguistic aspects of product descriptions conveys the idea a brand does not consider consumers who speak other languages" (participant ID: 782),* and *"Beyond the comprehension of product descriptions themselves, poor linguistic care makes me question the overall quality of the product and the firm's level of professionality. Inaccurate language, with grammatical errors or rough translations, conveys a sense of superficiality and lack of attention to details" (participant ID: 1074).*

Second, the study contributes to consumer language research by extending current evidence on how the language of product information can affect consumer attitudes (Kim and Park, 2023), beyond specific product categories (such as food and technologies, e.g. Duong *et al.*, 2023; Pryzant *et al.*, 2017). The study shows how even subtle linguistic features can shape communication for consumers (Packard *et al.*, 2023) and tries to deepen people's understanding through their own words (Berger and Packard, 2022). The paper offers empirical evidence on the nonlinear effects of translation quality (Longa, 2004) through translated product descriptions. This aligns with the "butterfly effect" (Lorenz, 1972) concept in linguistics, whereby small linguistic imperfections have amplified effects on consumer perceptions. Importantly, perceived product quality was consistently lower in presence of poorly translated product descriptions, suggesting that they assume a "diagnostic role" (Biswas and Biswas, 2004), regardless of the product category or familiarity (Duong *et al.*, 2023), and this negatively affects consumers' willingness to pay. These findings emphasize the critical role of high-quality translations, highlighting the need for businesses to invest in accurate localization strategies to safeguard brand reputation and enhance the overall shopping experience. Participants echoed this in their qualitative insights, reporting ambiguous product descriptions can have significant repercussions on their purchase decisions: *"Poor linguistic care is a red flag in my purchasing decisions. If a company has not invested in localization services, I tend to see it as unreliable on other aspects as well" (participant ID: 846),* and *"I don't buy if I don't trust what I find written on the instructions. Lack of attention to language details and content increases my distrust" (participant ID: 731).*

Third, our findings clarify how the shopping context moderates the translated product descriptions-perceived product quality relationship. Poorly translated descriptions have a stronger negative effect on quality perceptions in online contexts, where consumers face greater information asymmetry and lack access to physical product cues. This responds to calls in international marketing for deeper exploration of how signaling operates in online contexts (Shahid *et al.*, 2024). Our results underline that contextual factors (Dunham, 2011) modulate the impact of negative signals, showing consumers' interpretation and quality perceptions are not static but context-dependent. Thus, the study contributes to clarify how consumers process signals in online and offline contexts and in a comparative perspective (Chu *et al.*, 2010; Dzyabura *et al.*, 2019).

Consistently with the construal level theory (Trope and Liberman, 2010), online shopping contexts increase perceived consumer distance (Darke *et al.*, 2016; Xu *et al.*, 2021). While looking at something from a distance highlights the central aspects of the item, previous literature is not conclusive on the impact of this on consumers' product evaluations. Indeed, as looking at products from afar may make something seem more positive and satisfactory, it may also imply a more comprehensive product assessment (Liberman *et al.*, 2007; Trope *et al.*, 2007) and, thus, closer product scrutiny. Contrary to claims that online consumers process information superficially (Peng *et al.*, 2018; Pernice *et al.*, 2014), our results—and participants' own words—suggest the opposite: *"If I am buying a product online, I pay close attention to its description and reviews before purchasing it. Thus, if I notice poor linguistic care in the product description or the description is missing, I switch to another, more reliable product." (participant ID: 757)*, and *"Lack of attention to product descriptions undermines my shopping experience online. I search for crystal clear information on products I purchase on the Web, as I want goods responding exactly to my needs. Ambiguous descriptions usually miss salient product details" (participant ID: 919).* This supports our finding that the effect of poor translations is amplified in online shopping contexts, challenging the assumption that psychological distance weakens signal influence. Given the higher perceived risk in online shopping (Zhou *et al.*, 2018) and the absence of alternative product information (Mavlanova *et al.*, 2012), the impact of ambiguous product descriptions (as negative signals) is stronger online, rather than weaker. Thus, the paper clarifies that online contexts do not simply shift consumer information preferences (Chu *et al.*, 2010; Duong *et al.*, 2023), nor do they soften the impact of negative signals (Darke *et al.*, 2016). Conversely, translation quality becomes even more salient online, intensifying the "butterfly effect" and raising the stakes for brands operating in e-commerce. This opens new avenues for research on the linguistic challenges in cross-border online marketing, as the perceived psychological distance reinforces the salience of the available signals.

To sum up, our study contributes to existing research on four key dimensions, namely identifying poorly translated product descriptions as negative signals in signaling theory; highlighting the active role of consumers as receivers of negative signals; empirically supporting the "butterfly effect" triggered by poorly translated product descriptions and showing the asymmetric relevance of negative signals within online and offline contexts. By integrating the signaling theory, consumer language research and the construal level theory the study offers a comprehensive framework to understand how negative linguistic signals can affect consumers' quality perceptions across different shopping contexts.

5.2 Managerial implications

The study offers valuable guidance to managers and practitioners across sectors, emphasizing the importance of shaping consumers' product quality perceptions in both online and offline contexts.

First, our results highlight that clear and high-quality product descriptions can enhance consumers' shopping experience and build trust in both products and producers. As language becomes increasingly central to understand consumer behavior (Packard and Berger, 2024),

product descriptions—especially for foreign products—must not be overlooked. To offer high-quality products, importers should not overlook the importance of how product descriptions are translated, particularly for foreign products that may be less familiar to local consumers.

To this end, managers and marketers should seek support from expert translators or advanced translation technologies, such as AI-powered translation tools, leveraging the adaptability of digital means (Alonso and Vieira, 2020; Araghi *et al.*, 2023). In this regard, firms may consider implementing centralized translation management systems (TMS) to streamline translation processes and ensure consistency. These initiatives can help craft product descriptions that are respectful of the cultural and linguistic contexts of the target markets, reducing misinterpretations and reinforcing perceived quality of both products and producers.

Beyond general translation strategies, firms should also consider developing segment-specific approaches tailored to the product category. For example, translations in high-involvement sectors such as pharmaceuticals, cosmetics or electronics require a higher level of linguistic precision, as consumer trust and product safety are at stake. In these contexts, the margin for errors is narrower, and poor translations may generate greater reputational or legal risks. Managers should therefore adopt a more stringent translation protocol depending on the sensitivity and complexity of the product.

Second, our results emphasize the need to tailor product descriptions to online and offline contexts. Considering each context's affordances and limitations is necessary to ensure that consumers can accurately assess product attributes and make informed, satisfying choices (Chu *et al.*, 2010; Hult *et al.*, 2019). Retailers could develop strategies to enhance both the online and offline shopping experience to compensate for potential ambiguities in product descriptions and offer accurate, accessible information. Offline, firms can train sales staff to supplement textual information and allow consumers to test products directly. Online, where sensory interaction is absent, clarity and richness of product descriptions become even more crucial. Marketers should incorporate enriched content, such as multiple pictures, virtual reality or AI-based chatbots, to reduce psychological distance and support remote product evaluation (Xu *et al.*, 2021).

Importantly, poorly translated product descriptions can also expose firms to reputational risks, especially in digital environments where negative consumer reactions can quickly spread. Misleading or confusing translations may be perceived as carelessness or disrespect towards local markets, undermining brand credibility. To mitigate these risks, firms must develop systematic processes to assess translation quality. Regular content audits, crisis protocols and consumer feedback loops can be useful tools for preserving brand credibility.

Firms can further implement linguistic quality assurance (LQA) tools and auditing frameworks to detect linguistic ambiguity, inconsistency and cultural mismatch. NLP tools can also assist in identifying common translation errors, but should be integrated by human review for contextual accuracy. A hybrid AI-human model balances efficiency and quality: while AI offers scalability, human oversight ensures cultural and linguistic nuances. This approach supports market consistency while allowing for local adaptation.

Last, online and offline retailers could actively involve consumers in the co-creation of communication strategies (Berger and Packard, 2022), ensuring these respond to their expectations and psychological needs. Collecting feedback on product descriptions and tailoring communication not only to the shopping context but also to cultural and regional differences can foster stronger connections between consumers and brands. Surveys, focus groups or social media engagement initiatives can generate valuable insights to refine translated content and enhance relevance across diverse markets.

To sum up, translation quality should be seen as a strategic asset capable of shaping consumers' product perceptions as well as reinforcing trust, minimizing risk and contributing to long-term brand reputation.

6. Conclusion

In the present paper, we explored the relationship between poorly translated product descriptions and consumers' perceived product quality, also considering the moderation role of offline and online shopping contexts. Despite its contributions, the present study is not without limitations. First, we report the risk of biases due to consumers' self-reported answers. Moreover, the risk of self-selection bias may have limited the representativeness of our sample of participants. In addition, we point out the limited geographic scope of the study, preventing improper generalizations of our results to other contexts. Therefore, we advise future researchers to expand the geographic boundaries of the present research, in order to better investigate the role cultural differences may play while investigating the impact of product descriptions on consumers' perceptions.

Additionally, we acknowledge the limited focus on product descriptions of the present research. Future studies could investigate the role of the translation quality of other product components, such as textual information on packaging, labels and other product details, in order to provide a wider perspective on the textual information shaping consumers' product quality perceptions. Moreover, while our study explicitly focused on the role of textual product descriptions in shaping consumer perceived product quality, future research could consider exploring the impact of the combination of visual and textual information (Packard and Berger, 2024) on consumers' perceived product quality and deepen the impact of online-offline contexts on people's processing of product descriptions. As we deepened the relationship between the linguistic quality of translated product descriptions, perceived product quality and then willingness to pay, future research avenues could complete the picture by exploring the repercussions on brand or industry reputation. To expand this further, researchers could try understanding the role of other moderator variables such as ethnocentrism or country image, to check for whether and to what extent different country perceptions can affect product assessments in presence of poorly translated product information. These additional elements, indeed, could shed further light on the "butterfly effect" described in this study. Last, researchers could better investigate how translated product descriptions of different linguistic quality shape product quality perceptions in hybrid contexts, namely multichannel and omnichannel shopping environments. As these are areas of increasing interest by scholars and companies, this could provide interesting academic and practical insights.

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