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Counterfactual Structure and Regret Intensity: Cross Linguistic Experiments on How Grammatical Mood Shapes Post Decision Emotions

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Abstract:

*Regret is a counterfactual emotion requiring mental simulation of alternatives to reality. Languages differ dramatically in grammatical mood marking for counterfactuals from obligatory subjunctive (Spanish, Turkish) to optional periphrastic (English) to absent (Mandarin). Whether these grammatical differences shape regret intensity remains unknown. This review synthesizes cross linguistic experimental evidence testing whether obligatory counterfactual mood increases post decision regret, whether fine grained mood distinctions produce graded effects, and what mechanisms explain these effects. We integrate behavioural, eye tracking, and self paced reading experiments comparing speakers of Spanish, Turkish, German, English, and Mandarin. Standardised decision scenarios with negative outcomes were used, measuring regret intensity, counterfactual generation latency/frequency, and rumination. Multilevel mediation and within language mood manipulations were employed. Obligatory mood produces significantly higher regret (Cohen's *d* up to 1.13) than optional or absent marking, mediated by faster counterfactual generation. Fine grained distinctions (past perfect vs. imperfect subjunctive) amplify regret selectively for irreversible outcomes. Mandarin speakers show lower regret but higher rumination, suggesting deliberative processing. Processing fluency reduced cognitive effort for counterfactual simulation when mood is obligatory is the primary mechanism. Grammatical mood is a cognitive determinant of regret intensity, not merely an expressive device. Regret's phenomenology is partially grammatically constructed. Future research should use neurolinguistic methods, developmental designs, artificial language learning, and clinical trials of "grammatical distancing" for regret based disorders. Applications in legal, medical, and marketing contexts should account for cross linguistic mood variation.*

Keywords:
Counterfactual thinking; grammatical mood; regret; linguistic relativity; emotion regulation

I. Introduction

1.1 Introduction: From "If Only" to "If It Were" Why Grammar Matters for Emotion

Opening vignette: Real-world regret and the spontaneous emergence of counterfactual language.

Consider a surgeon who, after a patient's unexpected death, replays the operation in her mind: If I had recognized the early signs of ischemia earlier, I would have altered the perfusion protocol. Or an investor, who, watching a stock he sold soars in value, mutters: If only I had held on for another week. In both cases, regret is not merely felt – it is structured linguistically. The grammar of "if only" and "if it were" appears spontaneously, as if the emotion itself demands a specific syntactic and morphological shape. But is this linguistic scaffolding a mere

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epiphenomenon of regret, or does it actively shapes the intensity with which regret is experienced?

The puzzle

Regret is a fundamentally counterfactual emotion. To experience regret, one must mentally undo the past simulate an alternative outcome that did not occur and compare it with what actually happened (Kahneman & Miller, 1986). Without the cognitive capacity to construct "what might have been," regret cannot arise. Yet human languages differ dramatically in the grammatical tools they provide for precisely this mental operation. Some languages (e.g., Spanish, Turkish, and German) possess obligatory or highly systematic morphological marking for counterfactual scenarios, typically via dedicated subjunctive or conditional mood inflections. Others (e.g., English) rely on periphrastic constructions that are grammatically optional. Still others (e.g., Mandarin) often leave counterfactuality to be inferred from context rather than explicitly marked by verb morphology (Bloom, 1981; Au, 1983; Yeh & Gentner, 2005).

This cross linguistic variation raises a question of fundamental importance for the cognitive science of emotion: do the grammatical tools a language provides for counterfactual simulation shape how intensely regret is felt? If language is a cognitive resource that can amplify or attenuate emotional experience, then speakers of languages with rich, obligatory counterfactual marking should experience regret more intensely – or at least differently – than speakers of languages in which such marking is optional or absent. Alternatively, it is possible that universal emotional processes override grammatical differences, rendering mood a mere conventional ornament with no causal role in emotional phenomenology. Resolving this question requires bridging three disciplines that rarely speak to one another: formal semantics of counterfactuals, psycholinguistics of mood processing, and the affective science of regret.

Brief historical backdrop: philosophical and psychological roots.

Modern philosophical treatments of counterfactuals have been dominated by possible worlds semantics, developed independently by Robert Stalnaker and David Lewis in the late 1960s and early 1970s. Stalnaker (1968) proposed that a counterfactual conditional "If A were the case, then C would be the case" is true just in case C holds in the nearest possible world where A is true the world that differs minimally from actuality. Lewis (1973) refined this analysis, introducing a comparative similarity ordering over possible worlds to handle cases where no single world is uniquely closest. For both philosophers, counterfactual reasoning involves mental exploration of nearby possible realities. This framework, although originally developed in formal semantics, has proven remarkably generative for empirical psychology: it predicts that the closeness or accessibility of a counterfactual alternative should determine its cognitive and emotional impact.

The psychological study of counterfactual thinking began in earnest with Kahneman and Tversky's (1982) work on the simulation heuristic – the observation that people judge the likelihood of events by the ease with which they can imagine them. In a now classic demonstration, they showed that passengers who miss a flight by five minutes feel more regret than those who miss it by thirty minutes, precisely because the counterfactual ("if only I had arrived five minutes earlier") is easier to simulate. Gilovich and Medvec (1995) extended this line of inquiry by documenting a temporal asymmetry in regret: actions generate more regret in the short term, whereas inactions (failures to act) produce more regret in the long run. Across decades of research, a consistent finding has emerged: regret is reliably predicted by the mutability of an event – the ease with which it can be mentally undone (Roese & Olson, 1995).

What has been almost entirely neglected, however, is the possibility that mutability itself may be grammatically conditioned.

Gap statement

Prior work has focused almost exclusively on the content of counterfactuals whether an outcome is easy or difficult to mutate, whether the counterfactual alternative is upward or downward, whether the event was an action or inaction. The grammatical architecture within which counterfactuals are expressed has been treated as a transparent medium, not as a variable that might affect the cognitive process itself. This is a striking omission. If grammar can influence thought in other domains – as research on spatial framing (Levinson, 2003), number concepts (Everett, 2005), and event construal (Slobin, 1996) has suggested then grammatical mood may be a previously unrecognized determinant of post decision emotion.

Majid (2012) has argued that language interacts with emotion at multiple levels, from phonology and lexicon to syntax and discourse. Pavlenko (2014) has demonstrated, in the context of bilingualism, that switching languages can alter emotional experience, sometimes dramatically. But neither line of research has systematically investigated how grammatical mood dedicated morphosyntactic category for marking realis vs. irrealis events modulates regret across languages. The present review fills this gap by synthesizing emerging experimental evidence on cross linguistic variation in counterfactual mood and its effects on regret intensity.

Research questions

Three questions organize this review:

a. RQ1: Does obligatory (vs. optional) counterfactual mood marking affect the intensity of regret experienced after negative decision outcomes?
b. RQ2: Do fine grained mood distinctions within a single language e.g., past subjunctive vs. past perfect subjunctive in Spanish, or synthetic vs. analytic Konjunktiv II in German – produce graded differences in regret intensity?
c. RQ3: Are the observed effects of mood on regret cross linguistically consistent, or are they moderated by language typology (e.g., agglutinative vs. fusional morphology, presence of evidentiality systems)?

II. Review of Literatures

2.1 The Cognitive Structure of Counterfactual Thought

Counterfactual thinking is the cognitive process of mentally representing alternatives to past events imagining how things could have been different (Roese, 1997). This capacity is ubiquitous in human cognition, emerging early in development (Harris, 1996) and playing a critical role in causal reasoning, moral judgment, and emotional experience (Byrne, 2005). The foundational theoretical framework for understanding counterfactual cognition is Byrne's (2005) *mental model theory*.

According to mental model theory, humans represent the world by constructing mental models – small-scale, analogical representations of situations. When reasoning about counterfactuals, the mind simultaneously maintains at least two models: a *factual model* representing what actually occurred, and one or more *counterfactual models* representing alternatives (Byrne, 2002, 2005). This dual-availability is computationally demanding but highly adaptive: it allows individuals to learn from past mistakes (by simulating better alternatives) and to experience emotions that guide future behavior (Zeelenberg et al., 1998). Critically for the

present review, mental model theory predicts that any factor facilitating the construction or maintenance of counterfactual models will amplify their cognitive and emotional consequences. Roese and Olson (1995) introduced the concept of the "counterfactual sweep" – the systematic tendency for counterfactual thoughts to vary along multiple dimensions. The most important of these dimensions for emotion is the distinction between *upward* and *downward* counterfactuals. Upward counterfactuals imagine alternatives that are better than reality ("If only I had studied harder, I would have passed the exam"). Downward counterfactuals imagine alternatives that are worse ("If I had not taken that train, I might have been on the one that derailed"). Upward counterfactuals typically produce negative emotions such as regret, disappointment, and sadness, whereas downward counterfactuals can produce positive emotions such as relief and gratitude (Roese & Olson, 1995; Markman, Gavanski, Sherman & McMullen, 1993).

Regret occupies a special place among counterfactual emotions. Unlike disappointment, which can arise from external circumstances, regret is inherently *self-focused* and *agency-based*: it requires the individual to recognize that they could have chosen differently and that a better outcome was attainable (Zeelenberg, van Dijk, Manstead & van der Pligt, 1998). Zeelenberg et al. (1998) demonstrated that regret is uniquely characterized by feelings of personal responsibility, a sense of having made an error, and a strong motivation to undo the past decision. This self-referential quality makes regret particularly sensitive to factors that enhance the salience or vividness of alternative choices – including, as argued below, grammatical mood marking.

From the perspective of mental model theory, regret arises when the counterfactual model (in which the better choice was made) is highly accessible and contrasts sharply with the factual model (in which the poorer choice was made). The intensity of regret is thus a function of the *distance* between these models and the *ease* with which the counterfactual model can be constructed. The present review extends this framework by proposing that grammatical mood is a previously unrecognized determinant of counterfactual accessibility – one that varies systematically across languages.

2.2 Grammatical Mood as a Cognitive Affordance

Grammatical mood is a morphological category that marks the speaker's attitude toward the factual status of an event or state of affairs. The most basic distinction is between *realis* mood, which represents events as having occurred or being actual and *irrealis* mood, which represents events as hypothetical, potential, or counterfactual (Palmer, 2001; Givón, 1994). Irrealis mood subsumes a range of more specific categories, including subjunctive (marking hypothetical or wished-for situations), conditional (marking dependency on a condition), and optative (marking desires).

Languages vary dramatically in how they grammaticism counterfactuality. At one end of the spectrum are languages with *obligatory* counterfactual marking: specific verb inflections that must appear in counterfactual contexts. Spanish, for example, requires the *imperfect subjunctive* (*cantara/cantase*) or *past perfect subjunctive* (*hubiera/hubiese cantado*) in the antecedent of past counterfactual conditionals morphological forms that signal unequivocally that the event did not occur. Turkish employs a dedicated counterfactual suffix, typically realized as *-sA* in combination with past tense marking, that unambiguously marks the clause as counterfactual (Kiss, 1993; Sezer, 1990). Across Turkic languages more broadly, dedicated counterfactual morphology is widespread, though it often interacts with evidentially systems (von Fintel & Iatridou, 2023; Slade, 2011).

At the other end of the spectrum are languages with *optional* or *periphrastic* marking. English relies on a combination of past tense and modal auxiliaries (*had, would, could*) in fixed phrasal patterns ("If I had known…"). Counterfactuality is thus constructed syntactically rather than by obligatory verb morphology; moreover, in many contexts, the same surface forms can be used non-counterfactually (e.g., "If I knew the answer, I would tell you" can be either counterfactual or epistemic, depending on context). The most extreme case is Mandarin Chinese, which lacks dedicated counterfactual verb morphology altogether. In Mandarin, counterfactuality must be inferred from context, often signalled by discourse particles (*lè, ba*), temporal adverbs (*zǎo – "earlier"*), or the conditional connective *yàobushi* ("if not for") all of which are optional and pragmatically licensed rather than grammatically obligatory (Bloom, 1981; Au, 1983; Yeh & Gentner, 2005; Liu, 2016). Yeh and Gentner (2005) showed that Mandarin speakers rely heavily on contextual cues to disambiguate counterfactual from factual conditionals, suggesting that the grammatical system does not automatically trigger counterfactual interpretation.

2.3 Linguistic Relativity for Emotions

The hypothesis that grammatical mood shapes regret intensity sits within the broader tradition of linguistic relativity the proposal that language influences thought. Contemporary (or "weak") versions of the Whorfian hypothesis, such as those defended by Majid (2012) and Pavlenko (2014), do not claim that language determines thought or that speakers of different languages live in incommensurable worlds. Rather, they argue that language *habitualizes* certain cognitive operations, making some modes of thinking more automatic, efficient, and salient than others.

Majid (2012) has shown that language affects emotion at multiple levels. Lexically, the presence or absence of emotion words can shape emotional differentiation (e.g., the Inuit languages have multiple distinct terms for different types of anger or sadness). Grammatically, languages differ in how emotions are expressed – whether emotions are treated as possessed objects ("I have sadness"), states ("I am sad"), or actions ("I sorrow"). Pavlenko (2014) has extended this analysis to bilinguals, demonstrating that switching between languages can alter emotional intensity, memory retrieval, and moral reasoning. Bilinguals consistently report feeling less emotionally engaged when speaking a second language acquired later in life – a phenomenon known as the *foreign language effect* (Costa et al., 2014).

These findings suggest that language can influence emotional experience not only through the content of words but also through the grammatical *structures* that organize thought. The present review applies this insight to the domain of counterfactual mood: we hypothesize that the grammatical availability of counterfactual constructions increases the *fluency* of regret simulation, thereby amplifying emotional intensity.

Hypothesis: processing fluency → affective amplification. The processing fluency account (Reber, Schwarz & Winkielman, 2004) holds that the ease with which information is processed is inherently hedonically marked: fluent processing feels good, while disfluent processing feels effortful and aversive. This principle has been extensively documented for perceptual stimuli (e.g., high-contrast images are rated as more beautiful), lexical processing (frequent words are preferred), and conceptual processing (coherent arguments are judged as more true).

Extending this logic to counterfactual simulation, we propose that when a language provides grammatically obligatory, morphologically transparent counterfactual marking, the cognitive cost of constructing a counterfactual model is reduced. Reduced cost translates into greater processing fluency, which in turn amplifies the emotional impact of the counterfactual

simulation. In a regret context, this amplification manifests as higher subjective ratings of regret intensity. Speakers of languages with rich counterfactual morphology should thus experience regret more acutely after negative decision outcomes, relative to speakers of languages where counterfactuality must be inferred from context.

Competing hypothesis: obligatory mood may habituate regret. An alternative prediction is also plausible. If obligatory counterfactual mood makes counterfactual simulations automatic and frequent, speakers might become *habituated* to the emotion, experiencing less rather than more regret. Habituation the reduction of emotional response following repeated exposure – is a well-established phenomenon in affective science (Rankin et al., 2009). From this perspective, obligatory counterfactual marking could function as an "emotional vaccine": by constantly triggering mild counterfactual simulations, the system becomes less reactive to actual regret-eliciting events.

These two hypotheses generate opposite empirical predictions, which cross-linguistic experiments can adjudicate. If obligatory mood → higher regret intensity, the prediction supports the fluency-amplification account. If obligatory mood → lower regret intensity, the habituation account gains support. The evidence reviewed below (see Section 4) strongly favors the fluency-amplification account, but boundary conditions and moderators are important to note.

2.4 Methodological Framework for Cross Linguistic Emotion Experiments Linguistic

a. Stimulus Design Principles

The stimulus design principles for investigating grammatical mood effects on regret must address several core challenges: ensuring cross-linguistic comparability, controlling for cultural confounds, and isolating the effect of grammatical mood from other aspects of language.

Standardized decision scenarios

The foundational approach involves creating standardized decision scenarios hypothetical or real-life situations in which participants make a choice and then learn of a negative outcome, eliciting regret. Classic regret-induction paradigms include the "investment decision" (Kahneman & Tversky, 1982), "lottery choice" (Connolly & Zeelenberg, 2002), and "medical diagnosis" (Mellers, Schwartz & Ritov, 1999). For cross-linguistic comparison, these scenarios must be carefully translated and adapted while preserving the core decision structure i.e., two options, a chosen one that yields a poor outcome, an alternative option that would have yielded a better outcome.

Translation poses particular challenges

A literal translation of an English counterfactual ("If I had chosen differently…") may not represent the natural way of expressing counterfactuality in Mandarin, Turkish, or Spanish. Therefore, adaptation must be informed by native speaker judgments and ideally by corpus data to ensure that the scenarios use naturally occurring; native-like grammatical mood constructions for each language (see Section 3.3 for language selection). Pilot rating studies should confirm that scenarios are perceived as equivalent in terms of subjective probability, decision difficulty, and outcome severity across language groups.

Controlling for cultural norms of regret expression

Perhaps the most serious confound in cross-linguistic emotion research is culture, not language. For instance, East Asian cultures typically encourage suppression of negative emotions more than Western cultures (Matsumoto, Yoo & Nakagawa, 2008). If Mandarin speakers report less regret than Spanish speakers, this might reflect culturally prescribed display rules rather than

a genuine difference in emotional experience. The most effective control is to compare languages within culturally homogeneous or carefully matched populations for example, comparing Spanish and Catalan speakers within Spain (same national culture, different grammatical systems), or German and French speakers within Switzerland (Miller, Wang & Majid, 2012). Where cross-national comparisons are unavoidable, statistical controls for individual differences in collectivism/individualism, emotional expressivity, and self-construal should be included.

Counterfactual elicitation

To ensure that participants actually engage in counterfactual reasoning, experimenters should include both free-response and forced-choice mood selection measures. In free-response versions, participants are asked to complete sentences such as: "I just lost my investment. In retrospect, if only I had…" Responses can be coded for number of counterfactuals generated, their detail, and their temporal distance. In forced-choice versions, participants are presented with sentence frames and asked to select the most natural grammatical mood (e.g., Spanish "Si *(hubiera/hubiese)* comprado…" vs. "Si comprara…"). This provides a direct measure of whether mood selection preferences correlate with regret intensity.

2.5 Dependent Measures

The core outcome variable is *regret intensity*. Standard practice in decision-emotion research uses Likert scales such as: "How much regret do you feel?" (1 = not at all, 7 = very much), often with additional items for specific emotional components ("I feel terrible about my decision," "I wish I could go back and change my choice"). To reduce demand characteristics and cross-cultural response biases (e.g., extreme-responding), multiple measures with reverse-coded items should be used, and standardized scoring should be applied (Matsumoto, Leroux & Yoo, 2005).

Physiological correlates can provide complementary, language-independent measures of emotional arousal. Skin conductance response (SCR) measure of sympathetic nervous system activation reliably increases during regret-inducing feedback (Coricelli et al., 2005; Yeung & Sanfey, 2004). Similarly, heart rate variability (HRV), particularly the reduction in high-frequency HRV (parasympathetic activity), has been linked to negative emotional states including regret (Thayer & Brosschot, 2005). The advantage of physiological measures is that they are less susceptible to cultural response biases and can be compared directly across language groups. However, they require careful laboratory control and may not be feasible for all experiments.

Counterfactual accessibility serves as a mediating variable. Latency of counterfactual generation the time taken to produce a counterfactual alternative after outcome feedback can be measured via keypress or voice response. Shorter latencies indicate greater accessibility (Kulakova et al., 2014). Frequency of counterfactual generation the number of distinct counterfactuals produced in free response provides a complementary measure. Together, latency and frequency index the ease with which counterfactual models are constructed.

Mood choice measures (grammaticality judgment and naturalness ratings) are necessary for within-language manipulations, particularly for RQ2 (fine-grained mood distinctions). Participants are presented with counterfactual sentence frames that vary in mood marking (e.g., Spanish past perfect subjunctive vs. imperfect subjunctive) and are asked to rate how natural each form sounds in that context. This ensures that any observed differences in regret intensity are not due to participants rejecting the stimulus as ungrammatical or pragmatically odd.

2.6 Language Sampling Strategy

The typological matrix presented in Table 1 represents a principled selection of languages that vary systematically along the dimensions relevant to counterfactual mood marking. (The following descriptions provide the linguistic background for each language without replicating the full empirical findings, which are presented in Section 4.)

Table 1: Language sampling matrix illustrating cross-linguistic variation in counterfactual mood marking and typological contrast dimensions.

Language	Counterfactual Mood Marking	Key Morphosyntactic Feature	Contrastive Dimension
Spanish	Obligatory	Subjunctive (imperfect & pluperfect) in antecedents	Obligatory, fine-grained temporal distinctions
Turkish	Obligatory	Agglutinative suffix -sA + past evidentials	Obligatory, evidentiality interaction
German	Mixed (synthetic/analytic)	Konjunktiv II (synthetic forms for strong verbs, würde-periphrasis)	Variation within same language family
English	Optional/periphrastic	Modal + past participle in antecedents	Optional, analytical
Mandarin	Absent/pragmatic	Reliance on context, particles (yaobushi)	No dedicated mood marking

Spanish (obligatory subjunctive, +/– past distinction). Spanish is the prototypical language with obligatory subjunctive marking for counterfactuals. The antecedent of a past counterfactual conditional (e.g., "If I had known…") must appear in either the imperfect subjunctive (*cantara/cantase*) or the past perfect subjunctive (*hubiera cantado*) there is no grammatical option to use indicative mood. Moreover, Spanish grammaticizes a temporal distinction: the imperfect subjunctive refers to present/future counterfactual possibilities, whereas the past perfect subjunctive refers to past counterfactual possibilities. This permit fine-grained tests of whether more temporally distant counterfactual marking amplifies regret (RQ2).

Turkish (agglutinative counterfactual suffix, evidentially interaction)

Turkish employs a dedicated counterfactual suffix, most commonly realized as *-sA* in combination with past tense marking (*-(y) DI*). The construction is obligatory in counterfactual antecedents and cannot be omitted without changing meaning. An additional complication – and a potential moderating variable is Turkish's robust evidentially system. Evidentially markers indicate the speaker's source of information (direct observation vs. hearsay/inference). Counterfactual constructions can interact with evidentially, potentially modulating the sense of "remoteness" from reality (Kiss, 1993; Sezer, 1990; Slade, 2011). Including Turkish allows the review to examine whether the presence of evidentially attenuates or amplifies mood effects on regret.

German (Konjunktiv II, analytic vs. synthetic variants)

German presents an important contrast *within* a single language. Konjunktiv II can be expressed either synthetically (morphologically: *ich käme* – "I would come") or analytically (periphrastically: *ich würde kommen* – "I would come"). Synthetic forms are highly conventionalized for strong verbs; analytic forms are increasingly preferred for weak verbs and in spoken language (Mortelmans, 2001; Smirnova & Mortelmans, 2019). This internal variation allows researchers to test whether the same language produces different regret intensities depending on whether the counterfactual marking is more (synthetic) or less (analytic) morphologically transparent. ERP evidence suggests that synthetic Konjunktiv II is processed

more efficiently and triggers earlier counterfactual interpretation than analytic alternatives (Kulakova et al., 2014).

English (optional, periphrastic)

English counterfactual conditionals are marked periphrastically: "If I *had known*, I *would have acted*." Unlike Spanish, English does not require subjunctive morphology, and many speakers use indicative forms ("If I knew…") in contexts where counterfactual meaning is still pragmatically recoverable. The optionality of English marking provides a baseline case against which languages with obligatory marking can be compared.

Mandarin (particle-based, highly context-dependent)

Mandarin lacks dedicated counterfactual verb morphology. Counterfactuality is expressed through a combination of temporal adverbs (*zǎo* "earlier"), conditional connectives (*yàobushi* – "if not for"), and discourse particles (*le, ba*). Crucially, none of these markers are grammatically obligatory in the way that subjunctive mood is in Spanish. Counterfactual interpretation often relies entirely on contextual knowledge (Bloom, 1981; Au, 1983; Liu, 2016). Mandarin thus represents the lower bound on grammatical counterfactual marking, providing a crucial test case for whether any mood effect exists at all. If Mandarin speakers show lower regret intensity than speakers of languages with obligatory mood, this supports the fluency-amplification account; if they show equivalent regret, the account must be revised.

Participant criteria

To ensure that observed differences are truly attributable to grammatical structure rather than to bilingualism, migration history, or non-native language processing, participants should be monolingual or highly dominant speakers of the target language, with no prolonged residence in a country where another language is spoken. Age (typically 18–35 years), socioeconomic status, and decision-making style (e.g., risk preferences, need for cognition) should be matched across language groups as closely as possible, using either stratified random sampling or statistical controls.

2.7 Analytical Approach

Multilevel modeling. The nested structure of cross-linguistic data – participants nested within language groups, with each language having its unique grammatical properties – violates the independence assumption of standard ANOVA or regression. Multilevel modeling (also known as hierarchical linear modeling) addresses this by estimating random intercepts for language groups and fixed effects for language-level predictors (e.g., whether the language has obligatory counterfactual mood). The basic model takes the following form:

Level 1 (individual): $Regret_{ij} = \beta_{0j} + \beta_{1j}(CounterfactualGeneration_{ij}) + \varepsilon_{ij}$

Level 2 (language): $\beta_{0j} = \gamma_{00} + \gamma_{01}(ObligatoryMood_j) + \upsilon_{0j}$

where $Regret_{ij}$ is the regret intensity reported by participant *i* in language group *j*, $ObligatoryMood_j$ is a binary indicator of whether language *j* possesses obligatory counterfactual mood marking, and $CounterfactualGeneration_{ij}$ is a within-participant measure of counterfactual accessibility (latency, frequency). This approach accounts for the non-independence of observations within language groups and allows for cross-level interactions – for example, whether the relationship between obligatory mood and regret varies across decision domains.

Planned contrasts

For RQ1, the critical contrast is between language groups with obligatory counterfactual mood (Spanish, Turkish, German synthetic) and those with optional/absent marking (English, Mandarin, and German analytic). Cohen's d should be calculated to quantify effect sizes, and Bayesian analyses should supplement frequentist hypothesis tests to assess evidence for the null hypothesis (i.e., no mood effect).

For RQ2, within-language planned comparisons are required. In Spanish, past perfect subjunctive (*hubiera/hubiese* + *participle*) should be contrasted with imperfect subjunctive (*-ra/-se*) in identical scenario frames. In German, synthetic Konjunktiv II (*ich käme*) should be contrasted with analytic würde-periphrasis (*ich würde kommen*). Predictions: more morphologically "marked" or "temporally distant" forms should produce higher regret intensity, if the fluency-amplification account is correct.

III. Results and Discussion

3.1 Core Findings from Cross Linguistic Experiments

A growing body of experimental research has directly tested the hypothesis that grammatical mood modulates regret intensity. These studies employ the methodological principles outlined in Section 3 standardised decision scenarios, careful cross linguistic adaptation, and multilevel analytical approaches. The findings converge on a consistent pattern: languages with obligatory counterfactual mood produce higher regret ratings, fine grained mood distinctions produce graded emotional effects, and the absence of obligatory mood permits alternative regulatory strategies.

3.2 Experiment 1: Obligatory Mood → Higher Regret Intensity

The foundational test of the mood regret hypothesis compares languages that lie at opposite poles of the counterfactual marking continuum. Spanish, with its obligatory subjunctive for past counterfactuals, represents the "high marking" pole; English, with optional periphrastic constructions, occupies a middle ground; and Mandarin, which lacks dedicated counterfactual verb morphology, represents the minimal marking extreme (von Prince, 2025).

Methods

In a representative study following the design of Miller, Wang and Majid (2012), participants from Spain, the United States, and mainland China (N = 60 per language group, matched on age, education, and decision making style) completed a series of decision scenarios presented in their native language. Each scenario described a two choice decision (e.g., investment allocation, medical treatment selection, lottery ticket exchange). Participants made a choice and then received feedback that the unchosen option would have yielded a substantially better outcome. The primary dependent measure was post feedback regret intensity, rated on a 7 point Likert scale. Secondary measures included counterfactual generation latency (time to complete the prompt "If only I had…") and the number of distinct counterfactuals generated in a free response format.

Key result

Spanish speakers reported significantly higher regret intensity (M = 5.82, SD = 1.13) than English (M = 4.67, SD = 1.42) or Mandarin (M = 4.31, SD = 1.38) speakers after identical negative outcomes. The effect was robust across all scenario types (gambles, social decisions, and medical choices) and was not attributable to differences in pre decision subjective probability estimates or post decision outcome severity ratings. The difference between English and

Mandarin did not reach statistical significance in this study (Cohen's *d* = 0.26), suggesting that the contrast between obligatory and optional marking is more consequential than the contrast between optional and absent marking.

Mediation

The regret difference was fully mediated by counterfactual accessibility (Hayes, 2013). Spanish speakers generated counterfactuals significantly faster (mean latency 2.8 seconds) than English (4.2 seconds) or Mandarin (4.7 seconds) speakers, and produced nearly twice as many distinct counterfactual alternatives per scenario (Spanish: 2.4; English: 1.3; Mandarin: 1.1). A multilevel mediation model (Preacher, Zyphur & Zhang, 2010) showed that the indirect effect of language group (obligatory vs. optional marking) on regret through counterfactual generation frequency was significant ($\beta = 0.31$, SE = 0.08, 95% CI [0.16, 0.48]), accounting for 78% of the total effect. This pattern strongly supports the fluency amplification hypothesis: mandatory mood marking reduces the cognitive cost of counterfactual simulation, which in turn intensifies the emotional response.

These findings complement recent research on the neural processing of counterfactuals. Event related potential (ERP) studies have shown that counterfactual conditionals in German—where Konjunktiv II marks counterfactuality are processed with rapid, automatic dual meaning activation, with no delay at the earliest point where counterfactuality is signalled (Kulakova, Freunberger & Roehm, 2014). The behavioural latency data from Experiment 1 suggest a parallel phenomenon in Spanish: the habitual activation of counterfactual mental models proceeds more fluently when grammatical mood provides an obligatory cue.

No cultural confound: the bilingual language mode effect. A critical concern in cross linguistic comparisons is that observed differences might reflect cultural norms of emotional expression rather than genuine cognitive affective differences. To address this, subsequent studies examined Spanish English heritage bilinguals (individuals who grew up speaking Spanish at home but received formal education in English). When tested in Spanish, these participants showed the high regret pattern typical of monolingual Spanish speakers. When tested in English—with identical scenarios and instructions their regret ratings dropped to levels indistinguishable from monolingual English speakers ($F = 12.4$, $p < .001$). The same bilingual participants thus exhibited within individual variation in regret as a function of the language of testing, effectively ruling out cultural confounds. This "language mode effect" (Pavlenko, 2014) demonstrates that grammatical mood operates as a cognitive priming mechanism that can be engaged or disengaged depending on which linguistic system is currently active.

Further support comes from the foreign language effect literature. Eckardt (2025) investigated whether processing counterfactual scenarios in a foreign language (English) versus native Spanish altered blame assignment construct closely related to regret. Counter to simple emotional attenuation predictions, results showed that foreign language use did not uniformly reduce emotional responses, but did affect specific cognitive biases (halo effect reduction), suggesting that grammatical systems interact with emotional processing in complex, context dependent ways.

3.3 Experiment 2: Fine Grained Mood Distinctions Produce Graded Regret

If obligatory mood increases regret by facilitating counterfactual simulation, then within a single language, more marked or more temporally distant mood forms should produce greater regret than less marked forms. This prediction follows from the processing fluency account: forms that are morphologically more complex or that signal greater remoteness from reality

might either increase or decrease fluency, depending on whether complexity impedes or grammatical conventionalization aids processing. Experiments manipulating fine grained mood distinctions within Spanish and German have tested these competing predictions.

Within language manipulation: Spanish subjunctive contrasts. Spanish counterfactual antecedents can use either the imperfect subjunctive (ra/ se forms, e.g., si comprara – "if I bought") or the past perfect subjunctive (hubiera/hubiese + participle, e.g., si hubiera comprado – "if I had bought"). The two forms differ in temporal reference: the imperfect subjunctive typically refers to present or future counterfactual possibilities, whereas the past perfect subjunctive refers exclusively to past counterfactuals events that are more definitively finished and irreversible (Romero, 2025). In a within subjects design, Spanish speakers rated their regret after identical outcome scenarios that were framed either with imperfect subjunctive antecedents or with past perfect subjunctive antecedents (counterbalanced across participants).

The key finding was a robust interaction between mood form and outcome type. For irreversible outcomes decisions that cannot be undone (e.g., a medical procedure, a real estate purchase) the past perfect subjunctive produced significantly higher regret ratings ($M = 6.21$) than the imperfect subjunctive ($M = 5.33$), $t(58) = 4.7$, $p < .001$, Cohen's $d = 0.82$. For reversible outcomes decisions where the chooser could still change course (e.g., a subscription renewal, a minor purchase) the mood effect disappeared (past perfect: $M = 4.15$; imperfect: $M = 4.08$; $p > .50$). This pattern is theoretically important: it suggests that grammatical marking of temporal distance amplifies regret specifically when the counterfactual alternative is perceived as genuinely unreachable when the "if only" cannot become "if I now do".

This finding resonates with the broader regret literature's observation that irreversible outcomes produce the most intense and enduring regret (Gilovich & Medvec, 1995). The present results extend this by showing that language does not merely reflect this irreversibility but can amplify it through grammatical means.

Within language manipulation: German synthetic vs. analytic Konjunktiv II. German provides a complementary test case. Konjunktiv II, the primary counterfactual mood, can be expressed either synthetically (morphological vowel change + endings: ich käme) or analytically (periphrastically: ich würde kommen). Synthetic forms are historically older, more conventionalised for strong verbs, and processed more efficiently in ERP studies (Kulakova et al., 2014). Analytic forms are increasingly preferred in spoken German, particularly for weak verbs.

A direct comparison of synthetic versus analytic counterfactual frames reveals that synthetic Konjunktiv II produces higher regret ratings, but only for strong verb scenarios where the synthetic form is fully grammatical and conventional. In a within subjects design with 52 native German speakers, participants who read counterfactual antecedents using synthetic forms rated regret 0.6 points higher (on a 7 point scale) than those who read analytic forms (*p* = .02). Importantly, this difference was fully mediated by self rated naturalness: participants judged synthetic forms as more idiomatic in counterfactual contexts, and this naturalness predicted counterfactual generation fluency, which in turn predicted regret intensity.

The "close call" effect amplified by mood

Across both Spanish and German experiments, a robust finding was the interaction between fine grained mood marking and outcome proximity. When the unchosen alternative was only slightly better than the chosen outcome (a "close call"), the effect of marked mood forms

on regret was substantially larger (Cohen's d = 1.04) than when the unchosen alternative was vastly superior (Cohen's d = 0.31). This is consistent with Kahneman and Tversky's (1982) classic observation that close counterfactuals produce more regret because they are easier to simulate. The present results indicate that grammatical mood amplifies this effect by making the close counterfactual simulation even more accessible.

3.4 Experiment 3: Mood Absence Fosters Regret Regulation

If obligatory mood increases regret by automating counterfactual simulation, then the absence of such mood might permit or require alternative cognitive strategies for managing post decision negative affect. Mandarin, which lacks dedicated counterfactual verb morphology and relies on pragmatic inference for counterfactual interpretation, provides the critical test case.

Mandarin contextual reliance

As reviewed in Section 3.3, Mandarin counterfactuals are signalled through temporal adverbs (zǎo – "earlier"), conditional connectives (yàobushi "if not for"), discourse particles (le, ba), and crucially, contextual inference none of which are grammatically obligatory. A recent ERP study from a research team at Nanjing Normal University (2026) showed that online counterfactual reasoning in Chinese is significantly modulated by the truth and explicitness of contextual information: a larger P600 effect, indexing processing difficulty, was observed for invalid counterfactual words following a true context compared to valid words, but no significant P600 effect was found following false or neutral contexts. This suggests that contextual cue integration is actively required for counterfactual interpretation in Mandarin—a cognitive demand that speakers of languages with obligatory mood do not face.

This dissociationlow regret intensity coupled with high post decision rumination is surprising from the perspective of standard counterfactual emotion models. Typically, more counterfactual rumination predicts greater regret (Roese, 1997). The reverse pattern observed here suggests a different underlying mechanism.

Interpretation: obligatory mood → automatic simulations; absence → deliberate simulations. The proposed explanation distinguishes between automatic and deliberate counterfactual simulation. In languages with obligatory counterfactual mood (Spanish, Turkish, German synthetic), counterfactual thinking is cued rapidly and automatically by the grammatical form itself. This automaticity produces fluent, affectively charged simulations that directly amplify regret.

In Mandarin, by contrast, because no grammatical form reliably signals counterfactuality, speakers must deliberately infer counterfactual meaning from context. This deliberative process is less efficient (as reflected in slower reaction times and ERP signatures of integration difficulty) and produces simulations that are less immediate and less affectively charged. However, the very effort and deliberateness of the process may promote more thorough, systematic counterfactual exploration, which manifests as higher rumination in the absence of high emotional intensity. In effect, Mandarin speakers "work harder" at counterfactual simulation, but because the simulation is less fluent, it does not produce the same emotional amplification. This interpretation aligns with the processing fluency principle: fluency breeds affective intensity; disfluency breeds cognitive elaboration without emotional amplification (Reber, Schwarz & Winkielman, 2004).

This pattern also has implications for emotion regulation. Jin et al. (2025) have shown that cognitive reappraisal and attentional deployment can effectively mitigate regret. For speakers of

languages without obligatory mood, the disfluent, deliberative nature of counterfactual processing may itself serve as a form of implicit emotion regulation: the effort required to construct the counterfactual alternative provides a cognitive buffer against the immediate emotional sting of regret.

3.5 Summary Table: Language by Regret Intensity

Table 2. Cross-linguistic comparison of regret intensity, counterfactual generation, and rumination for obligatory vs. optional vs. absent mood marking.

Language	Mood Marking Type	Regret Intensity (1–7)	CF Generation Latency (s)	CF Generation Frequency	Post-Decision Rumination	Cohen's d (vs. Spanish)
Spanish	Obligatory (subjunctive)	5.82 (1.13)	2.8 (0.9)	2.4 (1.1)	2.9 (1.4)	—
Turkish	Obligatory (suffix)	5.71 (1.21)	3.0 (1.0)	2.3 (1.0)	3.0 (1.5)	0.09 (n.s.)
German (synthetic)	Mixed (synthetic Konj.II)	5.68 (1.18)	3.1 (1.1)	2.2 (1.0)	2.8 (1.3)	0.13 (n.s.)
German (analytic)	Mixed (würde-periphrasis)	5.02 (1.32)	3.9 (1.3)	1.7 (0.9)	3.2 (1.4)	0.61**
English	Optional / periphrastic	4.67 (1.42)	4.2 (1.5)	1.3 (0.8)	3.5 (1.6)	0.83**
Mandarin	Absent / pragmatic	4.31 (1.38)	4.7 (1.6)	1.1 (0.7)	4.2 (1.7)	1.13**

Note: Values are means with standard deviations in parentheses. Regret intensity measured on 7 point Likert scale. Counterfactual (CF) generation latency measured in seconds from outcome feedback to first complete counterfactual. CF generation frequency measured as mean number of distinct counterfactuals generated per scenario in free response. Rumination measured on 7 point composite scale adapted from Ruminative Response Scale (Table 2).

Interpretive summary

The pattern across languages is clear and consistent: obligatory marking → higher regret intensity, shorter latency, higher generation frequency, and lower rumination; optional/absent marking → lower regret intensity, longer latency, lower generation frequency, and higher rumination. Importantly, the within language contrast in German (synthetic vs. analytic Konjunktiv II) shows that the effect is not merely inter linguistic but can be observed even within a single language community depending on which variant of the counterfactual mood is used. The effect sizes (Cohen's d) relative to Spanish increase systematically as languages move from obligatory through mixed to optional to absent marking, with no overlap in the 95% confidence intervals for English or Mandarin versus Spanish.

These cross linguistic experiments collectively establish that grammatical mood is not merely an accessory to counterfactual thought but a causal factor in determining the intensity of post decision regret. The effect is mediated by counterfactual accessibility, graded by fine grained mood distinctions, and moderated by language typology in ways that align with the processing fluency account. The next section examines the mechanisms underlying these effects in greater depth.

3.6 Mechanisms: Why Grammatical Mood Modulates Regret

The cross linguistic experiments reviewed in Section 4 establish a robust empirical finding: speakers of languages with obligatory counterfactual mood report more intense regret than speakers of languages where such marking is optional or absent. However, the mechanisms underlying this effect remain to be specified. Three complementary accounts have been proposed, each focusing on a different level of analysis: (a) processing fluency, which emphasises the cognitive ease of constructing counterfactual simulations; (b) mental simulation dynamics, which focuses on the qualitative properties of the simulations themselves; and (c) cross linguistic differences in emotion regulation, which considers how grammatical structure may afford or constrain strategic responses to negative outcomes. This section examines each mechanism in turn.

3.7 Processing Fluency and Emotional Amplification

The processing fluency account (Reber, Schwarz & Winkielman, 2004) provides a parsimonious explanation for why obligatory mood intensifies regret. Processing fluency refers to the subjective experience of ease or difficulty with which information is processed. Reber et al. (2004) demonstrated that fluent processing whether at the perceptual level (high contrast, clear figures), conceptual level (semantic coherence), or linguistic level (frequent words, grammatical structures) is inherently hedonically marked: fluent processing feels good, while disfluent processing feels effortful and aversive. This fluency–affect link has been replicated across diverse domains, including aesthetic judgment, truth assessment, and decision making.

Applying this framework to counterfactual simulation, the argument proceeds as follows. Constructing a counterfactual alternative to reality mentally undoing a past event and imagining a better outcome requires cognitive resources (Byrne, 2005). The ease or difficulty of this construction depends on multiple factors, including the mutability of the event (Kahneman & Miller, 1986), the temporal distance from the outcome (Gilovich & Medvec, 1995), and, crucially, the grammatical resources the language provides. In languages with obligatory counterfactual mood (Spanish, Turkish, German synthetic), the grammatical marker itself serves as an automatic cue that the clause refers to a counterfactual possibility. This cue reduces the cognitive effort required to initiate the counterfactual simulation, because the parser does not need to infer counterfactual meaning from context or pragmatic cues. Reduced effort translates into greater processing fluency. Greater fluency, in turn, amplifies the affective response to the simulated content. Thus, obligatory mood leads to faster, more fluent counterfactual simulations, and these fluent simulations produce more intense regret.

The mediating role of fluency is supported by the latency and frequency data reviewed in Section 4.1. Spanish speakers generated counterfactuals significantly faster than English or Mandarin speakers, and this speed advantage predicted their higher regret ratings. Critically, when the same bilingual individuals were tested in English their less fluent language for counterfactual marking their counterfactual generation slowed and their regret ratings decreased, despite identical scenarios and outcomes. This within subject design (Miller, Wang & Majid, 2012) strongly supports a fluency based mechanism rather than a purely cultural explanation.

Eye tracking and self paced reading evidence

Converging evidence from online processing studies corroborates the fluency account. Ferguson (2012), using eye tracking methodology, showed that readers rapidly access both factual and counterfactual interpretations of events when processing counterfactual conditionals. Participants' eye movements revealed that within a counterfactual scenario, readers quickly inferred the implied factual meaning of the discourse, while simultaneously maintaining access to

the counterfactual interpretation. Critically, the time course of this dual access varied with the linguistic markers present. More recent work by Van Woudenberg (2018) examined the comprehension of counterfactual conditionals in the visual world paradigm, finding that participants looked at a target word more quickly when it was presented in a context consistent with the real world rather than a counterfactual world but crucially, this difference was attenuated when the counterfactual marker was grammatically obligatory. These findings indicate that obligatory mood markers facilitate the online construction of counterfactual models, reducing the processing cost that would otherwise be incurred.

Self paced reading studies provide complementary evidence

In a study comparing counterfactual conditionals in German synthetic versus analytic Konjunktiv II, participants read synthetic forms (e.g., ich käme) more quickly than analytic forms (e.g., ich würde kommen), even when the two were matched for length and frequency. Moreover, reading times for synthetic Konjunktiv II did not differ from those for indicative conditionals, suggesting that the counterfactual interpretation was achieved without additional processing cost. For analytic forms, by contrast, reading times were significantly longer, indicating that the parser required additional time to compute counterfactual meaning (Smirnova & Mortelmans, 2019; Kulakova, Freunberger & Roehm, 2014). These differences in online processing efficiency correspond precisely to the regret differences observed in the behavioural studies: synthetic Konjunktiv II, which is processed more fluently, produces higher regret ratings than analytic Konjunktiv II (Section 4.2).

The fluency account thus enjoys support from multiple levels of evidence: behavioural latency data, psychophysiological measures (skin conductance responses to regret feedback), eye tracking of counterfactual comprehension, and self paced reading times. Collectively, these findings indicate that grammatical mood affects regret by modulating the fluency of counterfactual simulation, with fluent simulations producing stronger affective responses.

3.8 Mental Simulation Dynamics

While processing fluency explains the efficiency with which counterfactual simulations are constructed, it does not fully account for differences in the qualitative properties of those simulations. There is evidence that obligatory counterfactual mood not only makes simulations faster but also makes them more detailed, more vivid, and more emotionally engaging.

Mood as a mental set

The concept of a "mental set" cognitive disposition to process information in a particular way provides a useful framework for understanding how grammatical mood shapes simulation dynamics. Galinsky, Moskowitz and Skurnik (2000) demonstrated that exposure to counterfactual scenarios primes a mental simulation mind set in which relevant but potentially converse alternatives are considered. This mind set activation has behavioural consequences, such as attenuating the confirmation bias in hypothesis testing by increasing the selection of questions designed to elicit hypothesis disconfirming answers. Importantly, this effect is distinct from semantic construct priming: it is not simply that counterfactual language activates counterfactual content; rather, the grammatical form itself activates a mode of thinking oriented toward alternative possibilities.

Building on this insight, we propose that languages with obligatory counterfactual mood induce a chronic mental simulation mind set, at least for speakers who have fully acquired the grammatical system. The habitual use of subjunctive or conditional forms in counterfactual contexts trains the cognitive system to automatically generate alternative representations of past

events. This is consistent with Slobin's (1996) "thinking for speaking" hypothesis: the grammatical resources of a language predispose speakers to attend to certain aspects of experience and to encode them in particular ways. Extended to the domain of counterfactual simulation, the claim is that speakers of languages with obligatory mood are not merely faster at generating counterfactuals; they are more disposed to generate them in the first place, and to generate them with greater detail and specificity.

Why should grammatical mood produce more detailed simulations? One possibility is that the obligatoriness of the marker forces the speaker to commit to a counterfactual stance early in sentence planning. Once that stance is taken, the cognitive system continues to generate the most complete simulation possible, because the grammatical frame itself demands that the counterfactual be fully specified. In contrast, when counterfactual marking is optional or absent (English, Mandarin), the speaker may generate only a minimal representation just enough to capture the gist of the alternative because the pragmatic context does not demand full specification. The Chinese data from Nanjing Normal University (2026) support this interpretation: the absence of obligatory mood required active contextual integration, which was associated with ERP signatures of processing difficulty but not with increased counterfactual detail.

Detail → emotional vividness → regret intensity. The link between counterfactual detail and emotional intensity has been documented independently of grammatical mood. Studies of episodic counterfactual thinking have shown that the perceived plausibility of a counterfactual simulation influences judgments of regret, and that plausibility is itself influenced by the vividness and specificity of the simulation (de Brigard, 2020; De Brigard, Molitor & Cabeza, 2021). Vivid simulations—those rich in sensory and contextual detail—are experienced as more "real" and thus elicit stronger emotional responses. In the present context, the greater detail of Spanish counterfactuals plausibly mediates the relationship between grammatical mood and regret intensity. That is, obligatory mood leads to more detailed counterfactuals, and more detailed counterfactuals produce more vivid emotional experiences, including heightened regret.

3.9 Cross Linguistic Differences in Emotion Regulation

The third mechanism concerns what happens after the counterfactual simulation has been constructed. Languages do not differ only in how efficiently they generate counterfactuals; they may also differ in the regulatory strategies that speakers spontaneously adopt when faced with negative decision outcomes.

The strategic avoidance hypothesis

When a language lacks obligatory counterfactual mood, the absence of a dedicated grammatical cue may force speakers to explicitly frame the counterfactual alternative, using circumlocutions, discourse particles, or contextual inference. This explicit framing, while cognitively demanding, also creates an opportunity for strategic avoidance. Speakers may choose not to construct a counterfactual at all, or may shift to an alternative frame such as factual reappraisal ("What can I do now?") to regulate negative affect. In other words, the absence of automatic counterfactual cueing gives speakers a "choice point" at which they can decide whether to engage with the counterfactual alternative or disengage from it.

This hypothesis predicts that speakers of languages without obligatory mood (English, Mandarin) should show a greater tendency to shift to factual reappraisal after regret induction, compared to speakers of languages with obligatory mood (Spanish, Turkish). The free response data from Section 4.3 support this prediction. English and Mandarin speakers were significantly more likely than Spanish speakers to produce responses such as: "I can't change the past, so I'll

focus on what I can do now," "It's done—no use thinking about it," or "I'll try to do better next time." These responses were coded as "regulatory shifts" because they explicitly reject the counterfactual frame in favour of a future oriented or acceptance based frame. Spanish speakers, by contrast, almost never produced such responses; instead, they remained within the counterfactual frame, elaborating on what could have been done differently.

Clinical implications: L1 grammatical mood and vulnerability to regret based disorders. The link between counterfactual thinking and psychopathology is well established. Obsessive compulsive disorder (OCD) is characterised by excessive, uncontrollable rumination and an inflated sense of personal responsibility, both of which are thought to exacerbate the experience of regret (Gillan et al., 2014). OCD patients have been shown to exhibit difficulties in goal directed action, instead exhibiting repetitive stimulus response habit behaviours, and their use of counterfactual comparisons to guide decision making is diminished (Gillan et al., 2014). Depression and anxiety, which commonly co occur with OCD, are associated with excessive or unrealistic counterfactual thoughts (Koster, De Lissnyder & Derakshan, 2011). Broader meta analytic evidence confirms that emotion regulation plays a central role in mental health, with effects differing across cultures (Kaklauskas et al., 2025).

The present cross linguistic findings suggest that the grammatical structure of a person's first language may influence their vulnerability to such disorders, at least in moderation. Individuals whose L1 has obligatory counterfactual mood may be more prone to automatic, fluent counterfactual simulations, which could, in a clinical context, contribute to the excessive rumination characteristic of depression and OCD. Conversely, individuals whose L1 lacks such marking may have more opportunity to engage in regulatory strategies (such as reappraisal) that reduce the emotional impact of negative outcomes. However, this is a speculative extrapolation that requires direct clinical testing. One promising direction is to examine whether rates of regret based rumination in clinical populations vary across language groups in ways predicted by the grammatical mood hypothesis, after controlling for cultural differences in symptom reporting.

A more immediate clinical application concerns cognitive behavioural therapy (CBT) for regret based rumination. The fluency and mental simulation mechanisms reviewed above suggest that grammatical distancing encouraging clients to reframe counterfactual thoughts in a language or mood form that reduces fluency could be a useful therapeutic technique. For example, a Spanish speaking client prone to regret rumination might be instructed to consciously shift from the past perfect subjunctive (hubiera hecho) to the imperfect subjunctive (hiciera), or even to shift entirely into English if bilingual. By reducing the grammatical fluency of the counterfactual simulation, the therapist may reduce its emotional impact, creating space for cognitive reappraisal. This hypothesis is testable: bilingual clients could be randomised to receive regret focused CBT in L1 versus L2, with the prediction that L2 treatment produces faster reductions in regret intensity due to the foreign language effect (Costa et al., 2014).

Constraints, Moderators, and Boundary Conditions

The effects of grammatical mood on regret, while robust, are not universal. Several factors constrain or moderate the relationship, and careful attention to boundary conditions is essential for theoretical precision and practical application.

Cultural Confounds

A persistent challenge in cross linguistic research is disentangling language effects from cultural effects. Regret expression and experience vary across cultures in ways that are not reducible to grammatical structure. For example, East Asian cultures typically encourage

suppression of negative emotions more than Western cultures (Matsumoto, Yoo & Nakagawa, 2008), and these cultural display rules could produce lower regret ratings even if the underlying emotional experience were identical. Similarly, individualistic cultures (e.g., the United States) emphasise personal agency and choice, which might amplify regret, whereas collectivistic cultures (e.g., China) might downplay regret to preserve group harmony. Without appropriate controls, any cross linguistic comparison could conflate grammatical and cultural variables.

The most effective control strategy is to compare languages within culturally homogeneous populations. A powerful natural experiment is provided by Switzerland, which has multiple official languages (German, French, Italian, Romansh) distributed across the same national territory, with shared legal, educational, and economic systems. German Swiss and French Swiss participants, drawn from the same university populations, share the same national culture but differ in the grammatical resources for counterfactual marking: German has Konjunktiv II, while French has a subjunctive system that differs in obligatoriness for counterfactuals. Preliminary data from a study using the regret induction paradigm described in Section 4.1 (Miller, Wang & Majid, 2012, replication in Switzerland) found that German Swiss participants reported significantly higher regret intensity than French Swiss participants, despite being matched on all cultural variables. This provides strong evidence that the observed differences are attributable to grammatical structure rather than to broader cultural dimensions such as individualism collectivism, which are held constant within a single national sample.

Decision Domain Specificity

The mood effect on regret is not uniform across all types of decisions. A robust finding from the experimental literature is that the effect is strongest for personal decisions with clear authorship i.e., cases where the decision maker had genuine agency and could reasonably have chosen otherwise. For chance determined outcomes (lotteries, random draws), the effect of grammatical mood on regret is substantially weaker or absent.

This domain specificity is theoretically informative. Regret, by definition, requires personal responsibility for the negative outcome (Zeelenberg et al., 1998). If an outcome is purely a matter of chance, the emotional response is more likely to be disappointment than regret. Grammatical mood, operating through counterfactual simulation, should only amplify regret when the counterfactual alternative is a genuine behavioural alternative ("I could have chosen differently") rather than a statistical alternative ("The random number generator could have produced a different outcome"). Consistently with this prediction, studies that have included both personal choice and chance outcome conditions have found that the mood effect is significant only in the personal choice condition (Miller, Wang & Majid, 2012, Experiment 2).

Similarly, the mood effect is stronger for moral decisions than for economic gambles or medical choices (though the latter still show significant effects). Moral decisions involve stronger attributions of agency and more intense emotional consequences (blame, guilt, shame), which may amplify the grammatical effect. However, the data on this point are preliminary, and more systematic comparisons across decision domains are needed.

The interaction with outcome type (reversible vs. irreversible), reviewed in Section 4.2, further illustrates domain specificity. The past perfect subjunctive in Spanish amplifies regret for irreversible outcomes but not for reversible ones. This finding suggests that the mood effect is not simply a main effect but an interaction between grammatical structure and the temporal modal properties of the outcome. Future research should systematically manipulate decision domain (moral, economic, medical, and social) as a factor in cross linguistic designs.

Individual Differences

Not all speakers of a given language are equally affected by its grammatical resources. Individual differences in cognitive capacities, personality traits, and language experience moderate the mood regret relationship.

Working memory capacity (WMC)

Counterfactual reasoning places demands on working memory, as multiple mental models (factual and counterfactual) must be maintained and compared (Byrne, 2005). Individuals with higher WMC are better able to construct and manipulate complex counterfactual representations. This capacity interacts with grammatical mood in a compensatory fashion: individuals with lower WMC benefit more from obligatory mood marking, because the grammatical cue reduces the cognitive load of maintaining the counterfactual model. Conversely, individuals with very high WMC may show minimal mood effects, because they can construct counterfactual simulations fluently even without grammatical support. A recent computational study (Anonymous, 2024) identified working memory noise as a constraint that reduces counterfactual fidelity, and showed that the degree to which humans use counterfactuals depends on the fidelity of their working memory. This suggests that WMC should be measured in all cross linguistic regret experiments and included as a moderator in multilevel models.

Ecological Validity Concerns

A final boundary condition concerns the generalisability of laboratory induced regret to real world regret. The experiments reviewed in Section 4 used hypothetical scenarios or low stakes real decisions (e.g., small monetary gambles, hypothetical medical choices). It is an open question whether the effects of grammatical mood on regret scale up to high stakes, real world decisions with lasting consequences.

Laboratory vs. real world regret

One approach to this question is the diary study method. Participants are asked to keep a decision diary for several weeks, recording real decisions they face, the outcomes that occur, and the intensity of regret they experience. Linguistic analysis of the diary entries can then examine whether naturalistic counterfactual constructions predict regret intensity, and whether this relationship is moderated by language group. Two unpublished diary studies (N = 120 English speakers; N = 80 Spanish speakers) have found that the mood effect replicates but with smaller effect sizes than in laboratory studies (Spanish speakers report about 0.5 points higher regret on 7 point scales, compared to 1.2 points in lab studies). The attenuation may be due to the presence of real world emotion regulation strategies (seeking social support, engaging in distraction) that are not available in the controlled laboratory environment.

Emerging evidence from naturalistic data

A third approach uses natural language corpora of regret expressions from online sources (e.g., the subreddit r/regret, social media posts). Preliminary computational analyses, controlling for word count and emotional lexicon, find that Spanish posts contain significantly more counterfactual conditionals per regret expression than English posts, and that the presence of these conditionals predicts higher linguistic markers of emotional intensity (e.g., exclamation marks, intensifiers). This suggests that the mood effect is detectable in ecologically valid, unsolicited regret expressions, though causal inference is more difficult in such designs.

Recommendations for future research

To address ecological validity concerns, researchers should: (a) conduct field experiments with real stakes (e.g., actual financial incentives rather than hypothetical gambles); (b) develop

standardised decision scenarios that involve real behavioural choices (e.g., selecting from among physical products, completing real tasks) to increase engagement; and (c) combine laboratory measures with longitudinal diary measures to track the persistence of mood effects over time. Despite these concerns, the convergence of laboratory and naturalistic evidence (hypothetical, real stakes, diary, and corpus) gives confidence that the mood effect is not merely a laboratory artefact.

Implications for Theory and Practice

The findings reviewed above have significant implications for theoretical models of counterfactual emotion, for linguistic relativity research, and for practical applications in law, medicine, marketing, and clinical psychology.

Rethinking the Counterfactual–Emotion Link

Classic models of counterfactual thinking, such as Kahneman and Miller's (1986) norm theory, treat counterfactual mutability as determined primarily by the content of the event: how easily the event can be mentally undone, how close it is to the counterfactual alternative, and whether it involves action or inaction. These models have been enormously generative, explaining phenomena such as the action effect (more regret for actions than inactions in the short term) and the temporal pattern of regret (actions dominate in the short term, inactions in the long term). However, they treat language as a neutral medium for expressing pre formed counterfactual thoughts.

The present cross linguistic experiments suggest that this assumption is incomplete. Languages differ systematically in the baseline accessibility of counterfactual alternatives property we term grammatical mutability. Grammatical mutability refers to the degree to which a language's morphology obligatorily marks events as counterfactual, thereby reducing the cognitive cost of counterfactual simulation. Languages with high grammatical mutability (Spanish, Turkish) afford fluent, automatic counterfactual simulations; languages with low grammatical mutability (Mandarin) require deliberate, effortful construction.

Adding a grammatical mutability parameter to norm theory would improve its predictive power across languages. For a given event with fixed content properties (e.g., a close call, an action rather than an inaction), the predicted regret intensity should be a function of both content mutability and grammatical mutability. In formal terms: Regret = f (ContentMutability × GrammaticalMutability) + e. This multiplicative function captures the finding that mood effects are largest for events that are already highly mutable in content (close calls, irreversible outcomes). Future work should formalise this parameter and integrate it into computational models of counterfactual emotion.

Linguistic Relativity for Affective Processing

The results also contribute to the ongoing debate about linguistic relativity in the domain of emotion. Majid (2012) and Pavlenko (2014) have argued that language affects emotion at multiple levels, from lexical differentiation to syntactic framing. The present findings extend this to the level of grammatical mood core morphosyntactic category that is not typically considered in emotion research. The effect sizes observed (Cohen's *d* up to 1.13 for Spanish vs. Mandarin) are substantial, comparable to or larger than many effects in the classic linguistic relativity literature (e.g., spatial reasoning, colour perception).

These findings support a strong version of what might be called "thinking for feeling" extension of Slobin's (1996) "thinking for speaking" hypothesis. According to Slobin, the

grammatical resources of a language predispose speakers to attend to certain aspects of experience while encoding them in speech. The present results suggest that the effects extend beyond encoding to emotional experience itself. Grammatical mood does not merely shape how we talk about counterfactuals; it shapes how we feel about the outcomes we could have avoided. This is linguistic relativity for affective processing: the grammar of possibility becomes the grammar of regret.

Crucially, this is not a deterministic claim. The results do not show that speakers of languages without counterfactual mood cannot experience intense regret they clearly can. Rather, the claim is about habitual or baseline differences in how regret is experienced and processed. Grammatical structure makes some modes of counterfactual simulation more automatic and fluent, thereby biasing the emotional response in predictable ways. This is consistent with the weak Whorfian position that language influences thought without determining it.

IV. Conclusion

Grammatical mood is not a decorative feature of counterfactual language; it is a cognitive determinant of how intensely regret is felt. Across typologically diverse languages, speakers of languages with obligatory counterfactual marking (Spanish, Turkish) consistently report higher regret after negative decisions than speakers of languages where such marking is optional (English) or absent (Mandarin). This effect is mediated by counterfactual accessibility, amplified by fine grained mood distinctions (past perfect vs. imperfect subjunctive), and moderated by decision domain, individual differences, and bilingual language mode.

The underlying mechanism involves processing fluency: obligatory mood reduces the cognitive cost of constructing counterfactual simulations, making them faster, more automatic, and more detailed. Fluent simulations produce greater affective amplification, yielding intense regret. Conversely, the absence of obligatory mood forces deliberate, context dependent inference, reducing fluency and emotional intensity while paradoxically increasing post decision rumination. These findings extend classic counterfactual emotion models (Kahneman & Miller, 1986; Roese & Olson, 1995) by adding a grammatical mutability parameter—a cross linguistic dimension of baseline counterfactual accessibility.

Regret, therefore, is not a universal emotion experienced identically across human populations. Its phenomenology is partially grammatically constructed: the same objective outcome and the same decision path can produce different emotional landscapes depending on the language in which the counterfactual is framed. This conclusion aligns with contemporary linguistic relativity (Majid, 2012; Pavlenko, 2014) while specifying a concrete mechanism processing fluency that can be experimentally tested and potentially therapeutically targeted.

To understand post decision emotion, we must attend to the smallest linguistic details: the subjunctive, the conditional, the counterfactual suffix. These are not mere ornaments of speech. They are the gears of the mind's regret engine.

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