

## You must worry! The interpretation of *mustn't* varies with context and verb complement.

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The current paper investigates experimentally whether the interpretation of deontic *mustn't* in American English varies with pragmatic context (*lack of necessity/ necessity not to*) and the semantic properties of the modal complement (negative mental activity/physical event).

**Background** English modals display an irregular behaviour in interaction with negation. While negation has a fixed position in English (i.e., always after a modal), its interpretation is variable (i.e., the negation may scope below/under modality). This is true for modals of a different quantificational force (universal/necessity vs. existential/possibility- see 1a, b), as well as different flavors of the same modal (deontic & epistemic-1b, c) [2].

- (1) a. The boy must not/mustn't go to the party. (NECESSARY > NOT)
- b. The girl cannot/can't play in the park this evening. (NOT > POSSIBLE)
- c. The girl may not be doing her homework. (POSSIBLE > NOT)

Various attempts at generalizations have been put forth, either in terms of the possibility/necessity distinction (e.g., [5]), or in terms of the deontic/epistemic modality distinction (e.g., [1]), but, as pointed by these authors themselves, there are always exceptions to these generalizations. Moreover, it is unclear what *n't* and *not* represent from a syntactic point of view (sentence or adverbial negation). In the ideal situation, sentence negation translates as external negation (NEG > MODALITY), and adverbial negation translates as internal negation (MODALITY > NEG). However, we find cases where what looks like sentence negation (*n't*) expresses internal negation (see (1a)). While deontic *must not* and *mustn't* are generally argued to express interdiction ([1], [2], [3], [4], [5]), deontic necessity scopes below negation in special polarity-sensitive contexts like contrastive negation-see (2) ([6], [7], [8], [9]).

- (2) No student MUST read 5 articles on the topic but one student is encouraged to do so.

We draw attention to some not (obviously) polarity-dependent situations, involving *lack of necessity* contexts and negative mental activities (3), which are also interpreted as *not necessary*.

- (3) You mustn't worry. It's just your usual jokester holiday! You mustn't feel bad if what you try to do doesn't work. //You mustn't panic.

**Current experiment** (N = 34 native AE speakers) We tested the intuition that *lack of necessity* contexts and negative mental activities bias the interpretation of *mustn't* towards *not necessary*.

**Procedure** Our experiment combined a forced choice task with a gradient acceptability task. Participants read sentences in context and had to choose the most suitable interpretation of *mustn't* (either necessity not to or lack of necessity contexts-Table 1). They then had to rate the acceptability of the sentence in context on a Likert scale from 1 to 7.

**Materials** Participants were presented with 8 critical sentences and 16 fillers (with *needn't* and *shouldn't*). The critical sentences used different verb types (mental/physical) in different pragmatic contexts (*lack of necessity/necessity not to*)-Table 1. Participants saw verbs in only one context. For each verb type, 4 verbs were tested: *worry, panic, be sad, be upset* (mental), and *eat, drink, do, speak* (physical). Half of the sentences with *mustn't* had 2<sup>nd</sup> person subjects and half 3<sup>rd</sup> person subjects.

**Results** While 15 participants (Interdiction group) gave mostly *necessary not to* readings, the rest produced more *necessary not* readings in *lack of necessity* contexts and with mental verbs (Figures 1, 2). Importantly, *mustn't* was rated as very acceptable in both *necessity not to* (5.84) and *lack of necessity* contexts (5.53). We computed a linear regression with Verb Type (Mental/Physical) and Context (*Necessity not to/Lack of necessity*) and their interaction as fixed effects and random slopes per Item and Participant. The results show significance for Verb Type ( $p < .05$ ), Context ( $p < .01$ ), and the Verb Type-Context interaction ( $p < .05$ ) The parallel analysis

of expected response times for the forced choice shows significantly longer times for *not necessary* contexts. The person of sentential subjects did not affect the interpretation.

Table 1. Sample experimental items

Forced Choice Task								
<b>Lack of necessity context:</b> In <i>You mustn't worry. The woman will give you money</i> , the sentence <i>You mustn't worry</i> means:								
<b>Necessity not to context:</b> In <i>You mustn't worry. You will get sick otherwise</i> , the sentence <i>You mustn't worry</i> means:								
a. It is necessary that you do not worry.								
b. It is not necessary that you worry.								
Acceptability Judgment Task (on a Likert scale from 1 to 7)								
<b>Lack of necessity context:</b> How acceptable do you think the sentence <i>You mustn't worry</i> is in the context <i>You mustn't worry. The woman will give you money?</i>								
<b>Necessity not to context:</b> How acceptable do you think the sentence <i>You mustn't worry</i> is in the context <i>You mustn't worry. You will get sick otherwise?</i>								
(Fully unacceptable)	1	2	3	4	5	6	7	(Fully acceptable)

Figure 1. Proportion of *necessary not to* readings for the Interdiction Group

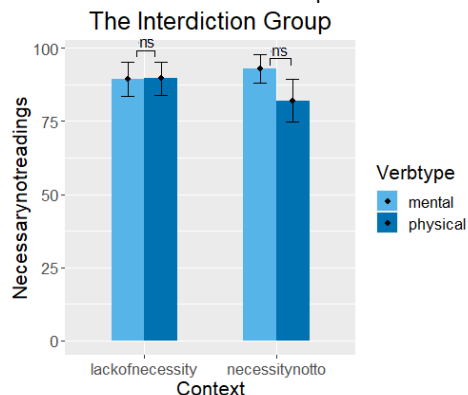
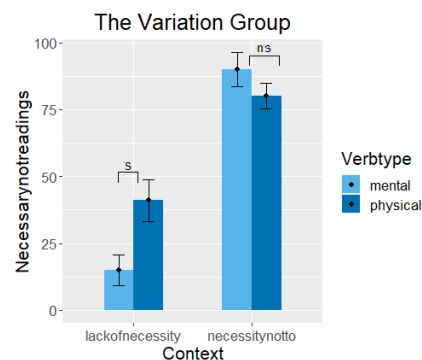


Figure 2. Proportion of *necessary not to* readings for the Variation Group



**Discussion** For some AE speakers, the scope between modality and negation in *mustn't* varies with pragmatic context and lexical verb. The importance of context has also been noticed in Romance, e.g., where *Negation + Obligation Verb* can contextually express either *not necessary* or *necessary not to*. Several proposals may capture this behavior: i) Neg Raising ([7], [8], [10], [11], deriving the strong reading from the basic order Neg> Modal via negative strengthening, ii) pragmatic weakening [12], [13], arguing the *not necessary* reading obtains as a suggestion from the basic strong *necessary not to*, (iii) ambiguity, arguing *mustn't* is ambiguous between two basic readings (strong/weak). While all accounts could be accommodated to capture context-sensitivity, a pragmatic weakening account starting from an *interdiction (necessary not to)* basic reading of *mustn't* is more in line with the high accuracy rates for *necessity not to* contexts compared to *lack of necessity* contexts, as well as *lack of necessity* readings being associated with longer RTs than *not necessary* readings. In addition to context, the type of verb the modal combines with also matters. Mental activities give rise to more *lack of necessity* readings than physical activities in *lack of necessity* contexts. Moreover, physical verbs give rise to more *necessary not* readings in *necessity not to* contexts than in *lack of necessity* contexts. We propose a cognitive account in terms of the difficulty of imposing one's will over another's (private) mental activities.

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