Examining the meaning of polarity subjunctive*

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1. Introduction

Traditional grammars of Spanish draw a distinction between cases of rigid mood selection and cases in which mood alternations are possible (Laca 2010, Quer 1998). One of these alternations, known as 'polarity mood' or 'polarity subjunctive', is triggered by negative (and similar) environments: Verbs that inherently select indicative allow, when negated, for a choice between indicative and subjunctive in their complement clause. The prevailing view in the literature is that, in these negative environments, the use of the indicative presupposes commitment to the embedded proposition p on the part of the speaker, whereas the use of the subjunctive does not trigger such presupposition (Borgonovo 2003), as in (1):

(1) a. No sabían que Dani se había ido de viaje. $\rightsquigarrow$ Dani went on a trip
not knew that Dani CLT had.IND gone of trip
'They didn't know that Dani had gone on a trip.'

b. No sabían que Dani se hubiese ido de viaje. $\not\rightsquigarrow$ Dani went on a trip
not knew that Dani CLT had.SUBJ gone of trip
'They didn't know that Dani had gone on a trip.'

The literature reports that this difference emerges both with factive verbs like *saber* 'know' (class V1), as in (1) above, and also with non-factive (non-fiction) predicates like *creer* 'believe' (class V2), as in (2) below (see e.g. Ridruejo (1999), Bosque (2012), Rivero (1971), Laca (2010), Borgonovo (2003), a.o.):

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(2) a. Alex no cree que Dani es inteligente ⇝ Dani is intelligent
Alex not believe that Dani is.IND intelligent
'Alex doesn't think that Dani is intelligent.'

b. Alex no cree que Dani sea inteligente ⇝̸ Dani is intelligent
Alex not think that Dani is.SUBJ intelligent
'Alex doesn't think that Dani is intelligent.'

Several approaches to mood choice in negative environments have been proposed in the literature to account for this effect. For example, Giannakidou (2009) proposes a veridical approach to mood, whereby indicative is used if there is at least one epistemic agent committed to the truth of *p*, otherwise subjunctive is used. Quer (1998) suggest that in polarity contexts indicative maps the complement *p* into the restrictor of negation (hence presupposing its truth), as in (3a), whereas subjunctive fails to do so, as in (3b).

(3) a. NOT [$_{Restrictor}$ *p* is true] [$_{NuclearScope}$ they believe that *p*]
b. NOT [$_{NuclearScope}$ they believe that *p*]

Crucially, these analyses are general enough as to apply to any kind of embedding verb, including V1 and V2 verbs like the ones above and also (non-factive) fiction verbs like *soñar* 'dream' (class V3). In other words, even though a difference in the speaker's commitment towards *p* has not been observed for this third class of verbs in the literature, current analyses in principle predict a similar effect to arise:

(4) Laura no soñó que era /fuera rica.
Laura not dream that was.IND /was.SUBJ rich
'Laura didn't dream that she was rich.'

The present paper is concerned with the semantic effects of mood choice in negative environments, mostly in reference to the V1 and V2 verb classes explicitly discussed in the literature but also in terms of the consequences predicted for the V3 class. In Section 2, we present novel evidence from an online experiment testing the verb classes V1 (factive), V2 (non-factive, non-fiction) and V3 (fiction). Our results show that, contrary to what the literature claims and predicts, the semantic difference reported for (1) and (2) and expected for (4) only emerges under factive verbs (V1s). Then, in Section 3, we propose a semantic analysis that combines Romoli's (2015) scalar approach to the presuppositions of soft triggers, which derives a difference between verb classes, with Schlenker's (2005) insights on mood, which explains the difference in speaker commitment brought about by mood choice in the case of V1s. The proposed analysis makes more accurate predictions than existing accounts such as Quer (1998) and Giannakidou (2009), which do not predict a split amongst verb classes.

2. Experiment

In this first section, we present the results from an online experiment aimed at testing whether the observation that mood choice under negated predicates triggers a presuppositional difference (see Section 1 above) is empirically robust.

2.1 Experimental Design

We designed a 3×2 study testing constructions consisting of a negated verb V (V1 = cognitive factive vs. V2 = non-factive/non-fiction vs. V3 = fiction) followed by a complement clause varying in mood morphology (IND vs. SUBJ). Participants were asked to rate to what extent they thought the embedded proposition *p* was true or not on a scale from 1 (no) to 5 (yes). See template in (5):[1]

(5) SUBJECT didn't VERB [that p.IND/SUBJ]. (Critical Items)
Is *p* true?

Additionally, we used as controls plain declarative clauses consisting of a matrix (non)-factive verb and an embedded proposition, as in (6). These were used as neutral (score 3) and ceiling (score 5) conditions against which to compare the results. Finally, we included filler sentences, which were intended to make participants use the whole of the scale (i.e scores from 1 to 5), thus avoiding biases towards certain responses (7).

(6) a. SUBJECT $\text{VERB}_{factive/implicative}$ [that p]. (Ceiling Controls)
b. SUBJECT $\text{VERB}_{non-factive/non-implicative}$ [that p]. (Neutral Controls)

(7) a. SUBJECT $\text{VERB}_{factive/implicative}$ [that not p] $\longrightarrow$ Expected Score 1 (Fillers)
b. SUBJECT $\text{VERB}_{factive/implicative}$ [who p] $\longrightarrow$ Expected Score 3
c. SUBJECT $\text{VERB}_{factive/implicative}$ [that p] $\longrightarrow$ Expected Score 5

The test materials included 30 critical items, 10 controls and 20 fillers counterbalanced across subjects using a Latin square design. Each participant thus saw each verb twice, once with an indicative complement clause and once with a subjunctive complement clause with different contents in the embedded clauses. Additionally, there were three practise items that were excluded from the analysis.

2.2 Stimulus Construction

For the CRITICAL ITEMS, five verbs from each semantic class were included: (8). These verbs always appeared conjugated in 3rd person singular and in past tense. This was done to

[1] All relevant information of the experiment including all items and the code used to run the experiment can be found at: `https://github.com/MaribelRomero/PolaritySubjunctiveMeaning`

make comparisons across items more reliable and also to reduce noise from other possible confounds (see for example Giorgi and Pianesi (1997:225) for the effect of tense on mood). For the content of the embedded clause, only content for which the participants have no bias based on world knowledge was included.

(8) a. V1: *recordar* 'remember', *notar* 'notice', *saber* 'know', *descubrir* 'find out' and *ver* 'see'.
b. V2: *decir* 'say', *contar* 'tell', *pensar* 'think', *creer* 'believe' and *sospechar* 'suspect'.
c. V3: *soñar* 'dream', *fantasear* 'fantasize', *inventar* 'invent', *fingir* 'fake' and *hacer creer* 'make believe'.

For the CONTROLS we used 5 non-factive/non-implicative verbs and 5 factive/implicative verbs. These verbs, again, were in past tense and 3rd singular to maximise comparability with the critical items:

(9) a. Factive/implicative: *lamentar* 'regret', *alegrarse* 'be happy', *conseguir* 'achieve', *lograr* 'manage' and *entristecerse* 'be sad'.
b. Non-factive/non-implicative: *querer* 'want', *desear* 'wish', *ordenar* 'order', *prohibir* 'prohibit' and *suplicar* 'beg'.

The experiment was run in the PennController platform (Zehr and Schwarz 2018) and took 10–15 minutes to complete. A demo of the experiment can be found in the following link: `https://farm.pcibex.net/r/yEVYkw/`

2.3 Participants

A total of 50 participants took part in the experiment. They were recruited via Prolific (`www.prolific.co`), and were paid 2.25£ for their participation. All participants reported being speakers of Peninsular Spanish. We also conducted a demographic questionnaire at the beginning of the experiment which included a question about their age –ages ranged from 21 to 57–, their gender –there were 20 female and 30 male participants–, and their level of education –37 of the participants had completed university studies and the remaining 13 had completed compulsory education. The responses of all participants were included as they all passed the attention controls.

2.4 Results

Based on what has been claimed in the literature, it was predicted that all verb types would behave the same: indicative having a high score of speaker commitment (5 in the scale), and subjunctive being neutral (3 in the scale). These predictions, however, were not borne out. The results show that there are differences across semantic verb classes. The only verbs close to what the literature predicts are class V1 verbs. In this category indicative is close to 5 with a mean score of 4.39 (SD=0.19) –i.e., there is speaker commitment– and there is

a drop (although not as drastic as the literature portrays) for subjunctive with a mean rating of 3.75 (SD=0.19). Class V2 and V3 on the other hand show a smaller difference in means between indicative and subjunctive (0.16 difference for V2 and 0.20 mean difference for V3) and moreover for class V3 the mean average for indicative is 3.57 (SD=0.19). So, for V2 and V3 verbs, even if we use the indicative, there is no speaker commitment. These results appear graphically represented in Figure 1. The data was analysed in R (version 4.2.1), and plotted using *ggplot* from the *ggplot2* package.

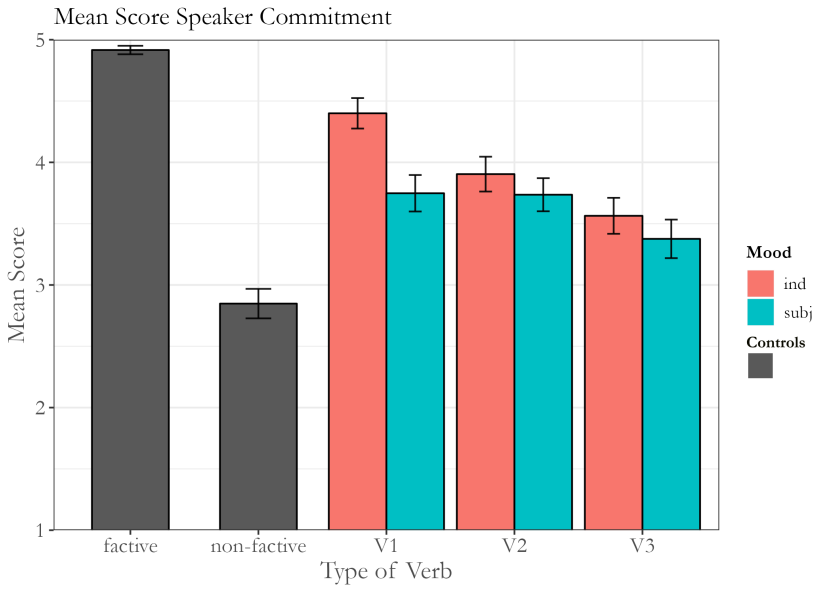

Figure 1: Mean responses for the critical items and the two control conditions. Error bars represent standard error. V1=cognitive-factive, V2= non-factive/non-fiction, V3=fiction.

In order to analyse these data, we calculated a linear-mixed effects regression model with Speaker Commitment as dependent variable and Mood and Verb Type as independent variables (using the packages *lme4* and *lmerTest*, Bates et al. (2014), Kuznetsova et al. (2017)). Participants and items were added as crossed random effects. Results showed a significant interaction between Mood and Verb Type (x2 = 20.12, df = 2, $p < 0.0001$). To investigate the nature of the interaction, a post hoc test was conducted using the emmeans() function in R. It showed that there was a significant difference between indicative and subjunctive for the V1s verbs (ß = 0.64, SE = 0.09, df = 1418, t = 7.56, $p < 0.0001$), and V3 verbs (ß = 0.19, SE = 0.09, df = 1418, t = 2.26, p = 0.02) but not for V2s (ß = 0.16, SE = 0.09, df = 1418, t = 1.89, p =0.06). Additionally, we also calculated Cohen's *d* (ussing the *effsize* package (Torchiano 2016) to estimate the effect size of these effects, and obtained that for group V1 the effect size was medium/large (d = 0.7) and for group V3 the effect size was small (d = 0.2).

Thus, our experimental data show that there are differences across semantic categories: mood choice has a categorial effect (significant and large-size effect) on speaker commitment on V1 verbs; contra claims in the literature, mood has no significant effect on class

V2; and, finally, contrary to what current theoretical accounts predict, mood choice does not make a categorial difference in V3s (significant effect but small size).

2.4.1 Variability within Groups

Finally, and to conclude with the experimental part, we wanted to better understand the variability within each verb class. For that we plotted a histogram showing the proportion of responses for each level in the scale, see Figure 2.

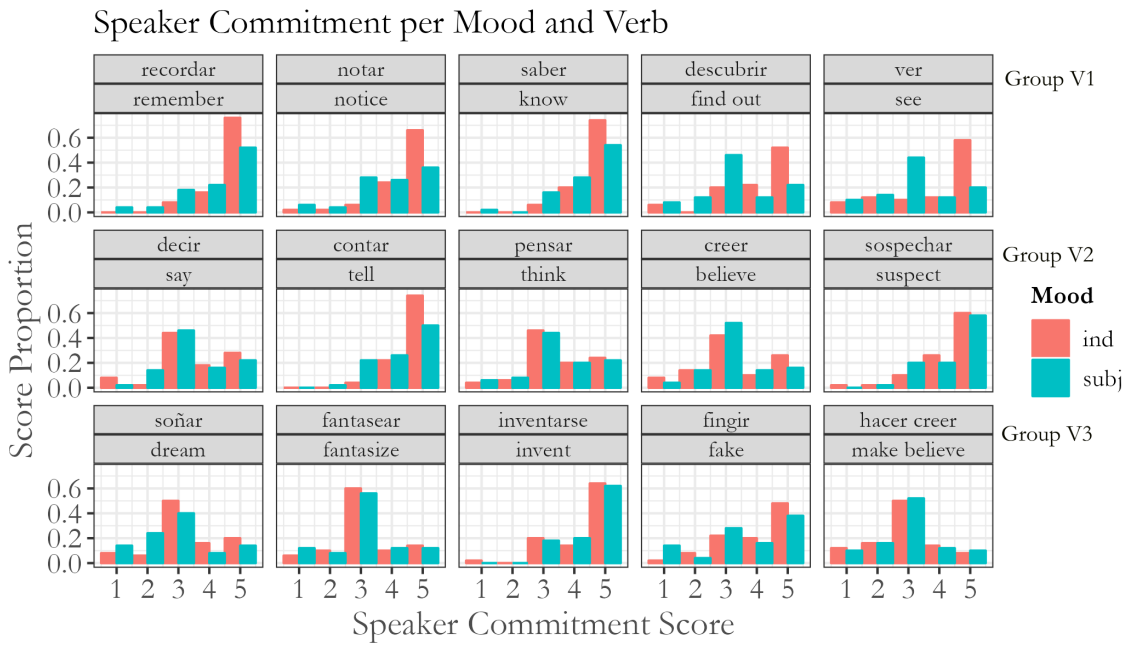

Figure 2: Proportion of responses for each individual verb. V1 = cognitive-factive verbs, V2 = non-factive/non-fiction verbs, V3 = fiction verbs.

Looking at the results, we observe that, for the V1 class, different verbs project with different strengths: e.g., *recordar* 'remember' plus *p*.IND/SUBJ projects more strongly than *descubrir* 'find out' plus *p*.IND/SUBJ. This is in accordance with previous findings in the literature (Jarrett and Hernández 2020). So, this variability is not surprising.

For the V2 class, the verb *contar* 'to tell' seems to behave more similar to V1 verbs than to V2s. Interestingly, previous literature had noticed that, with some communication verbs (e.g. *announce*, *inform*), when the context makes clear that the attitude subject is trustworthy, the complement *p* is not just contextually entailed but rather presupposed (see, Anand and Hacquard (2014), Schlenker (2021)). Our Spanish examples with *contar* 'to tell' may have invited an 'autobiographical' reading that makes the attitude subject trustworthy and, thus, makes *p* presupposed. Hence the resemblance to V1s. If we exclude this verb from class V2, we still get that mood is not significant for class V2 (ß = 0.08, SE = 0.09, df = 1418, t = 0.90, p = 0.37).

For the V3 class, two distinct patterns arise in our data. On the one hand, some verbs (*soñar* 'dream', *fantasear* 'fantasize' and *hacer creer* 'make believe') show a clear neutral tendency with regards to whether *p* is true or false. On the other hand, some other verbs (*inventar* 'invent' and *fingir* 'fake'), when negated, show a general tendency to make the proposition *p* true. While this second pattern was not expected, note that it differs from the behaviour of V1 verbs in two respects: (i) mood choice does not significantly affect the tendency of negated 'invent' and 'fake' to make *p* true, unlike in the case of V1 verbs; and (ii) V1 verbs in the positive imply the truth of the complement proposition *p*, as in (10), while 'invent' and 'fake' imply its falsity, as in (11):

(10) Mary knew that it was raining $\rightsquigarrow$ It was raining

(11) Mary invented/made up that it was raining $\rightsquigarrow \neg$(It was raining)

2.5 Summary of the experimental results

In conclusion, our experimental results show that there are differences across verb classes regarding the semantic effect triggered by mood choice. Mood choice has a categorial effect on speaker commitment with V1 verbs that we do not see with classes V2 and V3. The contrast between the V1 class and the V2 (and V3) class challenges existent approaches, which have been crafted as general mechanisms that predict a homogeneous effect of mood choice across verb classes. The found contrast calls, hence, for a new analysis. This leads to our proposal in section 3.

Additionally, we obtained a split pattern in the V3 class. While a sub-group of V3 verbs behaves like the V2 class, a second sub-group of negated V3 verbs lead to a high speaker commitment score, regardless of mood choice. Though a full account of this second V3 sub-group is beyond the scope of this paper, we will sketch some ideas in section 3.5.

3. A new proposal

To account for the significant effect of mood choice under V1 verbs (cognitive factives) and the lack thereof under V2 verbs (cognitive non-factives), we need **(i)** an account of factivity that distinguishes between the two verb classes and **(ii)** an analysis of the semantic contribution of mood morphology. In this paper, we will follow Romoli's (2015) treatment of soft presuppositions for point (i) (§3.1) and apply it to our cases (§3.2); and we will follow Schlenker's (2005) proposal on mood for point (ii) (3.3). The two accounts will then be combined to derive the contrast between V1 and V2 verbs (§3.4). Finally, we will briefly address the patterns found for V3 verbs (fiction) (§3.5).

3.1 Romoli (2015): soft presuppositions as scalar implicatures

Romoli (2015) proposes to derive soft presuppositions not as lexical presuppositions but as scalar conversational implicatures. There are two core ingredients to his analysis. First,

a scale of ordered alternatives is invoked by the soft presupposition trigger. Second, the exhaustivity operator EXH applies to negate some of those alternatives.

Let us see how this works with a simple soft presupposition trigger, e.g. *win*. Each soft presupposition trigger is lexically associated with a scale of ordered alternatives where the trigger itself is the strongest item. In the case of *win*, this produces, for sentence (12a), the set of alternatives in (12b), where the alternative WON(j) stands for 'John participated and won' and is, thus, stronger than the alternative PARTICIPATED(j):

(12) a. John won.
b. $\mathscr{A}lt$: {WON(j)$_{str}$, PARTICIPATED(j)$_{wk}$ },
where WON(j) means 'John participated and won'.

Just like in the case of scalar implicatures (e.g. with the scale {every$_{str}$, some$_{wk}$}), EXH takes a proposition *p* and a set of alternatives $\mathscr{A}lt$(p) as arguments and outputs the negation of all innocently excludable alternatives in $\mathscr{A}lt$(p), as defined in (13a). The innoncently excludable alternatives of a set $\mathscr{A}lt$(p) are those alternatives in $\mathscr{A}lt$(p) that can be consistently negated without contradicting the assertion *p* and without affirming any other alternative *r*, as in (13b) (Fox 2007):

(13) a. $[\![\text{EXH}]\!]$ ($\mathscr{A}lt$(p))(p)(w) = p(w) $\wedge$ $\forall$q $\in$ $\mathscr{E}xcl$ (p,$\mathscr{A}lt$(p))[$\neg$q(w)]
b. $\mathscr{E}xcl$(p,$\mathscr{A}lt$(p)) = { q $\in$ $\mathscr{A}lt$(p): p $\not\subseteq$ q $\wedge$ $\neg\exists$r [r $\in$ $\mathscr{A}lt$(p) $\wedge\neg q \subseteq$ r] }

In positive environments like (14a), since the other alternative is entailed by the asserted alternative, exhaustification is vacuous and no additional implication arises: (14c).

(14) a. John won.
b. $\mathscr{A}lt$: {WON(j)$_{str}$, PARTICIPATED(j)$_{wk}$ }
c. $[\![$EXH [John won]$]\!]$ = 1 iff WON(j)

But, in negative environments like (15a), the entailment relation is reversed, as indicated in (15b). This means that, in the right pragmatic contexts, exhaustification will apply and an additional piece of meaning will be implicated, as in (15c):

(15) a. John didn't win.
b. $\mathscr{A}lt$: { $\neg$WON(j)$_{wk}$, $\neg$PARTICIPATED(j)$_{str}$ }
c. $[\![$EXH [John won]$]\!]$ = 1 iff $\neg$WON(j) $\wedge$ PARTICIPATED(j)

3.2 Applying Romoli (2015) to our Case Study

Our **V1 verbs** are cognitive factive verbs, classified as soft triggers in the literature. This means that, following Romoli (2015), *know* and the other V1 verbs lexically give rise to a scale of ordered alternatives, among which the soft trigger is again the strongest member, as illustrated in (16b) for *know*:

(16) a. John knows that Mary runs
b. $\mathscr{A}lt$: { KNOW(j,RUN(m))$_{str}$, RUN(m)$_{wk}$ }
where KNOW(j,RUN(m)) means 'Mary runs and John knows that Mary runs'.

In positive environments, since the asserted alternative is stronger than the other alternative, exhaustification is vacuous and no implicature obtains, as in (17c):

(17) a. John knows that Mary runs.
b. $\mathscr{A}lt$: { KNOW(j,RUN(m))$_{str}$, RUN(m)$_{wk}$ }
c. ⟦EXH [John knows that Mary runs]⟧ = 1 iff KNOW(j,RUN(m))

In negative environments, the entailment relation is reversed: (18b). Again, in the right pragmatic contexts, exhaustification will be applied to the sentence and we obtain (18c):

(18) a. John doesn't know that Mary runs.
b. $\mathscr{A}lt$: { ¬KNOW(j, RUN(m))$_{wk}$, ¬RUN(m)$_{str}$}
c. ⟦EXH [J doesn't know that M runs]⟧ = 1 iff ¬KNOW(j, RUN(m)) ∧ RUN(m)

Crucially, not being (soft) presupposition triggers, **V2 verbs** like *say* do not lexically give rise to a set of ordered alternatives. Since the asserted alternative *p* does not come into play as a weaker alternative in (19b), no exhaustification will take place. We only have the original literal meaning (19c):

(19) a. John didn't say that Mary runs.
b. $\mathscr{A}lt$: –
c. ⟦John didn't say that Mary runs⟧ = 1 iff ¬SAY(j, RUN(m))

This derives the split between V1 verbs and V2 verbs. However, the difference brought about by mood still needs to be explained. To account for it, we turn to Schlenker (2005).

3.3 Schlenker (2005)

Some pieces of verbal morphology have received a pronominal treatment in the literature. To see this, consider first the standard analysis of personal pronouns, e.g. *she*$_2$ in (20). The pronoun refers to whichever individual (type e) the variable assignment g maps the pronoun's index *2* to, with the presupposition that the so obtained individual is female:

(20) $[\![she_2]\!]^g$ is defined only if g(2) is female;
if defined, $[\![she_7]\!]^g$ = g(2)

A parallel pronominal analysis has been proposed for tense morphology (Partee 1973, Kratzer 1998). As sketched in (21), the temporal proform $PAST_2^{pro1}$ refers to whichever time interval (type i) the assignment g maps index *2* to, with the presupposition that the so obtained time interval temporally precedes the (relevant) anchor time g(1):

(21) $[\![Past_2^{pro1}]\!]^g$ is defined only if g(2) < g(1);
if defined, $[\![Past_2^{pro1}]\!]^g$ = g(2)

Building on insights from mood in conditionals (Stalnaker 1984, von Fintel 1997) and from mood in complement clauses (see Farkas (1992), Quer (1998), Giannakidou (2009), amongst others), Schlenker (2005) proposes to extend this pronominal treatment to mood morphology. The mood proforms Ind_2^{pro1} and $Subj_2^{pro1}$ denote whichever possible world (type s) the assignment g maps their index *2* to. The indicative proform Ind_2^{pro1} imposes a presupposition on the so obtained world: It has to be a member of the (relevant) anchor C(ontext) S(et) g(1), where g(1) may be the matrix context set of the speaker (CS*) or a derived context set of an attitude holder *x*, e.g. $\text{Epi}_x(w_0)$, as defined in (22a). The subjunctive proform $Subj_2^{pro1}$, in contrast, imposes no presupposition on the world g(2), as in (22b):

(22) Where CS is the Context Set of the speaker (CS*) or a derived Context Set of some attitude holder x, e.g. $\cap\text{Dox}_x(w_0)$, $\cap\text{Epi}_x(w_0)$ or the relevant modal base:

a. $[\![Ind_2^{pro1}]\!]^g$ is defined only if g(2) ∈ g(1);
if defined, $[\![Ind_2^{pro1}]\!]^g$ = g(2)

b. $[\![Subj_2^{pro1}]\!]^g$ always defined;
if defined $[\![Subj_2^{pro1}]\!]^g$ = g(2)

To see the effects of these mood proforms, let us insert them in an –embedded or matrix– clause. The indicative version in (23) leads to a partial proposition defined only for the worlds w' in the relevant CS, whereas the subjunctive version in (24) expresses a total proposition defined for all w' in W:

(23) $[\![$(that) Mary runs.$Ind_2^{pro1}]\!]^g$ = λw': w' ∈ CS. Mary runs at w'

(24) $[\![$(that) Mary runs.$Subj_2^{pro1}]\!]^g$ = λw': ~~w' ∈ CS~~. Mary runs at w'

In the case of embedded clauses under attitude verbs, the semantics of the embedding verb will interact with the partial or total complement proposition and lead to grammaticality or ungrammaticality.[2] In the case of matrix clauses, the choice of mood is linked to the illocutionary act intended by the speaker (Schlenker 2005, Portner 2018), which –crucially for us– indicates, in turn, whether the speaker is committed to the expressed proposition. More concretely, the indicative partial proposition (23) is used in statements like (25) because it is sufficient to fulfill the speaker's intention that this proposition be intersected with the matrix CS*; this intention, in turn, signals that the speaker is committed to the truth of the proposition. In contrast, subjunctive is used for a variety of illocutionary acts, including orders, wishes, exclamations, etc., which may –(26b)– or may not –(26a)–commit the speaker to the truth of the proposition:

[2]Schlenker (2005) uses the difference in (23)-(24) to derive mood selection by the Romance counterparts of *believe* vs. *regret* and Romero (2012) extends the analysis to *want*.

(25) Ana corre. (Statement)
Ana runs.IND
'Ana runs.' → speaker's commitment to p

(26) a. Corra, Sra. Ana. (Order)
Run.SUBJ, Mrs. Ana.
'Run, Mrs. Ana.' ↛ speaker's commitment to p
b. ¡Que Ana corra a estas horas de la noche! (Exclamation)
that Ana runs.SUBJ at these hours of the night
'That Ana run at this hour of the night!' → speaker's commitment to p

3.4 Combining insights from Romoli (2015) and Schlenker (2005)

We start with **V1 verbs**. After exhaustification applied, we obtained (18c), repeated here as (27). This gives us the two conjuncts in (27a)-(27b):

(27) $[\![$EXH [J doesn't know that M runs]$]\!]$ = 1 iff $\neg$KNOW(j, RUN(m)) $\wedge$ RUN(m)
a. $\neg$KNOW(j, RUN(m))
b. RUN(m)

Let us now add the contribution of mood to these two conjuncts.

If the **embedded CP is in the Indicative**, the first conjunct in (27a) will lead to the truth conditions in (28a), where the embedded λw.RUNw(m) proposition is only defined for John's epistemic worlds –which leads to the trivial presupposition that $\cap\text{Epi}_{w0}(\text{j}) \subseteq \cap\text{Epi}_{w0}(\text{j})$– or for the worlds in the current CS* –leading to the (reasonable) presupposition that $\cap\text{Epi}_{w0}(\text{speaker}) \subseteq$ CS*.[3] But, crucially, the second conjunct in (27b) leads to the truth conditions in (28b). As in the case of a simple matrix declarative clause like (25), Indicative in (28b) signals that the speaker intends the proposition to be intersected with the current CS*, which in turn indicates that the speaker is committed to the truth of that proposition:

(28) [EXH [John doesn't know [that Mary runs.IND]]]
a. $\lambda \text{w}_0.\ \neg\ \text{KNOW}_{w0}\ (\text{j}, \lambda w : \left\{ \begin{matrix} w \in \cap\text{Epi}_{w0}(\text{j}) \\ w \in \text{CS*} \end{matrix} \right\}.\ \text{RUN}_w(\text{m}))$
b. λw: w $\in$ CS* .RUN$_w$(m) $\longrightarrow$ speaker's commitment to p

If the **embedded CP is in Subjunctive**, the conjuncts in (27) lead to the truth conditions in (29). Now, the truth conditions of the second conjunct (29b) fail to signal any intention of intersecting the proposition with the current CS* and, thus, leave open whether the speaker is committed to it or not, as we saw in (26). Hence, when Subjunctive is used, the speaker may but need not be committed to the expressed proposition.

[3] If the matrix Common Ground only contains propositions that the conversationalists know to be true, the latter presupposition is satisfied.

(29) [EXH [John doesn't know [that Mary runs.SUBJ]]]

a. $\lambda w_0.\ \neg\ \text{KNOW}_{w0}\ (j, \lambda w : \left\{ \begin{array}{l} \sout{w \in \cap \text{Epi}_{w0}(j)} \\ \sout{w \in \text{CS*}} \end{array} \right\} \text{RUN}_w(m))$

b. $\lambda w{:}\sout{w \in \text{CS*}}.\text{RUN}_w(m)$

This derives the impact of mood choice on speaker's commitment towards *p* with V1 verbs: With indicative the speaker is committed to the embedded proposition *p* whereas with subjunctive the speaker can but need not be committed to it.

We turn to **V2 verbs**. We saw that, since there are no alternatives, there is no exhaustification. The only implication we have is the literal meaning in (30). This amounts to having only the first conjunct.

(30) $[\![\text{John didn't say that Mary runs}]\!] = 1 \quad \text{iff} \quad \neg\text{SAY}(j, \text{RUN}(m))$ (=19c)

If the **embedded CP is in the Indicative**, we obtain the truth conditions in (31), where the embedded partial proposition $\lambda w.\text{RUN}_w(m)$ will lead to trivial or near-trivial presuppositions, as in the case above:[4]

(31) [John didn't say [that Mary runs.IND]]

a. $\lambda w_0.\ \neg\ \text{SAY}_{w0}\ (j, \lambda w : \left\{ \begin{array}{l} w \in \cap \text{Rpg}_{w0}(j) \\ w \in \text{CS*} \end{array} \right\}.\ \text{RUN}_w(m))$

If the **embedded CP is in the Subjunctive**, we obtain the truth conditions in (32), where the embedded total proposition $\lambda w.\text{RUN}_w(m)$ does not lead to any presupposition:

(32) [John didn't say [that Mary runs.SUBJ]]

a. $\lambda w_0.\ \neg\ \text{SAY}_{w0}\ (j, \lambda w : \left\{ \begin{array}{l} \sout{w \in \cap \text{Rpg}_{w0}(j)} \\ \sout{w \in \text{CS*}} \end{array} \right\}.\ \text{RUN}_w(m))$

Either way, regardless of whether Indicative or Subjunctive is used in the embedded clause, there is no second conjunct and, thus, no speaker commitment to *p* is conveyed. This derives the lack of significant impact of mood choice on the truth of *p* with V2 verbs.

3.5 On the behaviour of V3 verbs

Since V3 verbs are not soft presupposition triggers, the proposed analysis will lead to the same truth conditions as for V2 verbs. This is indeed what we found: The observed interaction of mood and speaker commitment for V3 verbs in our experimental results, though significant, does not lead to a categorical difference in the perceived speaker commitment to *p*, as predicted by the analysis.

[4]The modal background Rpg, used as the modal based of *say* in (31a)-(32a), stands for 'reported common ground' (Portner and Rubinstein 2020).

Still, there is an open issue. We found two distinct patterns in our data. In the first pattern, the structure [x not V3 p.IND/SUBJ] is neutral with respect to whether the speaker considers *p* to be true or false. This is in line with the proposed analysis. In the second pattern, the structure [x not V3 p.IND/SUBJ] conveys –regardless of the embedded mood– that the speaker considers *p* true. This is not captured by the analysis proposed so far.

As a tentative suggestion, we propose to explain the asymmetry as a consequence of how the lexicon is organised. In the case of verbs such as *fake* and *invent*, the positive structure [x Vs that *p*] is used as antonymic to [*p* is true], and when negation is used this lexical relation is reversed, as in (33). This leads to the second pattern described above, where the negated structure leads to speaker commitment to *p*. In contrast, with verbs like *dream* and *fantasise*, the positive structure [x Vs that *p*] is not antonymic to [*p* is true], and thus negation does not affect speaker commitment to *p* with these verbs, as in (34):

(33) [x invented/faked that *p*] as antonym of [*p* is true]
¬[x invented/faked that *p*] as synonym of [*p* is true]

(34) x dreamt/fantasized that *p*] ~~as antonym of~~ [*p* is true]
¬[x dreamt/fantasized that *p*] ~~as synonym of~~ [*p* is true]

4. Conclusion

Contra previous literature, our experimental results show that mood choice has a significant effect on the speaker's commitment to the complement proposition *p* in the V1 class (cognitive factives) but not in the V2 class (non-factive/non-fiction). An analysis has been proposed that correctly derives the effect of mood choice for V1s and the lack thereof for V2 based on the following two ingredients, independently argued for in the literature: **(i)** V1s give rise –via a scalar inference– to the soft presupposition *p*, whereas V2s do not; **(ii)** Indicative signals that the Speaker intends the implicated *p* to be intersected with the matrix CS* and, thus, that she is committed to its truth; subjunctive sends no such signal. The V3 class (fiction) patterns like the V2 class, except for some verbs invoking antonymic relations.

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