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Argumenthood and Syntactic Optionality
The Case of Instruments

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Abstract Instruments are peculiar elements that blur the argument/adjunct distinction: they can be semantically obligatory or optional, yet are always syntactically optional. This study replicates Barbu's (2020) cross-linguistic work in Italian to examine whether instruments are perceived as necessary participants at the semantic and syntactic levels, also depending on their semantic obligatoriness. The results confirm that perception varies with semantic obligatoriness and that instruments are often syntactically omitted, even when judged semantically necessary.

Keywords Optionality. Instrumental role. Argumenthood. Semantics. Syntax. Psycholinguistics.

Summary 1 Introduction. – 2 Obligatory but Optional: When Semantics and Syntax Don't Match. – 3 The *Semantic* and *Syntactic* Experiments. – 4 Discussion. – 5 Conclusions.

1 Introduction

Instruments are a fascinating thematic role: they are not easily classified as arguments or adjuncts, as they are semantically required by certain verbs (*require*-verbs) but semantically optional for others (*allow*-verbs) (Koenig et al. 2003; 2008; Rissman 2013; Suozzi et al. 2024). They are also always syntactically optional, regardless of their semantic obligatoriness. Studying this element can therefore provide valuable insights into the argument/adjunct distinction and into the semantic representation of verbs.

In this work, we adapt Barbu's (2020) cross-linguistic study on instruments to the Italian language. Building on her work, we design

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two experiments: one probing Italian speakers' semantic intuitions, and the other examining their syntactic intuitions. The experiments aim to determine whether instruments are perceived as necessary participants at both semantic and syntactic levels, and whether Italian speakers recognize the distinction between *require-* and *allow*-verbs. This paper is structured as follows: Section 2 outlines the main issues concerning instrument behavior and previous studies on this element; Section 3 presents the experiments; Sections 4 and 5 discuss the results and offer a few concluding remarks.

2 Obligatory but Optional: When Semantics and Syntax Don't Match

2.1 Obligatoriness and Argumenthood: The Case of Instruments

Obligatoriness at the semantic and syntactic levels is a central criterion for determining whether a linguistic element functions as an argument or as an adjunct. This property is rooted in the principle that a verb's semantic structure determines its syntactic behavior (e.g., Gruber 1965; Chomsky 1981, 1986; Grimshaw 1990; Jackendoff 1990; Levin, Rappaport-Hovav 2005; Van Valin 2005).

Although the distinction between arguments and adjuncts may seem intuitive and straightforward, it is actually challenging to delineate, as certain elements resist clear classification. This is especially true for semantically obligatory but syntactically optional arguments, which cause a misalignment between a verb's conceptual structure and its syntactic behavior.

Instruments – the focus of this study – are a case in point. Consider (1): although a cutting instrument is always required semantically, it is always possible to omit the prepositional phrase or the clitic pronoun encoding this participant. Noteworthy, instruments behavior is similar across different languages (Koenig et al. 2003; 2008; Rissman 2013; Barbu 2020).

(1)	Gianni	(ci)	taglia	il	pane	(con	un	coltello)
	'Gianni	(with it =)	cuts	the	bread	(with	a	knife)'

Because of this mismatch between semantic and syntactic obligatoriness, and because traditional semantic and syntactic diagnostics of argumenthood are not conclusive, the status of instruments with respect to the argument/adjunct distinction has long been debated. They have been classified as arguments (Bresnan 1982;

Schütze 1995), secondary complements (e.g., Speas 1990; Cardinaletti 2016; 2019), but – more often – adjuncts (a.o. Dowty 1982; Rissman 2013). They have also been used to support a non-dichotomous, gradual representation of the argument/adjunct distinction (Choi 2010; Rissman et al. 2015) or viewed as semantic arguments but syntactic adjuncts (Barbu, Toivonen 2016; Rissman, Rawlins 2017). However, a clear consensus regarding their nature has yet to be reached.

2.2 Instruments Are Not (Always) Semantically Optional

To make the picture even more complex, a survey conducted on a large sample of English verbs (Koenig et al. 2003; 2008) showed that instruments, with respect to semantic obligatoriness, "fall into two categories: they are sometimes semantically required by the meaning of the verb, and they are sometimes not semantically required but merely permitted" (Koenig et al. 2008, 177). The authors further hypothesize that the existence of these two variants is endemic to the instrumental role and thus holds cross-linguistically.

The survey of Koenig et al. (2008) was later replicated on a sample of 762 Italian verbs (Suozzi et al. 2024), and the findings confirmed that the existence of two classes of instruments holds for Italian as well. Specifically, some verbs semantically require the presence of an instrument (*require*-verbs), while other verbs semantically allow, but do not require, the presence of an instrument (*allow*-verbs). Examples of *require*-verbs include *sparare* 'to shoot' and *tagliare* 'to cut', while *colpire* 'to hit' exemplifies the class of *allow*-verbs: one can hit something with a bat, but also by falling on it unintentionally.

The authors propose to classify semantically obligatory instruments as arguments, and semantically optional ones as adjuncts. They also conclude that the difficulty in classifying instruments stems from treating these two distinct classes as a single category.

2.3 The starting point: Barbu's (2020) experiments

The study conducted by Barbu (2020) specifically aims to investigate the status of instruments as arguments or adjuncts, considering both (a) semantic and syntactic obligatoriness and (b) the distinction between *require*- and *allow*- verbs. Her goal was to determine whether instruments are perceived as necessary participants at the semantic and syntactic levels, and whether differences emerge between *require*- and *allow*-verbs in this respect. To this purpose, she conducted two experiments, one aimed at "tapping into the speakers' semantic intuitions, and one into their syntactic intuitions" (Barbu 2020, 67).

Her study – replicated in English, Spanish, Turkish, and Romanian – shows that (a) semantically, instruments are perceived as necessary participants more frequently with *require*-verbs than with *allow*- ones, thus confirming the psychological validity of this distinction; and (b) even when instruments are mentioned as necessary participants semantically, they are not realized as necessary elements syntactically, confirming the aforementioned mismatch between the two levels.

She obtained consistent results across all the investigated languages, supporting the cross-linguistic validity of these characteristics of instruments.

3 The *Semantic* and *Syntactic* Experiments

Following Barbu (2020), we conducted one semantic and one syntactic experiment to investigate how Italian speakers perceive instruments at both levels. Our research questions (adapted from Barbu 2020) are:

I. Are instruments perceived as necessary participants or not, at the semantic and syntactic levels?
II. Do verbs licensing an instrument encode this participant in the same way that ditransitive verbs encode an indirect object?
III. Do speakers' (semantic and syntactic) intuitions confirm the existence of two verb classes, *require*- and *allow*-verbs? In other words, do verbs licensing an instrument pattern as a unified class, or do they divide into verbs that semantically require versus verbs that allow, but not require, an instrument?

Questions (I) and (II) are closely related: if instruments are perceived as arguments, we expect a high degree of similarity between their encoding and that of indirect objects in ditransitive verbs, either at the semantic or syntactic level, or both.

Finally, Barbu (2020, 66) formulated an additional research question: Does these instrument characteristics hold cross-linguistically? As mentioned above, she conducted her study in four languages, obtaining comparable results. By replicating her study in Italian, our research contributes to addressing this cross-linguistic question as well.

3.1 Design and instructions

The semantic experiment is conceived as an *empty box* task. Respondents are presented with a verb in isolation (in the infinitive form), and an empty box below it. They are asked to fill the box with any elements (people, objects or places) that must necessarily be present for the event described by the verb to take place, without any

time or space limits **[fig. 1]**. Since our respondents are naïve speakers with no formal training in linguistics, we provided two examples of possible completions in the general instructions of the experiments. Respondents were also reminded that certain elements, although they may be syntactically omitted, are nevertheless semantically required, and should therefore be listed. General instructions for the semantic experiment, together with their English translation, are reported in Table 1.

Table 1 General Instructions for the semantic experiment and their English translation

General Instructions: **Quali persone, oggetti o luoghi devono necessariamente essere presenti perché l'evento descritto dal verbo abbia luogo?**
Ad esempio, pensi ad un evento di **divorare**: un evento di **divorare** è completo e può accadere solo se c'è ***qualcuno che divora*** e ***qualcosa da divorare/che viene divorato***. Se manca uno di questi elementi, l'evento non può accadere. Quindi **"qualcuno che divora"** e **"qualcosa che viene divorato"** possono essere le sue risposte. Allo stesso modo, dato un evento di **regalare**, c'è sempre bisogno di ***qualcuno che regala, qualcosa che viene regalato*** e ***qualcuno a cui viene fatto il regalo***. Solo in questo modo l'evento è completo e può accadere. Quindi **"qualcuno che regala"**, **"qualcosa da servire/che viene regalato"** e **"qualcuno a cui il regalo viene fatto"** possono essere le sue risposte. Le chiediamo di pensare attentamente agli elementi necessari per completare gli eventi, e di scriverli tutti. Tenga a mente, mentre scrive gli elementi necessari, che **alcuni** di questi **possono essere lasciati fuori da una frase** (per esempio, si può dire ***Io ho regalato una sciarpa*** senza dire a chi l'ho regalata), **ma nell'evento sono comunque presenti e necessari** (anche se non si dice, è sempre presente qualcuno a cui il regalo viene fatto). Questi elementi **devono essere scritti**.
'Which people, objects, or places must necessarily be present for the event described by the verb to take place?
For example, think of an event of **devouring**: such an event is complete and can occur only if there is ***someone who devours*** and ***something that is being devoured***. If one of these elements is missing, the event cannot take place. Therefore, **"someone who devours"** and **"something that is devoured"** can be your answers. Similarly, in the case of an event of **giving**, there must always be ***someone who gives, something that is given***, and ***someone to whom the gift is made***. Only in this way is the event complete and can actually occur. Therefore, **"someone who gives"**, **"something that is given"** and **"someone to whom the gift is made"** can be your answers. We ask you to think carefully about the elements necessary to complete each event, and to list all of them. Please keep in mind that **some of these elements may be omitted in a sentence** (for example, one can say ***I gave a scarf*** without specifying to whom it was given), **but they are still present and necessary in the event** (even if it is not mentioned, there is always someone to whom the gift is given). **These elements must be written down**.'

The syntactic experiment is designed as a sentence completion task. Respondents are presented with an incomplete sentence and asked to

complete it with the words necessary to form a meaningful sentence. As in the semantic experiment, we provided two examples of possible completions. General instructions for the syntactic experiment, together with their English translation, are reported in Table 2.

Table 2 General Instructions for the syntactic experiment and their English translation

General Instructions:
Date queste frasi incomplete, aggiunga **le parole che servono per creare una frase di senso compiuto**. Ad esempio, data la frase **L'uomo ha divorato…,** possibili risposte sono **una pizza** oppure **un panino**, ecc.: (a) L'uomo ha divorato… **una pizza / un panino /…**Allo stesso modo, data la frase **Il portinaio ha regalato…**, possibili risposte sono: (b) Il portinaio ha regalato… **una sciarpa alla vicina/un pallone al bambino/…**
'Given these incomplete sentences, please add **the words necessary to form a complete and meaningful sentence.** For example, given the sentence **The man devoured…**, possible answers are **a pizza** or **a sandwich**, etc.: (a) The man devoured… **a pizza / a sandwich /…** Similarly, given the sentence **The doorman gave…**, possible answers are: (b) The doorman gave… **a scarf to the neighbor / a ball to the child /…**'

3.2 Materials

Both the semantic and the syntactic experiments consists of 64 experimental stimuli, each containing a different verb. The verbs used in the stimuli are the same across the two experiments. Of these, 16 verbs are transitive; 16 are ditransitive; 16 are *require*-verbs; finally, 16 are *allow*-verbs. The expected participants for each verb type are summarized in Table 3.

Table 3 Summary of the verb types used for the experiment and the participants they require

Verb type	Example verb	Agent/Subject	Patient/Object	Third participant/Argument	Instrument
Transitive (16 verbs)	Baciare 'to kiss'	✓	✓	×	×
Ditransitive (16 verbs)	Regalare 'to give'	✓	✓	✓	×
Require (16 verbs)	Tagliare 'to cut'	✓	✓	×	✓
Allow (16 verbs)	Uccidere 'to kill'	✓	✓	×	?

The original version of the study (Barbu 2020) included 19 verbs for each verb type. Based on existing classifications of Italian verbs, and a pilot study (completed by 58 respondents, 34 for the semantic experiment and 24 for the syntactic one), we modified the verb sample, which – in the final version of the study – contains 16 verbs for each verb type, for a total of 64 verbs. The complete list of verbs is displayed in Figure 1.

Transitive	**Ditransitive**	**Require**	**Allow**
Baciare 'to kiss'	Dare 'to give'	Disegnare 'to draw'	Superare 'to overtake'
Leccare 'to lick'	Consegnare 'to deliver'	Spazzare 'to sweep'	Sollevare 'to lift'
Annusare 'to sniff'	Vendere 'to sell'	Affettare 'to slice'	Bere 'to drink'
Mordere 'to bite'	Inviare 'to send'	Scolpire 'to sculpt'	Difendere 'to defend'
Afferrare 'to grab'	Portare 'to bring'	Dipingere 'to paint'	Pulire 'to clean'
Tirare 'to pull'	Raccontare 'to tell'	Scavare 'to dig'	Uccidere 'to kill'
Pizzicare 'to pinch'	Chiedere 'to ask'	Scrivere 'to write'	Affascinare 'to charm'
Abbracciare 'to hug'	Mostrare 'to show'	Tagliare 'to cut'	Aprire 'to open'
Calciare 'to kick'	Dire 'to say' (from transitive to ditransitive)	Tritare 'to chop'	Rompere 'to break'
Incontrare 'to meet'	**Regalare 'to give'**	Dissezionare 'to dissect'	Raccogliere 'to pick up'
Possedere 'to possess'	**Rubare 'to steal'**	Lavare 'to wash' (from *allow* to *require*)	Calcolare 'to calculate'
Credere 'to believe'	**Estrarre 'to extract'**	**Tosare 'to shear'**	Guardare 'to look at'
Rovesciare 'to spill'	**Togliere 'to remove'**	**Condire 'to season'**	Mangiare 'to eat'
Seguire 'to chase'	**Spedire 'to ship'**	**Cuocere 'to cook'**	Ispezionare 'to inspect'
Picchiare 'to beat'	**Mettere 'to put'**	**Arrostire 'to roast'**	Colpire 'to hit' (from *require* to *allow*)
Offendere 'to insult'	**Dedicare 'to dedicate'**	**Intagliare 'to carve'**	**Curare 'to cure'**

Figure 1 Verbs used in the semantic and syntactic experiments; new verbs are **bolded**, reassigned verbs are underlined

In the semantic experiment, each verb was presented in isolation. An example item is provided in Figure 2.[1]

1 Since no additional context was provided, we could not control for the polysemy of the verbs. In particular, two verbs that could have elicited different responses due to their multiple senses were *seguire* 'to chase' but also 'to follow someone on social networks' and *colpire* 'to hit' but also 'to impress/affect'. Crucially, both verbs belong to the same class (i.e., Transitive for *seguire*, and Allow for *colpire*) regardless of their interpretation. Furthermore, none of our respondents interpreted these verbs in a sense different from the one we intended.

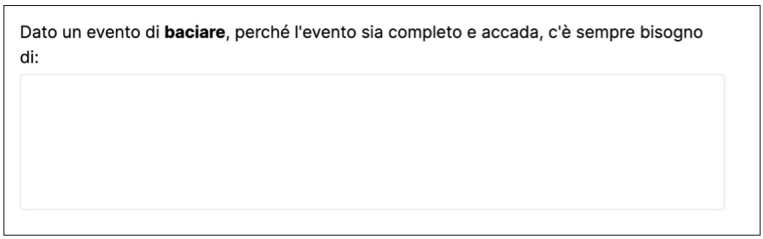


Figure 2 Example item for the semantic task. English translation: 'Given an event of **kissing**, for the event to be complete and to take place, there must always be:'

In the syntactic experiment, each verb was inserted into an incomplete sentence consisting of an agent/subject and the verb. To select a subject for each verb, we examined which nouns most frequently occur with that verb in the ItTenTen20 corpus (Jakubíček 2013) (e.g., *artigiano~scolpire* 'craftsman~sculpt', *corriere~consegnare* 'courier~deliver', etc.). Highly associated subjects (i.e., nouns that most frequently co-occur as subject of our experimental verbs) were chosen to construct sentences that were as natural as possible. An example item is shown in Figure 3.

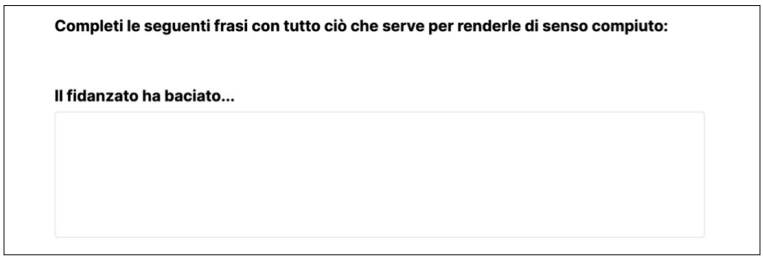


Figure 3 Example item for the syntactic task. English translation: 'Complete the following sentences by adding everything that is needed to make them complete and meaningful. **The boyfriend kissed...**'

3.3 Participants and Procedure

56 Italian adult speakers (29F, 26M, 1NB; M(age) = 34.71, SD(age) = 11.02) took part in the semantic experiment. Of these, 44.64% held a high school diploma, 21.43% a bachelor's degree, and 33.93% a master's degree. All participants reported Italian as their L1.

As for the syntactic experiment, the sample consists of 61 Italian adult speakers (26F, 33M, 2NB; M(age) = 33.88, SD(age) = 10.13). Of these, 1.64% held a middle school diploma, 40.98% a high school diploma, 26.23% a bachelor's degree, 27.87% a master's degree and 3.28 a PhD. All participants reported Italian as their L1.

The experiment was conducted online, using Gorilla Experiment Builder (Anwyl-Irvine et al 2018) to create and host both experiments.[2] Participants were recruited via Prolific, an online research platform that facilitates participant recruitment and management for online studies.[3] There was no time limit for completing the task, and participants received monetary compensation in accordance with Prolific's policies.

Before starting the experiment, each prospective participant read and accepted an informed consent, in compliance with the regulation (EU) 2016/679. After having accepted the consent form, they completed a demographic questionnaire, through which we collected information on their age, gender, education level, and first language.

For both experiments, participants were automatically redirected to one of the four experimental lists after completing the demographic questionnaire. Each list contained 16 items balanced for verb type, presented in a randomized order. Each participant saw only 16 items to prevent the task from becoming too long or demanding. Each experimental session lasted approximately 20 minutes.

Each list of the semantic experiment was completed by 14 participants. In the syntactic experiment, three lists were completed by 15 participants each, while one list was completed by 16 participants.

3.4 Results

3.4.1 Necessary participants

We started by examining how instrument verbs (*require-* and *allow-*) behave relative to ditransitive and transitive verbs. Ditransitive verbs are expected to require, and therefore elicit, a higher number of participants, while transitive verbs are expected to elicit the fewest. The behavior of *require-* and *allow-* verbs depends on whether instruments are mentioned as necessary semantic participants (in the semantic experiment) and/or as arguments (in the syntactic experiment).

The distribution of realized semantic participants/arguments by verb type and experiment is displayed in Figure 4. It should be noted that the maximum expected number of necessary participants is 2 (expected for ditransitive and possibly *require*-verbs, **[fig. 4]**. Indeed, since in the syntactic task the subject was already provided in the

2 https://www.gorilla.sc/.

3 https://www.prolific.com/.

stimuli, we followed Barbu (2020) in excluding the agent from the computation of produced arguments in this task.[4]

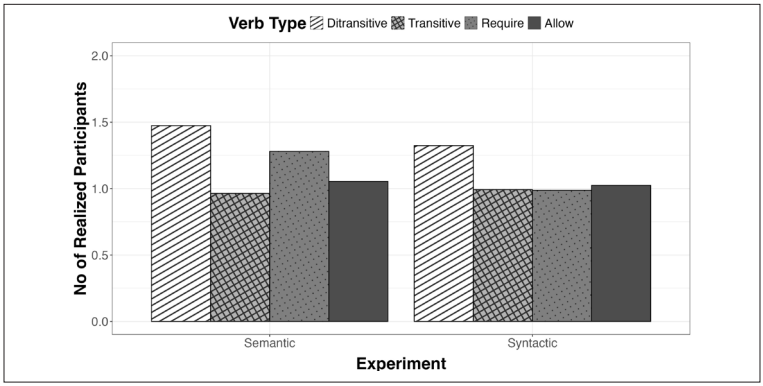


Figure 4 Distribution of necessary participants mentioned, by verb type and experiment

Overall, a similar number of necessary participants was produced in the two experiments (semantic: M = 1.18, SD = 0.48; syntactic: M = 1.08, SD = 0.34). Ditransitive verbs consistently elicited the highest number of participants (semantic: M = 1.47, SD = 0.58; syntactic: M = 1.32, SD = 0.49). The number of participants mentioned for transitive verbs was also consistent across the two experiments (semantic: M = 0.96, SD = 0.19; syntactic: M = 0.99, SD = 0.09), although slightly higher in the syntactic experiment, and is the lowest among all types.

Concerning instrument verbs, fewer participants were produced for *allow*-verbs in the syntactic experiment (semantic: M = 1.05, SD = 0.34; syntactic: M = 1.02, SD = 0.25). This decrease was more pronounced for *require*-verbs, which elicited a mean of 1.28 participants in the semantic experiment (SD = 0.55) but only 0.98 in the syntactic experiment (SD = 0.26). In the semantic experiment, ditransitive and *require*-verbs behave more similar to each other in terms of the number of participants produced, whereas in the syntactic experiment, *require*-verbs patterned with transitive and *allow*-verbs, eliciting a lower number of participants.

To further explore the behavior of each verb type across the two experiments, we analyzed the data using a linear mixed-effects model. The analyses were conducted in the R computing environment

4 For example, for the verb *abbracciare* 'to hug', the necessary semantic participants mentioned were *qualcuno che abbraccia* and *qualcuno che è abbracciato* 'someone who hugs' and 'someone who is hugged'. We only counted the patient as a produced argument.

(R Core Team 2025), employing the *lme4* (Bates et al. 2015) and *emmeans* (Lenth 2023) packages.

Experiment type (semantic vs. syntactic) and verb type (ditransitive, transitive, require, and allow) were included as fixed effects, while participants and items were modeled as random effects. The dependent variable was the number of semantic participants (arguments) produced. The model, therefore, predicts the number of participants as a function of the two fixed effects and their interaction. We also computed the estimated marginal means **[fig. 5]** and conducted *post hoc* pairwise comparisons with Tukey correction.

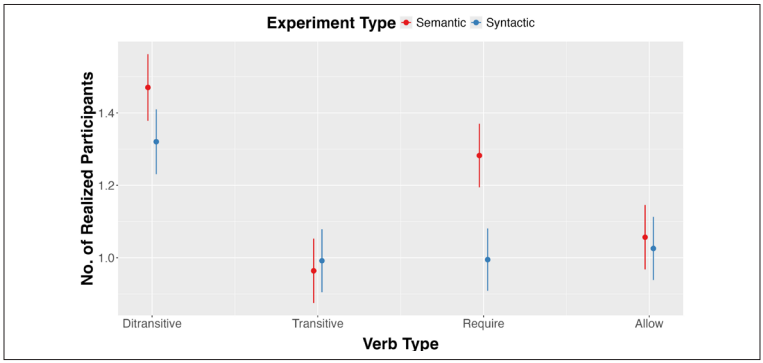


Figure 5 Estimated Marginal Means of number of participants, for all verb types and both experiments

This analysis revealed a significant interaction between verb type and experiment ($p < 0.001$), indicating that the number of realized participants depends strongly on both factors. Pairwise comparisons further clarify these patterns.

Comparing verb types, ditransitive verbs elicited a significantly higher number of participants than all other verb types in both the semantic (all $p_s < 0.001$) and the syntactic experiment (all $p_s < 0.001$). Transitive verbs, in contrast, elicited significantly fewer participants than all other verb types in the semantic experiment (all $p_s < 0.001$). However, in the syntactic experiment, transitive verbs differed significantly only from ditransitive verbs ($p < 0.001$) and not from *require-* ($p = 1.00$) or *allow*-verbs ($p = 0.99$).

Require-verbs elicited significantly more participants than *allow*-verbs only in the semantic task ($p = 0.005$), whereas the two verb types were comparable in the syntactic task ($p = 0.99$). Finally, ditransitive verbs elicited fewer participants in the syntactic than in the semantic experiment ($p = 0.005$). The decrease is even larger decrease for *require*-verbs ($p < 0.001$). No significant differences were observed for transitive or allow verbs across experiments ($p = 0.99$).

In summary, *require*- and *allow*-verbs elicit more participants in the semantic task – particularly *require* verbs, although they elicit less participants than ditransitive ones – positioning themselves between ditransitive and transitive verbs. Transitive verbs elicit fewer participants in both tasks. In the syntactic task, the difference between transitive and instrument verbs is minimal, while the difference between them and ditransitive increases.

3.4.2 Mentions of instruments

After having overviewed the behavior of *require*- and *allow*-verbs relative to ditransitive and transitive verbs, we can now focus exclusively on the mention of instruments. Figure 6 shows the distribution of instruments mentions in *require*- and *allow*-verbs by experiment.

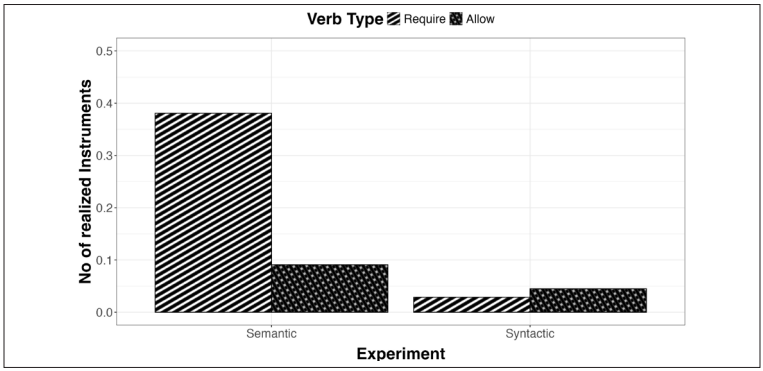


Figure 6 Distribution (%) of Instruments mentioned by experiment, for require and allow verbs

In the semantic experiment, *require*-verbs elicited 36.62% of responses containing an Instrument, whereas *allow*-verbs elicited only 9.22%. In the syntactic experiment, both *require* and *allow* verbs elicited fewer instruments than in the semantic experiment; notably, *require* verbs elicited even fewer instruments than *allow* verbs (4.23% vs. 5.00%).

To examine whether verb and experiment type significantly affect the realization of instruments, we used a generalized linear mixed-effects model fitted by maximum likelihood via Laplace approximation. Verb type and experiment type were treated as predictors, and the number of instruments produced was the dependent variable. We then calculated the estimated marginal means to perform pairwise comparisons with Tukey correction. All analyses were conducted in R

(R Core Team 2025), using the *lme4* (Bates et al. 2015) and *emmeans* (Lenth 2023) packages.

The analysis revealed a significant interaction between verb and experiment type ($p < 0.001$), indicating that the number of instruments produced depends strongly on both factors. Pairwise comparisons showed that, in the semantic experiment, *require*-verbs elicited significantly more instruments than in the syntactic experiment ($p < 0.001$) and more instruments than *allow*- verbs in both experiments ($p < 0.001$). In contrast, *allow*-verbs in the semantic experiment did not elicit significantly more instruments than *require*-verbs in the syntactic experiment ($p = 0.69$). Finally, *allow*-verbs did not differ significantly between the semantic and syntactic experiments ($p = 0.77$), and *require*- and *allow*-verbs did not differ in the syntactic experiment ($p = 0.99$).

In summary, *require*-verbs elicited significantly more instruments than *allow*-verbs in the semantic experiment, as well as more instruments than both verb types in the syntactic experiment, where instruments were rarely produced.

Finally, we compared the frequency of instrument mentions in instrument verbs with that of third arguments/indirect objects in ditransitive verbs and patients/direct objects in transitive verbs. The corresponding percentages for each experiment type are reported in Table 4.

Table 4 Mentions (%) of instruments and third arguments/indirect objects by verb and experiment type.

Verb Type	Semantic Experiment	Syntactic Experiment
Require	38.97%	4.12%
Allow	9.21%	5.00%
Ditransitive	53.46%	30.51%
Transitive	96.24%	99.53%

In the semantic experiment, *require*-verbs pattern more closely with ditransitive verbs than with *allow*-verbs, although instruments for *require*-verbs are produced slightly less frequently than third participants for ditransitive verbs. In the syntactic experiment, however, both *require*- and *allow*- verbs elicit far fewer instruments than ditransitive verbs with indirect objects. By contrast, patients and direct objects – prototypical semantic and syntactic arguments *par excellence* – are mentioned with frequencies close to 100% in both experiments.

4 Discussion

The results of our experiments provide answers to the research questions (I-III) outlined in Section 3. First, at the semantic level, instruments are perceived as necessary participants of *require*-verbs, whereas they are rarely mentioned in the case of *allow*-verbs. At the syntactic level, by contrast, they are not mentioned as necessary participants for either class. This finding answers our first research question (*Are instruments perceived as necessary participants at the semantic and syntactic levels?*) as well as our third one (*Do speakers' (semantic and syntactic) intuitions confirm the existence of two verb classes, require- and allow-verbs?).* Instrument verbs, indeed, do not behave as a unified class, particularly at the semantic level. At the syntactic level, on the other hand, the two classes are indistinguishable. These results also confirm the mismatch between the semantic and syntactic behavior of instruments, highlighting that they tend to be syntactically omitted even when they are perceived as necessary participants semantically.

With regard to the second research question, namely *Do verbs licensing an instrument encode this participant in the same way that ditransitive verbs encode an indirect object?*, we observed a similar behavior between ditransitive and require-verbs in the semantic experiment, although instruments were mentioned less frequently than third participants for ditransitive verbs.

This difference also represents the main divergence between our findings and those reported by Barbu (2020), which are otherwise highly similar. In her study, instruments were mentioned as semantically necessary participants of *require*-verbs more frequently than third participants for ditransitive verbs, and this pattern held consistently across all four languages investigated. This discrepancy could be due to the specific verbs we selected for Italian, or to our sample of participants.

Finally, Barbu (2020) interprets her results as evidence that instruments function as semantic arguments of *require*-verbs but not *allow*-verbs, while acting as syntactic adjuncts in both classes. More recently, accounts for Italian have linked instrument omission to their semantic recoverability, treating it as a case of argument omission (Suozzi et al. 2024). Future work will examine the *require*- and *allow*-verbs that elicited instrument production in both experiments, to assess whether their production patterns align with these accounts.

5 Conclusions

In this study, we replicated Barbu's (2020) semantic and syntactic experiments to investigate the status of semantically obligatory and

semantically optional instruments as arguments or adjuncts. Overall, our results closely replicate those of Barbu (2020). Specifically, our findings confirm the distinction between *require-* and *allow*-verbs, with the former eliciting a higher number of instruments than the latter in the semantic task. Moreover, the misalignment between semantic and syntactic behavior is maintained: instruments occur significantly more frequently in the semantic experiment but are rarely produced in the syntactic one. In conclusion, the debated status of instruments with respect to the argument/adjunct distinction is also observed in Italian and is tightly linked to the existence of the two verb classes, *require-* and *allow-*, as well as to the mismatch between instruments' semantic and syntactic behavior.

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