This volume explains and illustrates key methodologies in how to approach the study of modality, including storyboards, questionnaires, corpora research, experimental tasks for adult and child participants, as well as discussion of practical semantic fieldwork techniques. The contributions of a number of these methods are evaluated, detailing their successes and challenges, within case studies on underdescribed languages.

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METHODS AND INSIGHTS

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Jozina Vander Klok, Núbia Ferreira Rech and Simone Guesser (Eds.)
Modality in Underdescribed Languages

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Jozina Vander Klok, Núbia Ferreira Rech, and Simone Guesser

Introduction to *Modality in underdescribed languages: Methods and insights*

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1 The study of modality cross-linguistically

The study of modality—that is, how speakers express possible or necessary states-of-affairs, such as with the use of *may, must* or *should* in English—has recently grown to include more in-depth studies from a diverse set of languages. These include, for example, St'át'imcets; Salishan, Canada (Davis et al. 2009), Gitksan; Tsimshianic, Canada (Peterson 2010; Matthewson 2013), Badiaranke; Niger-Congo, Senegal, Guinea, Guinea-Bissau (Cover 2010), Japanese; Japonic, Japan, and Chinese; Sino-Tibetan, China (Narrog 2012), Javanese; Austronesian, Indonesia (Vander Klok 2013; Vander Klok and Hohaus 2020), Paresi; Arawakan, Brazil (Brandão 2014; Rech and Brandão 2018), Washo; Isolate, USA (Bochnak 2015), Luganda; Bantu, Uganda (Kawala et al. 2018), Daakaka; Austronesian, Vanuatu; and Saliba-Logea, Austronesian, Papua New Guinea (von Prince and Margetts 2019), Hebrew; Afro-Asiatic, Israel (Herberger and Rubinstein 2019), and Logoori; Bantu, Kenya (Gluckman and Bowler 2020), among many others. These studies have shown the need to further develop a grammatical typology of modality pertaining to the expression of at least three factors: (i) modal force (e.g., possibility vs. necessity), (ii) modal strength (e.g., weak necessity), and (iii) modal flavour (e.g., epistemic, based on someone's beliefs or knowledge; or deontic, based on a body of rules or regulations).

For example, it is known that various modal flavours can be expressed by distinct grammatical strategies, or by the same strategy. Languages such as English, Spanish or Portuguese express multiple modal flavours with the same lexical item; we understand these modals to be referentially ambiguous across the different modal flavours. In Brazilian Portuguese, for instance, the modal auxiliary verb *dever* 'must' is used to express deontic modality as well as epistemic modality, as shown in the following examples:[1]

(1) *Conforme o código de trânsito brasileiro,*
According.to DET code PREP traffic Brazilian
o motociclista ***deve*** *usar capacete.*
DET motorcyclist DEO wear helmet
'According to the Brazilian traffic code, the motorcyclist must wear a helmet.'

[1] The following abbreviations are used in the glosses: 1,2,3 first, second and third person; BEN benefactive; DEO deontic modality; DEM demonstrative; DET determiner; EPIS epistemic modality; INF infinitive; NEG negation; POSS possessive PREP preposition; SG singular; VM verbal marker.

(2) *Esse cão está com coleira. Ele* ***deve*** *ter dono*.
DEM dog COP PREP collar 3SG EPIS have owner
'This dog has a collar. It must have an owner.'

Example (1) expresses an obligation given certain circumstances (the (non-)use of a helmet by a motorcyclist) and a set of laws (Brazilian Traffic Code), illustrating deontic modal flavour. Epistemic modality, on the other hand, involves a state of information, which may be based on someone's knowledge, beliefs or understanding. In (2), the modal refers to the speaker's world knowledge, which includes the fact that dogs that wear a collar have an owner.

Other languages have distinct grammatical strategies, such as different lexical items, to express different types of modal flavour. This is the case for Paresi (Brandão 2014; Rech and Brandão 2018; Rech, Brandão and Wit 2018), St'át'imcets (Matthewson 2016), Gitksan (Matthewson 2013), Javanese (Vander Klok 2013), and Atayal (Chen 2018), among others. Examples (3) and (4) show distinct epistemic and deontic markers, respectively, in Paresi:

(3) *Maitsa* ***ala*** *maiha Æ=tyo-ita kalini*.
NEG EPIS NEG 3SG=come-INF today
'He must not come today.' (Rech and Brandão 2018: 2822)

(4) ***Maika*** *eze cracha ha=moka hi=hiye ha=wena-ne kitxiya*
DEO DEM badge 2SG=for 2SG=BEN 2SG=life-POSS until
'You must wear this badge during your visit.' (Rech, Brandão, and Wit 2018: 232)

In (3), the particle *ala* is used, which corresponds to a marker of epistemic modality in Paresi (Brandão 2014). In (4), a marker of deontic modality is used: the *maika* particle (Rech and Brandão 2018). Paresi is a language that marks the type of modal flavour in the lexicon, showing different vocabulary items for epistemic and deontic modal flavours. In contrast, these markers are both compatible with different modal force (necessity and possibility), as suggested by the discourse contexts in (5) and (6), and illustrated with the particle *maika*:

(5) Context: Diana likes to eat chocolate all the time when she is on vacation. So, Marina, Diana's mother, before going to work, gives the following instruction to the nanny:

Maika *makani weta taita chocolate Diana ana h=itsa.*
DEO tomorrow early only chocolate Diana BEN 2SG=give
'You must give chocolate to Diana only early in the morning. / Give chocolate to Diana only early in the morning.' (Rech and Brandão 2018: 2823)

(6) *Paula,* ***maika*** *h=ehokoty-ao.*
Paula DEO 2SG=liedown-VM
'Paula, you can lay down.' (Brandão 2014: 229)

Example (5) shows the *maika* particle in a context of obligation (deontic necessity). The same particle appears in (6), which describes a permission context (deontic possibility). These examples show that in Paresi the same lexical item is used to express necessity and possibility for deontic modality. That modals allow for variable force (possibly only seemingly) has

expanded the cross-linguistic typology of modality and how to formally account for variation in the expression of modal force, and in connection, modal strength (see, e.g., Rullmann, Matthewson and Davis 2008; Deal 2011; Narrog 2012; Bochnak 2015; among others).

Other recent studies on expressions of modal strength, such as weak necessity, has demonstrated the need for more in-depth cross-linguistic semantic fieldwork in this area. For example, Vander Klok and Hohaus (2020) show that the suffix *-ne* in Javanese derives weak necessity modals from strong necessity modals, as shown in (7) with *kudu* 'have.to', but this same suffix cannot attach to possibility modals to derive weak possibility.

(7) *Wong wong jawa* ***kudu-ne*** *iso ngomong kromo*,
person person java ROOT.NEC-NE CIRC.POS AV.talk high.speech
terus anak-e rojo yo ***kudu*** *iso.*
then child-DEF king PRT.YES ROOT.NEC CIRC.POS
'Javanese people ought to be able to speak Krama, and the Sultan's son has to be able to.'
(Vander Klok and Hohaus 2020: 2)

Javanese illustrates a different strategy to derive weak necessity than many Indo-European languages, which might lexicalize modal strength distinctions or use counterfactual morphology. This study reinforces that "…weak modal strength is not a uniform phenomenon across languages, neither lexico-morphologically nor semantically" (Vander Klok and Hohaus 2020: 42). At the same time, Javanese brings up the question of what might be a cross-linguistic paradigm of modal strength; for instance, whether languages prioritize grammaticalizing weak necessity over weak possibility.

Overall, these studies have shown the need to expand the theoretical analyses of modality based on new empirical observations. The present state of research into modality in underdescribed languages is limited to several in-depth studies, including the aforementioned ones, that consider modal flavour, force, and strength in developing a cross-linguistic typology of modal expressions, and how this typology integrates into the wider grammatical system of language. Other work on diverse languages has also advanced the interaction of modality expressions in other areas of research, such as on semantic and pragmatic change (e.g., Bybee et al. 1994; Narrog 2012), or with other grammatical components, such as on the split between epistemic and root modality and its interaction with syntax (e.g., Nauze 2008), as well as on the interaction of modality with temporality (e.g., Chen et al. 2017; Rullmann and Matthewson 2018).

However, in many past and present scholarly works, the study of modality in poorly investigated languages still tends to be based on translation. In semantic fieldwork, translations are at best clues to pinpoint the contribution of meaning of a morpheme, and cannot be used as a conclusive result (e.g., Matthewson 2004). At the same time, modality can be difficult to elicit and subsequently describe in field research because these expressions are often intertwined with tense, aspect, or mood, or the contexts necessary to elicit modality are too cumbersome. As a result, often a full description of how the semantic and/or morphosyntactic dimensions of modality are expressed in a given language is either lacking or translation-based in reference grammars, and inclusive, in-depth studies are left for future research.

Each of the above studies have provided new empirical insights to theoretical issues. Expanding the study of modality to a wider set of underdescribed languages will undoubtedly bring added value for the general enterprise of understanding modality and towards a cross-

linguistic typology of modal expressions. As Matthewson (2016: 28) aptly puts, "Assuming that our ultimate goal is a theory of universals and variation in human language, one important task for the field is to gather information about modality in unfamiliar and understudied languages. Formal research on such languages will allow us to develop a formal typology of modality, which in turn will facilitate greater theoretical understanding."

2 About this volume

In order to facilitate describing and analyzing aspects of modality across the world's languages, *Modality in underdescribed languages: Methods and insights* brings together key methods for how linguistic researchers can approach the study of modality, especially from the perspective of working together with speakers of underdescribed languages. This volume arose out of the 2019 "Intermediate meeting of the grammar theory working group" (National association for research and graduate studies in Letters and Linguistics - ANPOLL), organized by Simone Guesser (Federal University of Roraima, Federal University of Rio de Janeiro, Federal University Southern Border) and Núbia Ferreira Rech (Universidade Federal de Santa Catarina), with Jozina Vander Klok (Humboldt-Universität zu Berlin) as one of the invited speakers. At the time, Núbia Ferreira Rech led the project 'Modals, a study on the syntax-semantics interface: Brazilian Portuguese and Wapichana' (CNPq, process 424025/2016–2017) in collaboration with Simone Guesser. Through discussion with Jozina Vander Klok on the challenges and insights of using different methodologies to study modality, we partnered to solicit and bring together demonstrations of various methodologies and specific case studies on underdescribed languages within one volume.

This volume aims to facilitate the study of modality in more diverse languages by explicitly discussing and illustrating a nuanced set of methods beginning with practical semantic fieldwork techniques, and also including storyboards, questionnaires, corpora research, and experimental tasks stemming from studies used in language acquisition. As such, this book also aims to bring the study of modality to a wider participant base, such as in language acquisition. The methodological protocols tested and employed by the authors can be applied as cross-linguistic tools, with special reference for how this can be applied to underdescribed languages, ranging from in an oral setting or as based on a transcribed corpus. This forms Part I on *Methodologies for studying modality*, where the focus is on how linguists can use one particular method or the combination of different approaches to study modality in underdescribed languages.

Part I of the book begins with the chapter *Fieldwork techniques in semantics,* by Luiz Fernando Ferreira (Federal University of Rio de Janeiro) and Ana Müller (University of São Paulo). The authors present and illustrate a mix of fieldwork techniques that can be used to enhance the quality of the data collection on modality. Based on their experience conducting research on Karitiana, an Amazonian language of the Tupi family, the authors discuss the following techniques: (i) training sessions and control conditions; (ii) the use of storyboards with the goal of tracking and improving the consultant's attention level; and (iii) the use of online forms in data elicitation.

The second chapter *Studying modality through targeted storyboard constructions*, by Zahra Kolagar (Fraunhofer Institute for Integrated Circuits IIS) and Jozina Vander Klok (Humboldt-Universität zu Berlin), shows how modality can be studied using targeted construction storyboards, both within a language as well as a cross-linguistic tool. The authors present the insights and the challenges of using storyboards in fieldwork. Through discussion of the results on modality in Tabari, a Caspian language of the Indo-European family, their findings reinforce

the view that targeted construction storyboards are an important, adaptive, and fun tool in semantic fieldwork.

The third chapter, *Discourse contexts targeting modality in fieldwork: Lessons from conducting the modal questionnaire* by Jozina Vander Klok (Humboldt-Universität zu Berlin), evaluates and expands on the discourse contents in a revised questionnaire from Vander Klok (2014) created to target and identify different expressions of modality within a language. Based on results from a variety of independent studies on diverse languages and further fieldwork on Javanese, an Austronesian language spoken in Indonesia, the author considers the successes and failures of a number of the discourse contents in the original questionnaire, building new ones to overcome the current failures, and widening the coverage of the modal questionnaire to target a further range of modal expressions connected to modal strength. This chapter also presents a short overview of different applications of how this revised questionnaire can be conducted within and across languages, ranging from various types of elicitation to experimental implementation.

The fourth chapter of Part I, *Using corpora to investigate modal-temporal interactions* by Daniel Reisinger, Lisa Matthewson, and Hotze Rullmann (University of British Columbia), describes two corpus studies that focus on the temporal interpretation of modals: a larger case study using English data from COCA, and a pilot study on an underdescribed language, St'át'imcets (Salish), with data drawn from a story collection (Alexander 2016). The two parameters of temporal perspective and temporal orientation (Condoravdi 2002) are investigated, testing hypotheses developed in an earlier theoretical study (Rullmann and Matthewson 2018). The authors discuss the advantages and shortcomings of the corpus methodology to investigate modality, and for this study, they ultimately emphasize the importance of consulting with native speakers to interpret corpus data, showing the relevance of methodological pluralism.

The fifth and final chapter of Part I, *Methods for studying modality in language acquisition* by Ailís Cournane (New York University) and Valentine Hacquard (University of Maryland), focuses on approaches used to test modality in child language acquisition. Emphasizing some methodological paradigms of modal development, the authors consider the advantages and challenges associated with adapting these methods to study underdescribed languages. They also approach how fieldworkers might be able to make the best use of these methods in a way that complements existing methods, again showing the importance of bringing the results of mutiple methods together.

In Part I, the chapters focus on how different research methods can be implemented to conduct more in-depth research on modality, with the intention of inspiring more research on underdescribed languages, starting with practical (semantic) fieldwork guidelines. As each methodological approach has its own inherent advantages and disadvantages, these chapters offer ideas and illustrations of which method or which combination of methods may be the most fruitful to research modality on the language under study.

A further objective of this volume is to present descriptions and analyses of languages from different families in order to better understand how the variation between languages occurs in relation to modality marking, while at the same time, showing the challenges and successes of different methodological contributions. This objective forms Part II of this book, *Lessons from case studies from underdescribed languages*, where the primary focus is on data results with a secondary focus on the successes and challenges as based on the type of method or combination of methods used.

The underdescribed languages represented in Part II include Atayal (Formosan; Austronesian), Ye'kwana (Cariban), Mapudungun (Araucanian), ʔayʔaǰuθəm (Salishan), and Lung'Ie (Portuguese-based creole). This diverse set of languages adds to the focus of Part I on methodology, which were also illustrated by different, mostly under-studied languages, including Karitiana (Tupi), Javanese (Malayo-Polynesian; Austronesian), Tabari/Mazandarani (Indo-Iranian; Indo-European), St'át'imcets (Salishan), and English (Germanic; Indo-European). Overall, the languages represented in this volume span six different language families.

The first chapter of Part II, *On applying semantic fieldwork elicitation techniques to describe modality in Ye'kwana* by Isabella Coutinho (State University of Roraima) and Ana Pessotto (Federal University of Rio de Janeiro), shows how modality is expressed in Ye'kwana, a language spoken on the Brazilian and Venezuelan border (Costa 2018). The authors claim that the morpheme *-jhai* is used to convey an inference from evidence of the speaker's context interpretations, and may express possibility in epistemic or deontic contexts, while the morpheme *-ne* contributes to the interpretation of modal force. The authors describe how they achieve this result, testing the deontic possibility vs. necessity interpretations and epistemic possibility vs. necessity from the theoretical model proposed by Kratzer (1981, 1991) and the methodology for conducting semantic fieldwork from Mathewson (2004) and Vander Klok (2014). This chapter provides a detailed illustration of how they conducted the elicitation tasks and how the consultants responded, giving food for thought for linguists preparing for semantic fieldwork.

The second chapter, *Modality in elicited data and spontaneous texts: A case study of Atayal* by Sihwei Chen (Academia Sinica), addresses the advantages and disadvantages of employing two types of methods in studying modality: conducting direct elicitation with designed, controlled contexts and observing modal utterances in naturally produced stories which had been transcribed. The focus is on Atayal, an Austronesian language that has a typologically unique modal system in which all different types of modal flavour are grammaticalized except the expression of epistemic necessity. Through investigating Atayal modality, the author discusses to what extent the result that is reached based on elicitation can be validly concluded from textual observation.

The third chapter, *Lessons from the field: Irrealis mood in Lung'Ie* by Ana Lívia Agostinho and Núbia Ferreira Rech (Universidade Federal de Santa Catarina), presents and discusses the benefits and the drawbacks of using two methods, storyboards and traditional stories, for studying modality of underdescribed and endangered languages, focusing on Lung'Ie, a Portuguese-lexifier creole language spoken in São Tomé and Príncipe, located in the Gulf of Guinea. Based on the results from these two methods, they propose that *ka* is an irrealis mood marker in Lung'Ie.

The fourth chapter, *Analyzing ʔayʔaǰuθəm evidentials: Evidence for epistemic modality* by Marianne Huijsmans (University of British Columbia), focuses on two evidential clitics, the inferential clitic *čɛ́* and the reportative clitic *kʷ́a*, in ʔayʔaǰuθəm, a Central Salish language. She shows that these clitics are epistemic modals that contribute a strong modal claim to the at-issue content of the clause and an evidential presupposition. As the author points out, the behaviour of these evidentials provides counterevidence to the claim that evidentiality and epistemic modality are non-overlapping categories (De Haan 1999; Aikhenvald 2004); instead, these evidentials provide additional evidence that at least some evidentials are epistemic modals (e.g., Matthewson et al. 2007). Considering that the current and commonly used diagnostics for distinguishing between modal and non-modal evidentials have all been previously criticized, the

author has as her main goal to identify which diagnostics can be used to argue for a modal (or non-modal) analysis and how they can be implemented in a fieldwork situation.

The fifth and final chapter of Part II, *Parameters for the production of discourse contexts: Eliciting the semantics of obligations and desires in Mapudungun* by Pablo Fuentes (Universidad Católica de la Santísima Concepción), focuses on overcoming methodological challenges when eliciting primary data related to the expression of obligation and desire. Through a case study on the combination of the frustrative suffix (*-fu-*) with modals in Mapudungun, an endangered Araucanian language, the author shows that Mapudungun behaves like so-called transparent ought/wish languages (cf. von Fintel and Iatridou 2008). In addition to discussing methodological challenges related to the study of these phenomena, Fuentes provides a guideline for producing controlled scenarios that can be used as the basic content of appropriate discourse contexts.

Each of the chapters in Part II demonstrates the results of using various methods, and in some cases, comparing different methods. These methods included storyboards, traditional stories, theory-driven elicitation, textual observation from a corpus, and questionnaires, complementing a number of the methods discussed in Part I. The first three chapters in Part II (Costa and Pessotto, Chen, and Agostinho and Rech) provide in-depth illustrations of the methodologies used for studying modality (and mood) through case studies on individual languages. Through the case studies on modality in last two chapters in Part II, Huijsmans and Fuentes provide tools, one for diagnosing evidentials, and one for building discourse contexts for cross-linguistic use, which can then be applied in the way a researcher sees fit, such as elicitation, experimental, or questionnaire tasks.

Overall, the themes of Part I and II indicate the intertwined values of linguistic theory and data collection: linguistic theory informs our fieldwork, while at the same time, data collected using a variety of methodologies allows us to refine and update our linguistic theory, thereby broadening the empirical base of our understanding of a grammar of language.

We hope that *Modality in underdescribed languages: Methods and insights* will be an important and useful resource for researchers to consult on designing and implementing methodological protocols to investigate modality in underdescribed languages, and will set the stage towards expanding the diversity of languages under study in this domain.

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Fieldwork techniques in semantics

Abstract: This chapter focuses on techniques to be used in semantics fieldwork. More specifically, we discuss complementary techniques, such as the use of storyboards to contextualize elicitations, the implementation of training sessions and control sentences, and the use of Google Forms. These techniques are to be implemented alongside traditional methods, such as questionnaires, contextualized translations, truth judgement tasks, and storyboards. Good linguistic analysis heavily depends on the quality of the data collected during fieldwork. There are two kinds of factors that may impair the quality of the data. The first includes factors inherent to the methodology, such as the use of contexts in order to determine the exact truth conditions of a sentence. The great number and variety of contexts tends to make consultants feel fatigued or bored during elicitation sessions. The second kind of factors that may lead to poor quality data relates to external conditions. Examples of these are consultants having a bad day or failing to understand instructions because they are not fluent speakers of the contact language. Being prepared for these kinds of problems increases the chances of successful fieldwork. This chapter argues that the combination of different methods yields more reliable fieldwork results. We contextualize our argument by presenting data we have collected during fieldwork that turned out to be unreliable. We also argue that the implementation of the suggested complementary techniques has a positive impact on fieldwork sessions. It increases consultants' attention level and furnishes important feedback on how much we can rely on data from each particular consultant.

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1 Introduction

This chapter presents and illustrates a mix of fieldwork techniques – storyboards for contextualizing elicitations; the use of training sessions; the use of control sentences; and the implementation of elicitation sessions through online forms. It describes how they can be used to enhance fieldwork practices and improve the quality of the collected data when working with indigenous languages. We claim that adopting a variety of techniques provides the linguist with more reliable data. These techniques have been tested by one of the authors in the elicitation of data on tense and on bouletic modality in Karitiana, an Amazonian language of the Tupi family. Thus, we will be able to demonstrate their positive impact on the elicitation sessions.

Our main motivation for adopting the fieldwork methods that we describe in this paper were two problems we faced: fatigued consultants and their misunderstanding of the context or the task. These kinds of problems are not uncommon (see Louie 2015) and linguists should

pay special attention to them, since fieldwork that is carried out under such conditions may yield unreliable data, which, in turn, may lead to linguistic analyses that are not consistent with the facts of the language.

The causes of fieldwork problems may be inherent to the applied methods or external to them. Semantic fieldwork tends to rely on many pairs of contexts and sentences. Depending on the phenomenon under investigation, those contexts become rather long. Thus, it is not unexpected that the consultant will feel fatigued during an elicitation session. This illustrates a problem that is inherent to the method, as argued by Louie (2015). In order to solve it, we suggest replacing verbal contextualization for the use of storyboards in our truth judgement tasks. The inclusion of technological tools such as online forms also helps since they add novelty and make the elicitation more appealing to the consultants.

The cause for the lack of attention and misunderstandings may also be due to external factors. External causes for fatigued/bored consultants may include not getting enough sleep the previous night or not being fluent in the contact language. Linguists do not have control over these factors.[1] We illustrate how training sessions and control conditions may be used in fieldwork in order to detect whether consultants are paying attention to the given context when providing their judgements. These complementary techniques can be implemented within the most common methods in semantics fieldwork: questionnaires, contextualized translations, truth judgement tasks, and storyboards (see Matthewson 2004; Sanchez-Mendes 2014; Bochnak and Matthewson 2015, 2020; Vander Klok 2019; Vander Klok and Conners 2019). We show how the metadata they provide may help us decide how much we can rely on certain data.

Lastly, we discuss the beneficial impacts that technological tools may have on fieldwork. We illustrate this by showing how online forms such as Google Forms have helped us to improve the way we collect and analyze data, since they can: (i) add a novel element, making consultants more excited about the elicitation session; (ii) save data automatically in the cloud, reducing the risk of losing it; (iii) automatically tabulate data by exporting the results of questionnaires to Excel tables; (iv) automatically generate graphs; and (v) monitor incorrect options in control conditions and give us real-time feedback on consultants' attention level.

[1] The literature on semantic fieldwork (see Vander Klok and Conners 2019; Bochnak and Matthewson 2020) usually distinguishes the contact language from the target language. The contact language is the language the linguist uses to communicate with the consultant and present the contexts/storyboards whereas the target language is the language under investigation.

This chapter is divided into five sections. Section 2 discusses the impacts of internal and external conditions on fieldwork, using our own experience with the Karitiana community as an illustration. Section 3 presents the methods for data elicitation. In 3.1 we focus on the most common methods used in semantics fieldwork; in 3.2, we discuss one of the methods we have implemented in our fieldwork (i.e., the contextualization of data elicitation through storyboards). Section 4 discusses some complementary methods, such as the use of training sessions and control conditions. Section 5 discusses the positive impact of technological tools. It shows how elicitations can be implemented using online forms, which make storage and feedback on the quality of the data even easier. The last section presents our final remarks.

2 Internal and external conditions of fieldwork

Before discussing elicitation methods, we will discuss internal and external conditions of fieldwork based on the dynamics of our own fieldwork with Karitiana speakers. This discussion is relevant to the understanding of what motivates the implementation of the methods we discuss in sections 3 and 4.

Bochnak and Matthewson (2015: 3) pointed out that "each field situation is unique and presents its own set of challenges, and so the fieldworker must adapt methodological tools to meet the challenges encountered in the field." This means that linguists should always take the conditions of the field into account before preparing for fieldwork. There are two types of conditions that should be taken into account: (i) those inherent to the methodology itself; and (ii) those external to it. Ignoring one or the other will have a negative impact on the success of fieldwork.

Internal/inherent conditions have to do with the fact that we conduct fieldwork on the semantics of a language. The advantages and disadvantages of each technique must be weighed against this fact. For instance, an investigation of some aspects of the semantics of a language will yield better results with the use of contextualized elicitation than with the use of translations without the introduction of any context (Matthewson 2004; Sanchez-Mendes 2014). Thus, when choosing one methodology or another, linguists should be aware of the pros and cons of each method.

Taking into account external conditions is equally important when planning data elicitation. Linguists should devote some time to considering external facts. The answers to the following questions provide important information for linguists to guide their elicitation:

- Does the linguist travel to the speech community or do the speakers come to the linguist?
- How easy is access to the community and to the consultants?
- How many days can the linguist stay with the community or the consultants stay with the linguist? How long do these visits last? How frequent are they?
- What will the contact language be? How fluent is the linguist in it? How fluent are the consultants in it?
- Does the target language have a writing system? Do the consultants use it?

The success of field trips depends heavily on how adequate the methods are to those conditions. We will illustrate the importance of taking internal and external conditions into account by using the case of Karitiana, which is a language of the Tupi branch and of the Arikém family.

2.1 Internal conditions of fieldwork

Semanticists usually depend on a number of methods of data elicitation: translations; contextualized data elicitation, which can be contextualized translations or truth judgements (Matthewson 2004; Sanchez-Mendes 2014); questionnaires (Vander Klok and Conners 2019; Bochnak and Matthewson 2020); and storyboards (Burton and Matthewson 2015; Vander Klok 2019; Bochnak and Matthewson 2020). There are specific advantages to each of these methods. Contextualized data elicitation, for instance, demands less preparation time than storyboards. On the other hand, data from storyboards are more natural than data from contextualized elicitations. We go over the advantages and disadvantages of each of these methods in more detail in section 3.1.

In this section, we focus on the inherent conditions of our methods that had the strongest impact on our fieldwork with the Karitiana; specifically, the consultants struggled to pay attention to the given contexts. Louie (2015) points out that, because we tend to organize our elicitation in paradigms, our tasks become extremely boring for consultants. This is a big problem inherent to the method. Context is of primary importance in semantic fieldwork (Bochnak and Matthewson 2015) and the fieldwork that is carried out under these conditions may yield unreliable data, which, in turn, may lead to linguistic analyses that are not consistent with the facts of the language. Thus, linguists should invest in techniques that make the sessions more appealing and in techniques that help detect when consultants stop paying attention to the given contexts.

Paying close attention to the consultants' mood is a good way of spotting when they are fatigued or bored. In our case, the consultants: (i) show signs of exasperation/impatience; (ii) take a long time to answer the questions; (iii) try to change the topic; (iv) constantly ask for breaks for coffee/cigarettes, etc. Most of these signs have also been reported by Louie (2015).

Louie (2015: 64) comments on some cases of bored consultants. One of the indicators is when they start complaining that the contexts/sentences sound the same to them. We have heard similar complaints from Karitiana speakers, who usually say, "You just said that"; "This is the same sentence as the last one"; and "It's the same".

The second way to spot fatigued/bored consultants is within the data. Depending on the linguists' proficiency level in the target language, they will be able to spot some inconsistencies in the data. Example (1) illustrates this kind of inconsistency.[2] It comes from an elicitation session with a truth judgement task that targeted non-future tense in Karitiana, using Brazilian Portuguese as the contact language.

(1) Fieldworker: *Uma criança vê Inácio matando a cobra e começa a chorar. Você poderia dizer "Ombaky Inácio oky tykiri, nakahyryp õwã." para descrever essa situação?*
Consultant: *Sim*[3]

The presented sentence is glossed and translated in (2):[4]

(2) *Ombaky* *Inácio oky* *tykiri,* *Ø-naka-hyryp-Ø* *õwã.*
jaguar Inácio kill when 3-DECL-cry-NFUT kid
'When Inácio killed the jaguar, the kid cried.'

The judgement that the consultant gave us in (1) is not consistent because the sentence meaning is incompatible with the context. In the context, Inácio kills a snake, and the consultant's sentence states that he killed a jaguar. It is not uncommon for consultants to ignore the contexts in a truth judgement task. Let's see another example:

[2] This sentence belonged to the training session. The mismatch between context and sentence was there on purpose so we could verify if the consultants were considering the details of the presented context when evaluating the sentence. We talk more about training sessions in section 4.

[3] English translation as follows:
Fieldworker: A child sees Inácio killing a snake and starts crying. Could you say "Ombaky Inácio oky tykiri, nakahyryp õwã." to describe this situation?
Consultant: Yes

[4] We follow the Leipzig glossing rules (Comrie, Haspelmath, and Bickel 2015). The following abbreviations will be used here: 3 third person; ADV adverbializer; COP copula; DECL declarative; FUT future; IPFV imperfective; N non-; NOM nominalizer; OBL oblique.

(3) Fieldworker: *Elivar disse que quer tomar sopa e que ele vai tomar sopa amanhã. Você usaria "Elivar naka'yt sopa" para descrever esta situação?*
Consultant: *Sim*.[5]

The presented sentence is glossed and translated in (4):

(4) *Elivar Ø-naka-'y-t sopa.*
Elivar 3-DECL-ingest-NFUT soup
'Elivar ate/eats soup.'

The judgement that the consultant gave us in (3) is not consistent. Elivar wants to have soup in the future, and the sentence presented by the consultant is stated in the non-future tense.

We suspect that these inconsistencies in the data result from fatigued/bored consultants since they also showed signs of boredom during the elicitation session. However, this may not be the only cause. Another inherent problem to this method is *yes-biased* answers. Experimental studies with children have observed that some participants show the bias of accepting all experimental items as "true" (Schmitt and Miller 2010). Vander Klok and Conners (2019) also discuss the possibility of *yes-bias* in their fieldwork.

One last possibility is that the consultant did not understand the task and was providing us with grammaticality judgements instead of truth condition judgements. This may occur due to the internal conditions we have already mentioned. Since it is exhausting to pay close attention to the contexts and keep track of the changes from one context to the other, the consultants stop paying attention to them and start providing us with grammaticality judgements. However, misunderstandings may also be due to external factors, as discussed in the next subsection.

2.2 External conditions of fieldwork

External factors should also be considered when preparing for fieldwork. This subsection discusses external factors in light of our experience with the Karitiana community. Karitiana

[5] English translation as follows:
Fieldworker: Elivar said that he wants to have some soup and that he is going to have it tomorrow. Would you use "Elivar naka'yt sopa" to describe this situation?
Consultant: Yes

currently has about 400 hundred native speakers (Storto and Rocha 2018). The Karitiana people live mainly in five tribes inside their indigenous reservation, located in the northwest Amazonian rainforest. The red square in Figure 1 shows the reservation, which is located in the state of Rondônia, about 100 kilometers from the city of Porto Velho (the capital of the state).

Figure 1 – Karitiana reservation[6]

We usually do fieldwork once a year, either traveling to the Karitiana community or paying for the speakers come to São Paulo. Until this year, the community did not have Internet or phone signals. Therefore, access to the community and to the consultants was not very easy. Our grants allowed us to bring consultants to us or to stay in the community for one to two weeks. These are important conditions external to the fieldwork methods. If something went wrong in an elicitation session and we did not find it in time, we would only have another opportunity to check it in the subsequent year.

The small number of speakers makes Karitiana an endangered language. An important external condition to take into account is the fact that the Karitiana people mostly speak Karitiana among themselves. They only use Portuguese to talk to non-Karitiana speakers. Children learn Karitiana as their first language, and only start learning Portuguese when they go to school. Since Portuguese is a second language for them, the Karitiana people speak it with various degrees of fluency. This makes a very good example of an external condition one has to take into account when preparing for fieldwork. We chose Brazilian Portuguese as our contact language, since our informants are more proficient in Brazilian Portuguese than we

[6] Available at https://terrasindigenas.org.br/pt-br/terras-indigenas/3725. Accessed on March 31, 2020.

are in Karitiana. Nevertheless, our consultants are not native speakers of Brazilian Portuguese. Thus, depending on the consultant we work with, the contact language can be a problem and the consultant may have trouble following the linguist's instructions. This may lead to inconsistencies such as those illustrated in (1) and (3). We exemplify this with one kind of noise that occurred in the elicitation section targeting bouletic modality.

> The consultant was presented with a storyboard in which a couple, Maria (the wife) and José (the husband), go to a restaurant that cooks a whole fish that serves two people. They take a look at the menu in order to decide what to eat. Maria and José do not want to eat the same fish. Maria wants to eat Tucunaré and José wants to eat Tambaqui.[7] They leave the restaurant without ordering anything because José does not want to eat the fish that Maria wants to eat and Maria does not want to eat the fish that José wants to eat.
>
> After hearing the story, the consultant was given a pen and a paper with many sentences in Portuguese that should be translated to Karitiana. All sentences were tied to the storyboard, which served as context for them. After each sentence in Portuguese, there was a space for Karitiana consultants to write their answers.[8]
>
> Fieldworker instruction: *Com base na história que eu acabei de te contar, como você falaria "Hoje José quer comer Tucunaré" em Karitiana?* [9,10]
>
> Consultant's answer:

(5)	*Kiri*	*Ø-na-siki'y-j*	*José syryho-ty*	*em Karitiana*
	today	3-DECL-want.eat-FUT	José Tucunaré-OBL	in Karitiana
	'Today José wants to eat Tucunaré in Karitiana'			

When we went through the consultant's answer, we realized the consultant thought "in Karitiana" was a part of the sentence. Actually, all sentences in this elicitation ended with "em Karitiana".[11] Consultants may even be aware that they do not understand the task. Nevertheless, there is a good chance that they will not acknowledge this either because they

[7] Tucunaré and Tambaqui are Amazonian fish.
[8] Karitiana has a writing system that many consultants know how to use. This is another important condition because when we know an informant can write, we record the sentences, but we also ask them to write them down.
[9] English translation: Based on the story I have just told you, how would you say "Today, José wants to eat Tucunaré" in Karitiana?
[10] A reviewer pointed out that the linguist may be asking the wrong question, since the question seemed to be ambiguous. We agree that the oral instruction was ambiguous. Nevertheless, since consultants also had a written version of the sentence they should translate, it did not cross our minds that they would interpret the "in Karitiana" as part of the sentence they should translate because it was not in the sentences on the paper.
[11] Although not ideal, this insertion did not cause much harm since, if we ignore "em Karitiana," the sentence provided by the speaker seems compatible with the context.

feel ashamed or because they do not want the linguist to think they are unfit for the task and not invite them for further sessions.

Another example of an external problem is that the chosen date may not be felicitous. In 2018, Luiz Fernando Ferreira scheduled his fieldwork trip for the first two weeks in February. It was Carnival time in Brazil and Porto Velho, the city close to the Karitiana reservation, holds a big traditional street party that lasts for days. For this reason, consultants were eager for the elicitation sessions to finish as soon as possible so they could attend the party. Thus, knowing the community and their main festivities is also relevant because it can affect consultants' performance in elicitation sessions.

Still another external factor that must be taken into account is that not every consultant is good at every task. The linguist will only learn about consultants' distinct potentials after working with the community a few times. For instance, Karitiana elders usually perform badly on elicitations about the semantics of the language. They are illiterate, so the linguist can only rely on oral presentations of the relevant contexts. Moreover, many times their memories are not apt to keep track of the small changes from one context to the other. In addition, they tend to misunderstand their role as consultants and assume that they are there to teach us to speak the language. One case in point is the community's *pajé* – the traditional religious leader. He has been working with linguists for more than 20 years and has participated in many elicitation sessions. Even so, he gets upset when presented with ungrammatical sentences or when presented with several context/sentence pairs that he judges to be wrong. For him, it looks as though the linguist is insisting on the mistake and failing to learn.[12] However, he performs very well when asked for spontaneous data, such as traditional narratives and stories.[13]

Young speakers may also perform badly on the tasks assigned to them.[14] We have experienced many kinds of misunderstandings during fieldwork with such speakers. For example, the consultant in (5) was a young girl in her late teens participating in an elicitation session for the first time. Thus, the consultant's lack of experience was another external factor that played a role in the misunderstanding illustrated in this example. A linguist who has worked with a community for some time learns which members of this community are the best fit for certain tasks. Louie (2015: 49), in her work on Blackfoot (Algonquian), an

[12] Louie (2015: 64) reports the same problem in a footnote.
[13] Since storyboards are argued to be a more spontaneous way of eliciting data (see Burton and Matthewson 2015), we predict that those consultants could perform better in semantic elicitation using the storyboard method. However, we have not tested this.
[14] By young, we mean those 20 years old or younger.

Indigenous Canadian language, was able to identify a speaker as the ideal consultant. This was so because this speaker had already participated in previous fieldwork and was interested in/inclined toward analyzing his/her own language. This speaker tended to spontaneously provide extra facts about the data and to correct infelicitous contexts, replacing them with felicitous ones.

Our fieldwork experience has taught us that our best Karitiana consultants are the teachers at the village schools. They attended a college for indigenous people in order to obtain their certification as teachers, in addition to receiving some formal education in Portuguese. Therefore, they are also the most fluent in Portuguese, and are able to read and write in both Portuguese and Karitiana. Because of this formal education, if the linguist does not understand an answer, the consultants are able to write it down.[15] On top of that, a number of teachers have already participated in several fieldwork projects. This gives them some expertise, which leads to better performance. Moreover, they generally show more interest in working with their language as compared to other consultants.[16]

Given that we already know which consultants perform better at each task, the logical decision, from the fieldworker's perspective, would be to only work with the consultants that perform better in the methodology one intends to use. However, this is not so simple. Choosing only certain consultants can actually do more harm, because the community may see it as the linguist playing favorites. In our work with the Karitiana community, selecting particular consultants has created attrition in the past, which lead to problems when negotiating for the next research projects. Thus, creating and maintaining a good relationship with the community is a fundamental part of the fieldworkers' task. Louie (2015: 57) mentions how the elicitation may get interrupted by consultants who wants to tell a story; meanwhile, interrupting the consultant cannot be done easily without risking the cordiality of the relationship between the consultant and the linguist.

[15] One reviewer asked what we would recommend for linguists working in a community for the first time. Since experience seems to lead to better performance at fieldwork tasks, trying to work with consultants who have worked with linguists before can make the fieldwork easier. In case the community has never worked with a linguist, our personal advice would be to try to work with consultants who have received some formal education. We are aware that it is not always the case that one can choose the consultant. In such cases, investing some time to develop a good training session minimizes inconsistent data and using control sentences helps to assess consultants' performance in a given task, as demonstrated in section 4.

[16] Their interest in analysing the language might be an advantage, but it might also become a problem. Burton and Matthewson (2015) argue that, when presenting storyboards, it is important for the speaker not to know which structure the linguist is targeting, since they might then let prescriptivism guide their judgements.

Since it is not always possible to work with experienced consultants, our recommendation is to always adopt a training session and control conditions for the elicitation, as will be discussed in section 4.

2.3 Summary of the section

In this section, we presented distinct factors that should be taken into account when doing fieldwork. Some of them are inherent to the methodology itself, such as the need for long detailed contexts that are similar to one another. These tend to make the elicitation boring or tiresome for the consultants, as pointed out by Louie (2015). In such situations, consultants may also tend to become yes-biased (Schmitt and Miller 2010; Vander Klok and Conners 2019). Other factors are external to the methodology. Examples of such cases are: (i) not having a contact language in which both the linguist and the speaker are native speakers; (ii) choosing an inconvenient date; or (iii) having to work with an informant that is not very good at the demanded task.

Both internal and external factors may play a role in the elicitation of inconsistent data, as illustrated in (1), (3), and (5). The linguist must be aware of the factors that lead to poor quality data. Ultimately, low quality data may lead to linguistic analyses that are not consistent with the facts of the language.

In order to be better equipped to deal with these conditions, we argue that linguists should combine different methods in their fieldwork. In the next section, we show how we have used storyboards in our truth judgement tasks as an attempt to make the presentation of the context less boring/tiresome. As most of the external factors cannot be controlled, we also show how training sessions and control conditions are vital to mensurate the reliability of the data.

3 Fieldwork techniques

This section discusses the most relevant fieldwork techniques for semanticists and illustrates them by describing how we have implemented them in our fieldwork with the Karitiana. It is divided in two subsections. The first section briefly discusses the most usual techniques when eliciting data in semantics fieldwork (i.e., translations, contextualized data elicitation, and storyboards) and their pros and cons. The second section describes how we complemented them with some other, more sophisticated techniques and how that impacted our fieldwork.

3.1 Usual techniques in semantic fieldwork

As discussed by Bochnak and Matthewson (2015), fieldwork in semantics has very specific needs. Other linguistics subfields (e.g., phonetics, phonology, morphology, and syntax) deal with more tangible entities, such as phonemes, morphemes, and phrases. In these fields, the data itself provides information about grammatical and well-pronounced expressions. The same is not true for semantics. The main task of semanticists is to find out which meanings a given structure/word/morpheme has, as well as which meanings it does not have. The problem is that a semantically well-formed utterance provides the linguist with very incomplete cues about what that utterance means (Bochnak and Matthewson 2015).

Because of this, fieldwork techniques in semantics are construed to make the meaning under investigation as salient as possible. This is why simple translation is often condemned as an elicitation practice. Translation is considered a less efficient method in semantics fieldwork because it introduces high interference by the communication language in the target language. Another problem with translation is that ambiguities in sentences in the communication language may lead to inaccurate translations in the target language. For these reasons, data from translations are least reliable (see Matthewson 2004; Bochnak and Matthewson 2020). Another problem with using translations as a method is that they do not provide negative data.[17]

The contextualized elicitation method involves two steps: Contextualized translations and truth judgement tasks. Contextualized translation is more reliable since the presentation of contexts avoids ambiguities and minimizes the chances of getting inaccurate translations. Judgment tasks, on the other hand, are able to provide semanticists with the negative data they need for their analysis (Matthewson 2004; Sanchez-Mendes 2014). Contextualized translation tasks and truth judgement tasks are organized in a paradigmatic way (i.e., the contexts or the sentences differ minimally from one another) in order to allow for fine-grained semantic analysis. These elicitation methods are based on the following dynamics:

Example of a truth judgement task:

- Fieldworker: Think about this context (presents a context).
- Fieldworker: Would you use sentence *p* in such a context*?*
- Fieldworker: Now think about this other context (presents another context that differs minimally from the previous one).

[17] Negative data here refers to the meanings a sentence cannot have.

- Fieldworker: Would you use sentence *p* in such a context?

Three problems persist in the use of these methods: the interference of the communication language; the lack of naturalness of the data produced under these circumstances (Burton and Matthewson 2015); and the use of paradigms, which becomes mentally exhausting for consultants since it is hard for them to keep track of the minimal changes in the presented contexts and/or sentences (Louie 2015). Louie (2015) suggests that, to mitigate these problems, instead of presenting a context for each sentence in a paradigmatic way, we could use story arcs to create a context that includes several sentences at a time.

Story arcs are a way of making the elicitation more interesting for the consultant. Nevertheless, they do not solve problems related to the lack of naturalness, since the consultants still have to translate sentences. One elicitation method which avoids both problems are storyboards. In this method, the linguist presents a narrative in the communication language using a series of pictures. Then, the consultant has to retell this story in the target language using only the pictures. According to the authors, the use of storyboards avoids the interference of the communication language since the consultants rely on pictures when retelling the story. Burton and Matthewson (2015) compared the perception of stories collected with storyboards to spontaneous stories told to a linguist by Japanese native speakers. They found that the stories elicited with storyboards were perceived as being as natural as spontaneously told stories. The application of storyboards to fieldwork in a variety of languages has confirmed its effectiveness for semantic fieldwork (Vander Klok 2019).

Despite their advantages, storyboards may not be sufficient to elicit some aspects of the meaning of a targeted linguistic structure. Thus, Burton and Matthewson (2015) suggest to combine storyboards with other methods, such as contextualized data elicitation (contextualized translation and truth judgement tasks). A story arc is basically a storyboard with no illustrations. So, if the story arc technique is complemented with illustrations, we get to the contextualization of our translations and judgements tasks by the use of storyboards. Bochnak and Matthewson (2020: 14) mention that storyboards may also be used as visual representations of contexts.

One of the disadvantages of using storyboards and story arcs is that creating a story arc or a storyboard for data elicitation requires much more planning than the more traditional methods. A specific disadvantage of the storyboard method is that, since consultants speak freely and are guided only by the pictures, the data may be more difficult to gloss and analyze. Moreover, one may not get the targeted structure or meaning (see Vander Klok 2019).

3.2 Complementary methods for semantic fieldwork

So far, we have discussed inherent and external conditions that influence fieldwork based on our own experience with Karitiana. We have also discussed the usual methods for semantic fieldwork and their pros and cons. Considering what we have discussed so far, we now describe and illustrate some complementary methods that can be used in semantic fieldwork. We show how they have helped us to improve and guarantee the quality of the data elicited in our fieldwork with Karitiana consultants.

The techniques we describe have been tested by one of the authors in the elicitation of data on tense and on bouletic modality in Karitiana. Note that Karitiana has a future vs. non-future temporal system. The goal of our investigation of tense was to discover whether the non-future inflection conveyed either present or past or both present and past (See Matthewson 2006; Jóhannsdottir and Mathhewson 2008). We assume that an expression conveys bouletic modality when it expresses desires (Von Fintel 2006; Von Fintel and Iatridou 2017). Our investigations on the expression of bouletic modality in Karitiana aimed to discover which linguistic structures were used to convey desires in the language. The results of this research are described in detail in Müller and Ferreira (2020) and in Ferreira (2020; 2022). We briefly refer to the results here as well, but this chapter will focus more on the elicitation methods.

3.2.1 Contextualization through storyboards

In order to avoid boredom due to the use of a multiplicity of context/sentence pairs, we presented a single story that encompassed the context of the totality of sentences to be elicited (Louie 2015). Our story arcs were illustrated with pictures to make them more interesting and easier for our consultants to follow. Since an illustrated story arc is in essence a storyboard, we refer to this practice as a contextualization of many sentences with a storyboard. The reason we argue in favor of implementing storyboards as a part of translation and truth judgement tasks is to make the elicitation less boring and tiresome. The stories were presented to the consultants in a slideshow fashion. After the presentation, they were asked to perform one of two tasks: translate sentences from the contact language to the target language based on the story that was presented to them; or judge sentences in the target language as true or false according to the story.

In order to collect data on bouletic modality in Karitiana, we created five story arcs and illustrated them with pictures. The main characters in the stories were a couple, José and

Maria. The stories were presented to consultants in the communication language with slides.[18] One story arc we used is illustrated below:[19]

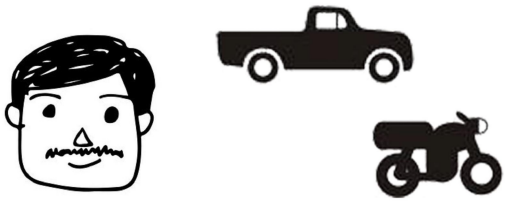
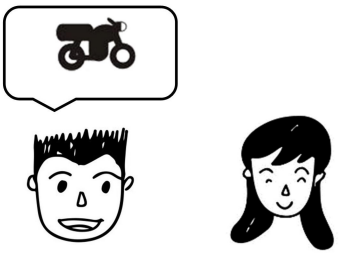
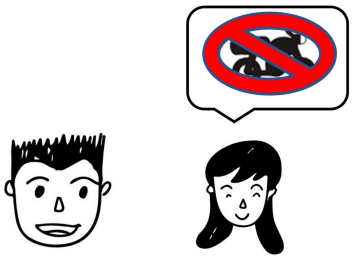
 This is Antônio. Antônio owns a car and a motorcycle.	He wants to sell the motorcycle and talks to his friend José about it.
 José is interested in the motorcycle and talks with Maria, his wife.	 She does not want José to buy the motorcycle because she believes that riding a motorcycle is very dangerous.

Figure 2. Example of illustrated story arc[20]

After being introduced to the story, we presented our consultants with two types of activities. The first was a contextualized translation of Portuguese sentences into Karitiana. We asked them to consider the story they had just heard when translating these sentences. This is illustrated below:

(6) Fieldworker: *Considering the story you have just heard; how would you say the sentence below in Karitiana?*[21]

[18] We were not the first researchers to use illustrations as a facilitating method in Karitiana fieldwork. Vivanco (2014, 2018) created a short-illustrated story to collect data on syntax. One difference is that, because semantic analysis requires an enriched context, our stories are relatively longer than those prepared by her.

[19] We would like to remind the reader that these are smaller, translated versions. The story arcs were originally in Portuguese and had about 8 slides. We reduced them to four in our example for the sake of space.

[20] All the pictures used to illustrate our story arc are from the Internet. For example, the pictures that illustrate this story arc came from the website https://pngtree.com/ [accessed on January 28th, 2020], where one can download PNG pictures for free as long as credit is given to the authors. The pictures of people came from the art "As adult PN" and the user who created it is *icontree*. The pictures of the car and motorcycle came from the art "high speed rail PNG" and the user who created it is *588ku*. One of the authors of this article created the story arcs and edited the pictures to match the story.

[21] This instruction was given orally by the fieldworker. The sentence was written on a piece of paper that was given to the consultant.

'Maria does not want José to buy Antônio's motorcycle.'

Consultant:	*Maria*	*Ø-na-aka-t*	*i-py'eep-Ø*	*Antônio*
	Maria	3-DECL-COP-NFUT	3-not.want-ADV	Antônio
	moto-ty	*José*	*ami-ty*	
	motorcycle-OBL	José	buy-OBL	

'Maria does not want José to buy Antônio's motorcycle.'

Why not just ask our consultants to retell the story? The problem with storyboards is that, since consultants can retell the story freely, they can omit a certain structure that was relevant for the linguist. In the case of the storyboard illustrated above, consultants may say "He wanted [$_{DP}$ the motorcycle]" instead of "He$_1$ wanted [$_{TP}$ t$_1$ to buy the motorcycle from Antônio", which was the structure we were aiming at. This kind of result may also occur with contextualized translations; however, in that case it is easier for the linguist to spot. One illustrative example of not getting the targeted data is reported in Vander Klok (2019). The author developed the storyboard 'Bill vs. the weather' targeting the use of modal expressions that did not come out when the consultant narrated the story freely. Ideally, if time and budget permit, the linguist should use both methods.

In the case of our fieldwork on bouletic modality, we used the data collected in this first stage to formulate hypotheses about the phenomenon. Our second step was to test those hypotheses by using a truth judgement task.

Note that there is no overt negation in sentence (6) produced by the consultant. Based on this fact, we concluded that the verb "py'eep" conveys a negative desire, which is a combination of bouletic modality and negation. In formal semantics, negation is analyzed as an operator over the sentence under its scope. Modality, on the other hand, is analyzed as quantification over possible worlds. Our hypothesis was that the verb "py'eep" both quantifies over all possible worlds compatible with the subject's desires and introduces a negation. The question this hypothesis poses is about the relative scope between the two operators introduced by the modal. We know that differences in scope give rise to different interpretations.[22] If negation is under the scope of the universal quantifier ($\forall w$:$\neg$ p(w) = *1*), sentence (6) should mean that Maria has the desire that José does not buy a motorcycle. If the quantification over possible worlds is under the scope of negation ($\neg\forall w$: *p(w) = 1*), sentence

[22] We thank Professor Marcelo Ferreira for pointing that out to us.

(6) should mean that Maria is indifferent towards José's buying of the motorcycle. The story arc supported the first analysis.

The truth condition judgement tests were applied to validate these conclusions. In this second step, we presented the context in the contact language and the sentence in Karitiana. We illustrate the task using English.[23]

(7) Fieldworker: Suppose José is planning to buy a motorcycle. Then, somebody in the tribe says the following: "Maria naakat ipy'eep Antônio mototy José amyty." If José buys the motorcycle, do you think Maria will be mad?

Consultant: She will be so mad she may even cut his penis off.

As can be seen above, the truth judgement task confirmed our initial hypothesis about the meaning of "py'eep." If the verb expressed Maria's indifference, there would be no reason for her to be so mad. Therefore, the use of storyboards to contextualize translations and truth judgements provided the kind of data we needed for our semantic analysis. One result of using storyboards was that we could work longer than usual. As mentioned in section 2, it was common for speakers to ask for coffee or time to smoke a cigarette, or grab their cell phones when they started getting bored with a task. This distraction would happen every 15 minutes to every hour, depending on the consultant. The storyboard kept their attention for longer periods and there were fewer interruptions. It took consultants about one hour to translate all sentences related to a storyboard. Most speakers remained focused for the entire session.

So far, we have discussed some complementary methods that can make elicitation more interesting and less tiring for consultants. One drawback of these methods is the time it takes to prepare elicitations that include their use (Louie 2015). They require a lot of creativity on the part of linguists to come up with stories that provide the data they need.

Using a methodology that is more interesting and less tiring for consultants is a good beginning. Nevertheless, it does not fully guarantee that consultants will pay attention to contexts. As we mentioned in section 2, there are many external factors that influence fieldwork such as bad timing, aptitude of consultants, or linguists not being one hundred

[23] This task was elicited with another consultant who had not heard the original story of storyboard. The story makes it clear that Maria does not want José to buy the motorcycle. The consultant who hears the story could favor the first reading, since this is the one it appears in the storyboard. Thus, in some cases, linguists cannot use the same storyboards for subsequent truth judgement tasks.

percent fluent in the contact language, etc. Linguists should be prepared for such factors; this is where complementary methods enter the scene.

4 Training sessions and control sentences as complementary methods

Making elicitation more interesting for consultants is a step in the right direction, but it does not guarantee that the consultants' level of attention will always be high. The predisposition of consultants on a given day depends on many external factors that are outside fieldworkers' control. Therefore, we propose that linguists should employ a variety of complementary techniques. These techniques will give linguists metadata on consultants' attention when they perform certain tasks. As a result, fieldworkers will be able to evaluate the reliability of their data. In this section, we argue for the benefits of adopting training sessions and control conditions in semantic fieldwork. These methods are commonly used in psycholinguistic experiments involving children. Schmitt and Miller (2010: 38–39) mention that:

> Experiments need both target and control conditions […] Experimental sentences in the target conditions(s) assess the linguist structure(s) that are of interest to the researcher. Experimental sentences in the control condition(s) ensure that any result in the experimental condition is due to the linguistic variable under study rather than some issue to the task procedure.
>
> In order to ensure that subjects, especially young children, understand the task procedure, it is important to have an initial training phase or a set of practice items at the beginning of the experiment. The number of training items will depend on the difficulty of the task procedure.

The problems faced by fieldworkers are similar to those faced by linguists who are working with children. Depending on their age and how complex the task is, the data from the experiment may be unreliable because the children did not understand what they were supposed to do. Studies on psycholinguistics use techniques to provide feedback on children's degree of attention and their understanding of the tasks: training sessions and control conditions (Crain and Thornton 1998; Schmitt and Miller 2010). Training sessions, as the name suggests, are sessions that involve tasks similar to those that consultants will be asked to complete. Control conditions in a linguistic experiment are situations for which researchers know the answers. They are there to provide feedback on speakers' understanding of the task and of their attention level. We argue that, since working with indigenous consultants poses

problems that are similar problems to those faced by psycholinguists, we should implement psycholinguistics methods in our fieldwork.[24]

The relevance of training consultants for a certain task has already been brought up in publications discussing semantics fieldwork. Burton and Matthewson (2015) point out that it is important for a consultant to repeat the storyboard and be trained in telling the story before doing it for real. Vander Klok and Conners (2019) also argue for the use of training sessions when eliciting data through questionnaires.

Training sessions should precede the elicitation. After the relevant instructions, the consultants go through a session in which the task is the same as the one in the elicitation session but involves only control sentences/contexts. This way, the fieldworker can verify whether the consultants understand the task.

We here illustrate how to go about a training session by describing our fieldwork on tense in Karitiana. The language has a future vs. non-future tense system (Storto 2002). An important question concerning this kind of system is whether the non-future tense is an ambiguous marker (meaning either present or past) or an underspecified marker (meaning both present and past at the same time). Matthewson (2006) and Jóhannsdóttir and Matthewson (2008) investigated two native Canadian languages - St'át'imcets (Lillooet Salish) and Gitxsan (Tsimshianic). These two languages also encode non-futurity in their tense systems. Thus, the authors faced the same question about the non-future tense that we faced for Karitiana. In order to answer that question, these authors used a truth judgment task. The consultants had to judge whether the sentences uttered after the presented context were true. The context and its correspondent sentence are illustrated below.

(8) Context: "Last year, John didn't go fishing, so he had no dried salmon last winter. Then summer came, and he went fishing. He got a lot of dried salmon. Fred didn't go fishing then, so Fred has no dried salmon now."[25]

(wa7) zúqw-cen s-John múta7 s-Fred
(IPFV) die-foot NOM-John and NOM-Fred
'John and Fred were/are starving.' (not at the same time)

(Matthewson 2006: 22)

[24] The cause of the problems may be different. In a psycholinguistic experiment, a child may not understand a task due to lack of maturity, whereas for fieldwork with indigenous consultants, the misunderstandings may be due to the consultants or the linguist not being 100% fluent in the contact language.
[25] The contexts were presented in St'át'imcets (Lillooet Salish). We have used their English translations to save space.

The fact that a sentence such as in (8) comes out as true in a context in which the described eventuality occurs both in the past and in the present shows that the non-future tense in the language under investigation is underspecified. We decided to investigate the semantics of the non-future tense in Karitiana using the same kind of truth judgment tests, as illustrated below.

(9) Context: "A professora Luciana estava em Porto Velho mês passado, mas ela já foi embora. Depois da Luciana ir embora, a Ana chegou e está na cidade neste momento." Nesta situação, você poderia dizer "Luciana Ana naakat iakat Porto Velho pip?"[26]

Luciana Ana ∅-naakat *i-aka-t* *Porto Velho pip*
Luciana Ana 3-DEC-COP-NFUT 3-COP-ADV Porto Velho in
#"Luciana and Ana were/are in Porto Velho." (not at the same time)

(Müller and Ferreira 2020: 14)

In order to avoid the problems described in section 2, we developed a training session with 10 context/sentence pairs. Some of the sentences were true in the context, as illustrated by context/sentence pair (10) below. They represented half of the training session (five pairs of context/sentences). We also included five sentences that could be judged true, but were not grammatical, as illustrated by sentence (11). Sentence (11) is ungrammatical because the word "kytopo" should be marked for oblique case, as in "kytopoty", since the verb "iengyt" is intransitive in the language.

(10) Context: Uma cobra aparece na casa. Inácio mata essa cobra. Você usaria "Inácio naokyt boroja" para descrever essa situação?[27]

( ) Sim ( ) Não

(11) Context: Mauro bebeu muita chicha ontem na festa e vomitou.
Você usaria "Mauro naakat iengyt kytopo" nessa situação?[28]

[26] Context: Professor Luciana was in town (Porto Velho) last month, but she has already left. After Luciana left, Ana arrived and she is in the city right now." In this situation, can you say "Luciana Ana naakat iakat Porto Velho pip?"

[27] Context: A snake appears in the house. Inácio kills this snake. Would you use "Inácio naokyt boroja" to describe this situation?

( ) Yes ( ) No

Inácio *∅-na-oky-t* *boroja.*
Inácio 3-DECL-kill-NFUT snake
'Inácio killed the snake'

( ) Sim ( ) Não

There were also pairs in which the sentences were grammatical but not true, as illustrated in examples (1) and (2) in section 2. In these cases, the context states that Inácio killed a snake, and the sentence in the target language says that he killed a jaguar. Another example of mismatch is illustrated in examples (3) and (4) in section 2, in which the context describes a future event, but the sentence in the target language is marked for the non-future.

Since the linguist knows the appropriate answers to all the context/sentence pairs presented in a training session, he/she is able to find out whether consultants understood their task. In case of poor performance, they may also be able to find out what the problem was. For example, in our training session for the investigation of the meaning of the non-future in Karitiana, the perfect scenario was the one in which a consultant answered YES to the sentences that were both grammatical and true, such as in (8), and rejected all the others. If the consultant rejected only the ungrammatical sentences, we would be able to conclude that they were giving grammatical judgements instead of truth condition judgements. If they consistently accepted sentences (3), (5), and (9), we would know that they were not paying enough attention.

A total of five consultants participated in in individual one-on-one training sessions.[29] Both the linguist and the consultant sat in front of the computer. Contexts were then presented through Google Forms. We read the context out aloud to the consultants. The consultants answered the question orally and the linguist marked 'yes' or 'no' according to their answers. Table 1 presents the percentage of correct answers for each consultant.

Table 1 - Consultant correct answer rates[30]

	Context 1	**Context 2**	**Context 3**	**Context 4**	**Context 5**
Consultant 3	yes	no	no	yes	no
Consultant 5	yes	yes	yes	yes	yes

[28] Context: Mauro drank a lot of chicha (A drink prepared for celebrations and rituals using fermentation) yesterday at the party and vomited. Would you use "Mauro naakat iengyt kytopo" in this situation?
( ) Yes ( ) No

**Mauro Ø-na-aka-t* *i-engy-t* *kytopo.*
Mauro 3- DECL-cop-NFUT 3-vomit-ADV chicha
'Mauro has vomited chicha.'

[29] For this research, we have worked with 11 consultants, but not all of them answered the questionnaire about tense. The complete training session is available in Ferreira (2022).

[30] The wrong answers are marked in red.

Consultant 9	yes	yes	no	yes	no
Consultant 10	yes	no	no	yes	yes
Consultant 11	yes	no	no	yes	no

	Context 6	**Context 7**	**Context 8**	**Context 9**	**Context 10**	Rate
Consultant 3	yes	no	no	yes	no	100%
Consultant 5	yes	no	yes	yes	no	60%
Consultant 9	no	no	no	yes	no	80%
Consultant 10	yes	no	no	yes	no	90%
Consultant 11	yes	no	yes	yes	no	90%

Experimental psycholinguists recommend creating a small training session of around five items. In our case, short training sessions with only five items would not be enough to train our consultants. Our training session had ten items and, by the end of the session, there were still consultants who had problems to understand the task such as consultant 5 in the table above. For experiments with children, short training sessions might not be a problem because children are often dismissed (Crain and Thornton 1998) if they do not do well in those short training sessions. Thus, these short sessions are used more as a filter than as a training method *per se*. Proper training would involve explaining the task one more time to the consultants who performed badly and running another training session.

What do we do when a consultant does not do well on the training session, as was the case for Consultant 5? When this happens with children, they are often dismissed from the study (Crain and Thornton 1998). However, dismissing a consultant after just a few questions could lead to a political problem with the tribe, depending on who the consultant is. We decided to go through all the context/sentence pairs with all the consultants and used the control conditions to monitor their performance.[31]

The control conditions were context/sentence pairs similar to those used in the training session. They presented true grammatical sentences, false and grammatical sentences, and true and ungrammatical sentences. They were spread throughout the task (for every 10 context/sentence pairs, three were control pairs). Having control sentences throughout the entire elicitation session was important. The fact that a consultant did well on the training

[31] One option might be to have a backup training session so the linguist can explain the instructions again and apply the backup training session only for those cases. Unfortunately, we did not anticipate the need for a backup training session. So, we do not know how effective it is to repeat the instructions one more time and reapply another training session.

session does not guarantee that he/she would not get bored or fatigued in the middle of the session. Here is the overall rate for the consultants using the control sentences:

Table 2 - Consultant correct answer rates

	Context 1	**Context 2**	**Context 3**	**Context 4**	**Context 5**
Consultant 3	yes	no	no	yes	no
Consultant 5	yes	yes	no	yes	no
Consultant 9	yes	no	no	yes	no
Consultant 10	yes	yes	no	no	no
Consultant 11	yes	no	no	no	no

	Context 6	**Context 7**	**Context 8**	**Context 9**	**Rate**
Consultant 3	no	yes	no	no	100%
Consultant 5	no	yes	yes	yes	66%
Consultant 9	no	yes	no	no	100%
Consultant 10	no	yes	no	no	77%
Consultant 11	no	yes	no	no	88%

The training session seemed to have a positive impact on consultant 9, who started hesitantly but, by the time the training session was over, was comfortable with the task. Her answers to the control sentences showed her improvement. Nevertheless, overall the training sessions did not seem to improve the consultants' rate of correct answers. Consultant 5 performed poorly in both the training session and the control sentences; Consultant 3 had outstanding performance in both the training session and the control sentences.

So far, we have discussed the implementation of control methods for traditional context/sentence pair elicitations. For the story arc method, we used a different control method, which was a true or false test to be applied immediately after the presentation of the story. As mentioned in section 2, not all Karitiana speakers have the same fluency in Portuguese. Therefore, we developed this true or false test in the communication language as a way to verify how much of the context the consultant had absorbed. For instance, after presenting the storyboard in Figure 2, the speaker had to complete the following test[32]:

[32] The test was, of course, presented in the contact language – Portuguese.

According to the story you just heard, mark (T) if the sentence is true or (F) if the sentence is false.	
Antônio wants to sell his car.	( )
Antônio wants to sell his motorcycle.	( )
José wants the motorcycle.	( )
José wants the car.	( )
Maria does not want José to buy the car.	( )
Maria does not want José to buy the motorcycle.	( )

Two consultants heard seven storyboards and answered true or false questions, which was our control method. The control was carried out after the consultants had finished the contextualized translations or the truth judgement tasks described in section 2. Table 6 shows a comparison of the results of these two consultants on these tests. We then determined their attention level based on how many correct answers they gave on the tests. The true or false questionnaire had six sentences. If the consultant answered three of them correctly, we would conclude that they were probably guessing, since they did achieve a rate of attention of 50%. The results for each consultant are presented in the table below.

Table 3 – Consultants' rate control 2

Storyboard	Consultant 4	Consultant 5
1	61%	88%
2	54%	67%
3	38%	84%
4	70%	75%
5	-	90%
6	46%	74%
7	58%	91%
TOTAL	54%	81%

As can be observed, the control test was able to provide information about how much the consultants had grasped from the story. What the table above shows is that Consultant 5 had a good understanding of the context that was presented to him, whereas Consultant 4 did not. This indicates that Consultant 4 either did not understand the stories or did not pay attention to them. Independent of what was causing it, what is important is that the data from contextualized translations from this consultant should count as mere translations, and the data from the truth judgement task should not be considered at all.

We also believe that the true or false questions we used as a control method can be used, not only as a control method, but as motivators, contributing to increasing speaker attention

levels. Some consultants started to pay much more attention after completing the first round of tests. Some even asked to go back to the slides to reread the story independently one more time before we proceeded to the questions. Based on his/her poor performance, we decided not to consider data provided by Consultant 5 (Table 2 and Table 3) in our analysis of tense in Karitiana. Moreover, when consultants disagreed on a judgement, we checked the metadata before opting for an analysis. If Consultant 5 and Consultant 10 answered 'yes', and Consultant 3 and Consultant 9 answered 'no' to the same question, the fact that the latter paid more attention than the former is something that we took into account. How much weight should be given to such results is a question each linguist has to answer based on their fieldwork experience. These methods proved very fruitful in letting us know how confident we could be about the data we elicited.

5 Technology and fieldwork

This section describes how certain virtual tools can be used to help semanticists in preparing for fieldwork and in facilitating linguistic analyses. We report our experience with online forms that have gained popularity as tools for collecting data. These forms allow linguists to create questionnaires and store them on the Internet, so that anyone with a computer available and access to the Internet will be able to answer the questions from the elicitation. We argue that there are advantages in the use of these forms, even in face-to-face, one-on-one fieldwork settings. There are websites that enable the creation of forms. We present examples of some of the tools offered by these websites using Google Forms, which is the form builder from Google.[33]

Before presenting some of the tools a form can offer, we start by pointing out that online forms, as the name suggests, stay online. Thus, they can only be implemented as an elicitation method if linguists have access to the Internet in the field. In our case, it is only possible to make use of online forms when we work with the Karitiana people at the University of São Paulo, or when we work with them in Porto Velho city. Even though there is access to the Internet in their village, their electricity comes from generators that are only turned on at night. For this reason, there is no stable Internet connection and, therefore, it is not feasible to use online forms.

[33] One may access it through <https://www.google.com/forms/about/>.

One of the useful tools that Google Forms provides is that it automatically saves the data on Google Drive. Therefore, the data is very safely stored; if something happens to a researcher's computer, the data can be easily retrieved by another computer.[34] Let us illustrate the use of online forms with the truth judgement task concerning tense in Karitiana. This task was entirely created using Google Forms. We start it with an identification section, as illustrated in Picture 4 below.

Figure 3 - Online form identification section[35]

This introductory section provides information about the elicitation to consultants and, at the same time, is used to obtain some metadata, such as the consultant's name and the date of their registration. Linguists can ask more questions (e.g., age, gender, etc.) if relevant for

[34] This was one important point that made us choose Google Forms. The University of São Paulo has an agreement with Google to provide its professors and students with unlimited space on Google Drive. When using Google Forms, we do not have to worry about space. We recommend that linguists do research on form builders and choose those that are the most adequate according to their fieldwork conditions.

[35] Translation:

Tense in Karitiana

This form's purpose is to investigate tense expression in Karitiana's language verifying the possible scenarios in which some sentences are accepted. The answers to this questionnaire are confidential.

*Compulsory

Name*: Your answer_____

Next

the research they are conducting. Including an introductory section to collect metadata is relevant, since "such information makes it possible to interpret the data with a finer-grained approach than perhaps anticipated" (Vander Klok and Conners 2020: 90). For instance, Storto (2002) argues that the Karitiana verbal prefix *pyn-* has a deontic use. Ferreira (2017) investigated deontic modality in the language. Contrary to expectations, the *pyn-* prefix did not appear spontaneously in his data. Instead, consultants used a modal verb *pydn*. Ferreira's (2017) hypothesis was that, since Storto's data came from narratives and her consultants were much older, the deontic prefix *pyn-* was becoming archaic and was only used by elders in traditional narratives. This conclusion was made possible because the metadata on consultants' ages was available.

Another relevant tool is a test mode that Google Forms allow us to create. This test is illustrated in Figure 6 below. Once the test mode is activated, linguists can go to their control conditions and mark the appropriate answers, as illustrated in Figures 4 and 5.

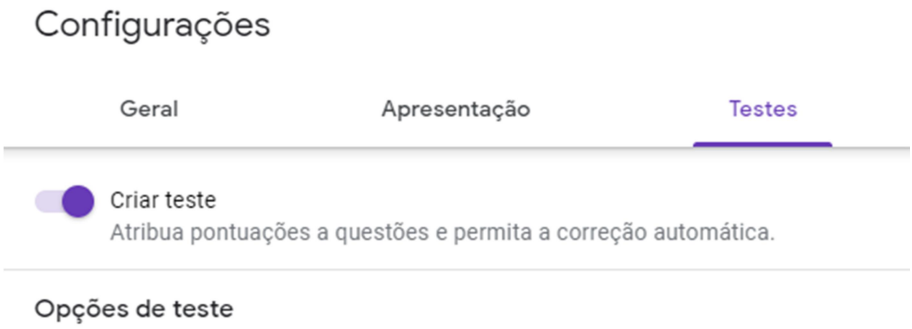


Figure 4 - Test mode activation[36]

[36] Translation:

Settings

General Presentation Tests

Create test
Attribute scores to the questions and allow automatic correction.

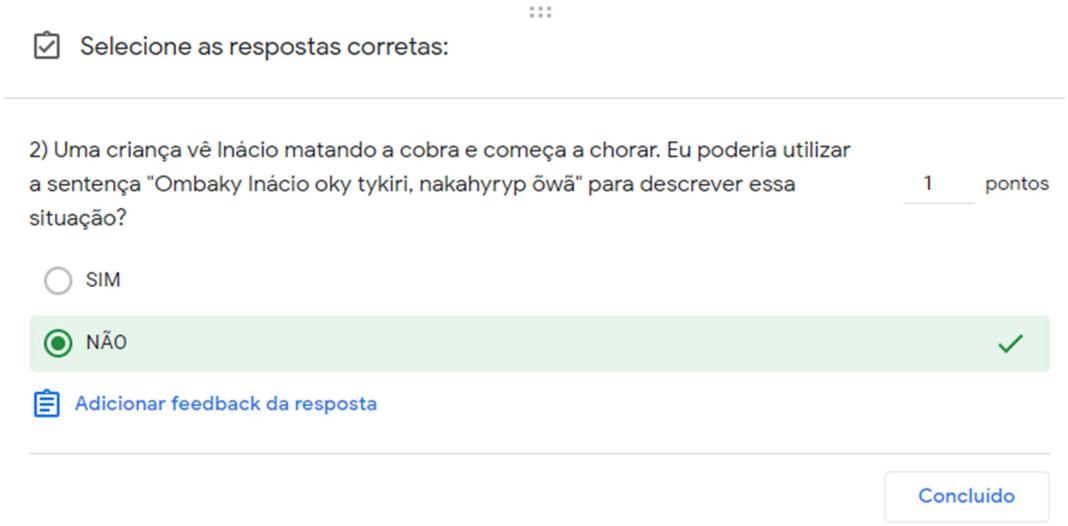


Figure 5 - Selecting the appropriate answer[37]

Once the test is created, a score is available immediately after each elicitation session. It shows the consultant's total score for a given questionnaire, and their score for each section. Thus, combining the control procedures described in the previous subsection with the tools described in this subsection provides fieldworkers with an easy and fast way of assessing consultants' performance in the training session and control conditions that the linguist has developed.[38]

[37] We presented the translation for this question when we discussed example (1).
[38] The score of the training sessions and control conditions from the elicitation sessions on tense were not communicated or discussed with the consultants.

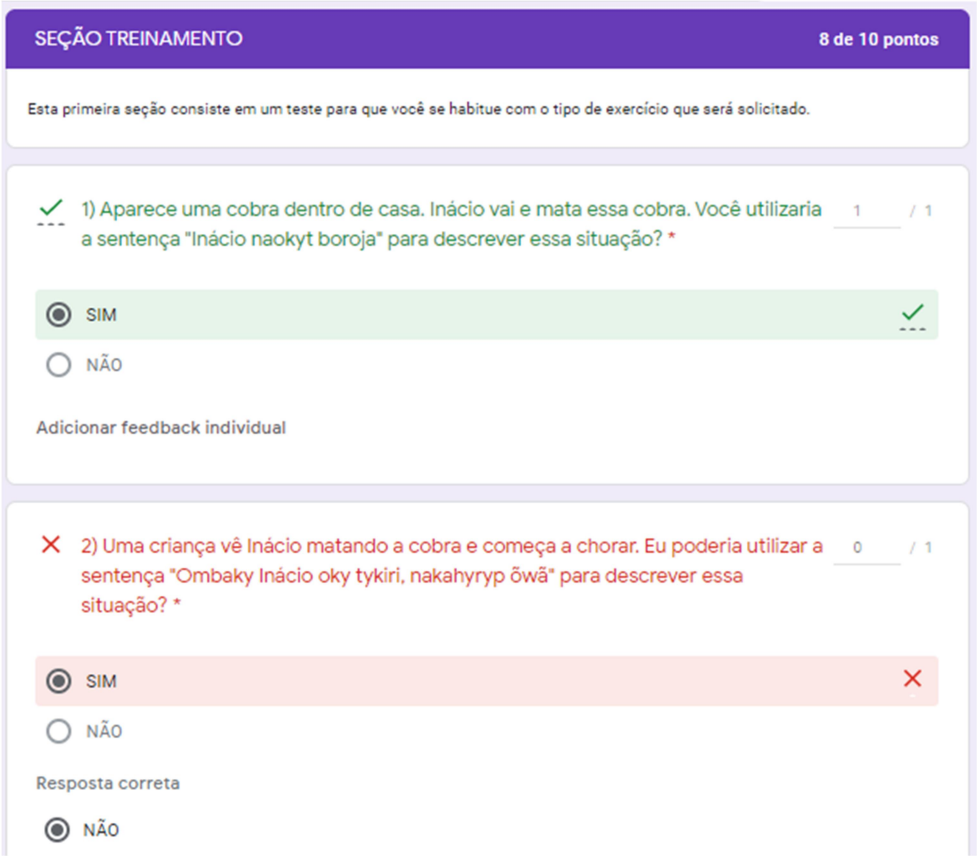


Figure 6 - Control score[39]

One last aspect of Google Forms that can facilitate linguists' work is the ability of the forms to automatically generate statistical graphs from consultants' answers, as illustrated in Figure 8 below. We do not claim that it necessarily makes sense to analyze fieldwork data statistically. A quantitative analysis is not feasible for many communities due to the low number of speakers (see Bochnak and Matthewson (2015) for relevant discussion). Nevertheless, graphs can provide linguists with visual representations of consultants' consensus on a given judgement.

[39] The translations of (1) and (2) in this figure were presented when we discussed examples (10) and (1), respectively.

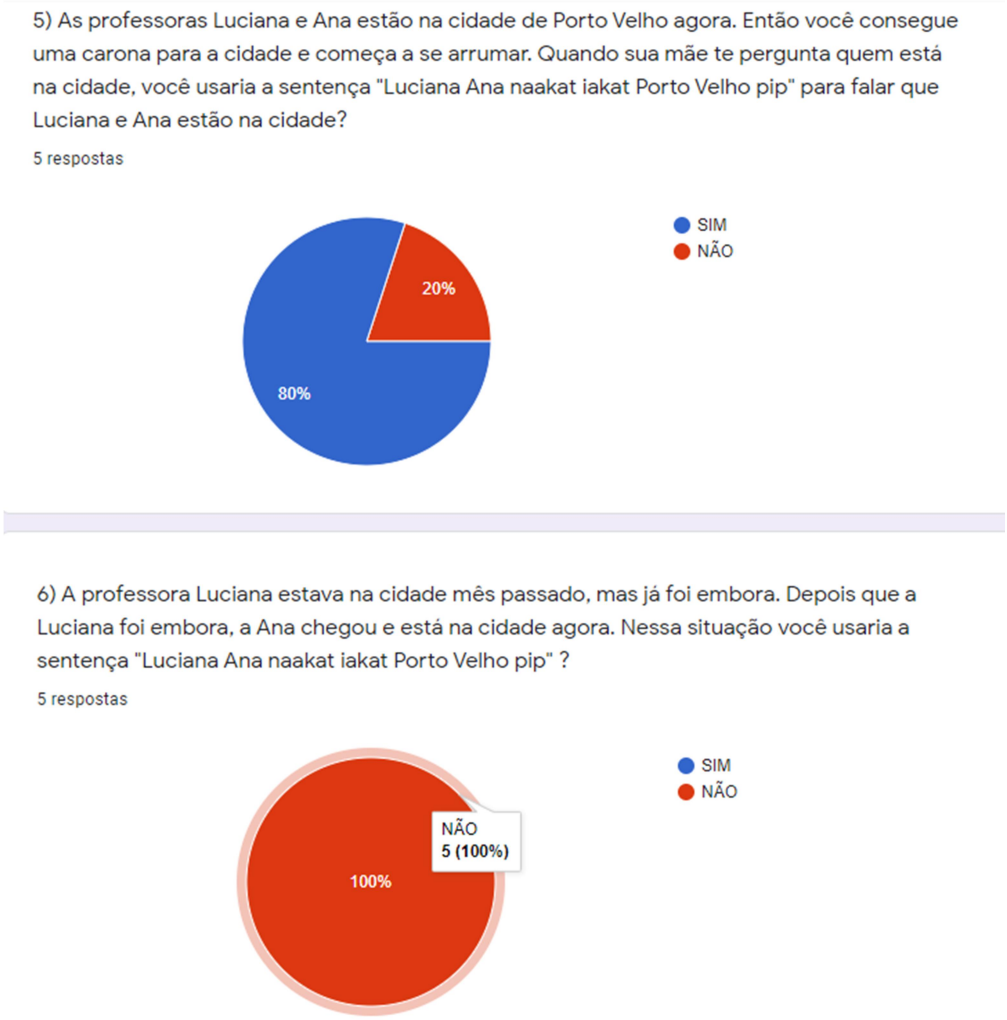


Figure 7 – Graphs generated by Google Forms

Linguists tend to use online forms only if they have to collect data from a large group in a virtual setting. We recommend that fieldwork linguists become familiar with tools such as Google Forms and make use of them in a variety of fieldwork environments.

We have argued that there are advantages in the use of online forms even in face-to-face/one-on-one settings, since they provide easy and fast access to the data and metadata. Having fast feedback may be vital for linguists who stay in the community for a short period of time. They need to decide whether consultants are adequate for their corresponding tasks. Moreover, Google Forms tend to make elicitations more interesting for the consultants, since working with a computer adds novelty to the fieldwork.

6 Final remarks

This chapter presented a number of techniques that can be used to elicit data during semantics fieldwork. We discussed how contextualizing many sentences in a single-story arc, as we have done with the use of storyboards, tends to be more effective than creating one context for each sentence of a questionnaire (Louie 2015). We argued that this approach makes elicitation sessions more interesting and less tiring for consultants. We also showed that training sessions and control conditions are interesting tools to assess whether consultants are good at certain tasks. These methods are also able to give feedback on consultants' attention levels/understanding of the tasks. We illustrated how true/false tests can be used with storyboards as a control technique. Lastly, we discussed the use of technologies during fieldwork. We argued that online forms, such as Google Forms, provide tools that help linguists control the quality of their data.

All the techniques suggested in this chapter can be used at the same time. Storyboards, for instance, can be used to make contextualized translations and truth judgement tasks more interesting. They can be combined with tests in to control consultants' levels of attention. Online form tools, on the other hand, can be combined with control methods to make control conditions easier to track. They provide us with a way to check the reliability of our data and facilitate linguistic analysis, with more transparent results for linguists.

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Fieldwork techniques in semantics

Abstract: This chapter focuses on techniques to be used in semantics fieldwork. More specifically, we discuss complementary techniques, such as the use of storyboards to contextualize elicitations, the implementation of training sessions and control sentences, and the use of Google Forms. These techniques are to be implemented alongside traditional methods, such as questionnaires, contextualized translations, truth judgement tasks, and storyboards. Good linguistic analysis heavily depends on the quality of the data collected during fieldwork. There are two kinds of factors that may impair the quality of the data. The first includes factors inherent to the methodology, such as the use of contexts in order to determine the exact truth conditions of a sentence. The great number and variety of contexts tends to make consultants feel fatigued or bored during elicitation sessions. The second kind of factors that may lead to poor quality data relates to external conditions. Examples of these are consultants having a bad day or failing to understand instructions because they are not fluent speakers of the contact language. Being prepared for these kinds of problems increases the chances of successful fieldwork. This chapter argues that the combination of different methods yields more reliable fieldwork results. We contextualize our argument by presenting data we have collected during fieldwork that turned out to be unreliable. We also argue that the implementation of the suggested complementary techniques has a positive impact on fieldwork sessions. It increases consultants' attention level and furnishes important feedback on how much we can rely on data from each particular consultant.

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1 Introduction

This chapter presents and illustrates a mix of fieldwork techniques – storyboards for contextualizing elicitations; the use of training sessions; the use of control sentences; and the implementation of elicitation sessions through online forms. It describes how they can be used to enhance fieldwork practices and improve the quality of the collected data when working with indigenous languages. We claim that adopting a variety of techniques provides the linguist with more reliable data. These techniques have been tested by one of the authors in the elicitation of data on tense and on bouletic modality in Karitiana, an Amazonian language of the Tupi family. Thus, we will be able to demonstrate their positive impact on the elicitation sessions.

Our main motivation for adopting the fieldwork methods that we describe in this paper were two problems we faced: fatigued consultants and their misunderstanding of the context or the task. These kinds of problems are not uncommon (see Louie 2015) and linguists should

pay special attention to them, since fieldwork that is carried out under such conditions may yield unreliable data, which, in turn, may lead to linguistic analyses that are not consistent with the facts of the language.

The causes of fieldwork problems may be inherent to the applied methods or external to them. Semantic fieldwork tends to rely on many pairs of contexts and sentences. Depending on the phenomenon under investigation, those contexts become rather long. Thus, it is not unexpected that the consultant will feel fatigued during an elicitation session. This illustrates a problem that is inherent to the method, as argued by Louie (2015). In order to solve it, we suggest replacing verbal contextualization for the use of storyboards in our truth judgement tasks. The inclusion of technological tools such as online forms also helps since they add novelty and make the elicitation more appealing to the consultants.

The cause for the lack of attention and misunderstandings may also be due to external factors. External causes for fatigued/bored consultants may include not getting enough sleep the previous night or not being fluent in the contact language. Linguists do not have control over these factors.[1] We illustrate how training sessions and control conditions may be used in fieldwork in order to detect whether consultants are paying attention to the given context when providing their judgements. These complementary techniques can be implemented within the most common methods in semantics fieldwork: questionnaires, contextualized translations, truth judgement tasks, and storyboards (see Matthewson 2004; Sanchez-Mendes 2014; Bochnak and Matthewson 2015, 2020; Vander Klok 2019; Vander Klok and Conners 2019). We show how the metadata they provide may help us decide how much we can rely on certain data.

Lastly, we discuss the beneficial impacts that technological tools may have on fieldwork. We illustrate this by showing how online forms such as Google Forms have helped us to improve the way we collect and analyze data, since they can: (i) add a novel element, making consultants more excited about the elicitation session; (ii) save data automatically in the cloud, reducing the risk of losing it; (iii) automatically tabulate data by exporting the results of questionnaires to Excel tables; (iv) automatically generate graphs; and (v) monitor incorrect options in control conditions and give us real-time feedback on consultants' attention level.

[1] The literature on semantic fieldwork (see Vander Klok and Conners 2019; Bochnak and Matthewson 2020) usually distinguishes the contact language from the target language. The contact language is the language the linguist uses to communicate with the consultant and present the contexts/storyboards whereas the target language is the language under investigation.

This chapter is divided into five sections. Section 2 discusses the impacts of internal and external conditions on fieldwork, using our own experience with the Karitiana community as an illustration. Section 3 presents the methods for data elicitation. In 3.1 we focus on the most common methods used in semantics fieldwork; in 3.2, we discuss one of the methods we have implemented in our fieldwork (i.e., the contextualization of data elicitation through storyboards). Section 4 discusses some complementary methods, such as the use of training sessions and control conditions. Section 5 discusses the positive impact of technological tools. It shows how elicitations can be implemented using online forms, which make storage and feedback on the quality of the data even easier. The last section presents our final remarks.

2 Internal and external conditions of fieldwork

Before discussing elicitation methods, we will discuss internal and external conditions of fieldwork based on the dynamics of our own fieldwork with Karitiana speakers. This discussion is relevant to the understanding of what motivates the implementation of the methods we discuss in sections 3 and 4.

Bochnak and Matthewson (2015: 3) pointed out that "each field situation is unique and presents its own set of challenges, and so the fieldworker must adapt methodological tools to meet the challenges encountered in the field." This means that linguists should always take the conditions of the field into account before preparing for fieldwork. There are two types of conditions that should be taken into account: (i) those inherent to the methodology itself; and (ii) those external to it. Ignoring one or the other will have a negative impact on the success of fieldwork.

Internal/inherent conditions have to do with the fact that we conduct fieldwork on the semantics of a language. The advantages and disadvantages of each technique must be weighed against this fact. For instance, an investigation of some aspects of the semantics of a language will yield better results with the use of contextualized elicitation than with the use of translations without the introduction of any context (Matthewson 2004; Sanchez-Mendes 2014). Thus, when choosing one methodology or another, linguists should be aware of the pros and cons of each method.

Taking into account external conditions is equally important when planning data elicitation. Linguists should devote some time to considering external facts. The answers to the following questions provide important information for linguists to guide their elicitation:

- Does the linguist travel to the speech community or do the speakers come to the linguist?
- How easy is access to the community and to the consultants?
- How many days can the linguist stay with the community or the consultants stay with the linguist? How long do these visits last? How frequent are they?
- What will the contact language be? How fluent is the linguist in it? How fluent are the consultants in it?
- Does the target language have a writing system? Do the consultants use it?

The success of field trips depends heavily on how adequate the methods are to those conditions. We will illustrate the importance of taking internal and external conditions into account by using the case of Karitiana, which is a language of the Tupi branch and of the Arikém family.

2.1 Internal conditions of fieldwork

Semanticists usually depend on a number of methods of data elicitation: translations; contextualized data elicitation, which can be contextualized translations or truth judgements (Matthewson 2004; Sanchez-Mendes 2014); questionnaires (Vander Klok and Conners 2019; Bochnak and Matthewson 2020); and storyboards (Burton and Matthewson 2015; Vander Klok 2019; Bochnak and Matthewson 2020). There are specific advantages to each of these methods. Contextualized data elicitation, for instance, demands less preparation time than storyboards. On the other hand, data from storyboards are more natural than data from contextualized elicitations. We go over the advantages and disadvantages of each of these methods in more detail in section 3.1.

In this section, we focus on the inherent conditions of our methods that had the strongest impact on our fieldwork with the Karitiana; specifically, the consultants struggled to pay attention to the given contexts. Louie (2015) points out that, because we tend to organize our elicitation in paradigms, our tasks become extremely boring for consultants. This is a big problem inherent to the method. Context is of primary importance in semantic fieldwork (Bochnak and Matthewson 2015) and the fieldwork that is carried out under these conditions may yield unreliable data, which, in turn, may lead to linguistic analyses that are not consistent with the facts of the language. Thus, linguists should invest in techniques that make the sessions more appealing and in techniques that help detect when consultants stop paying attention to the given contexts.

Paying close attention to the consultants' mood is a good way of spotting when they are fatigued or bored. In our case, the consultants: (i) show signs of exasperation/impatience; (ii) take a long time to answer the questions; (iii) try to change the topic; (iv) constantly ask for breaks for coffee/cigarettes, etc. Most of these signs have also been reported by Louie (2015).

Louie (2015: 64) comments on some cases of bored consultants. One of the indicators is when they start complaining that the contexts/sentences sound the same to them. We have heard similar complaints from Karitiana speakers, who usually say, "You just said that"; "This is the same sentence as the last one"; and "It's the same".

The second way to spot fatigued/bored consultants is within the data. Depending on the linguists' proficiency level in the target language, they will be able to spot some inconsistencies in the data. Example (1) illustrates this kind of inconsistency.[2] It comes from an elicitation session with a truth judgement task that targeted non-future tense in Karitiana, using Brazilian Portuguese as the contact language.

(1) Fieldworker: *Uma criança vê Inácio matando a cobra e começa a chorar. Você poderia dizer "Ombaky Inácio oky tykiri, nakahyryp õwã." para descrever essa situação?*
Consultant: *Sim*[3]

The presented sentence is glossed and translated in (2):[4]

(2) *Ombaky* *Inácio oky* *tykiri,* *Ø-naka-hyryp-Ø* *õwã.*
jaguar Inácio kill when 3-DECL-cry-NFUT kid
'When Inácio killed the jaguar, the kid cried.'

The judgement that the consultant gave us in (1) is not consistent because the sentence meaning is incompatible with the context. In the context, Inácio kills a snake, and the consultant's sentence states that he killed a jaguar. It is not uncommon for consultants to ignore the contexts in a truth judgement task. Let's see another example:

[2] This sentence belonged to the training session. The mismatch between context and sentence was there on purpose so we could verify if the consultants were considering the details of the presented context when evaluating the sentence. We talk more about training sessions in section 4.

[3] English translation as follows:
Fieldworker: A child sees Inácio killing a snake and starts crying. Could you say "Ombaky Inácio oky tykiri, nakahyryp õwã." to describe this situation?
Consultant: Yes

[4] We follow the Leipzig glossing rules (Comrie, Haspelmath, and Bickel 2015). The following abbreviations will be used here: 3 third person; ADV adverbializer; COP copula; DECL declarative; FUT future; IPFV imperfective; N non-; NOM nominalizer; OBL oblique.

(3) Fieldworker: *Elivar disse que quer tomar sopa e que ele vai tomar sopa amanhã. Você usaria "Elivar naka'yt sopa" para descrever esta situação?*
Consultant: *Sim*.[5]

The presented sentence is glossed and translated in (4):

(4) *Elivar Ø-naka-'y-t sopa.*
Elivar 3-DECL-ingest-NFUT soup
'Elivar ate/eats soup.'

The judgement that the consultant gave us in (3) is not consistent. Elivar wants to have soup in the future, and the sentence presented by the consultant is stated in the non-future tense.

We suspect that these inconsistencies in the data result from fatigued/bored consultants since they also showed signs of boredom during the elicitation session. However, this may not be the only cause. Another inherent problem to this method is *yes-biased* answers. Experimental studies with children have observed that some participants show the bias of accepting all experimental items as "true" (Schmitt and Miller 2010). Vander Klok and Conners (2019) also discuss the possibility of *yes-bias* in their fieldwork.

One last possibility is that the consultant did not understand the task and was providing us with grammaticality judgements instead of truth condition judgements. This may occur due to the internal conditions we have already mentioned. Since it is exhausting to pay close attention to the contexts and keep track of the changes from one context to the other, the consultants stop paying attention to them and start providing us with grammaticality judgements. However, misunderstandings may also be due to external factors, as discussed in the next subsection.

2.2 External conditions of fieldwork

External factors should also be considered when preparing for fieldwork. This subsection discusses external factors in light of our experience with the Karitiana community. Karitiana

[5] English translation as follows:
Fieldworker: Elivar said that he wants to have some soup and that he is going to have it tomorrow. Would you use "Elivar naka'yt sopa" to describe this situation?
Consultant: Yes

currently has about 400 hundred native speakers (Storto and Rocha 2018). The Karitiana people live mainly in five tribes inside their indigenous reservation, located in the northwest Amazonian rainforest. The red square in Figure 1 shows the reservation, which is located in the state of Rondônia, about 100 kilometers from the city of Porto Velho (the capital of the state).

Figure 1 – Karitiana reservation[6]

We usually do fieldwork once a year, either traveling to the Karitiana community or paying for the speakers come to São Paulo. Until this year, the community did not have Internet or phone signals. Therefore, access to the community and to the consultants was not very easy. Our grants allowed us to bring consultants to us or to stay in the community for one to two weeks. These are important conditions external to the fieldwork methods. If something went wrong in an elicitation session and we did not find it in time, we would only have another opportunity to check it in the subsequent year.

The small number of speakers makes Karitiana an endangered language. An important external condition to take into account is the fact that the Karitiana people mostly speak Karitiana among themselves. They only use Portuguese to talk to non-Karitiana speakers. Children learn Karitiana as their first language, and only start learning Portuguese when they go to school. Since Portuguese is a second language for them, the Karitiana people speak it with various degrees of fluency. This makes a very good example of an external condition one has to take into account when preparing for fieldwork. We chose Brazilian Portuguese as our contact language, since our informants are more proficient in Brazilian Portuguese than we

[6] Available at https://terrasindigenas.org.br/pt-br/terras-indigenas/3725. Accessed on March 31, 2020.

are in Karitiana. Nevertheless, our consultants are not native speakers of Brazilian Portuguese. Thus, depending on the consultant we work with, the contact language can be a problem and the consultant may have trouble following the linguist's instructions. This may lead to inconsistencies such as those illustrated in (1) and (3). We exemplify this with one kind of noise that occurred in the elicitation section targeting bouletic modality.

> The consultant was presented with a storyboard in which a couple, Maria (the wife) and José (the husband), go to a restaurant that cooks a whole fish that serves two people. They take a look at the menu in order to decide what to eat. Maria and José do not want to eat the same fish. Maria wants to eat Tucunaré and José wants to eat Tambaqui.[7] They leave the restaurant without ordering anything because José does not want to eat the fish that Maria wants to eat and Maria does not want to eat the fish that José wants to eat.
>
> After hearing the story, the consultant was given a pen and a paper with many sentences in Portuguese that should be translated to Karitiana. All sentences were tied to the storyboard, which served as context for them. After each sentence in Portuguese, there was a space for Karitiana consultants to write their answers.[8]
>
> Fieldworker instruction: *Com base na história que eu acabei de te contar, como você falaria "Hoje José quer comer Tucunaré" em Karitiana?* [9,10]
>
> Consultant's answer:

(5)	*Kiri*	*Ø-na-siki'y-j*	*José syryho-ty*	*em Karitiana*
	today	3-DECL-want.eat-FUT	José Tucunaré-OBL	in Karitiana
	'Today José wants to eat Tucunaré in Karitiana'			

When we went through the consultant's answer, we realized the consultant thought "in Karitiana" was a part of the sentence. Actually, all sentences in this elicitation ended with "em Karitiana".[11] Consultants may even be aware that they do not understand the task. Nevertheless, there is a good chance that they will not acknowledge this either because they

[7] Tucunaré and Tambaqui are Amazonian fish.
[8] Karitiana has a writing system that many consultants know how to use. This is another important condition because when we know an informant can write, we record the sentences, but we also ask them to write them down.
[9] English translation: Based on the story I have just told you, how would you say "Today, José wants to eat Tucunaré" in Karitiana?
[10] A reviewer pointed out that the linguist may be asking the wrong question, since the question seemed to be ambiguous. We agree that the oral instruction was ambiguous. Nevertheless, since consultants also had a written version of the sentence they should translate, it did not cross our minds that they would interpret the "in Karitiana" as part of the sentence they should translate because it was not in the sentences on the paper.
[11] Although not ideal, this insertion did not cause much harm since, if we ignore "em Karitiana," the sentence provided by the speaker seems compatible with the context.

feel ashamed or because they do not want the linguist to think they are unfit for the task and not invite them for further sessions.

Another example of an external problem is that the chosen date may not be felicitous. In 2018, Luiz Fernando Ferreira scheduled his fieldwork trip for the first two weeks in February. It was Carnival time in Brazil and Porto Velho, the city close to the Karitiana reservation, holds a big traditional street party that lasts for days. For this reason, consultants were eager for the elicitation sessions to finish as soon as possible so they could attend the party. Thus, knowing the community and their main festivities is also relevant because it can affect consultants' performance in elicitation sessions.

Still another external factor that must be taken into account is that not every consultant is good at every task. The linguist will only learn about consultants' distinct potentials after working with the community a few times. For instance, Karitiana elders usually perform badly on elicitations about the semantics of the language. They are illiterate, so the linguist can only rely on oral presentations of the relevant contexts. Moreover, many times their memories are not apt to keep track of the small changes from one context to the other. In addition, they tend to misunderstand their role as consultants and assume that they are there to teach us to speak the language. One case in point is the community's *pajé* – the traditional religious leader. He has been working with linguists for more than 20 years and has participated in many elicitation sessions. Even so, he gets upset when presented with ungrammatical sentences or when presented with several context/sentence pairs that he judges to be wrong. For him, it looks as though the linguist is insisting on the mistake and failing to learn.[12] However, he performs very well when asked for spontaneous data, such as traditional narratives and stories.[13]

Young speakers may also perform badly on the tasks assigned to them.[14] We have experienced many kinds of misunderstandings during fieldwork with such speakers. For example, the consultant in (5) was a young girl in her late teens participating in an elicitation session for the first time. Thus, the consultant's lack of experience was another external factor that played a role in the misunderstanding illustrated in this example. A linguist who has worked with a community for some time learns which members of this community are the best fit for certain tasks. Louie (2015: 49), in her work on Blackfoot (Algonquian), an

[12] Louie (2015: 64) reports the same problem in a footnote.
[13] Since storyboards are argued to be a more spontaneous way of eliciting data (see Burton and Matthewson 2015), we predict that those consultants could perform better in semantic elicitation using the storyboard method. However, we have not tested this.
[14] By young, we mean those 20 years old or younger.

Indigenous Canadian language, was able to identify a speaker as the ideal consultant. This was so because this speaker had already participated in previous fieldwork and was interested in/inclined toward analyzing his/her own language. This speaker tended to spontaneously provide extra facts about the data and to correct infelicitous contexts, replacing them with felicitous ones.

Our fieldwork experience has taught us that our best Karitiana consultants are the teachers at the village schools. They attended a college for indigenous people in order to obtain their certification as teachers, in addition to receiving some formal education in Portuguese. Therefore, they are also the most fluent in Portuguese, and are able to read and write in both Portuguese and Karitiana. Because of this formal education, if the linguist does not understand an answer, the consultants are able to write it down.[15] On top of that, a number of teachers have already participated in several fieldwork projects. This gives them some expertise, which leads to better performance. Moreover, they generally show more interest in working with their language as compared to other consultants.[16]

Given that we already know which consultants perform better at each task, the logical decision, from the fieldworker's perspective, would be to only work with the consultants that perform better in the methodology one intends to use. However, this is not so simple. Choosing only certain consultants can actually do more harm, because the community may see it as the linguist playing favorites. In our work with the Karitiana community, selecting particular consultants has created attrition in the past, which lead to problems when negotiating for the next research projects. Thus, creating and maintaining a good relationship with the community is a fundamental part of the fieldworkers' task. Louie (2015: 57) mentions how the elicitation may get interrupted by consultants who wants to tell a story; meanwhile, interrupting the consultant cannot be done easily without risking the cordiality of the relationship between the consultant and the linguist.

[15] One reviewer asked what we would recommend for linguists working in a community for the first time. Since experience seems to lead to better performance at fieldwork tasks, trying to work with consultants who have worked with linguists before can make the fieldwork easier. In case the community has never worked with a linguist, our personal advice would be to try to work with consultants who have received some formal education. We are aware that it is not always the case that one can choose the consultant. In such cases, investing some time to develop a good training session minimizes inconsistent data and using control sentences helps to assess consultants' performance in a given task, as demonstrated in section 4.

[16] Their interest in analysing the language might be an advantage, but it might also become a problem. Burton and Matthewson (2015) argue that, when presenting storyboards, it is important for the speaker not to know which structure the linguist is targeting, since they might then let prescriptivism guide their judgements.

Since it is not always possible to work with experienced consultants, our recommendation is to always adopt a training session and control conditions for the elicitation, as will be discussed in section 4.

2.3 Summary of the section

In this section, we presented distinct factors that should be taken into account when doing fieldwork. Some of them are inherent to the methodology itself, such as the need for long detailed contexts that are similar to one another. These tend to make the elicitation boring or tiresome for the consultants, as pointed out by Louie (2015). In such situations, consultants may also tend to become yes-biased (Schmitt and Miller 2010; Vander Klok and Conners 2019). Other factors are external to the methodology. Examples of such cases are: (i) not having a contact language in which both the linguist and the speaker are native speakers; (ii) choosing an inconvenient date; or (iii) having to work with an informant that is not very good at the demanded task.

Both internal and external factors may play a role in the elicitation of inconsistent data, as illustrated in (1), (3), and (5). The linguist must be aware of the factors that lead to poor quality data. Ultimately, low quality data may lead to linguistic analyses that are not consistent with the facts of the language.

In order to be better equipped to deal with these conditions, we argue that linguists should combine different methods in their fieldwork. In the next section, we show how we have used storyboards in our truth judgement tasks as an attempt to make the presentation of the context less boring/tiresome. As most of the external factors cannot be controlled, we also show how training sessions and control conditions are vital to mensurate the reliability of the data.

3 Fieldwork techniques

This section discusses the most relevant fieldwork techniques for semanticists and illustrates them by describing how we have implemented them in our fieldwork with the Karitiana. It is divided in two subsections. The first section briefly discusses the most usual techniques when eliciting data in semantics fieldwork (i.e., translations, contextualized data elicitation, and storyboards) and their pros and cons. The second section describes how we complemented them with some other, more sophisticated techniques and how that impacted our fieldwork.

3.1 Usual techniques in semantic fieldwork

As discussed by Bochnak and Matthewson (2015), fieldwork in semantics has very specific needs. Other linguistics subfields (e.g., phonetics, phonology, morphology, and syntax) deal with more tangible entities, such as phonemes, morphemes, and phrases. In these fields, the data itself provides information about grammatical and well-pronounced expressions. The same is not true for semantics. The main task of semanticists is to find out which meanings a given structure/word/morpheme has, as well as which meanings it does not have. The problem is that a semantically well-formed utterance provides the linguist with very incomplete cues about what that utterance means (Bochnak and Matthewson 2015).

Because of this, fieldwork techniques in semantics are construed to make the meaning under investigation as salient as possible. This is why simple translation is often condemned as an elicitation practice. Translation is considered a less efficient method in semantics fieldwork because it introduces high interference by the communication language in the target language. Another problem with translation is that ambiguities in sentences in the communication language may lead to inaccurate translations in the target language. For these reasons, data from translations are least reliable (see Matthewson 2004; Bochnak and Matthewson 2020). Another problem with using translations as a method is that they do not provide negative data.[17]

The contextualized elicitation method involves two steps: Contextualized translations and truth judgement tasks. Contextualized translation is more reliable since the presentation of contexts avoids ambiguities and minimizes the chances of getting inaccurate translations. Judgment tasks, on the other hand, are able to provide semanticists with the negative data they need for their analysis (Matthewson 2004; Sanchez-Mendes 2014). Contextualized translation tasks and truth judgement tasks are organized in a paradigmatic way (i.e., the contexts or the sentences differ minimally from one another) in order to allow for fine-grained semantic analysis. These elicitation methods are based on the following dynamics:

Example of a truth judgement task:

- Fieldworker: Think about this context (presents a context).
- Fieldworker: Would you use sentence *p* in such a context*?*
- Fieldworker: Now think about this other context (presents another context that differs minimally from the previous one).

[17] Negative data here refers to the meanings a sentence cannot have.

- Fieldworker: Would you use sentence *p* in such a context?

Three problems persist in the use of these methods: the interference of the communication language; the lack of naturalness of the data produced under these circumstances (Burton and Matthewson 2015); and the use of paradigms, which becomes mentally exhausting for consultants since it is hard for them to keep track of the minimal changes in the presented contexts and/or sentences (Louie 2015). Louie (2015) suggests that, to mitigate these problems, instead of presenting a context for each sentence in a paradigmatic way, we could use story arcs to create a context that includes several sentences at a time.

Story arcs are a way of making the elicitation more interesting for the consultant. Nevertheless, they do not solve problems related to the lack of naturalness, since the consultants still have to translate sentences. One elicitation method which avoids both problems are storyboards. In this method, the linguist presents a narrative in the communication language using a series of pictures. Then, the consultant has to retell this story in the target language using only the pictures. According to the authors, the use of storyboards avoids the interference of the communication language since the consultants rely on pictures when retelling the story. Burton and Matthewson (2015) compared the perception of stories collected with storyboards to spontaneous stories told to a linguist by Japanese native speakers. They found that the stories elicited with storyboards were perceived as being as natural as spontaneously told stories. The application of storyboards to fieldwork in a variety of languages has confirmed its effectiveness for semantic fieldwork (Vander Klok 2019).

Despite their advantages, storyboards may not be sufficient to elicit some aspects of the meaning of a targeted linguistic structure. Thus, Burton and Matthewson (2015) suggest to combine storyboards with other methods, such as contextualized data elicitation (contextualized translation and truth judgement tasks). A story arc is basically a storyboard with no illustrations. So, if the story arc technique is complemented with illustrations, we get to the contextualization of our translations and judgements tasks by the use of storyboards. Bochnak and Matthewson (2020: 14) mention that storyboards may also be used as visual representations of contexts.

One of the disadvantages of using storyboards and story arcs is that creating a story arc or a storyboard for data elicitation requires much more planning than the more traditional methods. A specific disadvantage of the storyboard method is that, since consultants speak freely and are guided only by the pictures, the data may be more difficult to gloss and analyze. Moreover, one may not get the targeted structure or meaning (see Vander Klok 2019).

3.2 Complementary methods for semantic fieldwork

So far, we have discussed inherent and external conditions that influence fieldwork based on our own experience with Karitiana. We have also discussed the usual methods for semantic fieldwork and their pros and cons. Considering what we have discussed so far, we now describe and illustrate some complementary methods that can be used in semantic fieldwork. We show how they have helped us to improve and guarantee the quality of the data elicited in our fieldwork with Karitiana consultants.

The techniques we describe have been tested by one of the authors in the elicitation of data on tense and on bouletic modality in Karitiana. Note that Karitiana has a future vs. non-future temporal system. The goal of our investigation of tense was to discover whether the non-future inflection conveyed either present or past or both present and past (See Matthewson 2006; Jóhannsdottir and Mathhewson 2008). We assume that an expression conveys bouletic modality when it expresses desires (Von Fintel 2006; Von Fintel and Iatridou 2017). Our investigations on the expression of bouletic modality in Karitiana aimed to discover which linguistic structures were used to convey desires in the language. The results of this research are described in detail in Müller and Ferreira (2020) and in Ferreira (2020; 2022). We briefly refer to the results here as well, but this chapter will focus more on the elicitation methods.

3.2.1 Contextualization through storyboards

In order to avoid boredom due to the use of a multiplicity of context/sentence pairs, we presented a single story that encompassed the context of the totality of sentences to be elicited (Louie 2015). Our story arcs were illustrated with pictures to make them more interesting and easier for our consultants to follow. Since an illustrated story arc is in essence a storyboard, we refer to this practice as a contextualization of many sentences with a storyboard. The reason we argue in favor of implementing storyboards as a part of translation and truth judgement tasks is to make the elicitation less boring and tiresome. The stories were presented to the consultants in a slideshow fashion. After the presentation, they were asked to perform one of two tasks: translate sentences from the contact language to the target language based on the story that was presented to them; or judge sentences in the target language as true or false according to the story.

In order to collect data on bouletic modality in Karitiana, we created five story arcs and illustrated them with pictures. The main characters in the stories were a couple, José and

Maria. The stories were presented to consultants in the communication language with slides.[18] One story arc we used is illustrated below:[19]

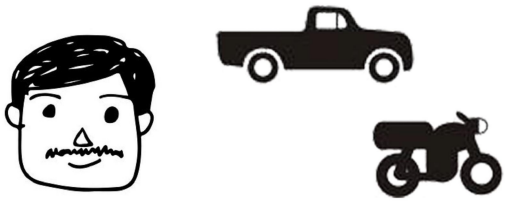
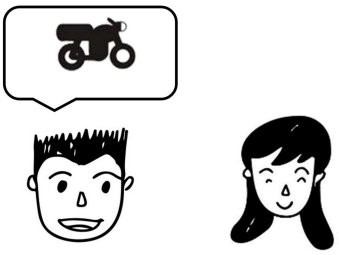
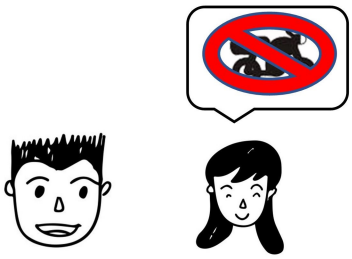
 This is Antônio. Antônio owns a car and a motorcycle.	He wants to sell the motorcycle and talks to his friend José about it.
 José is interested in the motorcycle and talks with Maria, his wife.	 She does not want José to buy the motorcycle because she believes that riding a motorcycle is very dangerous.

Figure 2. Example of illustrated story arc[20]

After being introduced to the story, we presented our consultants with two types of activities. The first was a contextualized translation of Portuguese sentences into Karitiana. We asked them to consider the story they had just heard when translating these sentences. This is illustrated below:

(6) Fieldworker: *Considering the story you have just heard; how would you say the sentence below in Karitiana?*[21]

[18] We were not the first researchers to use illustrations as a facilitating method in Karitiana fieldwork. Vivanco (2014, 2018) created a short-illustrated story to collect data on syntax. One difference is that, because semantic analysis requires an enriched context, our stories are relatively longer than those prepared by her.

[19] We would like to remind the reader that these are smaller, translated versions. The story arcs were originally in Portuguese and had about 8 slides. We reduced them to four in our example for the sake of space.

[20] All the pictures used to illustrate our story arc are from the Internet. For example, the pictures that illustrate this story arc came from the website https://pngtree.com/ [accessed on January 28th, 2020], where one can download PNG pictures for free as long as credit is given to the authors. The pictures of people came from the art "As adult PN" and the user who created it is *icontree*. The pictures of the car and motorcycle came from the art "high speed rail PNG" and the user who created it is *588ku*. One of the authors of this article created the story arcs and edited the pictures to match the story.

[21] This instruction was given orally by the fieldworker. The sentence was written on a piece of paper that was given to the consultant.

'Maria does not want José to buy Antônio's motorcycle.'

Consultant:	*Maria*	*Ø-na-aka-t*	*i-py'eep-Ø*	*Antônio*
	Maria	3-DECL-COP-NFUT	3-not.want-ADV	Antônio
	moto-ty	*José*	*ami-ty*	
	motorcycle-OBL	José	buy-OBL	

'Maria does not want José to buy Antônio's motorcycle.'

Why not just ask our consultants to retell the story? The problem with storyboards is that, since consultants can retell the story freely, they can omit a certain structure that was relevant for the linguist. In the case of the storyboard illustrated above, consultants may say "He wanted [$_{DP}$ the motorcycle]" instead of "He$_1$ wanted [$_{TP}$ t$_1$ to buy the motorcycle from Antônio", which was the structure we were aiming at. This kind of result may also occur with contextualized translations; however, in that case it is easier for the linguist to spot. One illustrative example of not getting the targeted data is reported in Vander Klok (2019). The author developed the storyboard 'Bill vs. the weather' targeting the use of modal expressions that did not come out when the consultant narrated the story freely. Ideally, if time and budget permit, the linguist should use both methods.

In the case of our fieldwork on bouletic modality, we used the data collected in this first stage to formulate hypotheses about the phenomenon. Our second step was to test those hypotheses by using a truth judgement task.

Note that there is no overt negation in sentence (6) produced by the consultant. Based on this fact, we concluded that the verb "py'eep" conveys a negative desire, which is a combination of bouletic modality and negation. In formal semantics, negation is analyzed as an operator over the sentence under its scope. Modality, on the other hand, is analyzed as quantification over possible worlds. Our hypothesis was that the verb "py'eep" both quantifies over all possible worlds compatible with the subject's desires and introduces a negation. The question this hypothesis poses is about the relative scope between the two operators introduced by the modal. We know that differences in scope give rise to different interpretations.[22] If negation is under the scope of the universal quantifier ($\forall w$:$\neg$ p(w) = *1*), sentence (6) should mean that Maria has the desire that José does not buy a motorcycle. If the quantification over possible worlds is under the scope of negation ($\neg\forall w$: *p(w) = 1*), sentence

[22] We thank Professor Marcelo Ferreira for pointing that out to us.

(6) should mean that Maria is indifferent towards José's buying of the motorcycle. The story arc supported the first analysis.

The truth condition judgement tests were applied to validate these conclusions. In this second step, we presented the context in the contact language and the sentence in Karitiana. We illustrate the task using English.[23]

(7) Fieldworker: Suppose José is planning to buy a motorcycle. Then, somebody in the tribe says the following: "Maria naakat ipy'eep Antônio mototy José amyty." If José buys the motorcycle, do you think Maria will be mad?

Consultant: She will be so mad she may even cut his penis off.

As can be seen above, the truth judgement task confirmed our initial hypothesis about the meaning of "py'eep." If the verb expressed Maria's indifference, there would be no reason for her to be so mad. Therefore, the use of storyboards to contextualize translations and truth judgements provided the kind of data we needed for our semantic analysis. One result of using storyboards was that we could work longer than usual. As mentioned in section 2, it was common for speakers to ask for coffee or time to smoke a cigarette, or grab their cell phones when they started getting bored with a task. This distraction would happen every 15 minutes to every hour, depending on the consultant. The storyboard kept their attention for longer periods and there were fewer interruptions. It took consultants about one hour to translate all sentences related to a storyboard. Most speakers remained focused for the entire session.

So far, we have discussed some complementary methods that can make elicitation more interesting and less tiring for consultants. One drawback of these methods is the time it takes to prepare elicitations that include their use (Louie 2015). They require a lot of creativity on the part of linguists to come up with stories that provide the data they need.

Using a methodology that is more interesting and less tiring for consultants is a good beginning. Nevertheless, it does not fully guarantee that consultants will pay attention to contexts. As we mentioned in section 2, there are many external factors that influence fieldwork such as bad timing, aptitude of consultants, or linguists not being one hundred

[23] This task was elicited with another consultant who had not heard the original story of storyboard. The story makes it clear that Maria does not want José to buy the motorcycle. The consultant who hears the story could favor the first reading, since this is the one it appears in the storyboard. Thus, in some cases, linguists cannot use the same storyboards for subsequent truth judgement tasks.

percent fluent in the contact language, etc. Linguists should be prepared for such factors; this is where complementary methods enter the scene.

4 Training sessions and control sentences as complementary methods

Making elicitation more interesting for consultants is a step in the right direction, but it does not guarantee that the consultants' level of attention will always be high. The predisposition of consultants on a given day depends on many external factors that are outside fieldworkers' control. Therefore, we propose that linguists should employ a variety of complementary techniques. These techniques will give linguists metadata on consultants' attention when they perform certain tasks. As a result, fieldworkers will be able to evaluate the reliability of their data. In this section, we argue for the benefits of adopting training sessions and control conditions in semantic fieldwork. These methods are commonly used in psycholinguistic experiments involving children. Schmitt and Miller (2010: 38–39) mention that:

> Experiments need both target and control conditions […] Experimental sentences in the target conditions(s) assess the linguist structure(s) that are of interest to the researcher. Experimental sentences in the control condition(s) ensure that any result in the experimental condition is due to the linguistic variable under study rather than some issue to the task procedure.
>
> In order to ensure that subjects, especially young children, understand the task procedure, it is important to have an initial training phase or a set of practice items at the beginning of the experiment. The number of training items will depend on the difficulty of the task procedure.

The problems faced by fieldworkers are similar to those faced by linguists who are working with children. Depending on their age and how complex the task is, the data from the experiment may be unreliable because the children did not understand what they were supposed to do. Studies on psycholinguistics use techniques to provide feedback on children's degree of attention and their understanding of the tasks: training sessions and control conditions (Crain and Thornton 1998; Schmitt and Miller 2010). Training sessions, as the name suggests, are sessions that involve tasks similar to those that consultants will be asked to complete. Control conditions in a linguistic experiment are situations for which researchers know the answers. They are there to provide feedback on speakers' understanding of the task and of their attention level. We argue that, since working with indigenous consultants poses

problems that are similar problems to those faced by psycholinguists, we should implement psycholinguistics methods in our fieldwork.[24]

The relevance of training consultants for a certain task has already been brought up in publications discussing semantics fieldwork. Burton and Matthewson (2015) point out that it is important for a consultant to repeat the storyboard and be trained in telling the story before doing it for real. Vander Klok and Conners (2019) also argue for the use of training sessions when eliciting data through questionnaires.

Training sessions should precede the elicitation. After the relevant instructions, the consultants go through a session in which the task is the same as the one in the elicitation session but involves only control sentences/contexts. This way, the fieldworker can verify whether the consultants understand the task.

We here illustrate how to go about a training session by describing our fieldwork on tense in Karitiana. The language has a future vs. non-future tense system (Storto 2002). An important question concerning this kind of system is whether the non-future tense is an ambiguous marker (meaning either present or past) or an underspecified marker (meaning both present and past at the same time). Matthewson (2006) and Jóhannsdóttir and Matthewson (2008) investigated two native Canadian languages - St'át'imcets (Lillooet Salish) and Gitxsan (Tsimshianic). These two languages also encode non-futurity in their tense systems. Thus, the authors faced the same question about the non-future tense that we faced for Karitiana. In order to answer that question, these authors used a truth judgment task. The consultants had to judge whether the sentences uttered after the presented context were true. The context and its correspondent sentence are illustrated below.

(8) Context: "Last year, John didn't go fishing, so he had no dried salmon last winter. Then summer came, and he went fishing. He got a lot of dried salmon. Fred didn't go fishing then, so Fred has no dried salmon now."[25]

(wa7) zúqw-cen s-John múta7 s-Fred
(IPFV) die-foot NOM-John and NOM-Fred
'John and Fred were/are starving.' (not at the same time)

(Matthewson 2006: 22)

[24] The cause of the problems may be different. In a psycholinguistic experiment, a child may not understand a task due to lack of maturity, whereas for fieldwork with indigenous consultants, the misunderstandings may be due to the consultants or the linguist not being 100% fluent in the contact language.
[25] The contexts were presented in St'át'imcets (Lillooet Salish). We have used their English translations to save space.

The fact that a sentence such as in (8) comes out as true in a context in which the described eventuality occurs both in the past and in the present shows that the non-future tense in the language under investigation is underspecified. We decided to investigate the semantics of the non-future tense in Karitiana using the same kind of truth judgment tests, as illustrated below.

(9) Context: "A professora Luciana estava em Porto Velho mês passado, mas ela já foi embora. Depois da Luciana ir embora, a Ana chegou e está na cidade neste momento." Nesta situação, você poderia dizer "Luciana Ana naakat iakat Porto Velho pip?"[26]

Luciana Ana ∅-naakat *i-aka-t* *Porto Velho pip*
Luciana Ana 3-DEC-COP-NFUT 3-COP-ADV Porto Velho in
#"Luciana and Ana were/are in Porto Velho." (not at the same time)

(Müller and Ferreira 2020: 14)

In order to avoid the problems described in section 2, we developed a training session with 10 context/sentence pairs. Some of the sentences were true in the context, as illustrated by context/sentence pair (10) below. They represented half of the training session (five pairs of context/sentences). We also included five sentences that could be judged true, but were not grammatical, as illustrated by sentence (11). Sentence (11) is ungrammatical because the word "kytopo" should be marked for oblique case, as in "kytopoty", since the verb "iengyt" is intransitive in the language.

(10) Context: Uma cobra aparece na casa. Inácio mata essa cobra. Você usaria "Inácio naokyt boroja" para descrever essa situação?[27]

( ) Sim ( ) Não

(11) Context: Mauro bebeu muita chicha ontem na festa e vomitou.
Você usaria "Mauro naakat iengyt kytopo" nessa situação?[28]

[26] Context: Professor Luciana was in town (Porto Velho) last month, but she has already left. After Luciana left, Ana arrived and she is in the city right now." In this situation, can you say "Luciana Ana naakat iakat Porto Velho pip?"

[27] Context: A snake appears in the house. Inácio kills this snake. Would you use "Inácio naokyt boroja" to describe this situation?

( ) Yes ( ) No

Inácio *∅-na-oky-t* *boroja.*
Inácio 3-DECL-kill-NFUT snake
'Inácio killed the snake'

( ) Sim ( ) Não

There were also pairs in which the sentences were grammatical but not true, as illustrated in examples (1) and (2) in section 2. In these cases, the context states that Inácio killed a snake, and the sentence in the target language says that he killed a jaguar. Another example of mismatch is illustrated in examples (3) and (4) in section 2, in which the context describes a future event, but the sentence in the target language is marked for the non-future.

Since the linguist knows the appropriate answers to all the context/sentence pairs presented in a training session, he/she is able to find out whether consultants understood their task. In case of poor performance, they may also be able to find out what the problem was. For example, in our training session for the investigation of the meaning of the non-future in Karitiana, the perfect scenario was the one in which a consultant answered YES to the sentences that were both grammatical and true, such as in (8), and rejected all the others. If the consultant rejected only the ungrammatical sentences, we would be able to conclude that they were giving grammatical judgements instead of truth condition judgements. If they consistently accepted sentences (3), (5), and (9), we would know that they were not paying enough attention.

A total of five consultants participated in in individual one-on-one training sessions.[29] Both the linguist and the consultant sat in front of the computer. Contexts were then presented through Google Forms. We read the context out aloud to the consultants. The consultants answered the question orally and the linguist marked 'yes' or 'no' according to their answers. Table 1 presents the percentage of correct answers for each consultant.

Table 1 - Consultant correct answer rates[30]

	Context 1	**Context 2**	**Context 3**	**Context 4**	**Context 5**
Consultant 3	yes	no	no	yes	no
Consultant 5	yes	yes	yes	yes	yes

[28] Context: Mauro drank a lot of chicha (A drink prepared for celebrations and rituals using fermentation) yesterday at the party and vomited. Would you use "Mauro naakat iengyt kytopo" in this situation?
( ) Yes ( ) No

**Mauro Ø-na-aka-t* *i-engy-t* *kytopo.*
Mauro 3- DECL-cop-NFUT 3-vomit-ADV chicha
'Mauro has vomited chicha.'

[29] For this research, we have worked with 11 consultants, but not all of them answered the questionnaire about tense. The complete training session is available in Ferreira (2022).

[30] The wrong answers are marked in red.

Consultant 9	yes	yes	no	yes	no
Consultant 10	yes	no	no	yes	yes
Consultant 11	yes	no	no	yes	no

	Context 6	**Context 7**	**Context 8**	**Context 9**	**Context 10**	Rate
Consultant 3	yes	no	no	yes	no	100%
Consultant 5	yes	no	yes	yes	no	60%
Consultant 9	no	no	no	yes	no	80%
Consultant 10	yes	no	no	yes	no	90%
Consultant 11	yes	no	yes	yes	no	90%

Experimental psycholinguists recommend creating a small training session of around five items. In our case, short training sessions with only five items would not be enough to train our consultants. Our training session had ten items and, by the end of the session, there were still consultants who had problems to understand the task such as consultant 5 in the table above. For experiments with children, short training sessions might not be a problem because children are often dismissed (Crain and Thornton 1998) if they do not do well in those short training sessions. Thus, these short sessions are used more as a filter than as a training method *per se*. Proper training would involve explaining the task one more time to the consultants who performed badly and running another training session.

What do we do when a consultant does not do well on the training session, as was the case for Consultant 5? When this happens with children, they are often dismissed from the study (Crain and Thornton 1998). However, dismissing a consultant after just a few questions could lead to a political problem with the tribe, depending on who the consultant is. We decided to go through all the context/sentence pairs with all the consultants and used the control conditions to monitor their performance.[31]

The control conditions were context/sentence pairs similar to those used in the training session. They presented true grammatical sentences, false and grammatical sentences, and true and ungrammatical sentences. They were spread throughout the task (for every 10 context/sentence pairs, three were control pairs). Having control sentences throughout the entire elicitation session was important. The fact that a consultant did well on the training

[31] One option might be to have a backup training session so the linguist can explain the instructions again and apply the backup training session only for those cases. Unfortunately, we did not anticipate the need for a backup training session. So, we do not know how effective it is to repeat the instructions one more time and reapply another training session.

session does not guarantee that he/she would not get bored or fatigued in the middle of the session. Here is the overall rate for the consultants using the control sentences:

Table 2 - Consultant correct answer rates

	Context 1	**Context 2**	**Context 3**	**Context 4**	**Context 5**
Consultant 3	yes	no	no	yes	no
Consultant 5	yes	yes	no	yes	no
Consultant 9	yes	no	no	yes	no
Consultant 10	yes	yes	no	no	no
Consultant 11	yes	no	no	no	no

	Context 6	**Context 7**	**Context 8**	**Context 9**	**Rate**
Consultant 3	no	yes	no	no	100%
Consultant 5	no	yes	yes	yes	66%
Consultant 9	no	yes	no	no	100%
Consultant 10	no	yes	no	no	77%
Consultant 11	no	yes	no	no	88%

The training session seemed to have a positive impact on consultant 9, who started hesitantly but, by the time the training session was over, was comfortable with the task. Her answers to the control sentences showed her improvement. Nevertheless, overall the training sessions did not seem to improve the consultants' rate of correct answers. Consultant 5 performed poorly in both the training session and the control sentences; Consultant 3 had outstanding performance in both the training session and the control sentences.

So far, we have discussed the implementation of control methods for traditional context/sentence pair elicitations. For the story arc method, we used a different control method, which was a true or false test to be applied immediately after the presentation of the story. As mentioned in section 2, not all Karitiana speakers have the same fluency in Portuguese. Therefore, we developed this true or false test in the communication language as a way to verify how much of the context the consultant had absorbed. For instance, after presenting the storyboard in Figure 2, the speaker had to complete the following test[32]:

[32] The test was, of course, presented in the contact language – Portuguese.

According to the story you just heard, mark (T) if the sentence is true or (F) if the sentence is false.	
Antônio wants to sell his car.	( )
Antônio wants to sell his motorcycle.	( )
José wants the motorcycle.	( )
José wants the car.	( )
Maria does not want José to buy the car.	( )
Maria does not want José to buy the motorcycle.	( )

Two consultants heard seven storyboards and answered true or false questions, which was our control method. The control was carried out after the consultants had finished the contextualized translations or the truth judgement tasks described in section 2. Table 6 shows a comparison of the results of these two consultants on these tests. We then determined their attention level based on how many correct answers they gave on the tests. The true or false questionnaire had six sentences. If the consultant answered three of them correctly, we would conclude that they were probably guessing, since they did achieve a rate of attention of 50%. The results for each consultant are presented in the table below.

Table 3 – Consultants' rate control 2

Storyboard	Consultant 4	Consultant 5
1	61%	88%
2	54%	67%
3	38%	84%
4	70%	75%
5	-	90%
6	46%	74%
7	58%	91%
TOTAL	54%	81%

As can be observed, the control test was able to provide information about how much the consultants had grasped from the story. What the table above shows is that Consultant 5 had a good understanding of the context that was presented to him, whereas Consultant 4 did not. This indicates that Consultant 4 either did not understand the stories or did not pay attention to them. Independent of what was causing it, what is important is that the data from contextualized translations from this consultant should count as mere translations, and the data from the truth judgement task should not be considered at all.

We also believe that the true or false questions we used as a control method can be used, not only as a control method, but as motivators, contributing to increasing speaker attention

levels. Some consultants started to pay much more attention after completing the first round of tests. Some even asked to go back to the slides to reread the story independently one more time before we proceeded to the questions. Based on his/her poor performance, we decided not to consider data provided by Consultant 5 (Table 2 and Table 3) in our analysis of tense in Karitiana. Moreover, when consultants disagreed on a judgement, we checked the metadata before opting for an analysis. If Consultant 5 and Consultant 10 answered 'yes', and Consultant 3 and Consultant 9 answered 'no' to the same question, the fact that the latter paid more attention than the former is something that we took into account. How much weight should be given to such results is a question each linguist has to answer based on their fieldwork experience. These methods proved very fruitful in letting us know how confident we could be about the data we elicited.

5 Technology and fieldwork

This section describes how certain virtual tools can be used to help semanticists in preparing for fieldwork and in facilitating linguistic analyses. We report our experience with online forms that have gained popularity as tools for collecting data. These forms allow linguists to create questionnaires and store them on the Internet, so that anyone with a computer available and access to the Internet will be able to answer the questions from the elicitation. We argue that there are advantages in the use of these forms, even in face-to-face, one-on-one fieldwork settings. There are websites that enable the creation of forms. We present examples of some of the tools offered by these websites using Google Forms, which is the form builder from Google.[33]

Before presenting some of the tools a form can offer, we start by pointing out that online forms, as the name suggests, stay online. Thus, they can only be implemented as an elicitation method if linguists have access to the Internet in the field. In our case, it is only possible to make use of online forms when we work with the Karitiana people at the University of São Paulo, or when we work with them in Porto Velho city. Even though there is access to the Internet in their village, their electricity comes from generators that are only turned on at night. For this reason, there is no stable Internet connection and, therefore, it is not feasible to use online forms.

[33] One may access it through <https://www.google.com/forms/about/>.

One of the useful tools that Google Forms provides is that it automatically saves the data on Google Drive. Therefore, the data is very safely stored; if something happens to a researcher's computer, the data can be easily retrieved by another computer.[34] Let us illustrate the use of online forms with the truth judgement task concerning tense in Karitiana. This task was entirely created using Google Forms. We start it with an identification section, as illustrated in Picture 4 below.

Figure 3 - Online form identification section[35]

This introductory section provides information about the elicitation to consultants and, at the same time, is used to obtain some metadata, such as the consultant's name and the date of their registration. Linguists can ask more questions (e.g., age, gender, etc.) if relevant for

[34] This was one important point that made us choose Google Forms. The University of São Paulo has an agreement with Google to provide its professors and students with unlimited space on Google Drive. When using Google Forms, we do not have to worry about space. We recommend that linguists do research on form builders and choose those that are the most adequate according to their fieldwork conditions.

[35] Translation:

Tense in Karitiana

This form's purpose is to investigate tense expression in Karitiana's language verifying the possible scenarios in which some sentences are accepted. The answers to this questionnaire are confidential.

*Compulsory

Name*: Your answer_____

Next

the research they are conducting. Including an introductory section to collect metadata is relevant, since "such information makes it possible to interpret the data with a finer-grained approach than perhaps anticipated" (Vander Klok and Conners 2020: 90). For instance, Storto (2002) argues that the Karitiana verbal prefix *pyn-* has a deontic use. Ferreira (2017) investigated deontic modality in the language. Contrary to expectations, the *pyn-* prefix did not appear spontaneously in his data. Instead, consultants used a modal verb *pydn*. Ferreira's (2017) hypothesis was that, since Storto's data came from narratives and her consultants were much older, the deontic prefix *pyn-* was becoming archaic and was only used by elders in traditional narratives. This conclusion was made possible because the metadata on consultants' ages was available.

Another relevant tool is a test mode that Google Forms allow us to create. This test is illustrated in Figure 6 below. Once the test mode is activated, linguists can go to their control conditions and mark the appropriate answers, as illustrated in Figures 4 and 5.

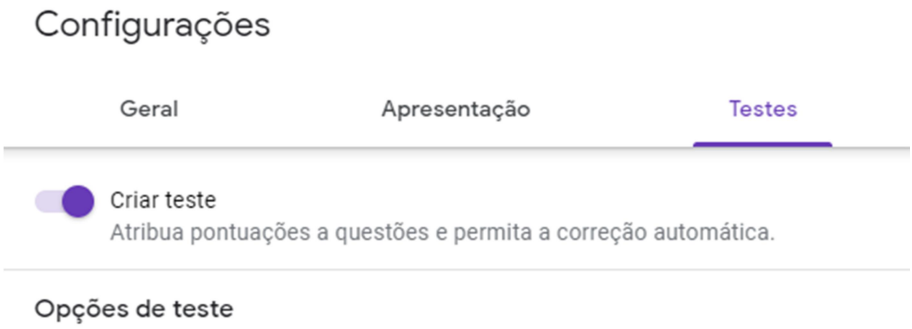


Figure 4 - Test mode activation[36]

[36] Translation:

Settings

General Presentation Tests

Create test
Attribute scores to the questions and allow automatic correction.

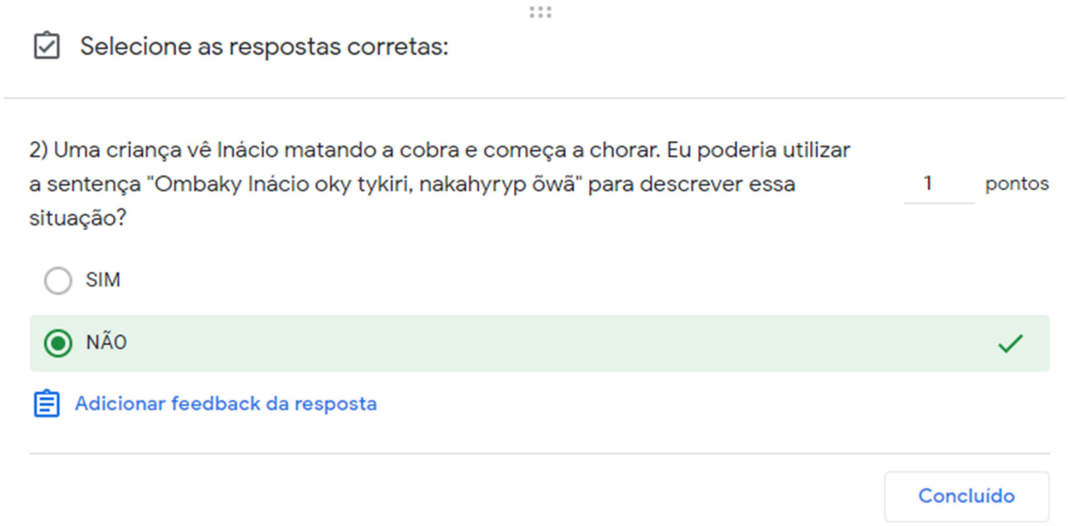


Figure 5 - Selecting the appropriate answer[37]

Once the test is created, a score is available immediately after each elicitation session. It shows the consultant's total score for a given questionnaire, and their score for each section. Thus, combining the control procedures described in the previous subsection with the tools described in this subsection provides fieldworkers with an easy and fast way of assessing consultants' performance in the training session and control conditions that the linguist has developed.[38]

[37] We presented the translation for this question when we discussed example (1).
[38] The score of the training sessions and control conditions from the elicitation sessions on tense were not communicated or discussed with the consultants.

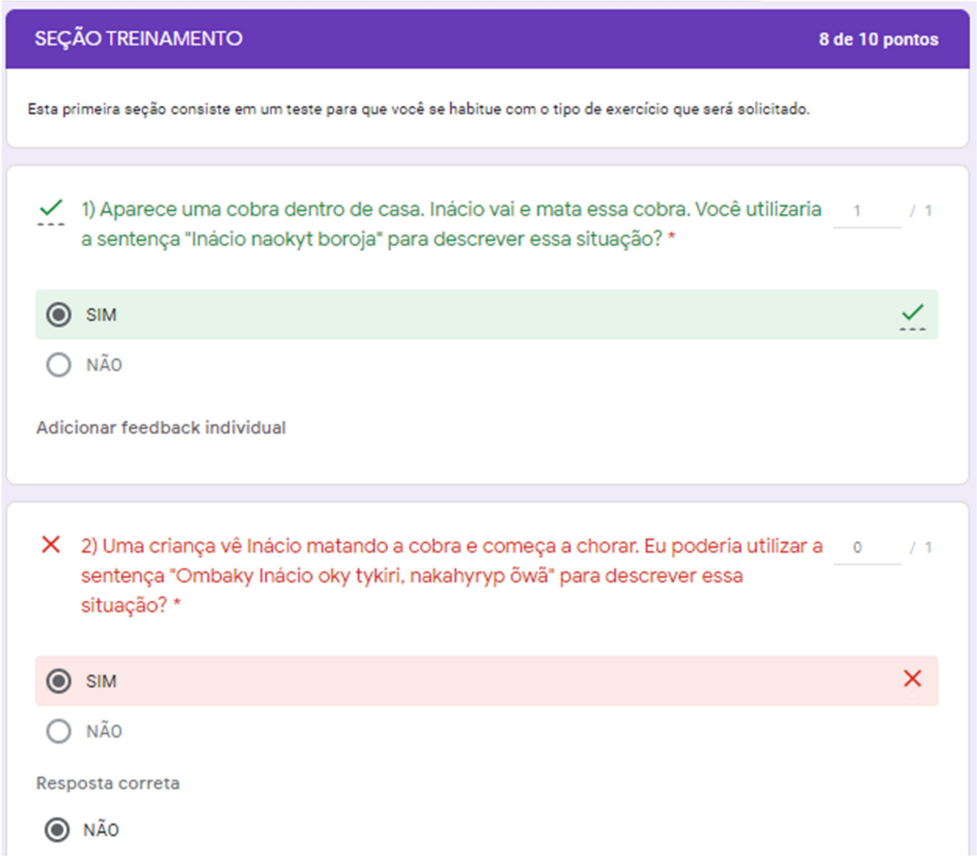


Figure 6 - Control score[39]

One last aspect of Google Forms that can facilitate linguists' work is the ability of the forms to automatically generate statistical graphs from consultants' answers, as illustrated in Figure 8 below. We do not claim that it necessarily makes sense to analyze fieldwork data statistically. A quantitative analysis is not feasible for many communities due to the low number of speakers (see Bochnak and Matthewson (2015) for relevant discussion). Nevertheless, graphs can provide linguists with visual representations of consultants' consensus on a given judgement.

[39] The translations of (1) and (2) in this figure were presented when we discussed examples (10) and (1), respectively.

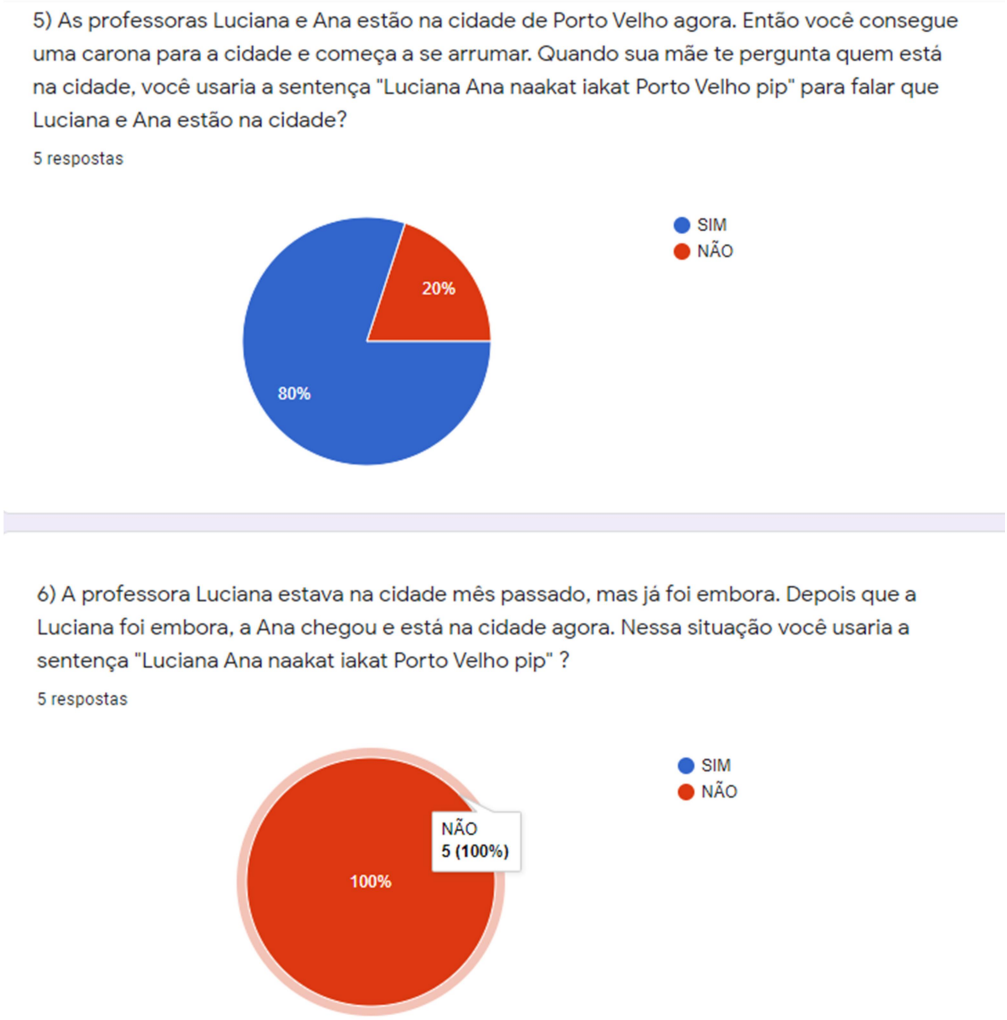


Figure 7 – Graphs generated by Google Forms

Linguists tend to use online forms only if they have to collect data from a large group in a virtual setting. We recommend that fieldwork linguists become familiar with tools such as Google Forms and make use of them in a variety of fieldwork environments.

We have argued that there are advantages in the use of online forms even in face-to-face/one-on-one settings, since they provide easy and fast access to the data and metadata. Having fast feedback may be vital for linguists who stay in the community for a short period of time. They need to decide whether consultants are adequate for their corresponding tasks. Moreover, Google Forms tend to make elicitations more interesting for the consultants, since working with a computer adds novelty to the fieldwork.

6 Final remarks

This chapter presented a number of techniques that can be used to elicit data during semantics fieldwork. We discussed how contextualizing many sentences in a single-story arc, as we have done with the use of storyboards, tends to be more effective than creating one context for each sentence of a questionnaire (Louie 2015). We argued that this approach makes elicitation sessions more interesting and less tiring for consultants. We also showed that training sessions and control conditions are interesting tools to assess whether consultants are good at certain tasks. These methods are also able to give feedback on consultants' attention levels/understanding of the tasks. We illustrated how true/false tests can be used with storyboards as a control technique. Lastly, we discussed the use of technologies during fieldwork. We argued that online forms, such as Google Forms, provide tools that help linguists control the quality of their data.

All the techniques suggested in this chapter can be used at the same time. Storyboards, for instance, can be used to make contextualized translations and truth judgement tasks more interesting. They can be combined with tests in to control consultants' levels of attention. Online form tools, on the other hand, can be combined with control methods to make control conditions easier to track. They provide us with a way to check the reliability of our data and facilitate linguistic analysis, with more transparent results for linguists.

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