An inquisitive approach to occasion-sensitivity

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Abstract

In this paper I propose an analysis of occasion-sensitive declarative and interrogative sentences (Travis 2008) using inquisitive semantics as the main formal framework. I define an extension to the basic inquisitive framework that takes into account the goal-sensitivity of interpretation. Instead of appealing to discourse goals and QUDs, the current account appeals to domain goals (Roberts 2012) and the property of goal-conduciveness as a way of explaining occasion-sensitivity. More particularly, I argue that among many different possibilities that a sentence denotes those that are maximally conducive to a given domain goal are also most prominent to the interlocutors on an occasion where that goal is salient. After introducing a formal system, I look at applications to simple positive declaratives, negations, and polar interrogatives, and I also consider some challenges for the current proposal.

1   Introduction

When someone says that the leaves are green or that the shoes are under the bed what they say is often sensitive to certain features of the occasion on which a sentence is uttered. For instance, they may be saying something that is compatible with the leaves being painted green, or, on other occasions, with them

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being only natural green. This sort of sensitivity to occasions, which I will be focusing on in this paper, has been a topic of many recent discussions.[1] Most of these theories take as their starting point simple declarative sentences such as Steel is strong enough, Tipper is ready, The leaves are green or Smith weighs 80 kilograms. According to one recent account (Schoubye and Stokke 2015), the context-sensitivity of such sentences should be explained as *question sensitivity*: what is said by a sentence in a context is determined relative to the *question under discussion*, and is identified with answers to QUDs (Roberts 1996, 2004, 2012). This approach, however, leaves one important issue open: since interrogative sentences can also be occasion-sensitive, which features of context determine what is expressed by interrogative sentences? It is not immediately obvious how the account that appeals to questions as a way to explain the occasion-sensitivity of assertions can also be used to explain the occasion-sensitivity of questions.

This paper extends the discussion of occasion-sensitivity to interrogative sentences, and provides a novel analysis that can uniformly explain occasion-sensitivity in both sentential forms without appealing to questions as a means of explanation. The main idea is that the content intuitively expressed by an utterance of a declarative or interrogative sentence in a context is determined relative to the *domain goal* (Roberts 1996) that is salient in that context.[2] From a number of possibilities (or ways for things to be) that a sentence denotes, only those that are *maximally conducive* to the salient domain goal are 'visible' to speakers in a given context. To formally capture the idea that a sentence denotes a set of possibilities I will use the framework of *inquisitive semantics*

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[1]Influential works on occasion-sensitivity (sometimes also referred to as 'underdeterminacy' or 'free pragmatic enrichment') include Recanati (2004, 2010, 2012), Carston (2002), Travis (1978, 2006, 2008), Cappelen and Lepore 2008, Predelli (2005), Rothschild and Segal (2009), MacFarlane (2009), Hansen (2011), and Kennedy and McNally (2010).

[2]I will however distinguish between the *semantic content* of a sentence and its *perceived or intuitive content*, i.e. what we *think* the sentence expresses when rich contextual information is provided.

(Ciardelli et al. 2013, Ciardelli et al. 2015a, Groenendijk et al. 2009, Roelofsen 2013, Roelofsen and Farkas 2015, Theiler et al. 2016). The basic system will be enriched with domain goals to account for the notion that these possibilities can be more or less goal-conducive.

The discussion will be structured as follows. In section 2 I introduce more examples of occasion-sensitivity in declarative and interrogative forms to motivate the proposal. In section 3 I discuss some conceptual issues surrounding occasion-sensitivity, in particular, which part of content is occasion-sensitive and which factor is crucial for the analysis of occasion-sensitivity. In section 4 I introduce inquisitive semantics as a framework that uniformly represents declarative and interrogative forms, updated with domain goals to capture occasion-sensitivity. In section 5 I look at some applications of the theory to simple declaratives, negations, and polar interrogatives. In section 6 I discuss a couple of potential problems and conclude in section 7.

2 Occasion-sensitivity in declarative and interrogative forms

In this section I describe motivating examples for the account of occasion-sensitivity I wish to advocate in this paper. I start with occasion-sensitive expressions in the context of declaratives where they are mainly discussed, and then extend the discussion to interrogatives.

2.1 Occasion-sensitivity: declaratives

Consider the following sentences:

(1) The leaves are green

(2) Smith weighs 80 kilograms

(3) The room is dark

(4) The shoes are under the bed

(5) Sid is a welder

(6) Sid grunts

On the face of it, (1)–(6) are semantically complete (modulo the demonstratives) so we should be able to compositionally assign them truth-conditions. However, many contextualists have argued that these and similar sentences actually don't have context-invariant truth-conditions but (often) have to be pragmatically enriched in order to determine their truth-conditional contents. In support of this view, Charles Travis uses "the method of contrasting pairs" showing that the same sentence placed in two different contexts (but in which the verifier is the same) intuitively says different things and yields different truth-value judgements. In the literature, these examples have come to be known as "Travis cases".[3] Consider a few of such cases.

The leaves are green[4]

Pia's Japanese maple is full of russet leaves. Pia paints them green.

(7) (a) *Zoe needs green leaves for her artwork* (henceforth, *the artist context*). Pia says: These leaves are green.

(b) *Zoe is a botanist seeking green leaves for a study of green-leaf chemistry* (henceforth, *the botanist context*). Pia says: These leaves are green

The shoes are under the bed[5]

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[3] See (Travis 1978, 2000, 2008, 2009)
[4] Travis (2008): 111
[5] Travis 2009: 119-120

Pia is looking for her shoes. Sid sees them, heels protruding from beneath the bed.

(8) (a) *Retrieving the shoes to go out.* Sid says: Your shoes are under the bed

(b) *Pia wants to make sure that her shoes would not catch the eye of the kleptomaniacal Zoe and are well hidden.* Sid says: Your shoes are under the bed.

Sid is a welder[6]

Sid is currently CFO of Amalgamated Metals, spent his whole working life in the boardroom, far away from a welding torch.

(9) (a) *Selecting a representative of the metal industry for a steering committee.* Pia says: Sid is a welder.

(b) *A ship is sinking and someone is urgently needed to weld the damaged part.* Pia says: Sid is a welder.

Notice that in each of these cases there is a contrast between contexts in (a) and (b) in terms of whether one would judge a sentence to be true. For example, whilst in (7a) it is acceptable to say that the leaves are green, in (7b) it's not. Ditto for the other two cases.

2.2 Occasion-sensitivity: questions

Consider again the contrasting cases discussed above but now using interrogative instead of declarative sentences:

Are the leaves green?

Pia's Japanese maple is full of russet leaves. Pia paints them green.

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[6]Travis 2018: 319

(10) (a) *The artist context.* Zoe asks: Are your leaves green?

(b) *The botanist context.* Zoe asks: Are your leaves green?

Are the shoes under the bed?

Pia is looking for her shoes. Sid sees them, heels protruding from beneath the bed.

(11) (a) *Retrieving the shoes.* Pia asks: Are the shoes under the bed?

(b) *The kleptomaniac context.* Pia asks: Are the shoes under the bed?

Is Sid a welder?

Sid is currently CFO of Amalgamated Metals, spent his whole working life in the boardroom, far away from a welding torch.

(12) (a) *The steering committee context.* Pia asks: Is Sid a welder?

(b) *Fixing a ship.* Pia asks: Is Sid a welder?

Evidently, the same phenomenon observed in (7)–(9) also occurs in (10)–(12). In other words, the content of an interrogative sentence – what is asked by uttering it – seems equally sensitive to the occasion on which the sentence is used.

There are a couple of issues here that I want to discuss in more detail in what follows. First, what does exactly vary across different occasions in Travis cases? And, second, as a function of what does it vary? I take these in turn in the following section.

3 What is occasion-sensitive and why?

3.1 Content: semantic and perceived

Travis cases have been widely used to argue that truth-conditions varies across different occasions of use. However, do these cases provide enough evidence that

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it is *truth-conditions* that thus vary rather than something else, such as felicity or appropriateness conditions? A parallel question then arises for interrogatives and resolution conditions.

Contextualists (e.g. Travis 1978, Recanati (2004), Carston (2002), Moravcsik 1994, Pietroski 2005, Chomsky 2000) argue "yes" , semantic minimalists (e.g. Cappelen and Lepore 2008, Borg 2004, Fodor 2003) "no". What seems to be beyond dispute is that there is such a thing as compositional, context-invariant linguistic meaning. What remains contentious, however, is whether this meaning should be identified with truth-conditions. According to semantic minimalists, sentences (1)–(6) have compositionally determined truth-conditions which are context invariant; what Travis cases show, on this view, is that some true utterances may be rejected because they are in some sense inappropriate or misleading (see Sainsbury 2001).

The debate is sometimes presented as revolving around the question whether compositional, truth-conditional semantics is possible once we accept that context sensitivity is pervasive, i.e. that (1)–(6) and similar sentences are context sensitive (see Schoubye and Stokke 2015: 760). It is doubtful, however, whether this is the contextualist's brief (see e.g. Travis 2018, Recanati 2010); what the contextualist rather seems to care about is either: (i) that the extent to which, and the manner[7] in which natural language is context-sensitive be adequately incorporated into the truth-conditional theory of meaning (see Recanati 2010), or else (ii) acknowledge the extent to which truth-conditional semantics is removed from actual judgements of speakers on contrasting cases (what they accept as true) and try to explain why this is so.

My position in this paper is that it is possible to determine the worlds in which (1)–(6) are true independently of context: the leaves *are* green if they are green in some way or other, Sid *is* a welder if he is a welder in some way

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[7]I.e. by top-down processes of free enrichment, not by automatic saturation of variables.

or other, the shoes *are* under the bed if they are under the bed in some way or other. On this view, *any* conceivable way (say) for the leaves to be green makes the sentence The leaves are green true.[8] The fact that we are not always prepared to recognise a given way for things to be as a legitimate truth-maker of a *sentence* has to do with facts other than semantic ones (see section 3.3). In short, intuitions elicited *when rich contextual clues of the kind given in Travis cases are provided* only *seem* to be about the *semantic* content of a sentence (Bach 2002). What we evaluate there is not necessarily the semantic content of a sentence but rather what we *perceive* the sentence to express against a certain background, and we tend to perceive only what is contextually highlighted. As I will explain below, context here acts as a lens that makes certain parts of content more, and certain other less, prominent. In general, whilst truth- and resolution-conditions can be considered context invariant features of sentences, their *perceived contents* (what we think is said by sentences) are considered *occasion-sensitive.*[9]

3.2 Is occasion-sensitivity question-sensitivity?

Which feature(s) of context explain contrasting judgements in Travis cases? Indexical expressions, for instance, have strict requirements for their saturation encoded in their semantics: I always requires the speaker of context to be known, he requires a male person referred to by the speaker, now requires the time of speaking etc. It is unlikely that occasion-sensitivity operates in a similar way[10]; there are far too many different understandings of green or welder to assume there is anything like a strict contextual parameter encoded in their

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[8]This take on semantic content is similar to the one defended in Borg (2012). As Emma Borg notes, "word meanings generalise over specific contextual understandings of them... the meaning of 'green' leaves open the way in which an object might be green (on its surface, on the inside, etc.)" (Borg 2012: 46).

[9]A very similar account explaining the effect in Travis cases by selective attention mechanism is proposed in Smith (2010)

[10]see however Rothschild and Segal (2009)

semantics.[11] Still, this doesn't prevent us from trying to identify *pragmatic parameter(s)* responsible for the contrasting judgements in Travis cases.

According to Schoubye and Stokke (2015) what is said in a declarative sentence that is occasion-sensitive is a function of a contextually salient *question under discussion* (QUD). In their words,

> the truth conditional meaning of a sentence in a context, or what is said by a sentence in a context, is partly determined by the question under discussion (QUD), cf. Roberts (2004, 2012). More specifically, according to our proposed view, what is said by a sentence in a context is the answer that it provides to a relevant question that is antecedently accepted as the topic of discussion (Schoubye and Stokke 2015: 760).

For instance, the sentence Sid is a welder can be an answer to different questions.

(13)   (a) Can you recommend a welder to sit on the steering committee?

     (b) Sid is a welder

(14)   (a) Who can operate a welding torch?

     (b) Sid is a welder

Intuitively, despite it being the same sentence, (13b) and (14b) say different things. Namely, as also indicated in example (9), what is said in (13b) would not be a good answer to (14a). For Schoubye and Stokke (2015), the content of Sid is a welder depends on which question is being answered.

A nice thing about this proposal is that it identifies a clear pragmatic parameter for the analysis of occasion-sensitive sentences, and that it deploys formal

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[11]Because of this lack of constraint on what's required to interpret an expression that is occasion-sensitive the phenomenon is also sometimes called "free pragmatic enrichment" (Recanati 2004, 2010, Pagin and Pelletier 2007).

semantic and pragmatic tools originally developed in the semantics of questions for the analysis of occasion-sensitivity. Nonetheless, its domain of application, at least in its current form, is limited to truth-conditions of declarative sentences since, conceptually and formally, what is asserted is determined relative to what is asked. However, consider the following dialogue:

(15) (a) Is Sid a welder?

(b) Sid is a welder

Notice that the question in (15a) is equally "underdetermined" or occasion-sensitive as the answer in (15b); so *this* question cannot be used as a method of determining what is said in (15b), not without further contextual clues spelling out what is asked. The account proposed by Schoubye and Stokke (2015) thus works as an explanation for the occasion-sensitivity of truth-conditional content *provided* the intended content of a question in a context is already fixed. If, however, we wish to explain how the content of an interrogative sentence such as (15a) is determined in context we need to look beyond QUDs.

3.3 Goal-sensitivity

3.3.1 Domain and discourse goals

Instead of QUDs, I propose *domain goals* (see Roberts 2012) as the main factor in explaining occasion-sensitivity. A domain goal is a practical goal such as fixing a ship, making an experiment, forming a committee, furnishing an office, hiding shoes, helping an impoverished student, or avoiding something unwanted etc., that agents strive to achieve in a certain situation and around which a conversation is structured. Besides a domain goal, which pertains to successfully performing a certain activity, interlocutors also aim to achieve a *discourse* goal, i.e. to stay on topic and settle a given QUD. According to Roberts (2012),

we can characterize sincere, competent and cooperative interlocutors as holding two kinds of goals at any given point in a discourse, their discourse goals—aiming to address particular questions in the QUD—and the rest, their domain goals—intuitively, those things they want to accomplish in the world (as opposed to their narrowly discourse goals). (Roberts 2012: 6)

For the present analysis, the distinction between discourse and domain goals is important. Whilst Schoubye and Stokke (2015) see discourse goals as guiding the interpretation of declarative sentences, I instead suggest that there is a link between a *domain* goal that agents strive to achieve on an occasion and how they are inclined to perceive both what is asserted and what is asked. So, whereas a discourse goal to resolve a QUD determines which information is relevant and on-topic, a domain goal determines which ways for things to be constituting this information are most prominent to the speakers in a context.

3.3.2 Goal-conduciveness and relevance

A domain goal provides a tangible thing at stake that motivates interlocutors to *favour* those possibilities that are *maximally conducive to that domain goal.*[12] For instance, we are practically motivated not to count Sid (the CFO) as a welder if we want to keep a boat afloat. Domain goals thus create *preferences* for certain ways for things to be because not all of them are equally *conducive* to a given goal. The leaves being non-naturally green *is* a way for the leaves to be green, but this way of them being green is not conducive to the botanist's goal, and so it doesn't *count as* such for this purpose. That is, as a way for the leaves to be green, its *prominence* amongst other such ways is very low.

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[12]Since there are two types of goals in a conversation, there are also two types of conduciveness to a goal, namely conduciveness to a *domain* goal and conduciveness to a *discourse* goal. However, to avoid confusion, I call the former simply *goal-conduciveness* and the latter *relevance.*

Relevance as a property of conversational moves is measured against a *discourse* goal and a topic of discussion (which can be expressed in the form of a question or not).[13] Conversational moves are relevant just in case they (partially) answer a question (a move is an assertion) or they form part of a strategy to answer a question (a move is another question).[14] If a question is a polar question, then, intuitively, both a positive and negative answer are equally relevant and on-topic. Whilst relevance is thus *preserved under negation*, goal-conduciveness isn't.[15] That is, for Sid to be a welder is one way things could be, and for him not to be a welder is another way things could be, although they contribute the same subject matter to utterances. Opposite ways for things to be potentially have different goal-conduciveness values. As a consequence, not all *relevant* answers to a QUD must denote goal-conducive ways for things to be. For instance, saying as a response to the question in (12b) that Sid is not a welder (in the sense of not being handy with the welding torch) is certainly relevant and on-topic – it *does* settle the discourse goal – but Sid's not being handy with the welding torch (as a way for things to be) is *not conducive to the practical goal* of welding the damaged ship. The distinction is subtle but nonetheless crucial because, on the proposed analysis, *goal-conduciveness* (rather than relevance) determines what is perceived as having been said.

4   A formal framework for occasion-sensitivity

In this section I propose a formal semantic framework for the analysis of occasion-sensitive sentences. We have seen above that occasion-sensitivity is not specific to declaratives. Since the perceived contents of interrogatives are also

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[13]For discussion of the connection between topic-sensitivity and question-sensitivity see Hawke (2017).

[14]See Roberts (2012), Schoubye and Stokke (2015)

[15]For a subject matter (topic) to be preserved under negation means, for instance, that Sid is a welder and Sid is not a welder both share the same topic, i.e., **Sid's profession** or, more specifically, **Sid's welderness**. See Hawke 2017: 5.

occasion-sensitive it would be desirable to have a semantics that can deal with the occasion-sensitivity of both kinds of expressions in a uniform way. A formal system known as *inquisitive semantics* that has recently been developed offers a nice starting point. Still, in order to explain occasion-sensitivity, after introducing the basic system I will upgrade it with domain goals.

4.1   Inquisitive semantics

Utterances of declarative and interrogative sentences achieve different discourse effects. In uttering a declarative sentence John smokes a speaker only provides information, whereas in uttering an interrogative Does John smoke? she only requests information. Because of this contrast, a declarative sentence is taken not to have any inquisitive content, which means that its meaning is often identified with truth-conditions or classical proposition: a set of possible worlds where the sentence is true (or a function from worlds to truth-values). On the other hand, interrogative sentences are traditionally taken as not having any informative contents, which means that their meaning can be formally represented by a set of classical propositions.

Inquisitive semantics takes a different approach. On this view, both the declarative John smokes and the interrogative Does John smoke? are understood as having informative and inquisitive content, only in the former case, the inquisitive content is trivial, whilst in the later case the informative content is trivial. This approach allows for a uniform treatment of declarative and interrogative sentences, where the meaning of any sentence, regardless of its form, is modelled by *a downward closed set of classical propositions* or *possibilities*. In the context of the present paper, having a uniform semantics will also allow for a uniform occasion-sensitive semantics. Let us capture some of the basic inquisitive concepts more formally.

Possibility, classical proposition.   A set of possible worlds $\alpha \subseteq W$ is called a possibility (or classical proposition).

Sentence meanings.   A sentence meaning or proposition $\mathcal{P}$ is a non-empty, downward closed set of possibilities, such that if $\alpha \in \mathcal{P}$ and $\beta \subset \alpha$ then $\beta \in \mathcal{P}$. The elements of $\mathcal{P}$ are, in this framework, referred to as *resolutions* of the sentence with the inquisitive meaning $\mathcal{P}$. Downward closure is supposed to formally capture the intuition that if the issue raised by $\mathcal{P}$ is resolved by a possibility $\alpha \in \mathcal{P}$ it will also be resolved by any stronger possibility $\beta \subset \alpha$. For any set of possibilities $\mathcal{P}$, $\mathcal{P}^{\downarrow}$ denotes the downward closure of $\mathcal{P}$.

Informative content.   The proposition expressed by a sentence φ is denoted by $[\![\varphi]\!]$.The informative content of φ corresponds to the union of all members of $[\![\varphi]\!]$, i.e., $\mathsf{info}(\varphi) := \bigcup [\![\varphi]\!]$

Inquisitive content.   The issue raised by φ may be a *trivial issue* that is resolved by the informative content $\mathsf{info}(\varphi)$, *viz.* whenever $\mathsf{info}(\varphi) \in [\![\varphi]\!]$. Whenever $\mathsf{info}(\varphi) \notin [\![\varphi]\!]$ a sentence raises a *proper issue* which is resolved by some more enhanced possibility $\alpha \subset \mathsf{info}(\varphi)$. Depending on whether an issue is trivial or proper, sentences will have trivial or proper inquisitive contents.

Alternatives.   *Maximal elements* of $[\![\varphi]\!]$ are called *alternatives* for φ. Alternatives in the inquisitive setting "correspond (roughly) to what are called answers in, e.g., a Hamblin-style theory of questions" (Theiler et al. 2016: 126). Although declaratives and interrogatives sentences both denote sets of propositions, declaratives are distinguished from interrogatives in that the former never introduce more than one alternative (one maximal element), and the latter introduce at least two.

Truth and truth-set. A sentence φ is said to be true in a world w just in case $w \in \mathsf{info}(\varphi)$. For any φ, the set of worlds w where φ is classically true (the classical truth-set) is denoted as $|\varphi|$. For any *non-inquisitive* sentence[16] φ, we can determine $\llbracket \varphi \rrbracket$ from $|\varphi|$ by taking into account all subsets of $|\varphi|$; thus for any non-inquisitive sentence φ, $\llbracket \varphi \rrbracket$ is a *power-set* of $|\varphi|$, i.e the set of worlds where φ is true.
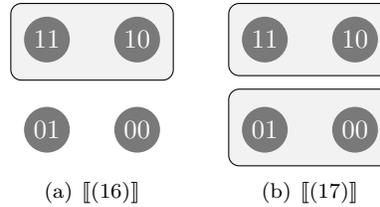

(a) $\llbracket (16) \rrbracket$ (b) $\llbracket (17) \rrbracket$

Figure 1: Propositions expressed by John smokes and Does John smoke?. Only maximal elements are depicted.

To illustrate what has been said so far consider sentences John smokes and Does John smoke? which in inquisitive semantics have following meanings:

(16) $\llbracket \mathsf{John\ smokes} \rrbracket = \{\{w : \text{John smokes in } w\}\}^{\downarrow}$

(17) $\llbracket \mathsf{Does\ John\ smoke?} \rrbracket = \{\{w : \text{John smokes in } w\}, \{w : \text{John does not smoke in } w\}\}^{\downarrow}$

These two propositions are visualised in Figure 1(a) and 1(b). Grey circles marked 11, 10, 01, 00 represent possible worlds; in worlds 11 and 10 John smokes, in worlds 01 and 00 John doesn't smoke. Shaded rectangles represent *maximal* elements of $\llbracket \mathsf{John\ smokes} \rrbracket$ and $\llbracket \mathsf{Does\ John\ smoke?} \rrbracket$ (or *alternatives* for (15) and (16)).

On this analysis, when someone utters (15) she (i) provides the information that the actual world is one of 11 or 10, but also (ii) raises a trivial issue which

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[16] A non-inquisitive sentence is a sentence with a trivial inquisitive content

doesn't require any further information to be resolved. By contrast, by uttering (16), a speaker (i) provides the trivial information that the actual world is one of 11, 10, 01, or 00 (all options are open) and (ii) requests information in order to locate the actual world either in the alternative $\{11, 10\}$ establishing that John smokes, or within the alternative $\{01, 00\}$, establishing that John doesn't smoke.

4.2   Occasion-sensitive inquisitive semantics

Although inquisitive semantics allows for a uniform treatment of declarative and interrogative sentential forms, in its basic implementation it is not concerned with context sensitivity. Just like in the classical setting, each sentence is here associated with a *unique* (albeit enriched) proposition without considering any contextual information. Based on earlier discussion concerning the role of domain goals in interpretation, in this section I want to propose an upgrade of the basic inquisitive framework in order to explain how perceived content may vary across occasions.

4.2.1   Ways for things to be

We have seen that in inquisitive semantics all sentences denote *downward closed sets of possibilities*. So, on this approach, a declarative sentence such as John smokes denotes, not a set of worlds where John smokes, but rather a set of possibilities such that all consist of worlds where John smokes. This more structured way of thinking about the semantics of sentences is also useful if one wants to make a further categorisation of possibilities in the denotation of a sentence, as I intend to do here. Above (section 3.3) I said that there are different *ways* for (say) leaves to be green. Formally speaking, *ways for things to be* should be thought of as possibilities (each a set of worlds). I also suggested

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that some of those ways (e.g. for leaves to be green) could be more conducive to some goal than others. Correspondingly, some elements in a downward closed set of possibilities (representing the standing meaning of a sentence) could be more conducive to a given domain goal than others in this set (thus determining the sentence's perceived meaning). Let us try to capture this intuition more formally.

4.2.2 Domain goals

Goals and γ-values. A domain goal γ is a function that maps a possibility α to a γ-value, 1 ('conducive to γ') or 0 ('not conducive to γ').[17]

According to this definition, possibilities are evaluated for conduciveness to a goal γ and are assigned a value (0 or 1) with respect to γ. For instance, a possibility that the leaves are only painted green is not conducive to the botanist's domain goal, and the possibility that the leaves are naturally and painted green is conducive to her goal. Furthermore, there is an important constraint on γ-valuations. Namely, more enhanced possibilities will also have greater (or equal but not smaller) γ-values. This constraint assures that a sentence is always interpreted in the strongest possible way given the domain goal (i.e. in such a way that further restricting the set of possibilities would not add goal-conduciveness). More formally,

Strengthening and γ-valuation For any pair of states α, β such that $\beta \subseteq \alpha$, and any domain goal γ, $\gamma(\beta) \geq \gamma(\alpha)$.

If some possibility α is assigned γ-value 1 (i.e. if α is valued as goal conducive), based on this constraint, any more specific possibility $\beta \subseteq \alpha$ will not be any less

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[17]Although the goal function maps possibilities to only two values, this is clearly a simplification. Intuitively, conduciveness to a goal comes in degrees.

conducive to γ. Intuitively, if the botanist's goal requires that the leaf be either only naturally green or both naturally and painted green, then the possibility that the leaf is both naturally and painted green (which is one of its subsets) is at least as conducive to the botanist as the former possibility. Similarly, if to achieve the goal of welding a damaged boat only requires Sid to be able to handle a welding torch, then a more specific possibility that he is (say) a right-handed welder shouldn't reduce goal-conduciveness (assuming, that is, that the possibility that Sid can weld is sufficient for achieving the goal). By contrast, for any possibility α which is *not* conducive to γ (i.e. where $\gamma(\alpha) = 0$) there could be $\beta \subset \alpha$ which *is* more conducive to γ.[18] For instance, the possibility that the leaf is non-naturally green or naturally green is *not* conducive to the botanist's goal, but the possibility that the leaf is naturally green (which is a subset of the possibility that the leaf is naturally or non-naturally green) *is* conducive to the botanist.

With the proposed constraint in place, we can represent perceived meanings as downward closed sets of possibilities just like in the standard inquisitive framework.

4.2.3   InqOS

In this section, following the presentation in Roelofsen and Farkas (2015), I introduce a goal-sensitive inquisitive semantics for a simple propositional language $\mathcal{L}$ consisting of atomic formulas $\mathcal{A}$, negation ($\neg$), disjunction ($\vee$), and two non-standard operators, (! and ?).

For every atomic formula $p \in \mathcal{A}$, a possible world w is a valuation function that assigns p a truth value such that either $w(p) = 1$ or $w(p) = 0$. In the basic system of inquisitive semantics, InqB, the proposition expressed by an atomic

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[18]Notice that in the latter case β must be a proper subset of α since a proposition cannot be both conducive and not conducive to γ.

formula p is defined as a set of possibilities such that p is true is all the worlds contained in these possibilities, i.e.

(18) $[\![p]\!]_{\mathsf{InqB}} = \wp(\{w : w(p) = 1\})$

The proposition expressed by a negative sentence in the basic InqB system is defined as follows:

(19) $[\![\neg\varphi]\!]_{\mathsf{InqB}} = \wp(\overline{\bigcup[\![\varphi]\!]_{\mathsf{InqB}}})$

In the inquisitive system upgraded with domain goals, which I will refer to as InqOS, the proposition (representing perceived content) expressed by a formula $\varphi \in \mathcal{L}$ is determined in the following recursive definition:

(20) $\qquad [\![p]\!]_\gamma = \{\alpha \in \wp(\{w : w(p) = 1\})$ such that there is no $\beta \in \wp(\{w : w(p) = 1\})$ such that $\gamma(\beta) > \gamma(\alpha)\}^{\downarrow}$

$\qquad [\![\neg\varphi]\!]_\gamma = \wp(\overline{\bigcup[\![\varphi]\!]_\gamma})$

$\qquad [\![\varphi \vee \psi]\!]_\gamma = [\![\varphi]\!]_\gamma \cup [\![\psi]\!]_\gamma$

$\qquad [\![!\varphi]\!]_\gamma = \wp(\bigcup[\![\varphi]\!]_\gamma)$

$\qquad [\![?\varphi]\!]_\gamma = [\![\varphi]\!]_\gamma \cup [\![\neg\varphi]\!]_\gamma$

Atomic formulas. The *standing meaning* of an atomic formula p corresponds to the proposition defined in (18), namely, a downward closed set of possibilities containing worlds where p is true. I also refer to it as *minimal proposition* and denote it by $[\![p]\!]_{\mathsf{min}}$. The *perceived meaning* of an atomic sentence p on an occasion where goal γ is operative is a downward closed set of possibilities $\alpha \in \wp(|p|)$ whose γ-values are at least as great as any other possibility in $\wp(|p|)$.[19] I also refer to this proposition as *contextual proposition* and denote it by $[\![p]\!]_\gamma$. Notice that in case no possibility $\alpha \in \wp(|p|)$ is conducive to γ the contextual

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[19] Any possibility with a γ-value that is smaller than those of others in this set is excluded from it.

proposition expressed by p will correspond to its minimal proposition. This condition assures that an utterance of p where γ is salient is true even when no $\alpha \in \wp(|p|)$ is conducive to γ.[20] Since an inquisitive meaning is construed as a downward closed set of possibilities it contains all of its enhancements. The contextual proposition expressed by an atomic formula is thus a *subset* of the minimal proposition expressed by it. For any atomic formula p it holds that

(21) $[\![p]\!]_\gamma \subseteq [\![p]\!]_{\mathsf{min}}$

Negation. The *standing* meaning of a negative sentence $\neg\varphi$ corresponds to the proposition defined in (19) and its perceived meaning to the one defined in (20). Notice that $[\![\neg\varphi]\!]_\gamma$ may contain some possibilities consisting of worlds where φ is *true* but which are *not* conducive to γ. Because of this, although contextual negation *may* be identical to literal negation[21], it never *asymmetrically entails* the minimal proposition expressed by a negative sentence. In many cases where possibilities $\alpha \in \wp(|\varphi|)$ have different γ-values relative to a goal γ, contextual negation *fails to entail* literal negation.[22] For negative sentences the entailment order holding between standing and contextual meaning is *reversed*:

(22) $[\![\neg\varphi]\!]_{\mathsf{min}} \subseteq [\![\neg\varphi]\!]_\gamma$

For entailment orders between contextual and minimal propositions (for positive and negative sentence) the following generalisation then holds:

(23) $[\![\varphi]\!]_\gamma \subseteq [\![\varphi]\!]_{\mathsf{min}}$ iff $[\![\neg\varphi]\!]_\gamma \supseteq [\![\neg\varphi]\!]_{\mathsf{min}}$.

That is, the contextual meaning of a positive sentence is more specific than its

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[20]This is the case, for instance, with (positive) sentences that (contextually) entail or implicate true negations of φ. For instance, in the botanist context at the world where the leaf is painted green and naturally red the utterance of These leaves are naturally red is true (and relevant) even though none of its resolutions is conducive to γ (see 5.1.1 below).

[21]This is just in case all $\alpha \in \wp(|\varphi|)$ have the same γ-values, either 0 or 1.

[22]This property of negation has also been observed in Schoubye and Stokke 2015: 782.

literal meaning just in case the literal meaning of its negation is more specific than its contextual negation.

Polar question. In the inquisitive setting a polar question $?\varphi$ is identical to the disjunction of a positive formula and its negation, $\varphi \vee \neg\varphi$. Correspondingly, $[\![?\varphi]\!]_\gamma = [\![\varphi \vee \neg\varphi]\!]_\gamma$, which means that the proposition expressed by $?\varphi$ always determines two alternatives (and is therefore always inquisitive), which jointly cover logical space (and it's therefore never informative).

Disjunction. The contextual proposition expressed by a disjunction $\varphi \vee \psi$ amounts to the union of $[\![\varphi]\!]_\gamma$ and $[\![\psi]\!]_\gamma$. Disjunctions contain (at least) two possibilities and so they are typically inquisitive. However, insofar as their informative content is not necessarily trivial a disjunction can also be informative.

Projection operators. The role of projection operators ! and ? is to project any proposition to an informative or inquisitive dimension thus trivialising either its inquisitive or its informative contents. ! is the non-inquisitive operator and ? the non-informative operator. For example, the proposition expressed by $!\varphi$ always contains a single possibility $\bigcup[\![\varphi]\!]_\gamma$ and is thus never inquisitive, whilst the proposition expressed by $?\varphi$ contains all elements of $[\![\varphi]\!]_\gamma$ and the complement of $\bigcup[\![\varphi]\!]_\gamma$, including all their subsets, and is thus always inquisitive.

5 Linguistic relevance of **InqOS**

The extension of the basic inquisitive system formally introduced in the last section is mainly motivated by linguistic examples known as Travis cases. In this section I want to illustrate how the **InqOS** framework can be used to explain the phenomenon that these cases capture.

5.1 Simple positive declaratives

Let us start with simple declaratives. Consider again the following declarative sentence uttered in dialogues in (7a) and (7b) above,

(24) The leaves are green

(a) $[\![(24)]\!]_{\mathsf{min}}$ (b) $[\![(24)]\!]_{\mathsf{artist}}$ (c) $[\![(24)]\!]_{\mathsf{botanist}}$
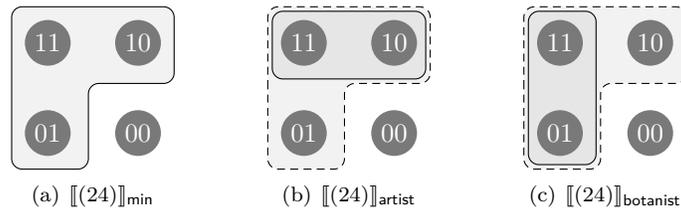
Figure 2: Minimal and two contextual propositions expressed by (24). Only maximal possibilities depicted.

In Figure 2(a) I depict the minimal proposition expressed by (24) and in Figure 2(b) and 2(c) two contextual propositions. Grey circles represent possible worlds such that in world 11 the leaves are both naturally and painted green, in world 10 they are only painted green, in world 01 only naturally green, and in world 00 neither. Shaded rectangles represent the *maximal* elements of $[\![(24)]\!]_{\mathsf{min}}$, $[\![(24)]\!]_{\mathsf{artist}}$ and $[\![(24)]\!]_{\mathsf{botanist}}$.

The minimal proposition expressed by (24) is a downward closed set containing possibilities each of which consists of worlds where (24) is true. Relative to the artist's goal (24) expresses the proposition depicted in the shaded part in Figure 2(b). In the botanist context (24) expresses the proposition depicted in Figure 2(c). The two contextual propositions are determined with respect to two different goal-conduciveness maps. I illustrated this process for the botanist's case in Figure 3.

Next, let us consider a case where for all $\alpha \in \wp(|p|)$, a goal γ maps these possibilities to 0, namely the case where *no* possibility in this set is goal-conducive. Assume that the domain goal is to prevent a kleptomaniac from stealing the
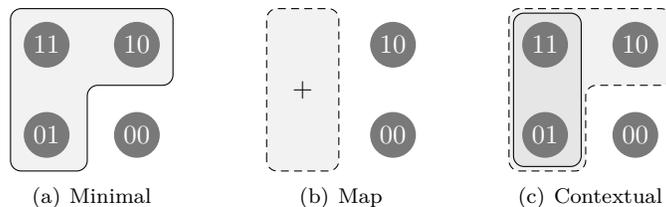
Figure 3: From literal to contextual meaning: the botanist's case

shoes by hiding them under the bed (cf. example (8) above). Furthermore, assume that the shoes are not under the bed but are visibly next to the bed. Compare the following sentences uttered in this context (suppose that both are true):

Hiding the shoes under the bed from a kleptomaniac

(25) The shoes are next to the bed

(26) Napoleon surrendered at Waterloo

Intuitively, no possibility compatible with the sentence in (25) is conducive to the *domain* goal of having the shoes hidden under the bed. Ditto for (26). However, whilst uttering (25) is still relevant, on-topic, and conducive to a *discourse* goal, uttering (26) (out of the blue) is irrelevant and off-topic. Notice that the semantics defined above doesn't distinguish between relevant and irrelevant utterances of sentences in as much as relevance concerns *discourse* goals and QUDs rather than domain goals (see also section 3.3.2). At any rate, in all cases where *no* element of the minimal proposition is conducive to a given domain goal, the contextual proposition expressed by a simple declarative sentence will simply correspond to its minimal proposition. This will also be the case if *all* possibilities are goal-conducive. In general, whenever there is no difference in γ-values between the possibilities denoted by the sentence, the contextual

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proposition expressed by it will be identical to its minimal proposition.

5.2 Negation

We've seen that the contextual meaning of a simple declarative is an enhancement of the minimal proposition expressed by it; in other words, its contextual meaning *entails* its standing meaning. However, this doesn't hold generally for all declarative sentences. To see why not consider the following negative declarative:

(27) The leaves are not green

In Figure 4(a) I depicted the minimal proposition expressed by (27) and in Figure 4(b) and 4(c) two contextual negations. To determine a contextual proposition expressed by a negated sentence (27), besides those possibilities containing worlds where (27) is false, we need to take into account *other* possibilities which are in the complement of $\bigcup [\![(27)]\!]_\gamma$. In the artist's context that is the singleton possibility $\{01\}$ (only naturally green) and in the botanist context the singleton possibility $\{10\}$ (only painted green). Accordingly, besides $[\![(27)]\!]_{\mathsf{min}}$, each of these possibilities constitutes the intended contextual negation for each domain goal.
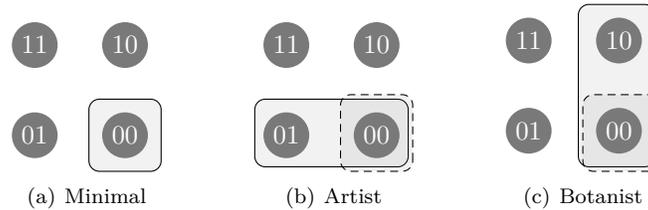

(a) Minimal   (b) Artist   (c) Botanist

Figure 4: Literal negation and two contextual negations. Only maximal possibilities depicted.

It is easy to see in the diagrams in Figure 4 that the minimal proposition expressed by a negated sentence (27) entails both of the contextual proposition
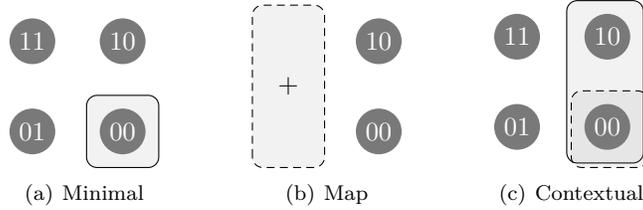
Figure 5: From literal to contextual negation: the botanist's case

expressed by it. Namely, that the leaf is not green in any way entails that the leaf is not painted green or that the leaf is not naturally green.

5.3 Interrogatives

In this section I turn to interrogatives. In some semantic frameworks for questions the meaning of a question is taken to correspond to a set of propositions which represent possible or true (at w) answers to the question (cf.Hamblin 1973, Karttunen 1977). In inquisitive semantics the notion of answerhood is not a primitive notion like in these theories but what counts as a basic answer to a question is derived from a more basic notion of *resolution*.[23] An issue can thus be thought of as a set of possibilities that resolve it or a set of resolving answers (in case an issue is a question). If the issue is not trivial – if it's inquisitive – there will be *two or more* alternative resolutions and thus two or more basic answers. Basic answers to a question are those that resolve the issue raised by the question and do not provide more information than necessary to do so.

Insofar as the InqOS system proposed above distinguishes between minimal and contextual proposition we need to distinguish two notions of answerhood. Thus, in addition to basic answers defined with respect to the semantic notion of resolution there is another notion of *acceptable answers* which are defined

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[23]Thus, "question meanings, i.e., issues, are defined in terms of what it takes to resolve them, and the basic/possible/complete/partial answers to a question are defined in terms of its meaning" (Ciardelli et al. 2015b: 74).

relative to the issue raised in a context where a given goal is operative. Recall that truth and resolution are not defined with respect to context, which means the notion of basic answerhood should also not be context-sensitive. Namely, if something is a true answer to a question (or a truthful resolution of an issue) it must remain so regardless of the contextually salient goal. I proposed to reconcile this prediction with the intuitions concerning Travis cases by distinguishing between semantic and perceived content. Thus, a true answer to a question need not be accepted as true in light of some goal, because its semantic content need not coincide with its perceived content.

Now consider the following polar interrogative sentence and three interpretations of it:

(28) Is the leaf green?

    (a) Is the leaf green in some way?   [minimal]

        i. Yes, the leaf is green some way

        ii. No, the leaf is not green in any way

    (b) Is the leaf painted green?   [artist]

        i. Yes, the leaf is painted green

        ii. No, the leaf is not painted green

    (c) Is the leaf naturally green?   [botanist]

        i. Yes, the leaf is naturally green

        ii. No, the leaf is not naturally green

A context-independent interpretation of the sentence (28) coincides with the proposition expressed by the sentence (28a) whose basic answers (corresponding to alternatives) are specified in (28ai) and (28aii). Two contextual interpretations of (28) coincide with the propositions expressed by sentences (28b)
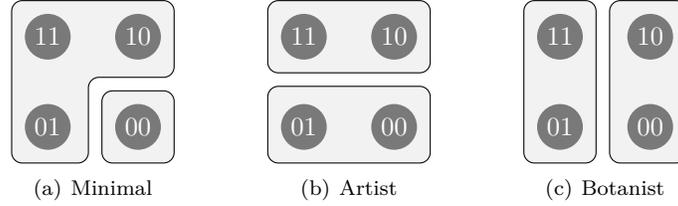
Figure 6: Literal and contextual interpretation of (28). Only maximal elements depicted.

and (28c). I have depicted these three interpretations in Figure 6. Figure 6(a) depicts semantic resolution conditions for the issue raised by (28) in abstraction from any domain goals. Figures 6(b-c) depict *perceived resolution conditions* relative to two different domain goals. Propositions expressed by (28bi) and (28bii) also represent *accepted answers* to the issue raised by (28) in the artist context, and (28ci) and (28cii) represent accepted answers to (28) in the botanist context. Notice that, on the proposed analysis, in the **Leaf** case Pia's answer is, strictly speaking, *true* in the botanist context (in world 10), although, intuitively, her answer is *not accepted as true* in world 10 (as predicted) given that the botanist's goal is salient on that occasion.

Furthermore, observe that, unlike in the case of a simple declarative, the two contextual propositions expressed by sentence (28) are *not* enhancements of the minimal proposition expressed by this sentence. Since $?\varphi$ is an abbreviation of $\varphi \vee \neg\varphi$ this is an expected consequence of the fact pointed out above to the effect that the contextual negation of φ does *not* asymmetrically entail the minimal proposition expressed by $\neg\varphi$. In any case, there is *no* entailment relation *or* reverse entailment relation between literal and contextual meanings of polar interrogatives. That is, the contextual meaning of $?\varphi$ is *incomparable* to its literal meaning in terms of inquisitiveness.

6 Potential problem cases

6.1 Discourse constraints

One potential concern for the present account stems from certain interpretive preferences that are not predicted by the proposed theory. Consider the following dialogue taking place in the botanist's context:

(29) *Zoe, the botanist seeks a green leaf for her experiment*

    (a) Zoe: Is the leaf (naturally) green?

    (b) Pia: The leaf is red

Intuitively, in the context of this dialogue, what Pia says by uttering (29b) is that the leaf is *naturally* red. However, the theory predicts that, inasmuch as *no* possibility compatible with the meaning of (29b) is more conducive to the botanist's goal than others, the proposition expressed by (29b) relative to the botanist's goal should coincide with the minimal proposition expressed by (29b). But, intuitively, it doesn't; as an *answer* to (29a), there seems to be an expectation that the sentence (29b) be interpreted so that the leaf is *naturally* red. Is there a way to reconcile this intuition with the current theory?

One way to explain the intuition is by appealing to the fact that, in the context of this particular dialogue, the answer in (29b) is supposed to *resolve the issue* raised by (29a). Answers that are considered *relevant* are those that either resolve the issue raised by a question, or represent part of a strategy to resolve the issue (cf. Roberts 1996, 2012). Basic answers that resolve the issue raised by this sentence in the botanist context are specified in (30a) and (30b):

(30) Is the leaf (naturally) green?

    (a) Yes, that leaf is (naturally) green.

    (b) No, the leaf is not (naturally) green. ($\rightsquigarrow$ The leaf is naturally not-green)

Assume, as before, that the actual world is such that the salient leaf is naturally red and painted green. So, the answer that in this context (and world) truthfully resolves the issue raised is (30b) in as much as it entails, as indicated, that the natural colour of the leaf is not green but is some other colour. Now, assuming that Pia's answer in (29b) is intended as a resolution of the issue raised by (29a), (29b) is supposed to imply the answer in (30b) and that is possible only if (29b) is interpreted so that red means naturally red since the leaf's surface colouring is *irrelevant* to the issue raised by (29a). If red is interpreted in any other way (29b) would not be a resolution of the issue raised by (29a) in the botanist's context. In general, then, the interpretation of a (declarative) sentence may be sensitive not only to contextual domain goals but it may also be constrained by a discourse goal, i.e., when the utterance is supposed to resolve an issue that has previously been raised.

6.2   Elimination strategy

Another challenge for the present account has to do with identifying relevant domain goals in a conversation. In all the examples considered so far a domain goal consisted in performing an activity for which a certain way for things to be was more suitable than some other way. Accordingly, it was considered more likely that speakers were taking about those ways that are better for attaining the goal as opposed to some others that have nothing to do with the goal or prevent it from happening. However, there *seem* to be some cases where the possibilities that are *not* conducive to the goal matter for the interpretation of a sentence. Consider, for instance, the following case:

Sid is hungry and wants to make a sandwich. There is a very old loaf of bread in the bread bin. Sid suspects it might be moldy.

(31) (a) Sid: Is the bread in the bread bin green?

(b) Pia: No, the bread is not green.

Assume there are different ways for bread to be green. Which way for bread to be green is conducive to Sid's domain goal(s)? On the proposed account, once we know Sid's goal we can determine what he inquires about. What is Sid's goal here exactly? We know he intends to eat a sandwich. Now, intuitively, what Sid has in mind in (31a) is whether the loaf of bread is moldy green (as opposed to, say, dyed with a green food colouring). But moldy green bread is certainly *not* conducive to eating a sandwich. So, in this case, the theory seems to make a wrong prediction.

Such a problem may arise if we attempt to analyse a sentence with a wrong goal in mind. Besides performing or enabling certain activities, a domain goal can also consist in trying to establish and eliminate unwanted possibilities that may prevent the attainment of other domain goals. Arguably, this is what goes on in example (31). Instead of thinking that eating a sandwich is Sid's only goal here, one of Sid's more imminent goals is to eliminate the unwanted and yet for him a likely possibility (i.e. bread being moldy) that would prevent him from attaining further goals. A *maximally conducive* way of being green relative to the goal of ascertaining that the bread is inedible is *moldy green*. Hence, this is the possibility that Sid inquires about in (31a) and also the possibility Pia denies in (31b). And this outcome *is* predicted by the current theory.

7   Conclusion

In this paper I proposed a uniform account of occasion-sensitivity for a range of declarative and interrogative sentences using inquisitive semantics as the main formal framework. I defined an extension to the basic inquisitive framework that takes into account the goal-sensitivity of interpretation. Instead of appealing to discourse goals and QUDs, the current account appealed to domain goals and goal-conduciveness as a way of explaining occasion-sensitivity. More particularly, it was argued that among many different possibilities that a sentence denotes those that are maximally conducive to the domain goal are most prominent to the interlocutors. On the view defended in the paper, intuitions concerning Travis cases are not primarily about the standing semantics of a sentence (semantic content) but rather about what interlocutors perceive this content to be, against the background of a certain domain goal. Successful discourse is not merely about providing information that is true, but we communicate, first and foremost, in order to successfully perform broader practical goals.

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