An inquisitive approach to occasion-sensitivity

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Inquisitiveness Below and Beyond the Sentence Boundary, InqBnB2

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• Topic: occasion-sensitivity, Travis cases (due to Charles Travis)
• Aim: to provide a formal account of the occasion-sensitivity of declaratives and interrogatives
• Formal framework: (enriched) inquisitive semantics
Not obvious context-sensitivity

1. The leaves are green / Are the leaves green?
2. Sid has a desk / Does Sid have a desk?
3. The shoes are under the bed / Are the shoes under the bed?
4. There is milk in the fridge / Is there milk in the fridge?
5. Sid is a welder / Is Sid a welder?
6. Sid grunts / Does Sid grunt?
7. The kettle is my grandmother’s / Is the kettle my grandmother’s?

There are no obviously context-sensitive items in these sentences (modulo definite descriptions), so they should all have classical truth (resolution)-conditions: their truth-valuations (answerhood) should not vary cross-contextually.
Travis case: The leaves are green

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

8 Zoe needs a green leaf for her decoration
   a. Zoe: Are the leaves green?
   b. Pia: Yes, the leaves are green.

9 Zoe is a botanist seeking green leaves for a study of green-leaf chemistry
   a. Zoe: Are the leaves are green?
   b. Pia: # Yes, the leaves are green.
   c. Zoe: No, the leaves are not green.
Travis cases: Sid has a desk

Sid, an impoverished student, uses a door over two stacks of milk crates as a desk to write on.

10 Concerned if Sid has a desk to write on
   a. Pia: Does Sid have a desk?
   b. Max: Sid has a desk

11 On the look out for high end furniture
   a. Pia: Does Sid have a desk?
   b. Max: # Sid has a desk
   c. Pia: No, Sid does not have a desk
Travis case: The shoes are under the bed

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

Retrieving the shoes to go out

a. Pia: Are the shoes under the bed?
b. Sid: The shoes are under the bed

Pia wants to make sure that her shoes would not catch the eye of the kleptomaniac Zoe and are well hidden

a. Pia: Are the shoes under the bed?
b. Sid: # The shoes are under the bed.
c. Pia: No, the shoes are not under the bed.
Some observations about the cases

- Same sentences (same standing meaning) are uttered on two different occasions;
- The world of evaluation is the same on both occasions;
- Different truth-evaluations, different answers considered correct: both declaratives and interrogatives affected;
- Different goals: e.g. decorating, studying chemistry;
- The way the world is: conducive to one, not conducive to the other goal;
- Categories affected: adjectives, common nouns, verbs, prepositions, possessives....
A declarative in different contexts

- A sentence may have different interpretations, or can express different (sets) propositions in different contexts.
- Assume two ways for \( a \) to be \( \overline{F} \), \( F_1 \) and \( F_2 \). Grey circle = \( p \)-world.
- \( F_{a_1} = \{11, 10, 01\}; F_{a_2} = \{11, 10\}; F_{a_3} = \{11, 01\} \ldots \)

Figure: Different contextual propositions expressed by \( Fa \)
Meaning and goals

An interrogative in different contexts

?Fa_{c1} = \{\{11, 10, 01\}, \{00\}\}; ?Fa_{c2} = \{\{11, 10\}, \{01, 00\}\};
?Fa_{c3} = \{\{11, 01\}, \{10, 00\}\}

(a) ?Fa in c1
(b) ?Fa in c2
(c) ?Fa in c3

Figure: Different contextual propositions expressed by ?Fa
Applying insights from the semantics of questions

- Methodology: think of the use potential of a sentence as encoded in its meaning (take different sets of worlds where \( Fa \) holds in different contexts as part of the standing meaning of \( Fa \))
- To represent the meaning of \( Fa \) we need (or could use) a set of propositions
- Models developed in the semantics of questions could be useful to capture this idea (unconstrained sets of alternatives, downward closed sets, partitions...)

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One recent account (Schoubye and Stokke 2016) appeals to some notions from question semantics to explain the occasion-sensitivity of assertions: Roberts’ QUDs and G&S partition semantics.

Occasion sensitivity $\approx$ question (topic)-sensitivity

QUD determines a range of possible answers (partition cells); the answer which entails the literal meaning of $Fa$ is the contextual meaning of $Fa$.

The account presupposes a particular (contextually salient) QUD to explain the occasion-sensitivity of assertions.

But it doesn’t explain the occasion-sensitivity of interrogatives.
Why inquisitive semantics?

- Inquisitive semantics enables a uniform formal treatment of declarative and interrogative sentential forms: sentential meanings are (downward closed) sets of classical propositions, possibilities.
- It dissociates meaning from alternatives (answerhood) (Ciardelli et al. 2017: 16-17).
- This strategy allows that possibilities constituting meaning are not identified with alternatives, i.e. non-trivial inquisitiveness characteristic of questions (possible answers).
- Possibilities can be utilised to capture different ways for a to be F (and combinations thereof) whilst alternative possibilities determine answerhood. (as usual).
Meaning and goals

Downward closure: motivation

- InqSem: use of downward closed sets motivated by the potential of a more specific proposition $\beta \subseteq \alpha$ to resolve the issue which is resolved by $\alpha$. $\beta$ in this respect doesn’t differ from $\alpha$, it doesn’t make a difference in content (inquisitive or informative).

- Here (in addition) downward closed sets encode the information that in some context $c$ may become necessary to establish that $p$ or to resolve the issue raised by $?p$.

- Without occasion-sensitivity it is assumed that the information contained in the maximal element of $\wp(|p|)$ is sufficient to establish that $p$.

- With occasion-sensitivity, however, this information may become insufficient in this respect (some $\beta \subseteq \alpha$ becomes necessary to establish that $p$).
**The InqB system: literal meaning**

- **Basic InqB system**: inquisitive semantics for a simple propositional language $\mathcal{L}$ consisting of atomic formulas $A$, negation ($\neg$), disjunction ($\lor$), and two non-standard operators, (! and ?)

- **Minimal proposition expressed by a formula $\varphi \in \mathcal{L}$** is determined by the following recursive definition (Roelofsen and Farkas 2015)

  \[ [p] = \varphi(\{w : w(p) = 1\}) \]
  \[ [\neg \varphi] = \varphi(\bigcup [\varphi]) \]
  \[ [\varphi \lor \psi] = [\varphi] \cup [\psi] \]
  \[ ![\varphi] = \varphi(\bigcup [\varphi]) \]
  \[ [?\varphi] = [\varphi] \cup \varphi(\bigcup [\varphi]) \]

- $[[\varphi]]$ represents the literal meaning of $\varphi$ (minimal proposition).

- **Maximal elements of $[[\varphi]]$: a set of basic answers (alternatives)**

- **$\text{ALT}(\varphi) \overset{\text{def}}{=} \{ \alpha \in [[\varphi]] | \text{there is no } \beta \in [[\varphi]] \text{ s.t. } \alpha \subset \beta \} $**
Illustration: minimal proposition

- PG = painted green; NG = naturally green
- (11) both PG and NG, (10) only PG, (01) only NG, (00) none.

Figure: Min. props expressed by The leaf is green and Is the leaf green?. Only maximal elements are depicted!

- green = green in any of the senses that the term is ever used (Rothschild and Segal 2009: 472, Kennedy and McNally 2010: 84)
Goals and goal-conduciveness

- Second ingredient: the goal-sensitivity of interpretation.
- The idea is that classical propositions/possibilities qua properties of worlds could be conducive (or not) to practical (domain) goals (e.g. the leaf being non-naturally green as a property of p-world is not conducive to the botanist’s goal)
- Practically $\gamma$-conducive and epistemically $\gamma$-conducive: the information that the leaf is not naturally green is still epistemically conducive to the botanist (finding out this is valuable)
- Goals: valuation functions that map possibilities to goal-conduciveness values ($c$-values) wrt to their practical conduciveness
Extending the InqB system

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

Goals
Goal $\gamma$ is a function that maps every classical proposition $\alpha \in \Pi$ to a goal-conduciveness value. I.e. $\Gamma : \Pi \rightarrow \{0, 1\}$, where $\Gamma$ is the set of goals, $\Pi$ is the set of classical propositions, $\{0, 1\}$ the set of c-values.

Goal-conduciveness: constraint guaranteeing downward closure
For any pair of states $\alpha, \beta$, such that $\beta \subseteq \alpha$, $\gamma(\beta) \geq \gamma(\alpha)$.

If $\alpha$ is sufficiently good for a goal, then any $\beta \subset \alpha$ will also be
The InqC system: enriched meaning

The contextual proposition expressed by $\varphi$ relative to the goal of context $\gamma$ is defined in the following recursive definition:

$[[p]]_\gamma = \{\alpha \in \varphi(\{w : w(p) = 1\}) \text{ such that there is no } \beta \in \varphi(\{w : w(p) = 1\}) \text{ such that } \gamma(\beta) > \gamma(\alpha)\}$

$[[\neg \varphi]]_\gamma = \varphi(\bigcup[[\varphi]]_\gamma)$

$[[\varphi \lor \psi]]_\gamma = [[\varphi]]_\gamma \cup [[\psi]]_\gamma$

$[[\neg \neg \varphi]]_\gamma = \varphi(\bigcup[[\varphi]]_\gamma)$

$[[\neg \varphi]]_\gamma = [[\varphi]]_\gamma \cup [[\neg \varphi]]_\gamma$

Atomic formulas

The proposition expressed by an atomic sentence $p$ on an occasion where the goal $\gamma$ is operative is a downward closed set of classical propositions $\alpha \in \varphi(|p|)$ which have greater c-values than others.
The leaf is green in (a $\gamma$-conducive way)

(a) Minimal

(b) Artist

(c) Botanist

Figure: Minimal proposition and two contextual propositions expressed by (16). Only maximal elements depicted
Positive declaratives: no goal-conducive $\alpha \in \wp(|p|)$

$\gamma$: *Hiding the shoes under the bed from a kleptomaniac*

(17) The shoes are next to the bed (in a $\gamma$-conducive way)

Intuitively, no possibility compatible with (17) is conducive to the goal of having the shoes hidden under the bed (all $\alpha \in [[(17)]]$ have c-value 0). (17) can nonetheless be true and uttering (17) is relevant to $\gamma$.

Whenever there is no difference in c-values between the classical propositions expressed by the sentence, the contextual proposition expressed by it will be identical to its minimal proposition.

For any atomic formula $p$ it holds that: $[[p]]_\gamma \subseteq [[p]]$. 
Negative declaratives

The leaf is not green (in the way conducive to $\gamma$)

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

Figure: Literal negation and two contextual negations

NB: $\neg \varphi$ may express *epistemically* $\gamma$-conducive information: it’s useful to find out that things are not practically $\gamma$-conducive or to rule out *some* (perhaps not all) practically not goal-conducive possibilities.
Entailment orders

In the case of negation the entailment order holding between literal and contextual meaning is *reversed*: \([[-\varphi]] \subseteq [-[-\varphi]]\gamma\]

Entailment orders for meanings of positive sentences and their negations \(\=[\varphi]\gamma \subseteq [\varphi]\) iff \([-[-\varphi]]\gamma \supseteq [[-\varphi]]\).

The contextual meaning of a positive declarative is more specific than its literal meaning just in case the literal meaning of its negation is more specific than its contextual negation. In case there is a difference between c-values of classical propositions constituting minimal proposition wrt to \(\gamma\), the contextual meaning of \(\varphi\) *strictly* entails the literal meaning of \(\varphi\) (and reverse holds for \(-\varphi\)), namely: \(\=[\varphi]\gamma \subset [\varphi]\) and \([-[-\varphi]]\gamma \supseteq [[-\varphi]]\).
Polar interrogatives

Is the leaf green (in the way conducive to $\gamma$)?

(a) Minimal

(b) Artist

(c) Botanist

**Figure:** Literal and contextual interpretations of (19)
[[?φ]] and [[?φ]]γ are incomparable

- Two contextual propositions expressed by ?φ are not enhancements of the minimal proposition expressed by ?φ.
- Since ?φ is an abbreviation of φ ∨ ¬φ this is an expected consequence of the observation that the contextual negation of φ does not asymmetrically entail the minimal proposition expressed by ¬φ (but that reverse may be the case).
- There is no entailment relation or reverse entailment relation between literal and contextual meanings of polar interrogatives: literal and contextual meanings of polar questions are incomparable.
Subject matter, answerhood and practical conduciveness

\(\gamma: \text{Hiding the shoes under the bed from a kleptomaniac}\)

Are the shoes under the bed?

- a. The shoes are under the bed
- b. The shoes are not under the bed
- c. The shoes are next to the bed
- d. John is a smoker
- e. The room (where the shoes are) is locked

- \([[\varphi]]\) has practically \(\gamma\)-conducive \(\alpha\): \([[20a]]\), \([[20e]]\)
- Directly relevant to the issue (on topic): (20a), (20b)
- Indirectly relevant to the issue: (20c) (not hidden under the bed ⇝ next to the bed)
- Irrelevant to the issue but \([[\varphi]]\) has practical \(\gamma\)-conducive \(\alpha\): (20e)
- Irrelevant to the issue and \([[\varphi]]\) has no practical \(\gamma\)-conducive \(\alpha\): (20d)
- Epistemically \(\gamma\)-conducive: (20a), (20b), (20c), (20e)
Problem: overgeneration

- Downward closure overgenerates:
  (i) $a$ is naturally green, painted green, moldy green... $\subseteq a$ is green ✓
  (ii) $a$ is naturally green and round $\subseteq a$ is green X

Excess information not a problem qua resolution/truth: $a$ is naturally green and $a$ is naturally green and round both resolve the issue raised by $\gamma(G_a$ relative to $\gamma_a$) and make $Ga$ true,

Desideratum: count only relevant c-values (i.e. c-values of $\alpha$ pertaining to the greenness of the leaves, ways for the leaf to be green); exclude c-values of $\alpha$ concerning the roundness of the leaves

Subject matter to the rescue! $a$ is round introduces alien subject matter (off topic).

Count only c-values of $\alpha \in [p]$ which wholly agree with $p$'s subject matter (result: topic-restricted down closure)
Problem: overgeneration

- Downward closure overgenerates:
  
  (i) a is naturally green, painted green, moldy green... ⊆ a is green ✓
  
  (ii) a is naturally green and round ⊆ a is green X

Excess information not a problem qua resolution/truth: a is naturally green and a is naturally green and round both resolve the issue raised by ?Ga (relative to γ) and make Ga true, Desideratum: count only relevant c-values (i.e. c-values of α pertaining to the greenness of the leaves, ways for the leaf to be green); exclude c-values of α concerning the roundness of the leaves

Subject matter to the rescue! a is round introduces alien subject matter (off topic). Count only c-values of α ∈ [p] which wholly agree with p's subject matter (result: topic-restricted down closure)

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**Problem: overgeneration**

- **Downward closure overgenerates:**
  1. \(a\) is naturally green, painted green, moldy green... \(\subseteq a\) is green \(\checkmark\)
  2. \(a\) is naturally green and round \(\subseteq a\) is green \(\times\)

- **Excess information not a problem** *qua* resolution/truth: \(a\) is naturally green and \(a\) is naturally green and round both resolve the issue raised by \(?Ga\) (relative to \(\gamma\)) and make \(Ga\) true,

- **Desideratum:** count only relevant c-values (i.e. c-values of \(\alpha\) pertaining to the greenness of the leaves, ways for the leaf to be green); exclude c-values of \(\alpha\) concerning the roundness of the leaves

- **Subject matter to the rescue!** \(a\) is round introduces alien subject matter (off topic).

- **Count only c-values of** \(\alpha \in [[p]]\) which wholly agree with p’s subject matter (result: topic-restricted down closure)
Possible problem cases

Cancelling an expected interpretation

Context: the leaf is naturally red but painted green, the botanist’s goal

a. The botanist: Is the leaf green?
   b. Pia: # Yes, the leaf is green.
   c. The botanist: No, the leaf is not green.

a. The botanist: Is the leaf green?
   b. Pia: Yes, the leaf is green but not naturally green.

(22b) explicitly cancels the expected interpretation (indicating a pragmatic inference like conversational implicature).

Cancellation is justified only when there is a reasonable assumption that the interlocutor may be interested in other possible interpretations despite the salient goal. 
Conclusion

- I provided (a sketch of) the uniform account of occasion-sensitivity in declaratives and interrogative using inquisitive semantics
- I showed how the model is supposed to work on simple declaratives, negations and polar questions
- Idealisation: both interlocutors know a contextually salient goal and what it takes to achieve it
- Future work:
  - Formally define a constraint on a set of possible interpretation of an atom (subject matter restriction)
  - examine more data: how goals interact with other operators
  - first-order case, inquisitive compositional semantics
  - ....