Inquisitive semantics

—the basics—

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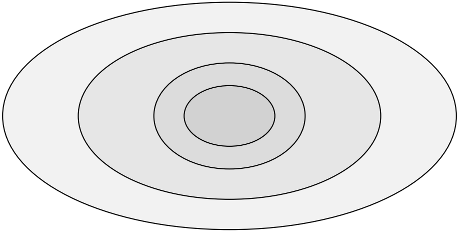
Umass, Amherst, January 25, 2010

Overview

- Motivation
- Basic notions
- Definition of the semantics
- Basic properties

The Traditional Picture

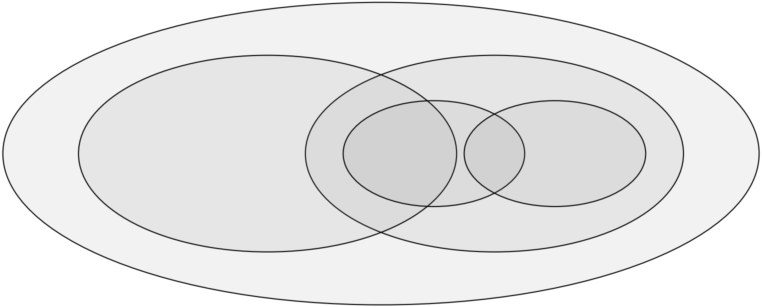
- Meaning = informative content
- Providing information = eliminating possible worlds



- Only captures purely descriptive language use
- Does not reflect the cooperative nature of communication

The Inquisitive Picture

- Propositions as proposals
- A proposal consists of one or more possibilities
- A proposal that consists of several possibilities is inquisitive



A Propositional Language

Basic Ingredients

- Finite set of proposition letters $\mathcal{P}$
- Connectives $\bot$, $\wedge$, $\vee$, $\rightarrow$

Abbreviations

- Negation: $\neg\varphi := \varphi \rightarrow \bot$
- Non-inquisitive closure: $!\varphi := \neg\neg\varphi$
- Non-informative closure: $?\varphi := \varphi \vee \neg\varphi$

Semantic Notions

Basic Ingredients

- Index: function from $\mathcal{P}$ to $\{0, 1\}$
- Possibility: set of indices
- Proposition: set of alternative possibilities

Notation

- $[\varphi]$: the proposition expressed by φ
- $|\varphi|$: the truth-set of φ (set of indices where φ is classically true)

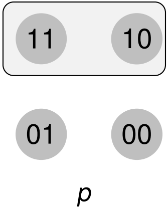
Classical versus Inquisitive

- φ is classical iff $[\varphi]$ contains exactly one possibility
- φ is inquisitive iff $[\varphi]$ contains more than one possibility

Semantics: atoms

For any atomic formula φ: $[\varphi] = \{|\varphi|\}$

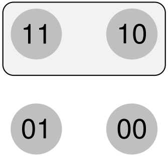
Example:



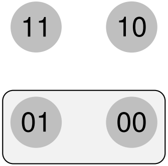
Semantics: negation

$$[\neg\varphi] = \left\{ \bigcap_{\alpha\in[\varphi]} \overline{\alpha} \right\} = \{\, |\neg\varphi| \,\}$$

Example, φ classical:



$[p]$



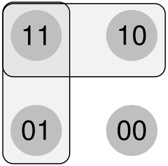
$[\neg p]$

Example, φ inquisitive:

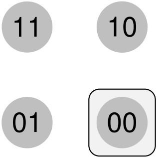
Semantics: non-inquisitive closure

$$[!\varphi] = [\neg\neg\varphi]$$

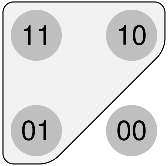
Example:



$[\varphi]$



$[\neg\varphi]$

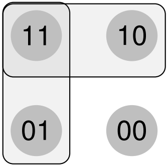


$[!\varphi]$

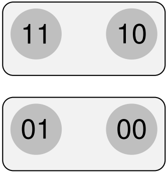
Semantics: disjunction (unrestricted)

$$[\varphi \vee \psi] = [\varphi] \cup [\psi]$$

Examples:



$p \vee q$

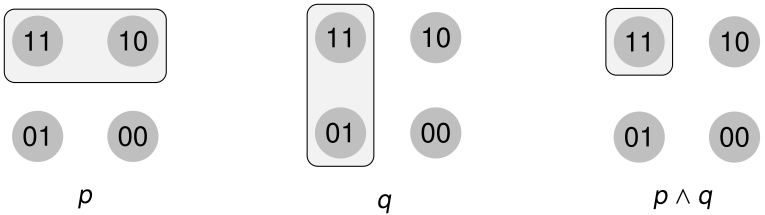


$?p \ \ (:= p \vee \neg p)$

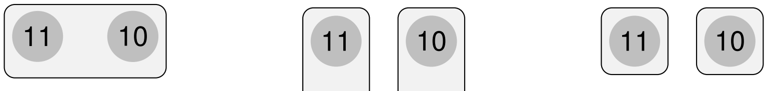
Semantics: conjunction (unrestricted)

$$[\varphi \wedge \psi] = \{\alpha \cap \beta \mid \alpha \in [\varphi] \text{ and } \beta \in [\psi]\}$$

Example, φ and ψ classical:



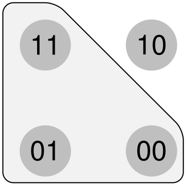
Example, φ and ψ inquisitive:



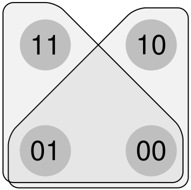
Semantics: implication (unrestricted)

$$[\varphi \to \psi] = \{\Pi_f \mid f : [\varphi] \to [\psi]\} \quad \text{where } \Pi_f = \bigcap_{\alpha \in [\varphi]} (\alpha \Rightarrow f(\alpha))$$

Examples, classical and inquisitive:

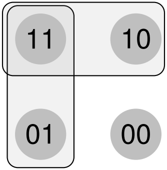


$p \to q$



$p \to ?q$

Informativeness and Inquisitiveness

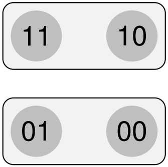


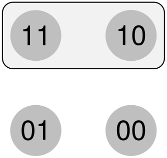
- $p \vee q$ is inquisitive: $[p \vee q]$ consists of more than one possibility
- $p \vee q$ is informative: $[p \vee q]$ proposes to eliminate indices
- For any formula φ: $|\varphi| = \bigcup[\varphi]$

  $\Rightarrow \bigcup[\varphi]$ captures the informative content of φ
  $\Rightarrow$ classical notion of informative content is preserved.

Questions, Assertions, and Hybrids

- φ is a question iff it is inquisitive and not informative
- φ is an assertion iff it is informative and not inquisitive

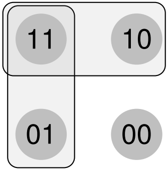




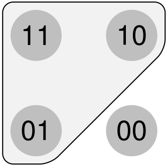
- φ is a hybrid iff it is both informative and inquisitive
- φ is insignificant iff it is neither informative nor inquisitive

Non-inquisitive closure

- Double negation has the effect of removing inquisitiveness
- For any formula φ: $[\neg\neg\varphi] = \{|\varphi|\}$



$p \vee q$

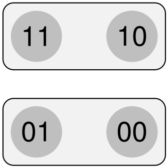


$\neg\neg(p \vee q)$

- Therefore, $\neg\neg\varphi$ is abbreviated as $!\varphi$ and called the non-inquisitive closure of φ

Inquisitiveness and Disjunction

- Classically, $p \vee \neg p$ is a tautology
- In inquisitive semantics it is not informative, but it is inquisitive
- It is in fact a question, abbreviated as $?p$



$p \vee \neg p$

- Disjunction is, for now, the only source of inquisitiveness in our language

  $\Rightarrow$ any disjunction-free formula is classical (non-inquisitive)