Inquisitive Semantics

Part 1/3: Polar Questions and Disjunctions

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. . . is a framework for declaratives and interrogatives alike – the first, in fact, where the two share the same logical type: the type of sets of sets of worlds.

It is 10 years old.

Let us concentrate on

➔ The canonical theory: Ciardelli, Groenendijk and Roelofsen (2019)

That book takes the perspective of the logically minded, starting with theory and moving on to language, the realities that the theory is to account for.

This mini-course takes the opposite perspective, starting with the facts and introducing the required pieces of theory as we move along.

1 Sources of inquisitiveness

In many languages, the same root can be used as a question particle and to express indefiniteness or disjunction (see also, for example, Bailey 2015):

(1) a. Maud wannu-oo? (Malayalam; Jayaseelan 2001)
Maud came-DISJ
'Did Maud come?'

b. ār-oo wannu.
who-DISJ came
'Somebody came.'

c. Maud-oo Peter-oo wannu.
Maud-DISJ Peter-DISJ came
'Maud or Peter came.'

Particularly the parallel between (1a) on the one hand and (1c) on the other is a coincidence on most theories. But Inquisitive Semantics takes it literally. In fact, the logical representation of (1a), (2a), is equivalent with (2b), while that of (1c) is (2c):

(2) a. $?Cm$
b. $Cm \vee \neg Cm$
c. $!(Cm \vee Cp)$

The disjunction sign and the lack of a question mark in (2b) are surprising, as is the exclamation mark in (2c).

Now a polar question like (1a) is commonly assumed to be equivalent with the alternative question with the negation as the alternative:

(3) Did Maud come, or not / or didn't she?

Alonso-Ovalle (2006) gave an analysis of alternative questions where *or* joins two polar questions to yield the union of two singleton sets of propositions.

By contrast, Inquisitive Semantics has *or* join two non-interrogative clauses and assigns to (3) the logical representation (2b).

More generally, an alternative question like (4) gets the representation (5):

(4) Did Maud↑ come or did Peter↓ come?

(5) $Cm \vee Cp$

Note the presence of ? in (2a) but its absence in (2b) or (5). How come?

2 What a simple sentence means

The meaning of any sentence is a set of sets of worlds, i.e., not a proposition but a set of (classical) propositions.

This is called a proposition, or more unambiguously an **issue**.

Issues obey one essential constraint: They are *downward closed* – that is, they contain all subsets of all sets they contain.

To illustrate, consider four worlds – w_1, w_2, w_3, w_4 – such that Maud came in w_1 and in w_2 but not in w_3 or in w_4, and Peter came in w_1 and in w_3 but not in w_2 or in w_4. The simple sentence (6) expresses the set $\{\{w_1, w_2\}, \{w_1\}, \{w_2\}\}$, while the simple sentence (7) expresses the set $\{\{w_1, w_3\}, \{w_1\}, \{w_3\}\}$.

(6) Maud came

(7) Peter came

The issue expressed by (6)((7) can be depicted in a diagram like Figure 1/2.

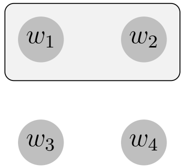


Figure 1: Cm

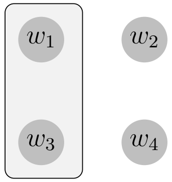


Figure 2: Cp

By convention, only the maximal issue members are depicted: In each case, the world sets contained in the expressed issue are the sets consisting of the worlds in the drawn rectangles plus their subsets.

3 Disjunction is union and intrinsically inquisitive

The simple sentence (8) now has the logical representation (5).

(8) Maud came or Peter came

The meaning is depicted in Figure 3:

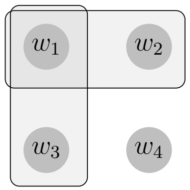


Figure 3: $Cm \vee Cp$

This is an **inquisitive** proposition or issue: No member has has all members as subsets, to say the same, the union over it is not a member of it.

> **Inquisitiveness**
> A proposition P is inquisitive iff $\bigcup(P) \notin P$

4 Complementizers: Declarative and interrogative

Meanings of simple sentences can be manipulated by two *complementizers*: One, with declarative word order and intonation, adds ! ,

> **Declarative complementizer** (eliminating inquisitiveness)
> $[\![\, !\,\phi\,]\!] \;=\; \wp(\bigcup [\![\,\phi\,]\!])$

the other, with interrogative word order and intonation, adds ? – unless the sentence expresses an inquisitive proposition already.

> **Interrogative complementizer** (ensuring inquisitiveness)
> $$[\![\, \langle ? \rangle\, \phi\,]\!] = \begin{cases} [\![\,\phi\,]\!] & \text{if } [\![\,\phi\,]\!] \text{ is inquisitive,} \\ [\![\,\phi\,]\!] \cup \{s \mid s \cap t = \emptyset \text{ for all } t \in [\![\,\phi\,]\!]\} & \text{otherwise.} \end{cases}$$

Now note that (9a) gets the logical representation (9b):

(9) a. Maud↑ came or Peter↓ came.
    b. $!\,(Cm \vee Cp)$

This means that its meaning is what is depicted in Figure 4:

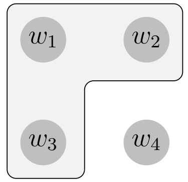


Figure 4: $!\,(Cm \vee Cp)$

The alternative question (4), however, has the meaning depicted in Figure 3: The interrogative word order – the intonation is like declaratives – blocks !, and $\langle ? \rangle$ is vacuous because the simple sentence is inquisitive to begin with.

Note that not only the declarative (9a) but also the alternative question (4) are *informative*:

> **Informativeness**
> A proposition P is informative iff $\bigcup(P) \neq W$

There is at least one world not contained in any member of the proposition.

5 The many modes of disjunctive questions

Now there are three more meanings that a string like (10) can get:

(10) Did Maud (come) or (did) Peter come

The first of the three additional issues is naturally expressed by (11):

(11) Did Maud or Peter↑ come?

This is the interpretation that more traditional theories have predicted – the straight reading. In Inquisitive Semantics, however, it is more complex than the alternative question (4), in fact, much more, as it is more complex than the declarative (9a), which is in turn more complex than (4).

This reading is built by (i) positing an additional left-peripheral operator, a *completion marker* with two possible forms, CLOSED and OPEN, operating on the complementizer ! or ⟨?⟩, and (ii) through the following structure:

(12) [[OPEN ⟨?⟩] [! [did Maud or Peter come]]]

The CLOSED completion marker is just the identity functor, doing nothing, but the OPEN completion marker disables the complementizer it applies to and instead applies ? to its aunt sentence:

Completion markers

$$[\![\,\mu\ \chi\,]\!] = \begin{cases} [\![\,\chi\,]\!] & \text{if } \mu \text{ is CLOSED,} \\ [\![\,?\,]\!] & \text{if } \mu \text{ is OPEN.} \end{cases}$$

To be clear: $[\![\,?\,\phi\,]\!] = [\![\,\phi\,]\!] \cup \{s \mid s \cap t = \emptyset \text{ for all } t \in [\![\,\phi\,]\!]\}$.

The outcome is the logical representation (13) and the meaning in Figure 5:

(13) $?\,!\,(Cm \vee Cp)$

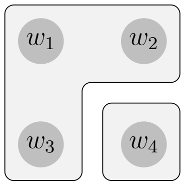


Figure 5: $?\,!\,(Cm \vee Cp)$

The next issue, the **open disjunctive** question, differs minimally from the alternative question (4) in having a rising instead of a falling intonation –

(14) Did Maud↑ come or did Peter↑ come?

and relatedly the structure (15) instead of the structure (16):

(15) [[OPEN ⟨?⟩] [[! did Maud come] or [! did Peter come]]]

(16) [[CLOSED ⟨?⟩] [[! did Maud come] or [! did Peter come]]]

The outcome is the logical representation (17) and the meaning in Figure 6:

(17) $?\,(Cm \vee Cp)$

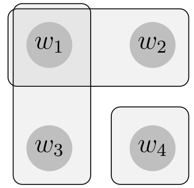


Figure 6: $?\,(Cm \vee Cp)$

The fourth and last issue that can be expressed with a string like (10) is the disjunction of two polar questions, a second possible interpretation of (14):

(18) [[OPEN ⟨?⟩] [did Maud come]] or [[OPEN ⟨?⟩] [did Peter come]]

The outcome is the logical representation (19) and the meaning in Figure 7:

(19) $(?\,Cm) \vee (?\,Cp)$

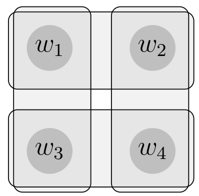
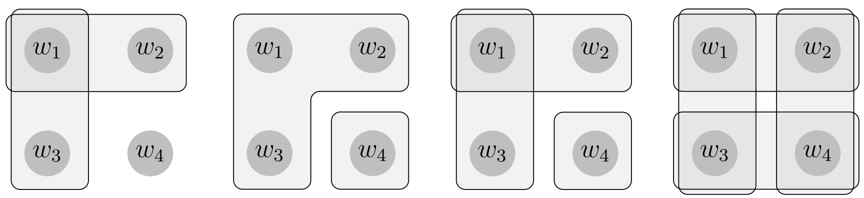


Figure 7: $(?\,Cm) \vee (?\,Cp)$

To see that this is the ensuing meaning, return to Figure 1 and 2 on page 3 and factor in ? by adding the complements; then form the union.

6 Resolution and inclusion

Let us compare the four different issues under consideration with each other from the perspective of their resolution conditions.



(5) (13) (17) (19)

(5)	$Cm \vee Cp$	Did Maud↑ come or did Peter↓ come?
(13)	$?\,!\,(Cm \vee Cp)$	Did Maud or Peter↑ come?
(17)	$?\,(Cm \vee Cp)$	Did Maud↑ come or did Peter↑ come?
(19)	$(?\,Cm) \vee (?\,Cp)$	Did Maud↑ come, or did Peter↑ come?

The third issue, (17), is a novum (see Roelofsen and van Gool 2010, Roelofsen and Farkas 2015).

So is the fourth issue, (19); in fact, that questions can be disjoined has been contested (see Krifka 2001, Szabolcsi 2015).

To judge the realism of these two issues, it is useful to consider the ways in which they could be **resolved**.

Resolution: an information state s resolves an issue I iff $s \in I$.

(19) is the only issue that is resolved by the informative content of (20):

(20) Maud didn't come. / Peter didn't come.

(13) is the only issue that is resolved by a response particle, *yes* or *no*.

Note that anything that resolves (5) resolves all the other three issues too. That is to say that (5) **entails** the other three issues:

Entailment: an issue I entails an issue J iff $I \subseteq J$.

Recall that any issue contains all subsets of all sets they contain.

Proper entailment between two issues means that one is more **demanding** than the other.

Thus to resolve (5), you must respond either that Maud came or that Peter came, or something stronger (say, that only Maud came). To resolve (17), you have one more option, namely, say that neither Maud nor Peter came.

To resolve (13), you have yet another option, namely, say that Maud came or Peter came.

While that will not do to resolve (19), what you can do there is say that Maud didn't come, or that Peter didn't come – which will not resolve (13).

In other words, (17) entails (13) and (19), but neither of these two entails the other.

➔ Next installment: Back to the third source of inquisitiveness, existentials; wh-questions and mention-all / mention-some

References

Alonso-Ovalle, Luis (2006) *Disjunction in Alternative Semantics*. PhD thesis, University of Massachusetts, Amherst.

Bailey, Laura (2015) Word order and the syntax of question particles. In Hancil, Sylvie, Alexander Haselow and Margje Post (eds.), *Final Particles*, Berlin: de Gruyter, 407–426.

Ciardelli, Ivano, Jeroen Groenendijk and Floris Roelofsen (2019) *Inquisitive Semantics*. Oxford: Oxford University Press.

Jayaseelan, K. A. (2001) Questions and question-word incorporating quantifiers in Malayalam, *Syntax* 4(2), 63–93.

Krifka, Manfred (2001) Quantifying into question acts. *Natural Language Semantics* 9(1), 1–40.

Roelofsen, Floris and Donka Farkas (2015) Polarity particle responses as a window onto the interpretation of questions and assertions. *Language* 91(2), 359–414.

Roelofsen, Floris and Sam van Gool (2010) Disjunctive questions, intonation and highlighting. In Maria Aloni et al. (eds.), *Logic, Language and Meaning: Selected Papers from the 17th Amsterdam Colloquium*, Berlin: Springer, 384–394.

Szabolcsi, Anna (2015) Can questions be directly disjoined? Presentation at the 51st Annual Meeting of the Chicago Linguistics Society (CLS 51).