SALT 30 · Satellite workshop · 17th August 2020

Factive islands and interrogative logical triviality

Hana Kalpak

intro

Wh-extraction of elements from a complement clause fails when the embedding verb is factive...

		factive	unique
(1)	*Which girl$_i$ does Sam know t_i is the tallest?	✓	✓
(2)	Which girl$_i$ does Sam think t_i is the tallest?	✗	✓

... and the property ascribed to the gapped element is unique:

(3)	Which girl$_i$ does Sam know t_i is tall?	✓	✗

Szabolcsi and Zwarts (1993) were the first to discuss cases like (1), henceforth called factive island (FI) constructions.

intro

(1) *Which girl$_i$ does Sam know t_i is the tallest?

Szabolcsi & Zwarts analysed constructions like (1) as meaningless; uninterpretable due to a semantic mismatch (cf. **six airs*).

Later work has instead treated FI constructions as interpretable, but as having meanings that are somehow pathological either in and of themselves (e.g., Abrusán, 2014) or in virtue of certain pragmatic constraints:

- **Schwarz and Simonenko, 2018:** (1) is necessarily infelicitous.
- **Schwarz, Oshima, and Simonenko, 2019:** (1) is maybe necessarily infelicitous, but generally necessarily blocked.

In this talk, I argue that the necessary infelicity/blocking accounts of FIs suffer from both under- and overgeneration problems. I diagnose these issues as stemming from the assumptions that FIs

1. crucially depend on pragmatic, speech-act constraints, and
2. are independent of distinction between logical/content terms.

I propose that FI-constructions are bad because they are IL-trivial:

> **IL-triviality (informal).** An interrogative φ is *IL-trivial* iff for every interpretation, at most one answer to φ is defined, regardless of how the content terms in φ are semantically narrowed.

IL-triviality is proposed as a complement to the influential notion of L-triviality (Gajewski, 2009), with a tweak from del Pinal, 2019.

outline

- **Pragmatic accounts of factive islands**
  - *Necessary infelicity, necessary blocking, and problems for pragmatic accounts.*
- **Interrogative logical triviality**
  - *Gajewski (2002; 2009)'s* L-triviality, *reasons for restricting reinterpretation, and the definition of IL-triviality.*
- **Factive islands and IL-triviality**
  - *Standard cases, FIs in embedded questions, FIs in multiple questions, and grammatical trivial questions.*
- **Conclusion**

Pragmatic accounts of factive islands

preliminaries

Like the proposals to be discussed, I will assume a Hamblin (1973) question semantics, according to which interrogative sentences denote sets of propositions (intuitively, sets of answers):

(4) $$[\![\text{Who ate?}]\!]_w = \{\lambda x \lambda w'.\mathbf{ate}_{w'}(x)\} = \left\{ \begin{array}{l} \lambda w'.\mathbf{ate}_{w'}(a), \\ \lambda w'.\mathbf{ate}_{w'}(b), \\ \lambda w'.\mathbf{ate}_{w'}(c) \end{array} \right\}$$

The propositions in an interrogative denotation (= a *question*) may be partial functions, restricted to a domain corresponding to presupposed information:

(5) $$[\![\text{Who ate the cake?}]\!]_w = \{\lambda x \lambda w' : \exists! y[\mathbf{cake}_{w'}(y)].\mathbf{ate}_{w'}(y)(x)\}$$

necessary infelicity

Elaborating on Oshima (2007), Schwarz & Simonenko (2018) (= *S&S*) argue that FIs result from necessary infelicity: constructions like (1) have jointly unsatisfiable felicity conditions.

(1) *Which girl$_i$ does Sam know t_i is the tallest?

Factive island constructions involve a clash between an existential presupposition (Dayal, 1996)...

(6) Who ate? $\overset{\text{presup}}{\Longrightarrow}$ Someone ate.

... and the answerability condition (cf. Guerzoni, 2003): An interrogative Q is felicitous in a context c (*context set*) only if

(i) c entails the presupposition of at least one $p \in [\![Q]\!]$,

(ii) c does not entail p itself.

necessary infelicity

Schwarz, Oshima, and Simonenko (2019) (= *SO&S*) show that necessary infelicity does not capture FIs in multiple *wh*-questions:

		factive	unique
(7)	*Who knows that Caesar was murdered where?	✓	✓
(8)	Who thinks that Caesar was murdered where?	✗	✓
(9)	Who knows that Caesar said what?	✓	✗

SO&S propose that factive island constructions are bad because they are necessarily blocked: they are pragmatically dispreferred to other interrogatives in any context where they are answerable.

For instance, (7) is blocked in a context c by (10), where x is the place of C's murder in c.

(10) Who knows that Caesar was murdered in x?

undergeneration

Both the infelicity analysis and the blocking analysis derive the unacceptability of FI construction from conditions on their use as matrix questions in the speech act of *asking*.

These analyses therefore do not explain why the unacceptability persists when the FI construction is not used to ask, as in (11):

		factive	unique
(11)	*Sam knows who$_i$ Alex knows t_i is the tallest.	✓	✓
(12)	Sam knows who$_i$ Alex thinks t_i is the tallest.	✗	✓
(13)	Sam knows who$_i$ Alex knows t_i is tall.	✓	✗

overgeneration

Both accounts similarly have problems of overgeneration, and erroneously predict that constructions like (14) are out.

(14) Who is [happy or not happy]?

(14) necessarily violates the answerability condition. This required for felicity of an interrogative Q in a context c, that there be some answer $p \in [\![Q]\!]$ not entailed by c.

Since any individual is either happy or not happy, all $p \in [\![(14)]\!]$ are tautologies. A tautology is entailed by (= a superset of) any c. Thus all $p \in [\![(14)]\!]$ are entailed by any c, and (14) is never *answerable*.

This means that (14) is both necessarily infelicitous and necessarily blocked (the latter trivially, since it's never answerable).

overgeneration

(14) Who is [happy or not happy]?

Schwarz & Simonenko (2018): In FI constructions, badness results from multiple felicity conditions being necessarily jointly violated. In (14), one felicity condition is necessarily violated.

Then the source of the badness of the latter is "more easily detectable by conscious introspection", which—drawing on Chierchia, 2013—could potentially make it less severe.

But this reasoning seems fallacious: How can necessarily violating a conjunction of felicity conditions result in unacceptability, while necessarily violating one of the conjuncts does not?

summary

	infelicity	blocking
standard FIs	✓	✓
multiple FIs	✗	✓
embedded FIs	✗	✗
trivial questions	✗	✗

(1) *Which girl$_i$ does Sam know t_i is the tallest? — standard

(7) *Who knows that Caesar was murdered where? — multiple

(11) *Sam knows who$_i$ Alex knows t_i is the tallest. — embedded

(14) Who is [happy or not happy]? — trivial

Interrogative logical triviality

l(ogical)-triviality

Why are some syntactically well-formed sentences still (perceived as) ungrammatical?

(15) a. I've read every book but *War and Peace*.
b. *I've read some book but *War and Peace*.

Some classical works in formal semantics discuss whether the badness of such constructions can be explained by their meaning being logically trivial (tautologous or contradictory); e.g., von Fintel, 1993 on (15).

But not all trivialities are perceived as ungrammatical. Many are clearly perceived as *part of the language*, as evidenced by their use.

(16) *Interviewer:* Truth is truth ...
R. Giuliani: No, it isn't truth! Truth isn't truth.[1]

[1] From this NBC interview, around 0.30.

l(ogical)-triviality

Gajewski (2002; 2009): [2] The triviality of a sentence is pathological only if its triviality is to some extent independent of the interpretation of the sentence' non-logical vocabulary.

Logical vocabulary ≈ permutation invariant vocabulary.

- **Logical:** *some, the, not, which...*
- **Non-logical:** *book, truth, Sam...*

In particular, the triviality of a sentence φ is pathological just in case φ's "logical skeleton" is trivial. Then the sentence is L(ogically)-trivial.

[2] For instance: Abrusán, 2011; Chierchia, 2013; Fox & Hackl, 2007; Gajewski, 2008; Mayr, 2019; Menendez-Benito, 2005; Theiler, Roelofsen & Aloni, 2019.

I-triviality

Proposal: The badness of factive island constructions derives from an analogue of L-triviality for interrogative sentences.

However, it will incorporate an independently motivated idea from del Pinal (2017): that L-triviality—and hence, the analogous notion for interrogatives—is not calculated with respect to logical skeletons, but instead with respect to rescales.[3]

[3] Contrary to what my abstract says! Thanks to an anonymous reviewer and Nadine Theiler for asking questions that prompted further thinking.

rescales

Let $\textsc{Rescale}_{i:i\in\mathbb{N}}$ be a subsective modifier ($[\![\textsc{Rescale}_i(\alpha)]\!] \subseteq [\![\alpha]\!]$) whose value otherwise varies with the interpretation.

Rescale (adapted from Del Pinal, 2017). A *rescale* of a sentence φ is the result of replacing each minimal content term token α in φ with $\textsc{Rescale}_i(\alpha)$, for a unique i.

(17) Kim is tall but not tall.

(17)′ Kim is $\textsc{Rescale}_1$(tall) but not $\textsc{Rescale}_2$(tall).[4]

where $[\![\textsc{Rescale}_i(\text{tall})]\!]$ is some subset of $[\![\text{tall}]\!]$.

(17) is contradictory, but (17)′ is not: it can be interpreted for instance as *Kim is quite tall but not extraordinarily tall*.

[4] *Kim* can also be rescaled, but I ignore this for simplicity.

il-triviality

Using rescales, L-triviality would be defined as follows:

L-triviality. A declarative sentence S is *L-trivial* just in case for all rescales S' of S, for all interpretations I, $[\![S']\!]_I = 1(0)$.

I propose the following definition of I(nterrogative)L-triviality:

IL-triviality. An interrogative sentence Q is *IL-trivial* just in case for all rescales Q' of Q, for all I, at most one $p \in [\![Q']\!]_I$ is defined.

Conceptual motivation: The communicative usefulness of an interrogative comes from its ability to *disjoin information*: to distinguish alternatives within a given information state. When an interrogative fails to do this, it is deficient on a par with a tautologous (contradictory) declarative.

il-triviality

Given the definition of rescales, *IL-triviality* has a corollary (simplified):[5]

Corollary 1. An interrogative sentence Q in which no content term has multiple occurrences is IL-trivial just in case for all interpretations, at most one $p \in [\![Q]\!]_I$ is defined.

[5] The full version of the corollary gives further requirements on Q, e.g. that it involves no elisions or co-bound traces of lexical vocabulary. For the examples discussed here, the simplification is innocent.

Factive islands and IL-triviality

standard cases

With the improved definition of IL-triviality in place, we begin by ensuring that this property accurately distinguishes constructions like (1) from constructions like (2) and (3).

		factive	unique
(1)	*Which girl$_i$ does Sam know t_i is the tallest?	✓	✓
(2)	Which girl$_i$ does Sam think t_i is the tallest?	✗	✓
(3)	Which girl$_i$ does Sam know t_i is tall?	✓	✗

presuppositions

Assumptions about the presuppositions of *wh*-questions:

- *Wh*-interrogatives presuppose existence (Dayal, 1996):

  (18) Who ate? $\overset{\text{presup}}{\Longrightarrow}$ Someone ate.

- Scope presuppositions may project either universally or existentially with respect to the elements in the *wh*-word's restrictor (e.g., Schwarz and Simonenko, 2018b).

  (19) Which of these students does Sam know passed?
  $\overset{\text{presup}}{\Longrightarrow}$ All of these students passed. $\forall$-projection
  $\overset{\text{presup}}{\Longrightarrow}$ Some of these students passed. $\exists$-projection

  IL-triviality w.r.t. existential projection implies IL-triviality w.r.t. universal projection, so I will only consider the former.[6]

[6] The general predictions only come apart when considering *de re*-readings of FI constructions, where $\forall$-projection yields a singleton question (cf. the abstract).

standard case

(1) *Which girl$_i$ does Sam know t_i is the tallest?

$\overset{\text{presup}}{\Longrightarrow}$ Some girl is the tallest girl. $\exists$-projection

$\overset{\text{presup}}{\Longrightarrow}$ Sam knows who the tallest girl is. EP

For any interpretation $I = (M, w, g)$ where (1) has more than one answer, the presuppositions of its answers are mutually incompatible:

$$[\![\text{Which girl does Sam know is the tallest?}]\!]_I$$
$$= \{\lambda x \lambda w' : \text{at } w', x \text{ is the tallest girl.}$$
$$\text{at } w', \text{Sam knows that } x \text{ is the tallest girl}\}$$

If any, the only defined answer at I is the one which accords with I on who the tallest girl is.

This means that in any interpretation I, (1) has at most one defined answer. By *Corollary 1*, this means that **(1) is IL-trivial.**

factivity

The IL-triviality of (1) depended on the factivity of the embedding predicate: (2) is not IL-trivial (on either projection reading).

(2) Which girl does Sam think is the tallest?

$\overset{\text{presup}}{\Longrightarrow}$ Sam believes that some girl is the tallest girl. EP

$\overset{\text{presup}}{\not\Longrightarrow}$ Some girl is the tallest girl. $\exists$-projection

$\overset{\text{presup}}{\not\Longrightarrow}$ All girls are the tallest girl. $\forall$-projection

Reason: The answers to (2) does not have mutually incompatible presuppositions—they do not have presuppositions at all.

$[\![\text{Which girl does Sam think is the tallest?}]\!]_I$
$= \{\lambda x \lambda w'.\text{at } w', \text{Sam thinks that } x \text{ is the tallest girl}\}$

uniqueness

The IL-triviality of (1) likewise depended on uniqueness of the predicate in the complement clause: (3) is not IL-trivial (on either reading).

(3) Which girl does Sam know is tall?

$\overset{\text{presup}}{\Longrightarrow}$ Sam knows that some girl is tall. EP

$\overset{\text{presup}}{\Longrightarrow}$ All girls are tall. $\forall$-projection

$\overset{\text{presup}}{\Longrightarrow}$ Some girl is tall. $\exists$-projection

Reason: While the answers to (3) have presuppositions, these need not be mutually incompatible. For instance, in some Is we have that

$$\begin{aligned}&[\![\text{Which girl does Sam know is tall?}]\!]_I\\ &= \{\lambda x \lambda w' : \text{at } w', \text{ all girls are tall girl.}\\ &\qquad\qquad \text{at } w', \text{ Sam knows that } x \text{ is a tall girl}\}.\end{aligned}$$

uniqueness and logicality

As shown in particular by Oshima (2007) and S&S, the property ascribed to the gapped element in an FI construction need not be unique by logical necessity.

(20) *Who$_i$ does Sam know that Joss got married to t_i on 1/7?

(21) *Where$_i$ does Max know that Caesar was murdered t_i?

However, in the above cases, it is intuitively unique with respect to the accessible (S&S) interpretations for the respective construction: the interpretations where one does not marry $>$ 1 person/day, and the property get murdered at more than one place.

This means that the "rescaled" versions of these properties must likewise be unique. Thus if we condition IL-triviality not on *all possible interpretations*, but on all accessible interpretations, these cases are accounted for: given *Corollary 1*, both (20) and (21) are IL-trivial.

interim summary

	infelicity	blocking	il-triviality
standard FIs	✓	✓	✓
multiple FIs	✗	✓	
embedded FIs	✗	✗	
trivial questions	✗	✗	

An IL-triviality based account of FIs thus handles standard cases of factive islands just as well as the competing pragmatic accounts.

(1) *Which girl$_i$ does Sam know t_i is the tallest? standard

embeddings

Works appealing to L-triviality standardly assume that the presence of an L-trivial constituent is sufficient for a sentence to be perceived as ungrammatical.

Then the badness of (22) is predicted by the L-triviality of the embedded clause.

(22) *Sam knows that I've read some book but *War and Peace*.

Presumably, whatever explains this behaviour of L-trivial sentences would predict the corresponding behaviour for IL-trivial sentences.

Then the badness of (11) is immediately predicted by the IL-triviality of the embedded clause.

(11) *Sam knows who$_i$ Alex knows t_i is the tallest.

multiple *wh*-questions

Unacceptability caused by L-triviality also seems to be preserved under *wh*-extraction.

For instance, (23) is in no way improved by *wh*-clause formation (24).

(23) *I've read some book but *War and Peace*.

(24) *Who$_i$ t_i read some book but *War and Peace*?

Analogously, the badness of (7) would be predicted by the IL-triviality of (25):

(7) *Who$_i$ t_i knows that Caesar was murdered where?

(25) *Where does Max know that Caesar was murdered?

trivial questions

While both necessarily infelicitous and blocked, constructions like (26) are not IL-trivial.

(26) Who is [happy or not happy]?

A counterexample to the IL-triviality of (26) is given by the rescale

(26)′ Who is $\textsc{Rescale}_1$(happy) and not $\textsc{Rescale}_2$(happy)?[7]

in combination with any interpretation $I : [\![\textsc{Rescale}_1(\text{happy})]\!]_I \neq [\![\textsc{Rescale}_2(\text{happy})]\!]_I$.

[7] The domain restrictor of *who* could also be rescaled, but I ignore this for simplicity.

summary

	infelicity	blocking	il-triviality
standard FIs	✓	✓	✓
multiple FIs	✗	✓	✓
embedded FIs	✗	✗	✓
trivial questions	✗	✗	✓

In sum, an IL-triviality based account of FIs handles the standard cases just as well as the pragmatic accounts do, extends naturally to both multiple and embedded FIs, and avoids predicting unacceptability for regular trivial questions.[8]

[8] Factive islands involving *manner* and *degree* questions are not obviously covered by the present account, since they do not obviously involve uniqueness. However, these should at least not be any *less* explicable on the present account than they are on infelicity or blocking accounts (which also assume uniquenss).

Conclusion

conclusion

I argued that FI constructions are bad because they are IL-trivial:

> **IL-triviality.** An interrogative sentence Q is *IL-trivial* just in case for all rescales Q' of Q, for all accessible interpretations I, at most one $p \in [\![Q']\!]_I$ is defined.

If this is correct, the analysis of factive islands does not require the assumption that there are *essentially* pragmatic sources of perceived ungrammaticality in natural language, *pace* S&S and SO&S.

This does not exclude the possibility or usefulness of an *external* pragmatic rationale for the assumed connection between (I)L-triviality and perceived ungrammaticality.

Yet, the predictive differences between the proposed account and pragmatic accounts point to the value of keeping this rationale separate from the core explanatory features of the analysis.

Thank you!

references i

- Abrusán, M. (2014), *Weak island semantics*, Oxford: Oxford University Press.
- Chierchia, G. (2013), *Logic in grammar: Polarity, free choice, and intervention*, Oxford: Oxford University Press.
- Dayal, V. (1996), *Locality in Wh-quantification: Questions and Relative Clauses in Hindi*, Dordrecht: Kl uwer.
- Del Pinal, G. (2017), "The logicality of language: A new take on triviality, ungrammaticality, and logical form", *Noûs* vol. 53 issue 4.
- Von Fintel, K. (1993), "Exceptive constructions", *Natural Language Semantics*, vol. 1 issue 2.
- Fox, D. and Hackl, M. (2007), "The universal density of measurement", *L&P* vol. 29 issue 5.
- Gajewski, J. (2002), "L-analyticity and natural language", unpublished manuscript.
- Gajewski, J. (2008), "More on quantifiers in comparative clauses", proceedings of *SALT 18*.

references ii

- Gajewski, J. (2009), "L-triviality and grammar", handout of a talk delivered at the UConn Logic Colloquium, available on-line.
- Guerzoni, E. (2003), *Why even ask? On the pragmatics of questions and the semantics of answers*, MIT PhD thesis.
- Mayr, C. (2019), "Triviality and interrogative embedding: Context sensitivity, factivity, and neg-raising". *Natural Language Semantics*, vol. 27, issue 3.
- Menández-Benito, P. (2005), *The grammar of choice*, University of Massachusetts Amherst PhD thesis.
- Oshima, D. (2007), "On factive islands: Pragmatic anomaly vs. pragmatic infelicity", *New Frontiers of Artificial Intelligence*, pp. 147–161.
- Schwarz, B. and Simonenko, A. (2018), "Factive islands and meaning-driven unacceptability", *Natural Language Semantics*, vol. 26 issue 3-4.
- Schwarz, B., Oshima, D. and Simonenko, A. (2019), "Factive islands from necessary blocking", proceedings of *SALT 29*.

references iii

- Szabolcsi, A. and Zwarts, F. (1993), "Weak islands and an algebraic semantics for scope taking", *Natural language semantics*, vol. 1 issue 3.
- Theiler, N., Roelofsen, F. and Aloni, M. (2019), "Picky predicates: Why *believe* doesn't like interrogative complements, and other puzzles", *Natural Language Semantics*, vol. 27, issue 2.