

### Factive islands and interrogative logical triviality

*Wh*-extraction of elements in the complement of a factive verb like *know* fails when the property ascribed to the gapped element expresses *uniqueness* (cannot hold of more than one individual):

- (1) a. \*Which girl<sub>i</sub> does Kim know *t<sub>i</sub>* is the tallest? +factive, +unique  
 b. Which girl<sub>i</sub> does Kim believe *t<sub>i</sub>* is the tallest? –factive, +unique  
 c. Which girl<sub>i</sub> does Kim know *t<sub>i</sub>* is tall? +factive, –unique

This *factive island* (FI) effect was discovered by [15]. This paper argues against two recent pragmatic explanations of FIs ([13],[14]), and instead proposes a semantic explanation of FIs in terms of *I(nterrogative)L-triviality*, a novel extension of [8]’s *L-triviality* to interrogatives. The paper thereby adds to the current debate about the sources of meaning-driven unacceptability ([13],[2]).

**Pragmatic accounts of FIs.** Building on [11], [13] argue FI effects result from *necessary infelicity*. They show that factivity + uniqueness in a *wh*-complement triggers a presupposition that contradicts the *existential presupposition* ([4]) of a *wh*-question, given certain assumptions about the felicity conditions of questions. In particular, assuming the *answerability condition*: questions are felicitous only in contexts that entail the presuppositions of at least one of their answers, but not that answer itself. [14] show that [13] cannot capture FI effects in *multiple wh-questions* (2a):

- (2) a.\*Who knows that which girl is the tallest?      b. Who knows that Sam is the tallest?

[14] propose an alternative account under which FIs result from *necessary blocking*: constructions like (1a) and (2a) are pragmatically dispreferred to other interrogatives in every context satisfying their answerability condition. For instance, (2a) is always blocked by the polar question resulting from replacing *which girl* with the name of the girl context entails is the tallest, e.g. (2b).

**Problems.** Both pragmatic accounts locate the source of FI effects in the violation of conditions tied to the *speech act* of asking a question. This does not explain why FI effects appear also in constructions that are *not* used to ask, like ones embedded by (non-speech act) verbs like *know*:

- (3) \*Sam knows [which girl<sub>i</sub> Kim knows *t<sub>i</sub>* is the tallest].

The paper argues that the robustness of FI effects across different speech acts shows that they cannot be explained in terms of felicity conditions or pragmatic blocking. Conversely, both pragmatic accounts struggle to explain why constructions like (4) are *not* unacceptable: (4a) necessarily violates the answerability condition, since in any context, everyone is happy or not; (4b) is necessarily blocked, by polar questions of the form *Kim knows that [everyone] is happy or not happy*.

- (4) a.?Who is happy or not happy?      b. ?Who does Kim know is happy or not happy?

[13] suggest that (4a) is acceptable because its infelicity depends only on the answerability condition. However, it is quite unclear why an infelicity resulting from a conjunction of conditions would result in unacceptability, but an infelicity requiring only one of the conjuncts would not.

**Interrogative logical triviality.** [8] proposed that a systematic form of logical triviality, *L-triviality*, is a source of unacceptability of sentences. Where **LS**( $\varphi$ ) is the result of *non-uniformly* substituting the maximal *non-logical* components of a sentence  $\varphi$  for variables of the same type:

**L-triviality.**  $\varphi$  is L-trivial if, for every interpretation *I* where **LS**( $\varphi$ ) is defined:  $\llbracket \mathbf{LS}(\varphi) \rrbracket_I = 1$  (0).

[8] proposes that any sentence which contains an L-trivial constituent is, in virtue of this, unacceptable. This assumption has proven remarkably productive (see e.g., [7, 6, 3, 16]), but is not immediately useful for the analysis of interrogative sentences: these are not readily taken to have truth-values. In order to assess the triviality of interrogatives under a standard, answer-set semantics ([9]), we introduce a complementary notion of systematic triviality: *I(nterrogative)L-triviality*. Intuitively, an interrogative is communicatively degraded if lacks multiple (defined) answers. An IL-trivial interrogative is so degraded regardless of how we interpret its non-logical components:

**IL-triviality.** An interrogative  $\varphi$  is IL-trivial if, for every interpretation  $M, w$  where  $\mathbf{LS}(\varphi)$  is defined: at most one  $p \in \llbracket \mathbf{LS}(\varphi) \rrbracket_{M,w}$  is defined at  $w$ .

The paper proposes that a sentence which contains an IL-trivial constituent is, in virtue of this, unacceptable. It is shown that this assumption explains FIs: constructions like (1a) are IL-trivial. [1] similarly proposed that FIs result from a systematic triviality, which depended on the assumption that presuppositions project *universally* in *wh*-questions (see below). But this projection can also be *existential* ([12]). The present proposal derives triviality for both projection patterns.

**IL-triviality and FI effects.** We assume a basic Hamblin ([9]) analysis of questions, and follow the standard assumption that *wh*-questions come with an existential presupposition (e.g., [4]). Then (1a) denotes, with respect to some interpretation  $M, w$ , the set of propositions in (5):

(5)  $\{\lambda w' : \text{the girl } d \text{ is the tallest girl } w'. \text{Kim believes in } w' \text{ that } d \text{ is the tallest girl} \mid d \in \llbracket \mathbf{girl} \rrbracket_{M,w}\}$

$\mathbf{LS}((1a))$  is obtained by substituting the maximal non-logical components of (1a) (here: *girl*, *tallest girl*, *Kim*, *know*) for variables of the corresponding type, below given in **boldface**. Following [5, 16], we assume that the component of attitude verbs responsible for factivity is purely logical, so is preserved in the variable **V** replacing *knows*. With simplifications,  $\llbracket \mathbf{LS}(1a) \rrbracket_{M,w}$  is then (6):

(6)  $\{\lambda w' : \text{the } \mathbf{P} \text{ } \mathbf{a} \text{ is the } \mathbf{Q} \text{ in } w'. \mathbf{a} \text{ } \mathbf{V} \text{ } \mathbf{s} \text{ in } w' \text{ that } d \text{ is the } \mathbf{Q} \mid d \in \llbracket \mathbf{P} \rrbracket_{M,w}\}$

On a *universal* projection analysis, (1a) presupposes that *Every girl is the unique tallest girl*: the uniqueness presupposition of *the tallest* and the factive presupposition of *know* project over *all* elements in the *wh*-restrictor (here, the set of *girls*). This only holds when  $\llbracket \mathbf{girl} \rrbracket_{M,w} = 1$ , in which case (5) is a singleton. Analogous reasoning gives us that  $\mathbf{LS}((1a))$  presupposes that  $\llbracket \mathbf{P} \rrbracket_{M,w} = 1$ , so that (6) is a singleton. Thus, (1a) is immediately IL-trivial on a universal projection analysis.

On an *existential* projection analysis, (1a) presupposes that *Some girl is the unique tallest girl*, so that in any interpretation  $M, w$  where (1a) is defined, exactly one girl  $g$  is the tallest girl. Then, only one answer in  $\llbracket (1a) \rrbracket_{M,w}$  can be defined: the answer that presupposes that  $g$  is the tallest girl. Analogous reasoning gives us that  $\mathbf{LS}((1a))$  can likewise only have one defined answer, meaning that (1a) is IL-trivial also on an existential projection analysis.

The analysis illustrated for (1a) extends to any interrogative formed through extraction of a (single) *wh*-phrase from a factive embedding encoding uniqueness of the extracted element. The derivation of IL-triviality requires uniqueness to be presupposed, which in turn requires factivity to project. Without factivity ((1b)) or without uniqueness ((1c)), no unacceptability is predicted.

**Embedding and multiple *wh*-questions.** [8] and subsequent work using L-triviality has assumed that sentences require only an L-trivial *constituent* to be unacceptable. We have done the same for IL-triviality, and the account thereby predicts the observed persistence of FI effects under embedding (cf. (3)). Unacceptability also seems to be preserved under *wh*-extraction from L-trivial constructions. For instance, the unacceptability of *\*believe whether*-constructions (analysed as L-trivial by [16],[10]) is not improved by extraction: *\*Who believes whether it's raining?* If IL-triviality behaves analogously, the present account explains the FI effect in multiple *wh*-questions.

**Conclusion.** The paper shows that FI effects can be explained in terms of systematic semantic triviality, whether one assumes universal or existential projection of presuppositions in *wh*-questions. This analysis does not immediately predict FI effects for constructions where uniqueness is not *logical*, but merely typical/default, as discussed in [13]. However, it is unlikely that in on-line assessment of (I)L-triviality, hearers considers *all possible* interpretations. A more sensible assumption is that we constrains attention to the most *relevant/typical* interpretations, and once these are fixed, assess triviality. With this assumption, the relevant data in [13] is accounted for.

## References

- [1] Márta Abrusán. *Weak island semantics*, volume 3. OUP Oxford, 2014.
- [2] Márta Abrusán. Semantic anomaly, pragmatic infelicity, and ungrammaticality. *Annual Review of Linguistics*, 5:329–351, 2019.
- [3] Gennaro Chierchia. *Logic in grammar: Polarity, free choice, and intervention*. OUP Oxford, 2013.
- [4] Veneeta Dayal. *Locality in Wh-quantification: Questions and Relative Clauses in Hindi*. Dordrecht: Kluwer Academic Publishers, 1996.
- [5] Guillermo Del Pinal. The logicity of language: a new take on triviality, ungrammaticality, and logical form. *Noûs*, 2017.
- [6] Danny Fox. Free choice disjunction and the theory of scalar implicatures. In Uli Sauerland and Penka Stateva, editors, *Presupposition and Implicature in Compositional Semantics*, pages 71–120. New York: Palgrave Macmillan, 2007.
- [7] Jon Gajewski. More on quantifiers in comparative clauses. In *Semantics and Linguistic Theory*, volume 18, pages 340–357, 2008.
- [8] Jon Gajewski. L-triviality and grammar. Handout of a talk delivered at the UConn Logic Group, available <https://logic.uconn.edu/wp-content/uploads/sites/508/2014/01/Gajewski022709.pdf>here, 2009.
- [9] Charles L Hamblin. Questions in Montague English. *Foundations of Language*, 10(2):41–53, 1973.
- [10] Clemens Mayr. Triviality and interrogative embedding: context sensitivity, factivity, and neg-raising. *Natural Language Semantics*, 27(3):227–278, 2019.
- [11] David Y Oshima. On factive islands: pragmatic anomaly vs. pragmatic infelicity. In *Annual Conference of the Japanese Society for Artificial Intelligence*, pages 147–161. Springer, 2006.
- [12] Bernhard Schwarz and Alexandra Simonenko. Two pragmatic accounts of factive islands. In *46th Annual Meeting of the North East Linguistic Society (NELS 46)*, volume 3, pages 169–179, 2016.
- [13] Bernhard Schwarz and Alexandra Simonenko. Factive islands and meaning-driven unacceptability. *Natural Language Semantics*, 26(3-4):253–279, 2018.
- [14] Bernhard Schwarz, Alexandra Simonenko, and David Oshima. Factive islands from necessary blocking. forthcoming in *Proceedings of Semantics and Linguistic Theory 29*, abstract available at <http://salt.linguistics.ucla.edu/29/program.html>, 2019.
- [15] Anna Szabolcsi and Frans Zwarts. Weak islands and an algebraic semantics for scope taking. *Natural language semantics*, 1(3):235–284, 1993.
- [16] Nadine Theiler, Floris Roelofsen, and Maria Aloni. Picky predicates: why believe doesn’t like interrogative complements, and other puzzles. *Natural Language Semantics*, 27(2):95–134, 2019.