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Syntactic freezing as semantic matching: licensing syntactic deviation in echo questions

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Abstract

Echo questions (EQs) with an interrogative base have been regarded as syntactically more constrained than declarative-based EQs by involving a frozen CP structure (Sobin, 2010). This paper argues against syntactic freezing and claims that both declarative- and interrogative-based EQs are uniformly licensed by entailment defined over information content. The seemingly freezing effect of EQs arises despite entailment when relevant domain alternatives of the antecedent are factored into calculating the meaning of the base such that strict entailment is blocked by exhaustivity inference.

1 Introduction

This paper focuses on constituent echo questions (EQs) such as (1B) and (2B) with echo wh-words in capitals, which mark an information gap between the speaker and the hearer. The *antecedent* of an EQ is usually the immediately preceding utterance, which contains an element that can fill in the gap, deriving the *base* utterance of the EQ. Reis [2017] claims that EQs are not a clause type of their own but are dependent on their base structure types. Accordingly, (1B) is a *declarative-based EQ*, whereas (2B) is an *interrogative-based EQ*.

(1) A: Mozart was arrested by the police. B: The police arrested WHO?
base of (1B): The police arrested Mozart.

(2) A: Did Mary meet Putin? B: Did Mary meet WHO?
base of (2B): Did Many meet Putin?

(1) also shows that the base of an EQ can syntactically deviate from its antecedent. There has been debate about how EQs are related to their antecedents. Quotative analyses [Janda, 1985, Sobin, 2010] assume phonetic or syntactic copy involved in EQs. This view has been criticized by semantic analyses [Artstein, 2002, Poschmann, 2018, Beck and Reis, 2018], which maintain that EQs are related to their antecedents by way of content. One piece of evidence comes from the fact that some declarative-based EQs such as (3B) have no linguistic element in common with their antecedents. Interrogative-based EQs, however, are claimed to be subject to an additional condition, requiring antecedents with identical clause-type features. The minimal pair in (4) and (5) shows that a mismatch in clause type results in infelicity. This additional syntactic constraint for interrogative-based EQs is nevertheless unmotivated for semantic analyses and has been left as a puzzle.

(3) A: Did Lisa already say something about how her son likes MIT?
B: Tom is studying WHERE? (Beck and Reis, 2018)

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(4) A: Who will cook lentil souffle? B: Who will cook WHAT? (Beck and Reis, 2018)

(5) A: I wonder which unfortunate individual was told to prepare lentil souffle.
B: # Who will cook WHAT? (Beck and Reis, 2018)

Sobin [2010] explains the syntactically more constrained interrogative-based EQs and less constrained declarative-based EQs as a COMP-freezing effect, which requires a frozen CP structure (Spec CP, C, C') of the antecedent being copied. (6)-(8) illustrate COMP-freezing effect. (6A) is a declarative sentence, whose complementizer differs from that of interrogatives in (7A) and (8A), as manifested by subject auxiliary inversion. (8A) further differs from (7A) in that its Spec CP is filled with a wh-phrase. When serving as antecedents, they only allow EQs with matched CP structures, such as (6B), (7B), and (8B). EQs with unmatched CP structures as in (6B'), (7B'), and (8B') are infelicitous.

(6) A: Mary had tea with Cleopatra. (Sobin, 2010)
B: Mary had tea with WHO?
B': # Did Mary have tea with WHO?

(7) A: Did Mary have tea with Cleopatra? (Sobin, 2010)
B: Did Mary have tea with WHO?
B': # Mary had tea with WHO?

(8) A: What did Dracula drink at Mary's party? (Sobin, 2010)
B: What did WHO drink at Mary's party?
B': # Who drank what at Mary's party?

By contrast, Sobin considers non-CP elements as involving a loose copy. A consequence is that active–passive alternation is possible for declarative-based EQs but not interrogative-based EQs as voice change in interrogatives will be reflected in the C domain through head movement.

This paper argues against COMP-freezing by providing a unified semantic matching condition for licensing syntactic deviation in EQs. We show that both declarative- and interrogative-based EQs are licensed by entailment defined over information content between the antecedent and the base utterance. The seemingly freezing effect arises despite entailment since strict entailment between questions is always blocked by exhaustivity inference when the relevant domain alternatives of the antecedent are factored into calculating the meaning of the base.

The rest of the paper is organized as follows. Section 2 discusses the problem of COMP-freezing. Section 3 claims that Poschmann's (2018) entailment condition uniformly licenses declarative- and interrogative-based EQs and solves the problematic cases for Sobin. Section 4 illustrates that entailment is insufficient and requires enrichment, and demonstrates how the seemingly syntactic freezing effect is explained by the enriched semantic condition.

2 Problems of COMP-freezing

As a quotative analysis, COMP-freezing has been challenged by previous literature in that there are well-formed EQs without a frozen CP structure. As in (9B), the echo wh-word occurring in the CP structure makes it different from the antecedent. (10) provides another counterexample. While the antecedent in (10A) is a yes/no question with a complementizer triggering T to C movement, the EQ in (10B) is declarative-based. The well-formedness of (9B) and (10B) regardless of having uncopied CP elements shows that COMP-freezing is too strong.

(9) A: Which books about linguistics sell like mad?

B: Which books about WHAT sell like mad? (Beck and Reis, 2018)

(10) A: Could you pass me the salt?
B: You are asking me to hand WHAT? (Poschmann, 2018)

Moreover, COMP-freezing predicts that active–passive alternation is not allowed in interrogative-based EQs, but this is not the case in (11).

(11) A: Who arrested the thief? B: Who was WHO arrested by?

On the other hand, COMP-freezing is too weak in that it does not capture the semantic relation between EQs and their antecedents. For example, (12B) is a declarative-based EQ that only involves loosely copied non-CP elements. However, When we switch the order of the antecedent and the base utterance, as in (13), the EQ becomes infelicitous, indicating that there are semantic relations at play.

(12) A: Mary speaks French. B: WHO speaks a foreign language?

(13) A: Mary speaks a foreign language. B: # WHO speaks French?

In sum, COMP-freezing is neither necessary nor sufficient in licensing well-formed deviations in EQs. We argue in Section 3 that the problems above can be addressed by entailment.

3 Antecedent through entailment

Based on Schwarzschild's (1999) entailment licensing, Poschmann [2018] proposes that a declarative-based EQ is licensed only if the meaning of its base utterance is entailed by the information content of its antecedent, where the information content (IC) of an utterance φ in a given context c consists of the propositional content, its presuppositions PRES and its implicatures IMP [Van der Sandt, 1991], represented as $\mathrm{IC}(\varphi, c) = \{[\![\varphi]\!]^c \cup \mathrm{PRES}(\varphi, c) \cup \mathrm{IMP}(\varphi, c)\}$.

(14)-(16) demonstrate that declarative-based EQs are licensed by entailment.The base utterances of the EQs in (14B), (15B), and (16B) are entailed by the proposition content of (14A), the presupposition of (15A), and the implicature of (16A), respectively[1].

(14) A: Mary speaks French. B: WHO speaks a foreign language?
$[\![(14A)]\!]^c \Rightarrow [\![\textit{Mary speaks a foreign language}]\!]^{c'}$

(15) A: Bill knows that Mary speaks French. B: WHO speaks a foreign language?
$\mathrm{PRES}((15\mathrm{A}),c) \Rightarrow [\![\textit{Mary speaks a foreign language}]\!]^{c'}$

(16) A: Jill may play the piano or the violin. B: WHO may play a string instrument?
$\mathrm{IMP}((16\mathrm{A}),c) \Rightarrow [\![\textit{Jill may play a string instrument}]\!]^{c'}$

Different from Beck and Reis's (2018) hypothesis that interrogative-based EQs require additional syntactic constraint, we claim that Poschmann's (2018) entailment condition also holds for interrogative-based questions such that both declarative- and interrogative-based EQ are licensed in the same way. Guerzoni and Sharvit [2007] discusses entailment between questions based on speakers' intuition such that a question A entails a question B only if asking A automatically leads to asking B. Accordingly, there is no entailment in the question nucleus. As in (17), the original entailment relation ($[\![\textit{bought a red car}]\!] \Rightarrow [\![\textit{bought a car}]\!]$) disappears in the question nucleus since the speaker asking *Which student bought a car* can have no interest in the

[1] We assume that antecedents are uttered in context c while EQs are uttered in context c'.

color of the car, and vice versa. In contrast, there is downward entailment in the wh-restrictor of a wh-question. As in (18), the direction of entailment ($[\![\textit{French students}]\!] \Rightarrow [\![\textit{students}]\!]$) is reversed in the questions as asking *Which students passed the exam* automatically leads to asking *Which French students passed the exam.*

(17) No entailment in the question nucleus:
$[\![\textit{Which students bought a car}]\!] \nLeftrightarrow [\![\textit{Which students bought a red car}]\!]$

(18) Downward-entailment in the wh-restrictor:
$[\![\textit{Which students passed the exam}]\!] \Rightarrow [\![\textit{Which French students passed the exam}]\!]$

Assuming entailment relation between questions as above, we demonstrate that the entailment condition defined over information content also licenses interrogative-based EQs. As in (19), the base of (19B) is asymmetrically entailed by its antecedent in (19A). In (20), the EQ is licensed by having a base entailed by the implicature of the antecedent. The fact that (19B) and (20B) are felicitous without strictly copied CP structure suggests that it is semantic relation rather than COMP-freezing that licenses syntactic deviation in EQs.

(19) A: Which French and German students passed the exam?
B: Which French students passed WHAT?

(20) A: I am curious about whether John speaks Wolof. B: Does John speak WHAT?

With entailment condition, we can understand why the prediction of COMP-freezing on voice alternation holds in some cases but not others. For instance, the infelicitous voice alternation in (8), repeated in (21), is attributed to no entailment relation between (21B') and IC of (21A). Conversely, when entailment is established between the base and antecedent, as in (11), repeated in (22), active–passive alternation is allowed.

(21) A: What did Dracula drink at Mary's party? (Sobin, 2010)
B': # Who drank what at Mary's party?

(22) A: Who arrested the thief? B: Who was WHO arrested by?

Also, those counterexamples to COMP-freezing pointed out by Beck and Reis [2018] and Poschmann [2018], repeated below, are no longer problematic with entailment condition. (23B) is licensed because its base utterance is semantically equivalent to the antecedent. The mismatched CP structure is allowed in (24) because the antecedent implicates a proposition that entails the base of (24B) such that our semantic condition is satisfied.

(23) A: Which books about linguistics sell like mad?
B: Which books about WHAT sell like mad? (Beck and Reis, 2018)

(24) A: Could you pass me the salt?
B: You are asking me to hand WHAT? (Poschmann, 2018)

4 Entailment is necessary but insufficient

Though the entailment condition is better than COMP-freezing in predicting possible syntactic deviation in EQs, it does not fully explain how this COMP-freezing illusion occurs as entailment itself is independent of clause types, shown in (25). This section discusses cases where the seemingly freezing effect occurs regardless of entailment. However, those cases are not counterexamples of entailment but suggest factors other than entailment at play. The enriched

semantic condition with those factors not only explains how the freezing effect arises but further demonstrates that declarative- and interrogative-based EQs are uniformly licensed.

(25) (Suppose Mary is a student.)
$[\![$*Which students passed the exam*$]\!] \Rightarrow [\![$*Did Mary pass the exam*$]\!]$

Despite the well-formed example in (19), we observe that asymmetric entailment between questions is always blocked in EQs. There are two kinds of strict entailment allowed between questions. One is downward-entailment in the wh-restrictor of wh-questions, as discussed in Section 3. The other is entailment from a wh-question to a polar question, as in (25). However, neither of them is sufficient to license EQs, as in (26) and (27). Not only questions, we observe that downward-entailment is not sufficient to license declarative-based EQs as well, as in (28).

(26) A: Which students passed the exam? B: # Which French students passed WHAT?

(27) A: Which students passed the exam? B: # Did Mary pass WHAT?

(28) A: Mary doesn't speak any foreign language. B: # WHO doesn't speak Igbo?

Before addressing the examples above, I will show that exhaustification of the base utterance triggered by alternatives plays a role in licensing EQs. Two relevant examples are shown below. The bases of (29B) and (30B) are strictly entailed by their antecedents, but both are infelicitous due to incompatible exhaustivity inference triggered by lexically determined scalar (σ-)alternatives associated with the base utterances.

(29) A: Jo teaches French and English. B: # WHO teaches French or English?

(30) A: John has three kids. B: # WHO has two kids?

To illustrate, consider (29B). The disjunctive connective *or* of the base utterance activates σ-alternatives as in (31). Those alternatives grow point-wise and are obligatorily factored into meaning via a covert exhaustifier O (modeled on *only*), deriving exhaustivity inference by negating all the contextually relevant alternatives (represented as C) that are excludable. In this case, we have a strengthened meaning of the base utterance as in (32), which implies that Jo does not teach both French and English. But this implicature is incompatible with what the antecedent asserted, and thus leads to infelicity.

(31) σ-ALT(or) = $\{\lambda x \lambda y.x \vee y,\ \lambda x \lambda y.x \wedge y\}$

(32) O_C(Jo teaches French or English) = teach(J,F)$\vee$teach(J,E)$\wedge\neg$(teach(J,F)$\wedge$teach(J,E))

We propose that the infelicity of (26)-(28) is also attributed to incompatible implicatures of the base, but rather than σ-alternatives, the domain for exhaustification contains domain (D-)alternatives activated by the antecedent. Chierchia [2013] assumes that a quantificational determiner carries a domain variable D, interpreted via an assignment function g and that the D-alternatives of the quantifier are derived by assigning a value that is a subset of $g(D)$ to this variable. Take (28) as an illustration. Assume D-alternatives activated by *any* in (33), with $g(D)$ consisting of three languages, Igbo (i), Spanish(s), and Arabic(a). With point-wise composition, we have a set of D-alternatives of the antecedent as in (34). Assuming those alternatives are inherited by the EQ and factored into calculating the meaning of the base, the exhaustivity inference is derived by negating all the relevant alternatives that are not entailed by the base. As in (35), the enriched meaning of the base implies that Mary speaks foreign languages other than Igbo, which contradicts the meaning of the antecedent.

(33) D-ALT(any$_D$) = $\{\lambda P \lambda Q.\exists x \in D'[P(x) \wedge Q(x)] : D' \subseteq \{i, s, a\}\}$

(34) D-ALT(Mary doesn't speak any$_D$ foreign language) = {¬spk(M,i∨s∨a), ¬spk(M,i∨s), ¬spk(M,i∨a), ¬spk(M,s∨a), ¬spk(M,i), ¬spk(M,s), ¬spk(M,a)}

(35) O$_C$(Mary doesn't speak Igbo) = ¬spk(M,i) ∧ spk(M,a) ∧ spk(M,s)

For questions that don't have a truth value such as (26), we assume that those D-alternatives project to a higher layer (over speech acts) such that exhaustivity inference operates over a set of question acts. Consider (26). Suppose there are two French students Mary and Fred, and a German student Sally such that D-alternative activated by *which* is in (36). Those alternatives grow point-wise into a set of question acts, as in (37), which serve as the relevant domain for exhaustification of the base. Thus the meaning of base is strengthened by implying that the speaker does not ask whether Sally passed the exam, which contradicts the antecedent. Since strict entailment for interrogative-based EQs always involves a base that is a domain alternative to the antecedent, the seeming freezing effect arises as a result of entailment failure.

(36) D-ALT(which$_D$) = $\{\lambda P \lambda Q.\exists x \in D'[P(x) \wedge Q(x)] : D' \subseteq \{Mary, Fred, Sally\}\}$

(37) D-ALT(which$_D$ students passed the exam) = $\{\text{QUEST}(\lambda p \exists x \in D'[\text{student}(x) \wedge p = \text{pass}(x, \text{exam})]) : D' \subseteq \{Mary, Fred, Sally\}\}$

(38) O$_C$(which French students passed the exam) =
QUEST(⟦*which French students passed the exam*⟧) ∧ ¬QUEST(⟦*Did Sally pass the exam*⟧)

In contrast, strict entailment is not blocked in (19), repeated below. Following Heycock and Zamparelli [2005], the domain of quantification of the question in (39A) is composed of a set of pluralities that each contain both French and German students. Hence the quantification domain of the base in (39B) is not a domain alternative to that of the antecedent such that no exhaustivity inference is derived. An alternative explanation is to regard (39A) as a conjunction of two questions by ellipsis such that (39B) has an antecedent semantically equivalence to the base. Evidence can be seen from the fact that EQs echoing one of the argument conjuncts of the antecedent are only acceptable when the predicate is distributive, e.g., (39) vs. (40).

(39) A: Which French and German students passed the exam?
B: Which French students passed WHAT?

(40) A: Which French and German students formed a circle?
B: # Which French students formed WHAT?

The contrast between (26) and (39) can also be accounted for by presupposition failure. The base of (26B) presupposes that some French students passed the exam. This presupposition is neither presupposed by the antecedent nor given in the preceding context. As EQs ask for closed information, we assume that ungiven presupposition cannot be accommodated and thus leads to infelicity. Similarly, presupposition failure also results in the infelicity of declarative-based EQs, as in (41), where the base carries an ungiven existential presupposition. (41) further confirms that declarative- and interrogative-based EQs are subject to similar constraints.

(41) A: Bill didn't get the perfect score. B: ?? It wasn't WHO who got the perfect score?

Given the above, the unified semantic licensing condition is enriched as follows.

(42) An utterance ω in context c' is a felicitous EQ to an utterance ϕ in context c iff its base (b(ω)) is entailed by IC(ϕ,c), and PRES(b(ω),c') and IMP(b(ω),c') are given in c.

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