Leitgeb, “about”, Yablo

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Motivations

- Yablo's paradox: circular?
- Leitgeb: depends (constituents vs. syntactic mappings).
- [EC]: circularity is to be preserved under logical equivalence.
- Fixing the first notion.
- Can it deal with Leitgeb qualms?

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1. Yablo's paradox: a formulation
2. Leitgeb's criticism of the debate
3. Leitgeb's self-reference$_1$
4. Leitgeb's qualms
5. Defining informative aboutness
6. Aboutness$_i$ and Leitgeb's qualms
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Yablo's paradox

$$\begin{aligned} s_0 &= \text{`}\forall_x(P_1(x) \rightarrow \neg Tr(x))\text{'}, \\ s_1 &= \text{`}\forall_x(P_2(x) \rightarrow \neg Tr(x))\text{'}, \\ s_2 &= \text{`}\forall_x(P_3(x) \rightarrow \neg Tr(x))\text{'}, \ldots \end{aligned}$$

- Tr is the truth predicate.
- The extension of every P_n is $s_n, s_{n+1}, s_{n+2}, \ldots$
- Roughly: "all the sentences below are not true".
- This leads to contradiction.
- Does it involve self-reference, though? [Yablo vs. Priest et al.]

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Leitgeb (2002) on the debate

- No clear definition of self-reference.
- In fact, at least two different notions being used:
  - Defined in terms of reference of constituents.
  - Defined in terms of syntactic mappings and fixed points.
- On the first one, the paradox is not self-referential.
- On the second one, it is.
- None of those notions is devoid of difficulties.
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Self-reference$_1$

Leitgeb's self-reference$_1$

The basic intuition

This usage of 'refers to' and 'says of' seems to presuppose that the usual reference relation *ref*, which holds between (singular or general) terms and their referents, is extended or complemented by a reference relation holding between *sentences* and objects (but where the referents of the sentences are not the truth values of the sentences). (Leitgeb 2002: 4)

- $x, y, z, \ldots$ range over objects and sentences.
- $\phi, \psi, \ldots$ range over sentences only.

'x is a sentence'	$\Leftrightarrow$	'$Sen(x)$'
'x is a singular term'	$\Leftrightarrow$	'$Sin(x)$'
'x syntactically contains y'	$\Leftrightarrow$	'$Con(x, y)$'
'x is a term which refers to y'	$\Leftrightarrow$	'$ref(x, y)$'

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$$ref_1(x, y) \Leftrightarrow Sen(x) \wedge \exists_z (Sin(z) \wedge Con(x, z) \wedge ref(z, y)) \quad (1)$$

$$selfref_1(x) \Leftrightarrow ref_1(x, x) \quad (2)$$

$ref_1^\star$ is the transitive closure of ref_1. (3)

$$circular_1(x) \Leftrightarrow ref_1^\star(x, x) \quad (4)$$

$$ref_1(`\forall_x (A(x) \rightarrow B(x))', x) \Leftrightarrow A(x) \quad (5)$$

Fact

No sentence in Yablo's sequence is self-referential$_1$ or circular$_1$.

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Leitgeb's qualms

- The notions are defined for sentences of very specific form only.
- self-referentiality$_1$ (and circularity$_1$) violate EC.

Example

$$b_1 = `(P(a) \vee \neg P(a)) \vee \neg Tr(b_1)' \qquad selfref_1(b_1)$$

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$$b_1 = \text{`}(P(a) \vee \neg P(a)) \vee \neg Tr(b_1)\text{'} \qquad selfref_1(b_1)$$

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Non-universality and the EC failure

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Why should we care about EC?

EC is plausible because logically equivalent sentences are not only extensionally equivalent in the actual world, but indeed in every logically possible world, and thus indistinguishable in terms of the semantics of first-order predicate logic. If self-reference is to be defined by extending the usual reference relation for terms, i.e., a semantical relation, it is certainly strange if EC is invalidated. If EC is not true, then self-referentiality or circularity of a sentence does not only depend on what the sentence says, but also in which way its content is being expressed. (Leitgeb 2002: 9)

The brute-force method of gaining EC doesn't work

- We might try to define:

$$selfref_1(x) \Leftrightarrow \exists_y(Sen(y) \wedge (y \Leftrightarrow x) \wedge ref_1(y, y)) \quad (6)$$

- But the conclusions that (6) leads to are too strong.
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Defining informative aboutness

Problems with ref_1

- Problems arise already with ref_1.
- For any object x, every ϕ is logically equivalent to ϕ' s.t. $ref_1(\phi', x)$.
- Just introduce a constant 'b' for x and define:

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Being about because of constants

- Intuition: disregard logically superfluous expressions.
- Say ϕ contains *a* and *P*, but doesn't contain *b* or *R*.
- Replacement (on all places): $\phi(a/b)$, or $\phi(P/R)$.
- *a* (*P*) *occurs in a informatively* iff $\phi \not\Leftrightarrow \phi(a/b)$ ($\not\Leftrightarrow \phi(P/R)$).
- Take a first-order model $\langle S, I_P, I_c \rangle$.

Definition

A sentence ϕ ***is about*** *x* ***because of a constant*** *a* ***relative to*** *$\langle S, I_P, I_c \rangle$ iff a occurs in ϕ informatively and $I_c(a) = x$.*

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Definition

- ***about$_i^\star$*** *is the transitive closure of about$_i$.*
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These notions are somewhat coarse-grained

Examples

- $\forall_x(A(x) \to B(x))$ is about$_i$ all the A's, **and** all the B's.
- If both a and b are P, then $P(a)$ and $P(b)$ are about$_i$ the same.
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- Aboutness is sensitive to the choice of predicates.

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- 'Everything is material', even if there are immaterial things, is about$_i$ material things.

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- ref_1 was defined only for sentences of a certain form.
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Aboutness$_i$ is preserved under logical equivalence.

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$$a = \text{`}\neg Tr(a)\text{'} \quad b = \text{`}\neg Tr(a) \wedge (P(c) \vee \neg P(c))\text{'} \quad c = \text{`}P(b)\text{'}$$

- a and b are logically equivalent.
- So b is about the same object as a.
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"(a) if EC is not true, then self-referentiality or circularity of a sentence does not only depend on what the sentence says, but also in which way its content is being expressed. . . (b) logically equivalent formulas are indistinguishable in first-order semantics."

- It's not just any way that the content is being expressed.
- It's whether the sentence is one of the objects that it is about.
- Once we put formulas in a model itself it's no longer obvious that this is not a semantical fact.
- (b) is usually true, but *only* if we don't allow the formulas themselves to be denoted by constants.
- In the example: $a \Leftrightarrow b$ and yet $a \neq b$.

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Is Yablo's paradox circular$_i$?

- s_0 is not only about$_i$ P_1's but also about$_i$ any x s.t. $Tr(x)$.
- So, if s_0 is among true formulas, it's circular$_i$.
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Fun facts

Fact

Aboutness$_i$ is not susceptible to Gödel-style slingshot arguments.

- *It is not preserved under substitution of coreferential terms.*
- *Say $P(b)$ and $R(c)$ are contingently true, but P and R differ in extension.*
- $(\iota x)(x = a \wedge P(b)) = (\iota x)(x = a \wedge R(c))$

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Aboutness$_i$ handles paradoxical reasonings better than Goodman's absolute aboutness (Goodman 1961). See the full paper.

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Summary and open questions

Main points:

- Leitgeb on ambiguity surrounding the paradox.
- Leitgeb's qualms pertaining to one of the notions.
- Definition of a notion that works better.
- Answers to Leitgeb's worries.

Questions:

- How to provide a stronger notion of aboutness?
  - Say we want 'all A's are B' to be about all A's only.
  - If we require EC and want the above to be the case no matter whether the sentence is true,
  - The task turns out to be quite complicated.
- Which notion of aboutness and circularity is important when we talk about paradoxes (if any)?

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