Hyperintensionality and Impossible Worlds: An Introduction

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One Guiding Idea

Intensionality :: Possible Worlds

as

Hyperintensionality :: Impossible Worlds
Extension

- The extension of a singular term is its referent
  - Extension of ‘Barack Obama’ is Barack Obama

- The extension of a general term is a class
  - Extension of ‘philosopher’ is the class of philosophers

- The extension of a predicate is a class or a property
  - Extension of ‘red’ is the class of red things, or the property of redness.

- And so on.
Extensionality

- Extensionality theses:
  - Extensional meaning: The meaning of an expression is its extension.
    - Meaning of ‘Barack Obama’ is Barack Obama
  - Extensional compositionality: The truth-value of a sentence is determined by the extensions of its parts.
    - ‘Barack Obama is George Bush’: true iff the extension of ‘Barack Obama’ is the extension of ‘George Bush’
Intensionality

- Challenges to extensionality theses:

  - Intensional Meaning: Coextensive expressions have intuitively different meanings, with different cognitive significance
    - ‘The Morning Star’, ‘The Evening Star’
    - Frege: ‘The MS is the ES’ is cognitively significant

  - Intensional Compositionality: Substituting coextensive expressions can change truth-value
    - ‘It is possible that the MS is not the ES’: true
    - ‘It is possible that the ES is not the ES’: false

- ‘It is possible that…’ is an intensional context.
Strategy 1: Intensions

- Strategy 1: Meaning isn’t an extension but an intension

- Carnap: The *intension* of an expression is a function from possible worlds to extensions
  - Intension of ‘the morning star’ picks out the morning star in all worlds

- ‘The morning star’ and ‘The evening star’ have same extension, different intension

- Truth-value of a sentence (with an intensional context) is determined by the intensions of its parts
  - ‘It is possible that the MS isn’t the ES’ is true because there’s a world where the intension of ‘the MS isn’t the ES’ is true.
Strategy 2: Structure

- Strategy 2: Appeal to internal structure in these expressions

- E.g. Russell: ‘the morning star is F’ is equivalent to ‘there exists a unique star visible in the morning and it is F’
  - Then ‘the morning star’ and ‘the evening star’ will be associated with different structures
  - The truth-value of a sentence may still be determined by the extensions of its parts.

- No need for possible worlds and intensions: structure plus extension can do the work.
Strategy 3: Denial

- Strategy 3: Deny the difference in meaning

- E.g. Kripke (for names, although not descriptions)
  - ‘Hesperus’ and ‘Phosphorus’ have the same meaning
  - ‘It is possible that Hesperus is not Phosphorus’ is false.
  - The cognitive difference is not a difference in meaning.

- So again, extension (plus structure) does the job.
Hyperintensionality

- Hyperintensional Meaning: Cointensive expressions (necessarily equivalent, same intension) have intuitively different meanings.
  - ‘Hesperus’, ‘Phosphorus’ (post-Kripke)
  - ‘77+44’, ‘121’

- Hyperintensional Composition: Substituting cointensive expressions can change truth-values
  - ‘It is a priori that H=H’ vs ‘It is a priori that H=P’
  - ‘John believes that 77+44=121’ vs ‘John believes that 121=121’

- ‘It is a priori that…’ , ‘John believes that…’ are hyperintensional contexts
Weak and Strong Hyperintensionality

- Say that two expressions are weakly cointensive if they are necessarily equivalent but not a priori equivalent
  - E.g. ‘Hesperus’ and ‘Phosphorus’ ‘Water’ and ‘H2O’

- Two expressions are strongly cointensive if they are necessarily equivalent and a priori equivalent
  - E.g. ‘77+44’ and ‘121’, ‘A or B’ and ‘not(not-A and not-B)’.

- These yield corresponding phenomena
  - weak hyperintensionality: difference in meaning/composition between weakly cointensive expressions
  - strong hyperintensionality: difference in meaning/composition between strongly cointensive expressions
Weak Hyperintensionality

- Weakly hyperintensional cognitive significance
  - ‘Hesperus = Phosphorus’ is cognitively significant
  - ‘Water = H2O’

- Weakly hyperintensional failures of intensional compositionality
  - ‘It is a priori that Hesperus is Phosphorus’
  - ‘It is a priori that water is H2O’

- ‘It is a priori that…’ is a weakly hyperintensional context (although not a strongly hyperintensional context).
Strategy 1: Impossible Worlds

- Strategy 1: Introduce “impossible” worlds where water is not H2O, where Hesperus is not Phosphorus, and so on.

- This is the strategy of “two-space” two-dimensionalism: a space of epistemically possible worlds (scenarios), and a distinct space of metaphysically possible worlds.

- ‘Water is H2O’ is true at all metaphysically possible worlds, but false at some epistemically possible worlds
  - ‘Water’ and ‘H2O’ have different *epistemic intensions*
  - ‘It is a priori that…’ operates on epistemic intensions.
Strategy 2: Find a new way of evaluating sentences at possible worlds so that ‘Water is H2O’ and ‘Hesperus is Phosphorus’ are false (under this evaluation) at some possible worlds.

This is the strategy of “one-space” two-dimensionalism: a single space of possible worlds (with or without centers), where sentences are associated with two different intensions over these worlds.

The secondary intension of ‘Water is H2O’ is true at all possible worlds, but the primary intension is false at some possible worlds.

- ‘Water’ and ‘H2O’ have different primary intensions
- ‘It is a priori that…’ operates on primary intensions.
Strategy 3: Appeal to Structure

- Strategy 3: Find some relevant difference in the internal structure of (the logical form of) ‘Hesperus’ and ‘Phosphorus’, or ‘water’ and ‘H2O’.

- E.g. the descriptivist about names:
  - ‘Hesperus’ = ‘the morning star’, ‘Phosphorus’ = ‘the evening star’
Strategy 4: Denial

- Strategy 4: Deny that there is any weak hyperintensionality of meaning (cf. direct reference theorists)

- The difference in cognitive significance between ‘Hesperus’ and ‘Phosphorus’ is not a semantic difference

- ‘It is a priori that…’ is not a weakly hyperintensional context
  - E.g. ‘It is a priori that Hesperus is Phosphorus’ is true.
Strong Hyperintensionality

- Strongly hyperintensional cognitive significance
  - ‘44+77 = 121’ is cognitively significant (although a priori)
  - ‘(A or B) iff (not(not-A and not-B))’ is cognitively significant (although a priori)

- Strongly hyperintensional failures of intensional compositionality
  - ‘John believes that 121=121’
  - ‘John believes that 44+77=121’

- N.B. Two-dimensionalism alone doesn’t help here, as a priori equivalent expressions have the same primary/epistemic intensions
  - ‘John believes that…’ is a strongly hyperintensional context.
Strategy 1: Impossible Worlds

- Natural suggestion: There are impossible worlds (or scenarios) where
  - ‘44+77=121’ is false
  - ‘(A or B) iff (not(not-A and not-B))’ is false

- Expressions can be associated with hyperintensions: functions from possible and impossible worlds to extensions.
  - ‘44+77’ and ‘121’ have the same intension, the same primary/epistemic intension, but different hyperintensions.
  - A priori truths are cognitively significant because they have nontrivial hyperintensions?
  - Strongly hyperintensional operators such as ‘John believes that’ operate on hyperintensions.

- Strongly hyperintensional cognitive significance
  - ‘44+77 = 121’ is cognitively significant (although a priori)
  - ‘(A or B) iff (not(not-A and not-B))’ is cognitively significant (although a priori)
Q: What are impossible worlds? How can we construct them?

Possible worlds: maximal compossible sets of sentences

(Ideal) epistemically possible scenarios: maximal a priori consistent sets of sentences.

How do we relax this for non-ideal epistemically possible scenarios?

See Bjerring, Brogaard/Salerno, Jago, Schaffer, …
1. Anything-Goes Worlds

- One avenue: There are no substantive constraints on impossible worlds. E.g. there are possible worlds where arbitrary contradictions are true.
  - E.g. Priest’s open worlds, which are arbitrary sets of sentences.
  - A sentence is true at an open world if it is in the set.

- Problem: The hyperintension of every sentence will be trivial
  - It will be the set of sets of sentences that contain S
  - These hyperintensions are insensitive to meaning of S
  - So they have no more structure/info than sentences
  - So hyperintensions over open worlds aren’t a useful notion of meaning
2. Nontrivial Impossible Worlds

- Another avenue: There are substantive constraints on impossible worlds. E.g. trivially false contradictions are ruled out.

- Bjerring: start with a non-normal but nontrivial modal operator
  - E.g. provable-in-n-steps (a stratified set of operators)
  - Use this to construct a space of worlds (stratified spaces of worlds)

- Problem: Depending on how the construction works, it threatens to yield either
  - too many worlds (almost-anything-goes worlds); or
  - not enough worlds (no worlds where logical truths are false)

- The worry seems to arise for most versions of nontrivial impossible worlds.

- Bjerring’s challenge: find a construction that avoids this dilemma.
Strategy 2: Find a new way of evaluating sentences at possible worlds so that ‘Water is H2O’ and ‘Hesperus is Phosphorus’ are false (under this evaluation) at some possible worlds.

- E.g. Stalnaker: the diagonal proposition of ‘Water is H2O’ is the set of worlds where ‘water is H2O’ (as uttered in that world) is true
  - False at some worlds, where language is different

- So ‘water’ and ‘H2O’ have different diagonal intensions.
Problems

- Problems for Stalnaker’s metalinguistic strategy
  - Diagonal intensions ignore meaning and have no more interesting structure than sentences
  - They treat nontrivial impossibilities and trivial impossibilities just the same.
  - They don’t seem to capture what we are entertaining when we wonder about the truth of some mathematical theorem

- Q: Any other version of a reinterpreting-possible-worlds strategy? (Schwarz?)
Strategy 3: Appeal to Structure

- Strategy 3: Find internal structure in strongly cointensive expressions: e.g. ‘44+77’ and ‘121’ have different structure
  - Represent these as structured intensions (Cresswell).

- 2D version of this strategy: sentences are associated with structured primary intensions (or: enriched intensions)
  - E.g. ‘Hesperus is Hesperus’, ‘Hesperus is Phosphorus’: same structure, different basic intensions
  - ‘44+77’, ‘121’: different structures

- One can argue that something like these structured intensions yield an adequate treatment of attitude ascriptions and other strongly hyperintensional contexts.
Problem

Problem: This will only work if there are no pairs of *simple* expressions with the same (primary) intension but cognitive/compositional differences.

- If there are, then structure won’t help.

Are there? Not obvious.

- Maybe the best case involve fiction/legend names with primary intensions that have no referent at any scenario.

Also: Even if this works, it would be very nice to have impossible worlds for various explanatory purposes, e.g. the analysis of epistemic possibility.
Strategy 4: Denial

- Strategy 4: Denial of strong hyperintensionality
  - Strongly hyperintensional differences in cognitive significance are psychological differences, not semantic differences
  - There are no strongly hyperintensional contexts (so ‘Lois knows that Superman is Clark Kent’ is true).
Strategy 5: Inferentialism

- Strategy 5: There is a semantic difference between strongly cointensive expressions, but this isn’t best represented using intensions and extensions.

- Instead, it’s a difference in inferential role (Restall)
Strategy 6: There is a difference between strongly cointensive expressions, but this isn’t best represented using intensions and extensions.

Instead, it’s a difference in “properties of expressions” (Bigelow)
Other Perspectives

- One can also approach these issues from the perspective of

  - Modal logic (Kripke-style semantics for non-normal modal operators)
  - Epistemology and epistemic logic (Hintikka-style analysis of non-ideal epistemic possibility)
  - Philosophy of mind/cognition (making sense of rational processes in non-ideal agents)
  - Metaphysics (analyzing the coherence and nature of impossible worlds)
Onward

- Onward into the impossible…