An attention-based explanation for some exhaustivity operators

Matthijs Westera

Institute for Logic, Language and Computation
University of Amsterdam

Sinn & Bedeutung, Edinburgh, September 2016

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  - it (partially) generates existing exhaustivity operators.

An attention-based explanation for some exhaustivity operators

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Outline

1. Problems for the standard recipe
2. Formal, attention-based account
3. Deriving exhaustivity operators

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(*Alternative:* Hurford's constraint and local exh.

- Hurford 1974; Katzir & Singh 2013.)

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Alternative, equivalent formulation of I-Quantity:

$$\text{I-Quantity}(\mathcal{Q}, p) = \forall q \left((\mathcal{Q}(q) \wedge p \not\subseteq q) \rightarrow \neg \Box^{\vee} q \right)$$

2.2. Warming-up: information-maxims

I-maxims: For an informational intent p and a QUD $\mathcal{Q}$:

$$\text{I-Quality}(p) = \Box^{\vee} p$$

$$\text{I-Relation}(\mathcal{Q}, p) = \mathcal{Q}(p)$$

$$\text{I-Quantity}(\mathcal{Q}, p) = \forall q \left(\begin{pmatrix} \text{I-Quality}(q) \wedge \\ \text{I-Relation}(\mathcal{Q}, q) \end{pmatrix} \rightarrow (p \subseteq q) \right)$$

Alternative, equivalent formulation of I-Quantity:

$$\text{I-Quantity}(\mathcal{Q}, p) = \forall q \left((\mathcal{Q}(q) \wedge p \not\subseteq q) \rightarrow \neg \Box^{\vee} q \right)$$

- The starting point for the standard recipe.

2.3. Attention maxims

A-maxims: For an attentional intent $\mathcal{A}$ and a QUD $\mathcal{Q}$:

A-Quality($\mathcal{A}$)

A-Relation($\mathcal{Q}, \mathcal{A}$)

A-Quantity($\mathcal{Q}, \mathcal{A}$)

2.3. Attention maxims

A-maxims: For an attentional intent $\mathcal{A}$ and a QUD $\mathcal{Q}$:

A-Quality($\mathcal{A}$) $= \forall a\, (\mathcal{A}(a) \rightarrow \Diamond^{\vee} a)$ *(first attempt)*

A-Relation($\mathcal{Q}, \mathcal{A}$)

A-Quantity($\mathcal{Q}, \mathcal{A}$)

2.3. Attention maxims

A-maxims: For an attentional intent $\mathcal{A}$ and a $\textsc{Qud}$ $\mathcal{Q}$:

A-Quality$(\mathcal{A}) = \forall a\, (\mathcal{A}(a) \rightarrow \Diamond^{\vee} a)$ *(first attempt)*

A-Relation$(\mathcal{Q}, \mathcal{A}) = \forall a (\mathcal{A}(a) \rightarrow \mathcal{Q}(a))$

A-Quantity$(\mathcal{Q}, \mathcal{A})$

2.3. Attention maxims

A-maxims: For an attentional intent $\mathcal{A}$ and a $\textsc{Qud}$ $\mathcal{Q}$:

$$\text{A-Quality}(\mathcal{A}) = \forall a\,(\mathcal{A}(a) \rightarrow \Diamond^{\vee} a) \qquad \textit{(first attempt)}$$

$$\text{A-Relation}(\mathcal{Q}, \mathcal{A}) = \forall a(\mathcal{A}(a) \rightarrow \mathcal{Q}(a))$$

$$\text{A-Quantity}(\mathcal{Q}, \mathcal{A}) = \forall a\left(\begin{pmatrix} \text{A-Quality}(\{a\}) \wedge \\ \text{A-Relation}(\mathcal{Q}, \{a\}) \end{pmatrix} \rightarrow \mathcal{A}(a)\right)$$

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Alternative, equivalent formulation of A-Quantity:

$$\text{A-Quantity}(\mathcal{Q}, \mathcal{A}) = \forall a\,((\mathcal{Q}(a) \wedge \neg\mathcal{A}(a)) \rightarrow \neg\Diamond^{\vee} a)$$

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Not quite right, e.g.:

(2) Who (of John, Mary and Bill) was at the party?

c. John, or everyone. *(Exh.: if Mary/Bill, then everyone.)*

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$$\text{A-Quality}(\mathcal{A}) = \forall a\,(\mathcal{A}(a) \to \Diamond({}^{\vee}a \wedge \forall b\,((\mathcal{Q}(b) \wedge b \subset a) \to \neg{}^{\vee}b)))$$

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$$\text{A-Quantity}(\mathcal{Q}, \mathcal{A}) = \forall a\begin{pmatrix} (\mathcal{Q}(a) \wedge \neg\mathcal{A}(a)) \rightarrow \\ \Box\left(\quad \neg{}^{\vee}a \quad \right) \end{pmatrix}$$

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Better:

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Let $\mathcal{Q} = \{{}^\wedge Pj, {}^\wedge Pm, {}^\wedge Pb, \ldots\}$ (closed under intersection)

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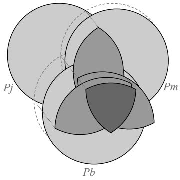

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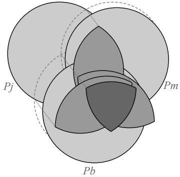
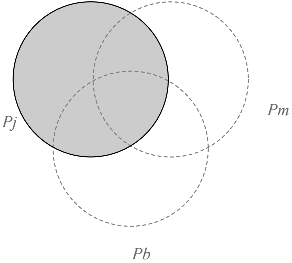
Let $\mathcal{Q} = \{{}^\wedge Pj, {}^\wedge Pm, {}^\wedge Pb, \ldots\}$ (closed under intersection), and:

- (2a): $\mathcal{A} = \{{}^\wedge Pj\}$;





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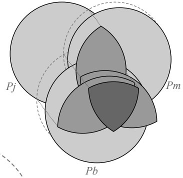

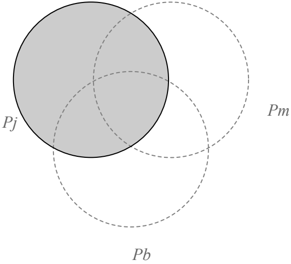

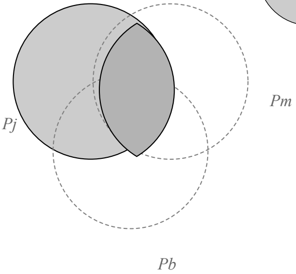

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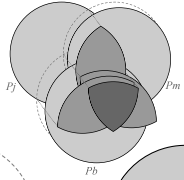

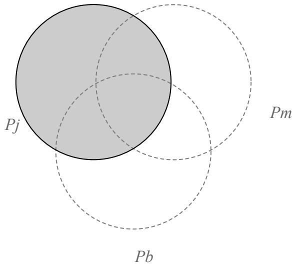

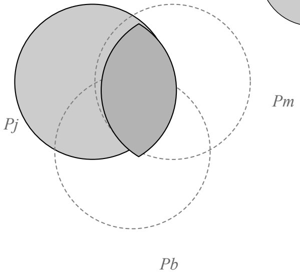

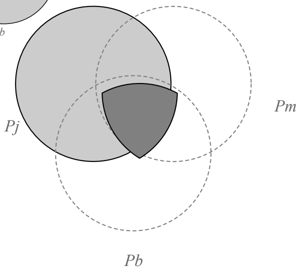

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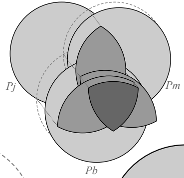

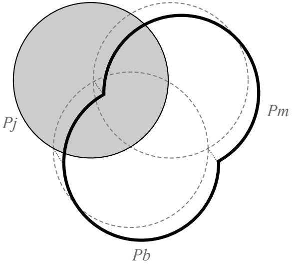

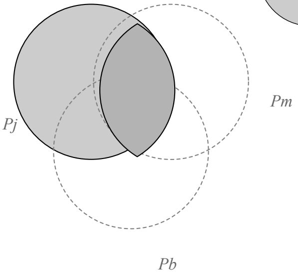

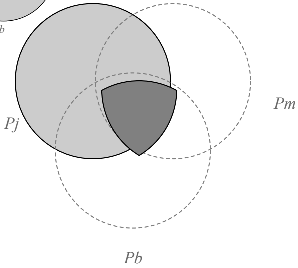

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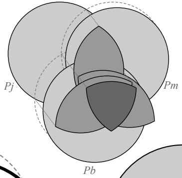

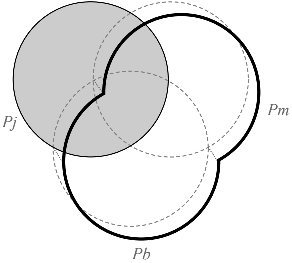

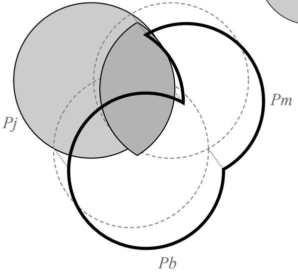

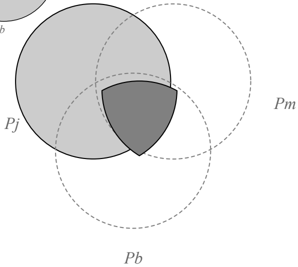

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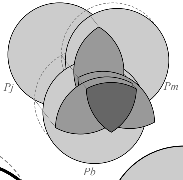

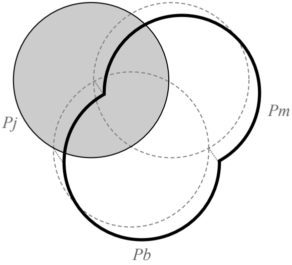

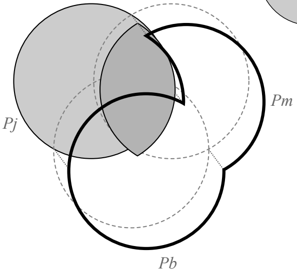

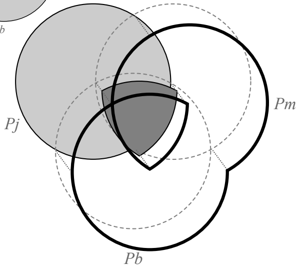

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Fact: For all admissible models **M** that interpret $\mathcal{Q}$, $\mathcal{A}$ as above:

- (2a): $\mathbf{M} \models \text{A-Quantity}(\mathcal{Q}, \mathcal{A}) = (\Box\neg Pm \wedge \Box\neg Pb)$
- (2b):
- (2c):

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Let $\mathcal{Q} = \{{}^\wedge Pj, {}^\wedge Pm, {}^\wedge Pb, \ldots\}$ (closed under intersection)

- (2a): $\mathcal{A} = \{{}^\wedge Pj\}$;
- (2b): $\mathcal{A} = \{{}^\wedge Pj, {}^\wedge(Pj \wedge Pm)\}$;
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Fact: For all admissible models **M** that interpret $\mathcal{Q}$, $\mathcal{A}$ as above:

- (2a): $\mathbf{M} \models \text{A-Quantity}(\mathcal{Q}, \mathcal{A}) = (\Box\neg Pm \wedge \Box\neg Pb)$
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2.4. Illustration of A-maxims

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1. Problems for the standard recipe

2. Formal, attention-based account

3. Deriving exhaustivity operators

Conclusion

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$$\text{A-Quantity}(\mathcal{Q},\mathcal{A}) = \forall a \begin{pmatrix} (\mathcal{Q}(a) \wedge \neg\mathcal{A}(a)) \rightarrow \\ \Box\begin{pmatrix} \neg{}^{\vee}a \vee \\ \exists b(\mathcal{A}(b) \wedge (b \subset a) \wedge {}^{\vee}b) \end{pmatrix} \end{pmatrix}$$

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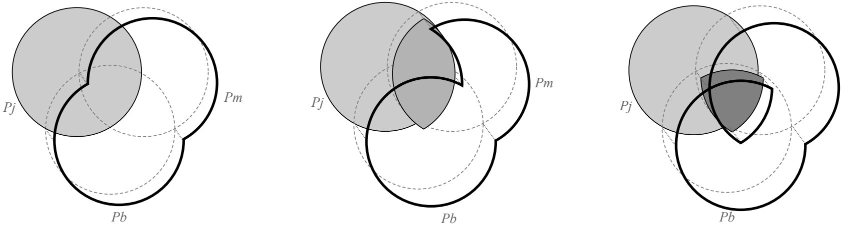

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Alternative, equivalent definition:

$$\text{Exh}(\mathcal{Q},\mathcal{A}) = \bigcap_{\substack{a\in\mathcal{Q} \\ a\notin\mathcal{A}}} (\overline{a} \cup \bigcup_{\substack{b\in\mathcal{A} \\ b\subset a}} b)$$

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The basic idea (Van Rooij & Schulz 2006; Spector 2007):

- remove all worlds from the informational intent...
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- my account makes very different predictions (e.g., problems A.-D.).

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But again: empirically our accounts make very different predictions.

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- if these assumptions are unwarranted:
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  - and existing operators remain unexplained.

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- exhaustivity derives from A-Quantity:
  - "intend to draw attention to all relevant propositions that you consider possible independently of anything stronger to which you intend to draw attention."
- the predicted implications are technically similar to the patterns described by (some) existing operators.

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