Towards an ontology of religious and spiritual belief

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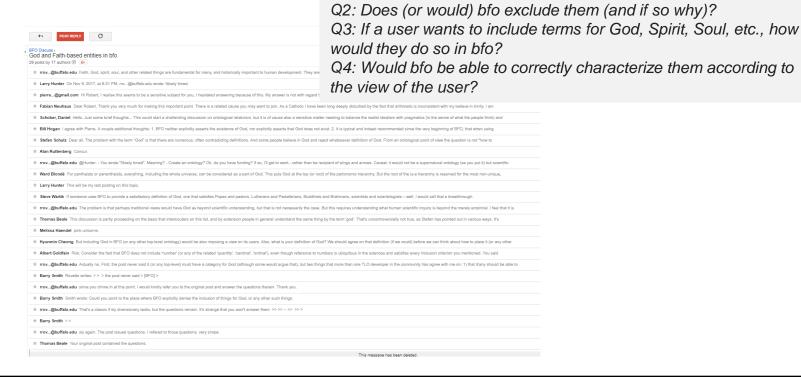[a] University of Rostock, Germany
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Motivation of this work

- Discussion on BFO list 11/17

Robert Rovetto:
Q1: Would bfo be inclusive of God, Soul, Spirit, etc.?
Q2: Does (or would) bfo exclude them (and if so why)?
Q3: If a user wants to include terms for God, Spirit, Soul, etc., how would they do so in bfo?
Q4: Would bfo be able to correctly characterize them according to the view of the user?

Motivation of this work

- Discussion on BFO list 11/17

- Relevance of faith-related concepts in human culture

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Q4: Would bfo be able to correctly characterize them according to the view of the user?

- Impact on well-being, health, social behaviour

- Interest in developing a framework for ***terms of controversial reference*** in a realist ontology[1,2], using a simple logic (OWL-DL)

- If this can be shown for religion / spirituality: blueprint for other domains: fiction, law, history, philosophy

- Preliminary work

[1] Schulz, S; Brochhausen, M; Hoehndorf, R. Higgs Bosons, Mars Missions, and Unicorn Delusions: How to Deal with Terms of Dubious Reference in Scientific Ontologies. Proceedings of the 2nd International Conference on Biomedical Ontology. 2011; CEUR-WS(833):183-190.-ICBO 2011 - 2nd International Conference on Biomedical Ontology.
[2] Schulz, S; Martínez-Costa, C; Karlsson, D; Cornet, R; Brochhausen, M; Rector, A. An Ontological Analysis of Reference in Health Record Statements. Proceedings of the 8th International Conference on Formal Ontology in Information Systems . 2014; 267: -8th International Conference on Formal Ontology in Information Systems (FOIS); Sept 22-25, 2014; Rio de Janeiro, Brazil.

Entities in religious / spiritual discourse

	Uncontested	Contentious
Concepts / Repeatables	Religious ceremonies Worshipping Religious beliefs Religious narratives Atheists, Priests, Shamans	Deities, angels, devils, elfs Souls, Spirits Holiness, Enlightenment Immortality Miracles Reincarnations
Individuals	Muhammad, St. Paul Martin Luther Pope Francis Herod's Temple Bible, Quran, Talmud, "Abraham", "Ibrahim"	Abraham Noah Holy Trinity Heaven, Hell, Purgatory Nirvana The final judgement

Reference without existence

- Ontology pattern[1] of denotation by information content entities (ICE):

  DL: ICE_A equivalentTo *ICE* and **represents_k** only *A*

  FOL: ∀x (*ICE_A* (x) ↔ *ICE* (x) ∧ y (**represents_k** (x,y) → A (*y*))

[1] Schulz, S; Martínez-Costa, C; Karlsson, D; Cornet, R; Brochhausen, M; Rector, A. An Ontological Analysis of Reference in Health Record Statements. Proceedings of the 8th International Conference on Formal Ontology in Information Systems . 2014; 267: -8th International Conference on Formal Ontology in Information Systems (FOIS); Sept 22-25, 2014; Rio de Janeiro, Brazil.

Reference without particular referents

- Ontology pattern[1] of denotation by information content entities (ICE):

  DL: ICE_A equivalentTo *ICE* and **represents_k** only *A*

  FOL: $\forall x$ (*ICE_A* (x) $\leftrightarrow$ *ICE* (x) $\wedge$ y (**represents_k** (x,y) $\rightarrow$ A (*y*))

- Example:

  CancerDiagnosis equivalentTo *Diagnosis* and
       'represents health condition' only *Cancer*

  CancerDiagnosis equivalentTo *Diagnosis* and
       btl2:represents only (*Cancer* or not *HealthCondition*)

[1] Schulz, S; Martínez-Costa, C; Karlsson, D; Cornet, R; Brochhausen, M; Rector, A. An Ontological Analysis of Reference in Health Record Statements. Proceedings of the 8th International Conference on Formal Ontology in Information Systems . 2014; 267: -8th International Conference on Formal Ontology in Information Systems (FOIS); Sept 22-25, 2014; Rio de Janeiro, Brazil.

Challenges

- Representing (possibly) non-denoting concepts
  - Logical expressions that extend to defined classes (may be empty), without violation of logical constraints:
- Elements of narratives
  - Individual characters: information entities that extend to classes that may have one or zero members
- Representing beliefs
  - Beliefs as dispositions [1]
  - Beliefs having a propositional content

Examples using the btl2 domain upper ontology (could be others)

[1] A. Barton. Towards an ontology of beliefs. JOWO 2018

Representing (possibly) non-denoting concepts

- *Creation* equivalentTo *btl2:process* and
  '**btl2:is realization of'** some *btl2:plan* and
  '**btl2:has outcome'** some *btl2:universe*

- *'Immortal soul'* equivalentTo *'btl2:immaterial entity'* and
  '**btl2:at some time'** some
  ('**btl2:is part of'** some *'Human body'*) and
  '**btl2:is agent in'** some *'Intellectual process'* and
  not ('**btl2:is bearer of'** some
  (*btl2:disposition* and '**btl2:has realization'** some *Dying*))

Elements of narratives

- '**btl2:is part of**' (**AbrahamCharacter**, **TheBookGenesis**)

- *AbrahamHuman* EquivalentTo *Human* and
  '**btl2:is represented by**' value **AbrahamCharacter**

- **AbrahamCharacter** Type *Character* and **btl2:represents** only
  (*Human* and ('**btl2:is bearer of**' some *MaleQuality*) and
  ('**btl2:is agent in**' some *Marrying*))

- *Ascribing* subclassOf *btl2:process* and
  ('**btl2:is part of**' some *Narrating*) and
  ('**btl2:has agent**' some ('btl2:is bearer of' some *AuthorRole*)) and
  ('**btl2:has patient**' some *Character*) and
  ('**btl2:has outcome**' only *P*)

Conceptualizing deities

- '**btl2:is part of**' (**YahwehCharacter**, **TheBookGenesis**)
  '**btl2:is part of**' (**AllahCharacter**, **Quran**)
  (…)

- '*God character*' = {**YahwehCharacter**, **AllahCharacter**, **ZeusCharacter**,…}
  Deity EquivalentTo *bfo:Continuant* and
       '**btl2:is represented by**' some '*God character*'

- '*Deist God character*' equivalentTo '*God character*' and
     btl2:represents only
       ('**btl2:is agent in**' some
         ((*Creating* and '**btl2:has outcome**' some *btl2:universe*) or
           not '*Causal intervention*'))

Conceptualizing belief and believers

- *'Belief B'* subclassOf *'Belief disposition'* and
  *'**btl2:inheres in**'* some (*'**btl2:is bearer of**'* some
  (*'Belief proposition'* and **btl2:represents** only *B*))

- *'Belief proposition that souls exist'* equivalentTo *'Belief proposition'* and
  (**btl2:represents** only *Soul*)

- *Deist* equivalentTo *Human* and '**btl2:is bearer of**' some
  (*'Belief proposition'* and
  (**btl2:represents** only
  (*'**btl2:is represented by**'* some *'Deist god character'*)))

Open issues

- Deities that are material objects (e.g. Sun), qualities, …
    - Impact on foundational ontologies

- Representing other flavours of mental representations
    - Disbelief: not believing =/= believing that not
      (Negation: belief in holy cats implies belief in holy animals;
      disbelief in holy animals implies disbelief in holy cats)
    - Hoping, expecting, considering, hypothesising,…

- Representing propositional content as filler of universally quantified roles:
    - Representational "trick"
    - Need for higher order logics ?

Outlook

- Use cases for ontologies of beliefs / religious entities?
- Beliefs may imply risks
    - Non-compliance with medical advice due to belief in destiny
    - Omission of reasonable decisions due to belief in astrology
- Related areas (cf. Keynote Peter Simons), requiring the representation of propositional content
    - Law: disagreements, e.g. Conflicting witness statements,
    - Statements of policy, opinion
    - Compliance with plans / regulations
    - Psychiatry
    - Fiction

- **Thank you for your attention**

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- BioTop ontologies: http://biotopontology.github.io/

- Prototype Ontology of Religious and Spiritual Belief: http://purl.org/biotop/orsb.owl

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