Thematic Roles: Conceptual Structures vs. Cyc

Tom O'Hara

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Introduction

- Thematic role overview
- Roles in Conceptual Structures (CS)
- Roles in Cyc
- Comparison

Thematic Roles

- ◆ Action verb representation (Davidson 1967)
- ◆ Relates events & participants

  Brutus$_{agent}$ stabbed Caesar$_{patient}$ with a knife$_{instrument}$
- ◆ Semantic correlates of syntactic roles

Syntactic	*Semantic*
subject	agent
direct object	patient
indirect object	benefactive
prepositional objects	instrument, location, source

Roles suggested in linguistic work

◆ Fillmore's (1968) roles

agentive	typically animate perceived instigator
instrumental	inanimate force or object causally involved
dative	animate being affected by the action
factitive	object or being resulting from the action
locative	location or spatial orientation of the action
objective	other entities involved in the action

◆ Frawley's (1992) roles

logical actors: agent, author, and instrument

logical recipients: patient, experiencer, and benefactive

spatial roles: theme, source, and goal

non-participant roles: locative, reason, and purpose

◆ No consensus on definitions (Lehmann 1996)

Representing Thematic Roles

◆ implicit representation

CS: [Person:Brutus] -> (STAB) -> [Person:Caesar]

Cyc: (stab Brutus Caesar)

◆ explicit representation

CS: [Person:Brutus] -> (AGNT) <- [Stab:Stabbing1] ->
(PTNT) -> [Person:Caesar)

Cyc: (and (performedby Stabbing1 Brutus)
(victim Stabbing1 Caesar))

◆ note: equivalent except for specificity

Roles from *Conceptual Structures*

◆ Sowa's (1984) *Conceptual Structures* text

◆ Two dozen or so thematic relations

- action-specific

  agent (AGNT)   destination (DEST) initiator (INIT)
  material (MATR)   object (OBJ)   recipient (RCPT)

- other

  instrument (INST) location(LOC)   point-in-time (PTIM)

◆ 37 conceptual relations in all
   See sowa-conceptual-relations.html

Sowa's updated roles

- Sowa's (1999) *Knowledge Representation* text
- 19 thematic roles
  - See sowa-thematic-roles.html
- Decompositional approach
  - Better hierarchical structuring
  - Four broad categories
    intiator, resource, goal, essence
    based on Aristotle's four causes (*aitia*)
  - Six categories for verbs
    action, process, transfer, spatial, temporal, ambient

Thematic Roles in Cyc

- Upper Cyc Ontology (1997)
- 100+ thematic roles
  - See cyc-thematic-roles.html
- Wide range of role types
  - generic roles
    - beneficiary   performedBy   objectActedOn
  - commonly occurring participation types
    - exchangers   mediators   victims
  - situation-specific roles
    - catalyst   communicationToken   wasteProducts

Comparison between CS and Cyc

- ◆ Conceptual Structures
  - ■ +   more standard set
  - ■ -   less hierarchical structure
  - ■ -   Aristotlean decomposition unnatural
- ◆ Cyc
  - ■ +   finer granularity for more precision
  - ■ -   some roles overly-specific
  - ■ -   underlying KB still proprietary

References

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