User Interface Design Considerations for Linked Data Authoring Environments

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OKM demo

http://rosemary.umw.edu:36681/okm

Experiment

- 71 UMW students

- Four groups:
  - Statements only without Template (S)
  - Statements & Attributes without Template (SA)
  - Statements only with template (ST)
  - Statements & Attributes with Template (SAT)

Specific Hypotheses

- Deciding between attributes and statements is challenging for novice users

- Templates will increase novice users' ability to correctly and consistently formulate RDF data

- Users will express n-ary relations using predicate modifiers over predicate reification

Liabilities of Attributes

category	# of items	% attributes
common nouns	5	27. 10%
date	3	56.50%
numeric	7	74.30%
proper nouns	14	16.20%
year	1	20.70%

Consistency of the attributes versus statements choice among various types of data

Impact of attributes on correctness

	total	incorrect	correct	% correct
SAT	432	96	336	77.78%
ST	432	79	353	81.71%
p = . 18				

Benefits of Roles

- Allows for templates
  - do not increase correctness
  - in some cases, increase consistency (but not always, traps can mislead)

- Presumed advantages of roles:
  - grayed-out predicates
  - more consistency of predicate choice
  - resulting data is richer
  - automatically saves domain and range predicates

	ST		*S*		
	Predicate Used:				
Item	Existing	New	Existing	New	P-Value
J	7	11	0	19	0.0031
K	10	8	0	19	0.0001
L	15	3	4	15	0.0002
P	1	17	0	19	0.4865
W	5	13	1	18	0.0897
X	3	15	0	19	0.1050
(Traps:)					
C	18	0	19	0	1.0000
O	12	6	19	0	0.0080
V	17	1	19	0	0.4865

Predicate Reification vs Predicate Modifiers

71 participants each attempted 5 items involving n-ary relations (355 total items)

example:

John Entwistle played bass on the song "Behind Blue Eyes."

Predicate Reification		Predicate Modifiers	
0 of 355	0.00%	201 of 355	56.62%

Conclusions

predicate modifiers are more intuitive

■ ■ ■

roles have certain advantages

(although benefits of template functionality are mixed)

■ ■ ■

literals are very difficult for people to use correctly, and they can generate data just as correctly without them

Correctness & Consistency of Roles

Object Already had Reasonable Role			
Item	% Correct	# of Roles	D
D	98.51%	4	0.19
E	76.81%	3	0.36
H	95.59%	4	0.17
K	94.37%	4	0.13
M	100.00%	1	0.00
N	88.57%	16	0.65
P	98.53%	3	0.31
S	75.71%	16	0.67
T	88.73%	6	0.72
U	95.59%	4	0.53
V	98.55%	3	0.18
W	97.06%	3	0.06
X	98.57%	4	0.08
Average	92.81%	5	0.31

User Forced to Add Role			
Item	% Correct	# of Roles	D
F	44.93%	4	0.53
G	69.23%	6	0.48
J	89.55%	6	0.58
K	92.31%	6	0.42
L	66.20%	9	0.53
O	75.36%	13	0.47
Q	77.14%	9	0.43
R	71.83%	4	0.53
Average	73.32%	7	0.50

Experiment #1 Results

predicate reification
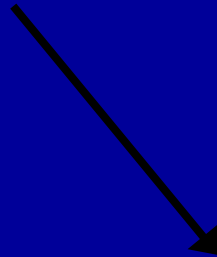
- textual
  - 8% (Sentence 3)
  - 0% (Sentence 4)

predicate modifiers

- textual
  - 82% (Sentence 3)
  - 59% (Sentence 4)

Chi-squared test where p < .001

Predicate Modifiers
to
Predicate Reification

subject primaryPredicate primaryObject
   predicate1 object1
   predicate2 object2

relation **nary:subject** *subject*
relation **nary:predicate** *primaryPredicate*
relation **nary:object** *primaryObject*
relation *predicate1 object1*
relation   *predicate2 object2*

Items for Template Predicate Usage

J. David Beckham scored 27 goals.

K. Peyton Manning passed for 206 yards, while Brett Favre threw for 315.

L. Deion Sanders has stolen 35 bases.

P. The song "Stairway to Heaven" featured Jimmy Page on guitar.

W. John Entwistle played bass on the song "Behind Blue Eyes."

X. Paul McCartney wrote the song "Maybe I'm Amazed."

Traps:

C. Eric Clapton auditioned for the Rolling Stones.

O. "The Matrix"'s gross earnings were $90 million.

V. Sydney Pollack produced the movie "Cold Mountain."

Experiment #1

- 86 UMW students

- Four Parts
  - Part 1: constructing binary relations
  - Part 2: n-ary "bomb"
  - Part 3: examples with n-ary relations
  - Part 4: n-ary test

- 2x2 factorial design   (between-subjects)
  - textual vs. visual
  - predicate reification vs. predicate modifiers

Predicate Reification after Examples

Sentence 3

Beyoncé won an MTV Video Music Award for Best Female Video
in 2003 for her video "Crazy in Love."

Sentence 4

On Sept. 23rd, 2009, Joe Williams bought a paperback copy of *Harry Potter*
on amazon.com with his Visa card (card number 1234567812345678).