

Position Paper: Relaxing the Basic KR&R Principles to Meet the Emergent Semantic Web

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Outline

- 1 Problem Statement
- 2 Considering an Alternative Path
- 3 Stepping on the Path



From Traditional KR&R to the Semantic Web

At the core of all well-founded belief, lies belief that is unfounded. Ludwig Wittgenstein

- within the **traditional AI**, KR&R has been largely an **analytical** and **computational** endeavour
- works fine in **closed** and **neat** environments, the **web** is not one of these, though
- **novel KR&R approaches** have been proposed, apt for tackling the **inherent features** of the **web environment** (**uncertainty, noisiness, incompleteness, dynamics**, etc.)
- however, these approaches mostly **extend** and **patch** the traditional KR&R groundwork to **cover** (also) the web, instead of genuinely **tailoring** the solution to its **very nature**
- the question is: does this approach truly fit the **relaxed web principles**, or does it rather resemble the **XANADU awkward striving** for rigorous perfection?



Empirical, Relaxed, Similarity-Based KR&R

Nothing is true, everything is permitted. William S. Burroughs (originally Hassan i Sabbah)

- the **web** is absolutely **open** and very **sloppy** (by design, not accidentally!); one of the most **prominent tasks** the upcoming Semantic Web should facilitate is **data integration**
- we suggest the following features of an **alternative KR&R approach** tailored to the above **generic premises**:
 - ① **empirical** nature – **everything shall be allowed** to a degree once it is supported by an **empirical evidence**
 - ② **relaxed** KR principles – the **knowledge representation** shall be **as simple as possible** to fit the **favourable sloppiness** and **grass-roots** nature of the web
 - ③ **similarity-based** reasoning – any inference service shall be based on a **simple**, yet **well-founded** soft **analogical unification** of KR entities



An Initial Prototype

Our real discoveries come from chaos, from going to the place that looks wrong and stupid and foolish. Chuck Palahniuk

● prototype **features**:

- native simple **knowledge extraction pipeline**, support for **homonymy**, **synonymy** and heuristic positive or negative **uncertainty** essential to the KR design
- **storage** of the **rudimentary KR entities** as elements of an ordered set of **metric spaces**, inference services (e.g., analogical extension or variable instantiation) building on the respective **distance notion**
- empirical **updates** and **aggregation** based on **OWA operators**
- support for uncertain conjunctive **rules** and **queries** (with negation)

● **examples**:

- query – `?X : type : disease & ?X : diagnosed by : ?Y & ?Y : type : radiology method & ¬ ?Y : type0.75 : 2D imaging & ?Y : uses0.8 : X-ray`
- answer (`?X`) – `brain tumor : type : disease`
- answer (`?Y`) – `CT : type : radiology method`

