

Semantics in Social Spaces

A Cognitive Perspective

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Agenda

What are semantics in social spaces?
What do they have to do with cognition?
How do we extract them?

Uh huh... Okay...

“Social space”

“Semantics”, or “meaning”

“Cognitive”

So what is a social space?

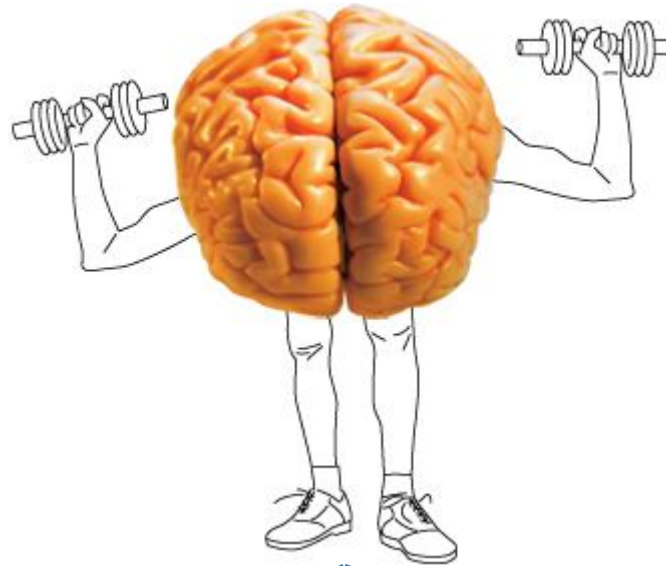
Blog posts, wiki pages, discussion
forum posts, Twitter conversations

What is common to these?

#1. Content is created by humans
in a “non-arbitrary” fashion

How is content created then?

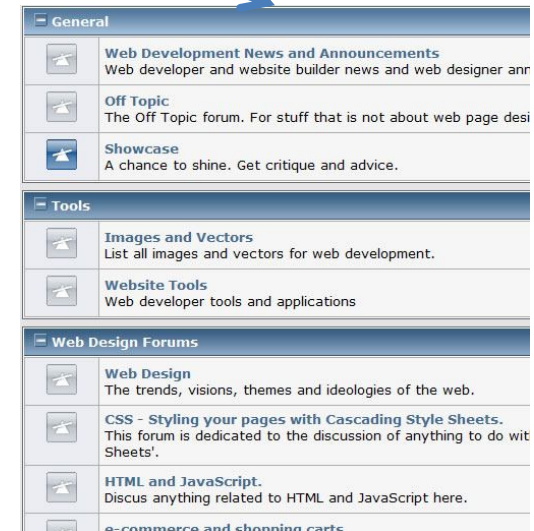
Cognitive Processes (CPs)



Opinion

Debate

Argumentation



#2. There is social interaction

Comments to blog posts, collaborative editing of wikis, replies to forum posts

Interaction between cognitive processes

Social Interaction between Cognitive Processes

So what do cognitive processes do?

They embed **individual world-views** into
the social space (or into the text)

**Kobbari Mithai with ice-cream tastes
great; Galaxy S3 is a smart phone**

Duh... you were supposed to talk
about semantics!

The individual world-views contain
semantic associations

**A tastes great with B; C is a D; X is an
attribute of Y**

So these are semantics?

But these are **individual** world-views,
remember?

**Semantics should be applicable across
the population!**

So, let's define *semantics*, shall we?

Semantics are nothing but the **shared world-view** of the population

Does the population at large think that the "**Galaxy S3**" is a "**smart phone**"?

Let's just get this out of the way...

A semantic association is

<concept> <association type> <concept>

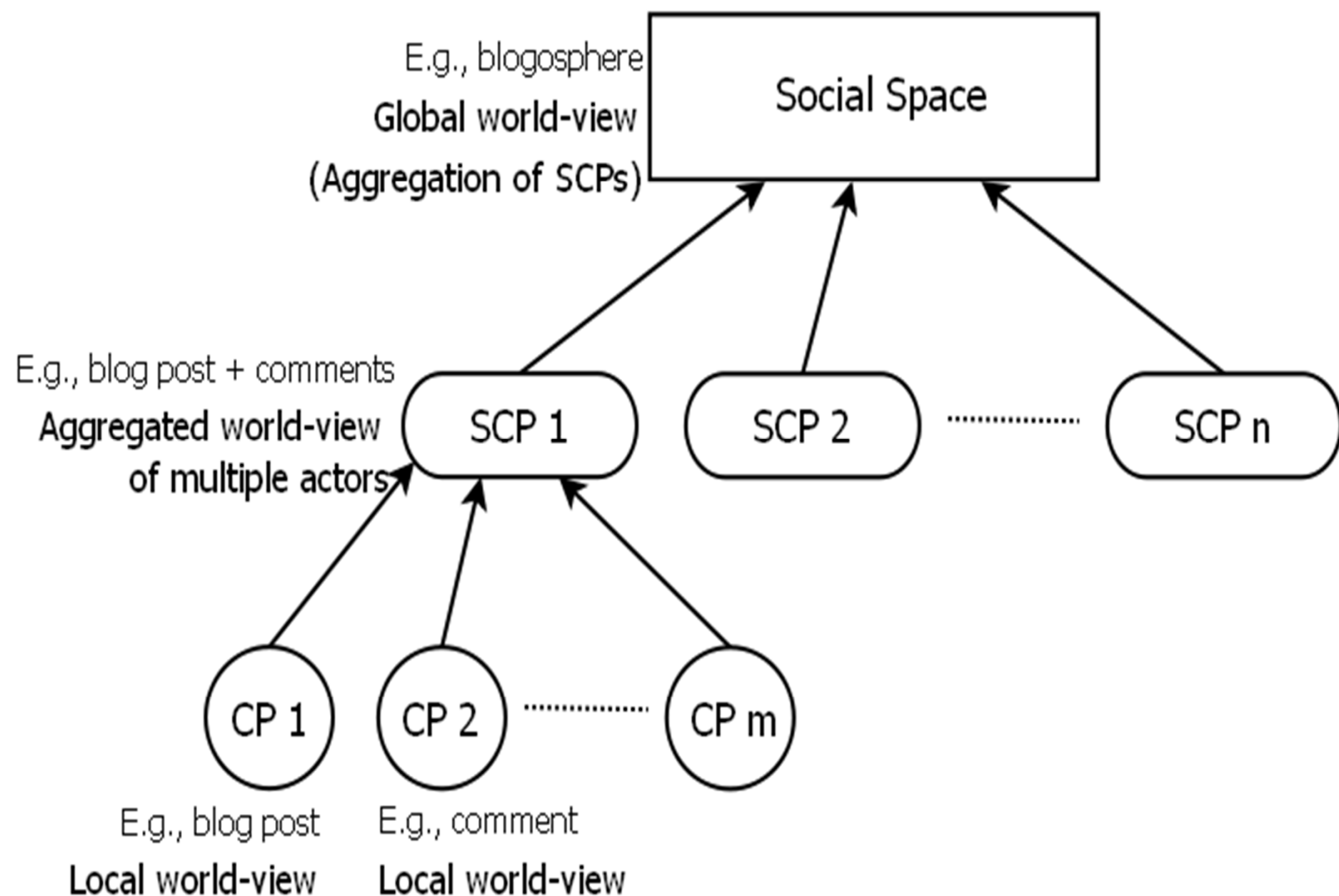
So what gives rise to these shared world-views, again?

These are aggregate structures, right?

Emergent, owing to **interaction between CPs**

A larger process, then...

Socio-cognitive Processes (SCPs)



Socio-cognitive Process!

How do we extract these semantics?

They were embedded in the social space by
cognitive activities, right?

So, isn't a **cognitive approach** the most
natural for **extracting** them too, then?

Why not, say, machine learning?

They can extract semantics, but can't explain
how they came to be

A cognitive approach could!

So, how then?

With a methodology that can mimic
human cognition (to a degree)

Let's see...

"There is a *lala* in my kitchen. In the morning, I made some tea in the *lala*. The *lala* is made of very high quality stainless steel. The *lala* has a volume of 2.5 ltrs."

What does "lala" mean?

Why did you conclude so?

**Due to the way it co-occurs with the other
concepts within the same context**

Basis for **co-occurrence analysis**

Cognitive Science
and
Ordinary Language Philosophy

Hebbian Theory of Cognition

**Semantic memory is formed when concepts
are co-activated in the brain**

“Cells that fire together, wire together”

Who else comes to mind when
you think of...



What comes to mind...



What comes to mind...



It's not just about visual impact

**Works even when you just think of
something**

The “lala” example!

What comes to mind...

Hiroshima

Nagasaki

Since the brain mostly “reads” **Nagasaki**
in the **same context** as **Hiroshima...**

Those two concepts eventually get “wired”
together

Co-activation of co-occurring concepts

Ordinary Language Philosophy

“Meaning is usage” –Ludwig Wittgenstein’s theory

So, co-occurrence lends meaning to
concepts...

We argue: it also lends meaning to concepts
w.r.t. their associations with other concepts

“describe” and “elucidate”...

...are **synonyms**

“Lalbagh” ...

is an **attribute** of “Bangalore”

Some co-occurrence based
hypotheses for these associations

a is a synonym of ***b*** if

They co-occur with a low probability

Their co-occurrence neighborhoods are similar

They have similar attributes (again, co-occ based)

A is a set of attributes of **b** if

A and b co-occur with high probability

A maximizes the probability of guessing b

(Akin to the 20-Questions game)

(Computing such a set, A , is NP-Hard)

More work in this area at OSL, IIIT-B

Co-occurrence hypotheses for semantic associations

Experimental analysis of hypotheses

Cognitive models for explaining semantics

This work is based on

MR Mutalikdesai, *Semantics Extraction in
Information Spaces using Co-occurrence Analysis*,
PhD Thesis Draft, Submitted to IIIT-Bangalore, 2012

In collaboration with

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Thank you!

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