THE QUANTUM OF NLP
Cognitive Metaphor as a Mind Discovering Device

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Abstract: Our research has been established on the comparative findings from cognitive and computational linguistics, philosophical and phenomenological mind's theories, modern physics discoveries and the natural language semantics dealing with meanings on the quantum level, which is pilot research mentioned as "The Elegant Mind" project. This project was created for implementing in artificial intelligence metaphoric reasoning algorithms. We have been particularly studied expressions describing a realm of mind in Czech and English. The data has been acquired by online Free Association Experiment (FEA) to visualize the latent connection between particular states of mind. A multilingual mind semantic dependency networks founded on the knowledge based system of authentic association data has been generated by Gephi dynamic graphs.

1 INTRODUCTION

The Elegant Mind Project (EMP) is knowledge representation research that uses Free Associations Test data to create a semantic network of Inner Self (Mind) from associations to a unique list of cognitive metaphor stimuli. EMP is a fundamentally new resource of deep semantic knowledge, a platform for mind study and optimizing the human communication process with electronic resource.

Two main methodologies are combined in this project: Free Association Test (C.G. Jung) and Cognitive Metaphor Theory of Inner Self (Lakoff, 1980, 1999). This paper proposed an NLP method representing cognitive dimension of mind based on the psychoanalytic methodology of Free Association Test. In the research, we conducted Free Association Experiment (FAE), giving us access not only to the diagnosis of psychopathological conditions, but also to information about the primary ways of thinking, the totality of mind experience acquired by all humankind, and to collective unconscious data.

Implemented reasoning model called ATT Meta developed at Birmingham University "performs a type of metaphor based reasoning." According to J.Barnden (1996), fully/fledged science can describe a mind as it describes itself in natural language. Author has been concentrated on such metaphoric notions as MIND PARTS AS PERSONS eg.*"One part of Mike knows that Sally has left for good"*, or MIND AS PHYSICAL SPACES "inner/outer Self", *"Emptiness was killing her."* It is obviously not only in English that cognitive realm representing its states mentioning: "fringes of consciousness," about "ideas surfacing at the mind", that we can see mental things "clearly" or "obscurely" (Barnden 1996).

According to K. Ahrens (2005) huge interest in embodied cognition has increased the need for cognitive models reflecting the relationship of the Inner Self within and out of the physical world. As W. James noticed we are divided into "spiritual me, social me and material me" (Deignan, 2005). Conceptual Metaphor Theory rejects the notion that metaphor is a decorative device.

Particularly interesting field of study is metaphor of Mind as a light. Interesting example in the literature has been found by J Barnden (1996) „Feelings have become in this respect like light itself - wavelike, as they used to say in his physics class." Light of the mind enlightens our personality "*Shine with happiness. personality is shining through, to have dark thoughts*". Smart person in always associates with bright, clear illuminated mind and its metaphoric opposite foggy mind creates darkness or dullness.

Our theory claims that MIND has a LIGHT nature. On the data gained from FEA and the examples below we have tried to show common

sense metaphor contains information which correlates with quantum physics discoveries gained last eighty years.

2 METHODS

In contrast with already presented WordNets or MindNet from Microsoft Research team, a collection of semantic relations that is automatically extracted from text data using a broad coverage parser" (Vandervende 2005) based on existing corpora and web data. The algorithm describes on immediate authentic respondent answers for given metaphor on mind stimuli.

To create and visualize association semantic network, we used a set of web application tools. A database was generated in SQL by an original algorithm in on-line mode. Data were loaded from the CSV file and visualized with Gephi dynamic graph. Analyzed data were lemmatized by an SQL and MS Excel and were classified into 75 primary semantic dimensions. Cases were grouped using Microsoft ACCESS. The most frequent answer contained Czech lexeme *byt mimo (sebe)* (literal translation is- *to be out of body*) which belongs to the MIND AS (conceptual metaphor and also correlates with a *distracted* state of Mind. Or Mind Entanglement (Radin, 2006)

First, we created a list of 400 stimuli for Free association Test in the Czech language. The stimuli appeared to each respondent in a random order, and she/he had the opportunity to write 0-3 responses in Czech to each stimulus. This application is used for writing associations to stimuli which is being offered, where respondents have to write the first word or phrase which immediately came into their mind.

We have classified our data from different points of view; we were after all interested in the qualitative findings. Unique associations produce another cognitive metaphor in connection with these stimuli. Most of the participants were university students mostly in humanities field such as history or philosophy. The linguistics data collected by this means were intrinsically different from what we have known about the mind from the neuroscience which has helped us imagine the cognitive function of the human mind as an access to a collective unconsciousness. Despite the relatively greater variation of the individual responses, there is an obvious pattern of synchronicity.

Basic statistics were provided online. The administrator can display either responses

categorized according to respondents or the issues, where individual responses are sorted according to the frequency of their occurrence for each stimulus. This application can be used not only for psychological, medical and sociological research but also as a multilingual dataset, where the user only selects stimuli in the preferred language.

3 EXPERIMENTAL FINDINGS

In the database we have collected 12,673 word responses for 400 stimuli from almost 200 participants. Primarily, we were interested in creating a semantic network from obtained data. Emphasized arrows mean high semantic dependency. We also examined which stimuli-response pairs occurred more frequently, which responses occurred more often, were there any unexpected connections between certain words, which answers occurred more often, which stimuli were semantically clustered by the same answer, and which stimuli occurred as an answer and in what context?
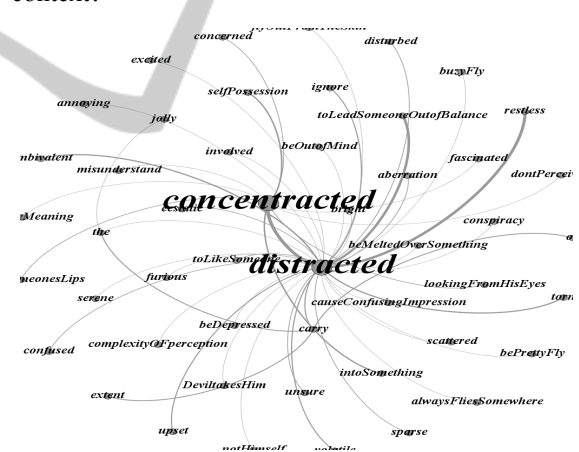

Figure 1: Concentrated /distracted semantic network.

Created mind network (eg. Fig 1) gave us a unique opportunity to discover the probabilistic nature of mind revealing itself in all languages as "entangled quantum" (Radin, 2006) particles. At the quantum level things could be at the multiple places at the same time, particles can be mired out act like waves, things could be interconnected even at the great distances, time is erased, the boundary between quantum world and class world is unclear,- some people call it: *collapse of the wave function*. Very similar phenomena are described by metaphoric view. Eg.*"No strings attached" "The bond between them".*

The conceptual metaphors of MIND AS A LIGHT below suggest that the metaphorical self - reflection "see" mind as a bright, shining troughs, able to lit light field correlate with the nature of electromagnetic waves described by quantum physics. Free particles in Broglie's wave-particle theory also have both functions as an Essential Self. It is striking that language had been acquainted with our Self's nature as light many thousands years before Broglie's discovery. How and where did we learn this knowledge? How could it happen that mind a priori knows that our spirits are distracted (Machova et al, 2010) that we are literally hanging around, MIND AS INVISIBLE LIGHT WAVES Czech: *Dělat vlny, Russ: Volnovatsja, Engl. lit. Making waves, Engl.Be upset, worried.*

Our mind has a light nature and interaction of two minds reminds us of an light interference pattern. When we look at the Fig.2 (Fournier, 2003) below we can understand why meeting in Czech calls „*se-tkání*"- *lit. co-binding.*
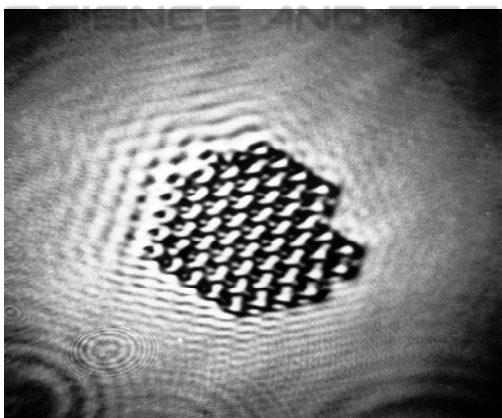

Figure 2: Metaphorical view of Minds Light binding.

As a confirmation conceptual metaphor presenting mind as a light texture, on the picture above, we can see the „periodic arrays of light intensity serve to trap dielectric micron size particles as well as cold atoms Optical binding is a long range force (proportional to 1/r) discovered at the Rowland Institute on Harvard. It allows creating of matter just by photons exchange (Fournier, 2003).

4 CONCLUSIONS

Empirical findings about the phenomenology of mind gained from Associative Experiment, has opened a new dimension of artificial intelligence and quantum linguistics research, allowing us to create a link between a collective unconscious level and a conscious Mind. Essential Self metaphors described by the association experiment allow us to identify the main structures of a priori semantic web hidden beyond the language. Our claim is that a literal meaning of the cognitive metaphor is not necessarily arbitrary and metaphorical as we used to think. Their literal meaning is a huge field of research discovering hidden structures of the mind.

Literal meaning and literal translation of cognitive metaphors of mind, which doesn't usually make common sense in the visible dimension, is a universal phenomenon, occurring throughout all languages; as we have noticed that it is often metonymy which needs to be uncovered in their full length. Thus, free association method applied on other languages equivalent can help us to do it.

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