George Lakoff

Women, Fire, and Dangerous Things

What Categories Reveal about the Mind

The University of Chicago Press, 1987

Motivation

the classical theory of categories have been taken so much for granted that alternative assumptions seem unthinkable

the classical theory of categories is inadequate for the study of natural language (and for the study of thought)

the new view:

- reason (thought) has a bodily basis
- imaginative aspects (metaphor, metonymy, mental imagery) are central to reason
- thought has gestalt properties

categorization as the main way that we **make sense of experience**

Roadmap of the talk

- traditional view
- from Wittgenstein to Rosch
- cognitive models
- objectivism vs. experiential realism

Traditional view

women, fire and dangerous things ?

things are categorized together on the basis of what they have in common

. . . but that is only a small part of the story

Dyirbal – a category *balan*, that actually includes women, fire and dangerous things

Traditional view, cnt'd

one of the goals of the book – to survey the **complexities** of the way people really categorize

an understanding of how we categorize is central to any understanding of how we think and how we function

from the time of Aristotle to the later work of Wittgenstein, categories were thought be well understood and unproblematic

Traditional view, cnt'd

categories as **abstract containers**

things either inside or outside the category . . . the property they have in common were taken as defining the category

classical theory was not the result of empirical study . . . it was not even a subject of major debate . . . it simply became part of the **background assumptions** taken for granted

From Wittgenstein to Rosch

The major themes

- family resemblances
- centrality
- polysemy as categorization (related meanings of words form categories; the meanings bear family resemblances to one another)
- generativity as a prototype phenomenon
- membership gradience

- centrality gradience

- conceptual embodiment (the nature of human biological capacities and of experience of functioning in a physical and social environment is significant)

- functional embodiment (certain concepts are used automatically, unconsciously)

- basic-level categorization and primacy

what unites these themes is the idea of a **cognitive model**

concepts characterized by cognitive models are understood via the **embodiment** of the models

Wittgenstein

family resemblances

game: there are no common properties shared by all games; the category of games is united by family resemblances

extendable boundaries

there is no fixed boundary to the category *game*; new kinds of games are introduced

central and non-central members

the fact that there can be good and bad examples of a category does not follow from the classical theory

Austin

why do we call different things by the same name ?

healthy

- body
- complexion
- exercise

there is what we may call a primary **nuclear sense** of “healthy”, the sense in which it is used of a healthy body

Austin, cnt'd

extended senses; chaining within a category

metonymy, metaphor, analogy – the principles of extension

a result of extensions: incomplete senses

holistic nature of meaning

Berlin and Kay; Kay and Mc Daniel

color research – a contribution to the prototype theory; basic color categories, central members, best examples

Brown and Berlin

basic-level categories

the dog on the lawn:

- a dog (the **basic level**)
- a boxer
- a quadruped
- an animate being

Brown and Berlin, cnt'd

basic level – the level

- which is learned earliest
- at which things are first named
- at which names are shortest and used most frequently
- of categorization, as opposed to a level created by "achievements of imagination"

- of distinctive actions

the basic level is primarily characterized by gestalt perception, by imaging capacity (which depends on overall shape), and by motor interaction

Rosch

experimental results: prototype effects, basic-level effects

Rosch, cont'd

prototypes (cognitive reference points)

Dani speakers (two basic color categories: dark-cool, light-warm);

an experiment (learning of new color terms): focal colors were learned more easily than non-focal colors

Rosch, cont'd

asymmetries (prototype effects):

- (prototypical members): some members of categories are more representative than other members ;
- asymmetry in similarity ratings
- new info about a representative category members is more likely to be generalized

Rosch, cont'd

prototype effects do not provide an alternative theory of mental representation (they constrained the possibilities for what representations might be)

cognitive reference points – the basis for inferences

Rosch, cont'd

Basic-level effects

animal – dog – retriever
SUPERORDINATE – BASIC – SUBORDINATE

3years-olds mastered basic-level categorization perfectly; superordinate categorization later

Rosch, cont'd

the basic level categories are basic in 4 respects:

- **Perception –** overall perceived shape; single mental image; fast identification
- **Function –** general motor program
- **Communication –** words: shortest, most commonly used, contextually neutral, first learned
- **Knowledge Organization –** most attributes of category members are stored at this level

Rosch, cont'd

gestalt perception – the fundamental determinant of the basic level
the type of attributes associated with a category at that level: concerned with **parts**

parts are usually correlated with **functions**
parts determine **shape**
we usually **interact** with things via their parts

Rosch, cont'd

Clusters of Interactional properties

property is not something objectively in the world; it is rather an **interactional property** – the result of our interactions as parts of our *physical* and *cultural* environments

interactional properties form **clusters** in our experience

prototype and basic-level structure can reflect such clustering

superordinate categories seem not to be characterized by images or motor actions; but they do have other human-based attributes like purposes and functions

Rosch, cont'd

Cue Validity

categories occur in systems,
such systems include **contrasting** categories (chair vs. stool, sofa)

at the basic-level categories are maximally distinct

cue validity is a conditional probability that an object is in a particular category given its possession of some feature (*cue*)

the highest cue validities at the basic level

Rosch, cont'd

a general perspective on **prototype theory**

- some categories are graded (degrees of membership, fuzzy boundaries, central members)

- some categories have clear boundaries, but with graded prototype effects (bird)

- categories "in the middle" – the most basic, relative to: **gestalt perception**, the ability to form a **mental image**, **motor interactions**, **ease** of learning, remembering and use; most **knowledge** is organized at this level

- the basic level depends upon perceived **part-whole** structure and corresponding knowledge about how the parts function relative to the whole

- categories are organized into **systems** with **contrasting elements**

- at least some categories are **embodied**; basic-level structure depends on human perception, imaging capacity, motor capabilities, etc.

- the properties relevant to the description of categories are **interactional** properties; prototypical members are sometimes describable in terms of **clusters** of interactional properties; clusters act as gestalts: the cluster as a whole is psychologically simpler than its parts

- prototype effects, asymmetries among category members (such as goodness-of-example judgments)

the cognitive models approach to categorization is an attempt to make sense of all these observations

Prototype effects in language

markedness (the unmarked member is the default value):
singular (zero-marking vs. plural (-s); simplicity in cognition $\rightarrow$ simplicity of form)

How tall is Harry?
How short is Harry?

neutralization of contrast: only one member of the pair can be used with a neutral meaning
tallness is cognitively more basic

Cognitive Models

Idealized cognitive models

the main thesis of the book:

- we organize our knowledge by means of a structure called **idealized cognitive models** (ICM)

- category structures and prototype effects are by-products of that organization

examples:
Fillmore's concept of a frame - *Tuesday* can be defined only relative to an idealized model (our model of a week; not all cultures have the same kind of weeks)

Idealized cognitive models, cnt'd

bachelor is defined with respect to an ICM that says nothing about the existence of priests, long-term unmarried couplings, homosexuals, Muslims etc.

idealized models do not fit the world precisely; they are oversimplified in its background assumptions

cluster models – another source of prototype effects:
mother – (the birth model, the genetic model, the nurturance model, the marital model, the genealogical model);
the concept *mother* usually combines all of these individual models (to form a cluster model);

Idealized cognitive models, cnt'd

because of the complexities of the modern life, the models in the cluster have come to diverge more and more

the concept *mother* is not clearly defined in terms of common necessary and sufficient conditions

biological, donor, surrogate, adoptive, unwed, step-mothers are mothers by virtue to their relation to the ideal case, where the models converge

that *ideal* case gives rise to prototype effects

Metonymic models

waitress: *The ham sandwich just spilled beer all over himself.*
(the person eating the sandwich)

The White House isn't saying anything.

an open-ended class of cases . . .

Metonymic models, cnt'd

a **metonymic model**: given an ICM, there is a "stands for" relation such that there is one element B that may stand for another element A

a subcategory, a member of a category can stand for the whole category

prototype effects are surface phenomena, a major source of such effects is **metonymy**

Metonymic models, cnt'd

an additional level of prototype effects in the *mother* category:

social stereotype – the mother as housewife

social stereotypes are cases of metonymy

a subcategory has a socially recognized status as standing for the category as a whole: housewife-mothers are better examples of mothers than non-housewife-mothers

Metonymic models, cnt'd

a subcategory (e.g. working mother) is defined in contrast with the stereotypical housewife-mother;

the stereotype is defined with respect to a metonymic model (a background for defining the subcategory);

the metonymic model (of motherhood) is defined relative to one of the models in the cluster, to the nurturance model

Metonymic models, cnt'd

unwed mother who gives up her child for adoption and then goes out and gets a job: she is not a working mother !

stereotypes define **normal** expectations: *She is a mother, but she isn't a housewife.*
strange: *She is a mother, but she is a housewife.*

Metonymic models, cnt'd

summary - two kinds of models for *mother*:

- a cluster of converging cognitive models

- a stereotypical model – a metonymic model in which the housewife-mother subcategory stands for the category as whole and serves the purpose of defining cultural expectations

both models give rise to prototype effects; a **composite** prototype:
a biological mother, who is a housewife and married to the child's father

Reasoning and metonymic models

typical examples

unconscious and automatic use of typical category members

reasoning on the basis of typical cases – a major aspect of human reason

inferences from typical to nontypical examples (we are rarely aware that we are doing it)

an asymmetry between typical and untypical cases: knowledge about typical cases is generalized to nontypical cases, but not conversely

Review of the first talk

the main thesis of the book:

- we organize our knowledge by means of a structure called **idealized cognitive models** (ICM)

- category structures and prototype effects are by-products of that organization

Metonymic models, a recap

a **metonymic model** is based on a *“stands for” relation*

a **subcategory**, a **member** of a category can **stand for** the **whole** category

prototype effects are surface phenomena, a major **source** of such effects is **metonymy**

some kinds of metonymic models: social stereotypes, typical examples

social stereotypes can be used to stand for a category as a whole (housewife-mother : mother)

they are changing over time

they define cultural expectations (reasoning: “jumping to conclusions”, judgments about people);

typical examples

reasoning on the basis of typical cases – a major aspect of human reason

(Gelfond: a substantial part of our education consists in learning various **defaults**, **exceptions** to those defaults, and the ways of using this information to draw **reasonable conclusions**)

Other kinds of metonymic models

ideal cases, paragons, generators, submodels, salient examples

they have a **cognitive** status, i.e. they are used in **reasoning**; they yield **prototype effects** of some sort

ideals

ideal husband vs. typical husband

cultural knowledge, prototypes
asymmetry: nonideal cases are not assumed to have all the good qualities of ideal cases, but (all) good qualities of nonideal cases are present in ideals

reasoning: planning

paragons

individual members who represent either an ideal or its opposite

(top ten :-), life stories of great men and women;

we are acquiring knowledge of paragons and regularly base our actions on that knowledge

generators

the members of a category are defined by the central members plus some general rules

natural numbers, other kinds of numbers

submodels

an example – powers of ten; **cognitive reference points**

special place in reasoning, especially in making **approximations**

98 is approximately 100 vs. 100 is approximately 98

salient examples

DC-10 crash in Chicago: safety judgments about the entire DC-10 category

a cognitive model may function to allow a salient example to stand metonymically for a whole category

in such cases our probability judgments are affected

conjunction fallacy, Tversky and Kahneman

Radial categories

the category *mother* is structured radially

a **central** subcategory, defined by a cluster of converging models (biological mother, nurturance mother . . .)

non-central **extensions** – adoptive mother, stepmother, surrogate mother . . .

Extensions

are **not generated** from the central model, they must be learned one by one

however, they are **motivated** by the central model + certain general principles of extension

the classification of things in traditional Dyirbal: a noun must be preceded by a variant of one of four words *bayi, balan, balam, bala*

they classify all objects

the **basic schema** of classification operates unless some **specialized principle** takes precedence

I. Bayi: (human) males; animals

II. *Balan:* (human) females; water; fire; fighting

III. Balam: non-flesh food

IV. Bala: everything not in other classes

the **domain-of-experience** principle: if there is a basic domain of experience associated with A, then it is natural for entities in that domain to be in the same category as A

example: *fish* – class I, therefore *fishing implements* also in class I

myth-and-belief principle: if some noun has characteristic X but is, through belief or myth, connected with characteristic Y, then generally it will belong to the class corresponding to Y

birds are believed to be the spirits of dead human females, and so are in class II (balan)

. . .

exceptions with no explanation

the general principles: centrality, chaining, experiential domains, idealized models (myths and beliefs), specific knowledge (knowledge of mythology overrides general knowledge)

motivation: the general principles do not predict exactly what the categories will be

the principles *motivate*, or *make sense*

centers (basic models): human males, human females, edible plants (+ everything else)

chaining structure (domain-of-experience principle, a list of domains relevant for categorization: myth, fishing, danger, . . .)

radial structure !

Radial structures:
some subcategories of mother are understood as deviations from the central case – stepmother, adoptive mother, birth mother, foster mother (paid by the state to provide nurturance), biological mother, unwed mother, genetic mother . . .

there is no general rule for generating kinds of mothers; they are culturally defined

a radial structure – a central case and conventionalized variations on it which cannot be predicted by general rules

Experiential, Imaginative, and Ecological Aspects of Mind

basic-level categorization depends on the nature of everyday human **interactions**

physical interactions, **functional** interactions (such as using an object as a vehicle), **social** interactions

our conceptual system is dependent on and intimately linked to our physical and cultural experience

imaginative aspects of mind: mental images, image-schema transformations, conceptual metonymies, conceptual metaphors

the **ecological** character of the human mind (a system with an overall structure, where effects cannot be localized; something in one part of the system affects things elsewhere in the system)

image-schema transformations

The man ran into the woods.
The road ran into the woods.

TRAJECTORY SCHEMA $\leftrightarrow$ LONG, THIN OBJECT SCHEMA

- propositional cognitive models
- image-schematic
- metaphoric (mappings form a propositional or image-schematic structure in one domain to the corresponding structure in another domain)
- metonymic

Metaphor

Your claims are indefensible.

He attacked every weak point in my argument.

His criticisms were right on target.

I demolished his argument.

I’ve never won an argument with him.

Defaults and stereotypes

Minsky (frames, defaults), Putnam (stereotype - an ideal mental representation of a normal case); both are cognitive models

(only) propositional models

impossible for them to account for complex radial structures

Complex and component categories

good examples of complex categories are often bad examples of component categories

pet fish, small galaxy, good thief, imitation brass, top-less bar, dry wine, past president

the principle of **compositionality** doesn’t work

the parts (only) **motivate** the meaning of the whole expression

fully motivated cases: predictable

totally unmotivated: arbitrary

compounds can form **chains**: topless dress, topless waitress, topless bar, topless district

they are based on related cognitive models

compounds can be *motivated* by their parts, but also by related compounds

what is required: a **theory of motivation**

The overall view

- the structure of thought is characterized by **cognitive models**
- **categories** of mind correspond to elements in those models
- some cognitive models yield categories with **grade of membership**

- some cognitive models are **classical**: they have right boundaries and are defined by necessary and sufficient conditions

- some cognitive models are **metonymic**

- the most radical prototype phenomena are **radial** categories; they involve many models organized around a center, with links to the center; the links are characterized by other cognitive models in the conceptual system or by a similarity relation; the non-central models are not predictable from the central model, but they are *motivated*

- **four types of cognitive models**: propositional, image-schematic, metonymic, metaphoric

- cognitive models are **embodied**; a concept is embodied when its content or other properties are motivated by bodily or social experience

Objectivism vs. Experiential Realism

The Objectivist Paradigm

the **classical theory of categories** has evolved side by side with some philosophical views in West

a goal: to bring our intellectual background into the foreground; to show that what have been taken as self-evident truths are really questionable opinions

against the objectivist view of thought and language

Basic Realism

common ground shared by objectivism and experien-tialism

- the **existence** of real world
- a **link** of some sort between human conceptual systems and other aspects of reality
- a conception of **truth** that is not merely based on internal coherence

- a commitment to the existence of **stable knowledge** of the external world

- a **rejection** of the view that **“anything goes”** – that any conceptual system is as good as any other

Two Aspects of Objectivism

metaphysics

epistemology

reality can be modeled by **set-theoretical models**;

the classical theory of categories – a link between objectivist metaphysics and set-theoretical models

many cognitive models use classical categories

classical categories play an **important** role in what we understand

the point: **not all** categories are classical; we cannot assume that all of nature is structured by classical categories

The Objectivist World

objectivist metaphysics

all of reality consists of **entities**, which have fixed **properties** and **relations** holding among them at any instant

classical categorization

all the entities that have a given collection of properties in common form a **category**; such properties are **sufficient and necessary** to define the category; all categories are of this kind

the doctrine of objective categories

the entities in the world form objectively existing categories based on their shared objective properties

the doctrine of natural kinds

there are natural kinds of entities in the world, each kind being a category based on shared essential properties, that is, the properties that things have by virtue of their very nature

objectivist logic

logical relations exist objectively among the categories of the world

real world atomism

all properties either are atomic or consist of logical combinations of atomic properties

Objectivist Cognition and Language

objectivist cognition

thought is the **manipulation of abstract symbols**; symbols get their meaning via correspondence to entities and categories in the world; the mind can represent the external reality and be said to **“mirror”** the nature

objectivist concepts

concepts are symbols that

- stand in a relation to other concepts in a conceptual system

- stand in correspondence to entities and categories in the real world (or possible worlds)

objectivist rationality

human reason is accurate when it matches objectivist logic

objectivist knowledge

knowledge

- correct conceptualizing and categorizing things in the world

- grasping the objective connections among those things and categories

the independence assumption

existence or **fact** are independent of belief, knowledge, perception, modes of understanding, and every other aspect of **human cognitive capacities**

God’s eye view

there is a correct categorization of things in the world
independent of human perception or cognition

varieties of objectivism:

the **nativist** position (a religious or an evolutionary version)

the **empiricist** position

objectivist position: **limitations** on what can and can-
not constitute a concept

all nonobjective influences are excluded

the properties of **basic level-concepts** cannot be true properties of concepts in an objectivist theory (gestalt perception, motor movement, image-formation, the organization of most knowledge at that level)

products of **imagination** such as metaphor, metonymy, and mental imagery, which usually are not capable of corresponding to entities in an objectivist world, are banned from the realm of true concepts

a conceptual category

a **symbolic representation** of a category in the real world

members of a conceptual category are symbolic entities that **correspond** to entities in the corresponding real-world category

a conceptual category is defined in terms of **necessary and sufficient conditions** shared by all members

conceptual atomism

all categories are either primitive or logical combinations of primitives

hierarchical categorization

a partition of a category into subcategories such that
all members are in one and only one category

cross-categorization

a number of hierarchical categorizations at the same level (example: people can be categorized according to an adult-child distinction and a female-male distinction)

objectivist semantics

linguistic expressions get their meaning only via their capacity to correspond to real world; they are capable of referring correctly or of being true or false

cognitivist and non-cognitivist variety

cognitivist objectivist semantics

linguistic expressions get their meaning indirectly via a correspondence with **symbols** used **in thought**; those symbols get their meaning via their capacity to correspond to entities and categories in the world

non-cognitivist objectivist semantics

linguistic expressions correspond to objects in the world directly

meaning is based on truth, the meaning of a sentence is taken to be its **truth conditions**

sameness of meaning: truth (false) in exactly the same situations

the reference-via-meaning doctrine (Frege)

words have inherent meanings (**intension**) and designate objects by virtue of those meanings;

competent speakers of a language know and make use of those meanings

brute facts, institutional facts

scientific institutions, theories, criteria of measurement

natural language as human institution

What’s wrong with objectivist meta-physics

three competing views of biological taxonomy: cladis-tic, phenetic, evolutionist

What's wrong with objectivist cognition

counterexamples to objectivist cognition and semantics – colors, folk-biological categories, conflicting categories, prototype effects

sources of prototype effects: idealizations, cluster models, metonymic models, radial categories

The Inadequacies of Objectivism

factors that determine **basic-level** structure do not correspond to anything in objectivist cognition (gestalt perception, imaging capacity, motor organization)

discontinuities in nature

Berlin et al., Hunn: people are much less accurate in dealing with discontinuities above and below the level of the genus (than at that level)

alternative cognitive models may be equally valid:

lie vs. *social lie* (being nice is more important than telling the truth); it is outside of objectivist semantics

similarly: strictly speaking vs. loosely speaking

sources of prototype effects:

idealizations that contradict reality

metonymic models

metaphoric models

radial structures

Limits of Objectivism

institutional facts are products of human mind(s) and of conceptual system(s)

cultural categories – the imaginative products of the human mind play an enormous role in the creation of reality

objectivism leaves no room for metaphorically defined concepts

Experientialism

what is needed:

an alternative account of meaning, truth, knowledge, understanding

a theory of cognitive models capable of dealing with the facts of categorization and natural language semantics

an account of relativism that avoids the problems of total relativism and makes sense of what stability there is in scientific knowledge

The experientialist strategy

meaning – the central issue

an attempt to characterize meaning in terms of the **nature and experience of organisms** doing the thinking (**species, communities**)

experience in the broad sense - everything that plays a role (the nature of our bodies, our genetically inherited capacities, our modes of physical functioning in the world, our social organization, etc.)

experiential realism characterizes meaning in terms of **embodiment** (collective biological capacities + physical and social experiences)

two parts of the problem:

- structure

- embodiment of that structure

structure – cognitive models

what makes that structure meaningful? it is embodied, tied to our **preconceptual** bodily experience

these structures are directly meaningful (they are directly and repeatedly experienced because of the nature of the body and its mode of functioning in environment

at least two kinds of structure in our *preconceptual* experiences:

- basic-level structure (gestalt perception, our capacity of bodily movement, our ability to form rich mental images)

- kinesthetic image-schematic structure (image schemas in our everyday bodily experience: CONTAINERS, PATHS, LINKS, FORCES, BALANCES and in various orientations and relations UP-DOWN, FRONT-BACK, PART-WHOLE, CENTER-PERIPHERY)

there are two ways in which abstract conceptual structure arises from basic-level and image-schematic structure

- by metaphorical projection
- by the projection from basic-level categories to superordinate and subordinate categories

abstract conceptual structures are understood because of their systematic relationship to directly meaningful structures

preconceptual foundations: bodily experience, basic-level structures, kinesthetic image schemas

Cognitive Semantics

what makes concepts meaningful:

our experience is preconceptually structured

our basic-level concepts correspond to that preconceptual structure

kinesthetic image schemas – only the grossest outlines of structure

gestalts – general overall shapes, relatively rich in structure (the wholes psychologically more basic than the parts)

basic-level concepts cannot be considered atomic building blocks

kinesthetic image schemas

CONTAINER schema – a schema consisting of a boundary distinguishing an interior from an exterior (in – out)

much of our daily experience is understood in CONTAINER terms (our body etc.)

there are a great many metaphors based on the CONTAINER schema (things come into and go out of sight . . .)

CONTAINER schema is inherently meaningful to people by virtue of their bodily experience

meaning postulates make sense given schemas that are inherently meaningful

The PART-WHOLE Schema

based on our bodily experience

structural elements – WHOLE, PARTS, CONFIGURATION

(basic logic: asymmetry of the part-of relation . . .)

sample metaphors: families (as wholes with parts), divorce, the general concept of structure itself is a metaphorical projection of PART-WHOLE schema)

the LINK schema

bodily experience – the umbilical cord . . .

metaphors: social and interpersonal relationships in terms of links . . . slavery, freedom . . .

the CENTER-PERIPHERY schema

the SOURCE-PATH-GOAL schema

experiential bases of metaphors; metaphor is motivated by the structure of our experience (more – up, less – down . . .)

The issue of primitives

our conceptual system has dual foundations (it is grounded at two points): basic-level and image-schematic concepts are directly meaningful

this system has foundations but no primitives

one primitive contains other primitives (MAN – INSIDE-OUTSIDE, UP-DOWN . . .)

rich mental images are structured by image schemas; the mental image is more than just the sum of schemas

semantic compositionality: it is still possible to have rules of semantic composition, all that semantic compositionality requires is a starting point, something that is directly understood

The conceptualizing capacity

the power of abstract reason

conceptualizing capacity consists in:

- the symbolic structures that correlate with pre-conceptual structures (basic-level and image-schematic concepts)

- the ability to project metaphorically from structures in physical domain to structures in abstract domains

- the ability to form complex concepts and general categories

Cognitive Models

mental spaces are structured by cognitive models

mental spaces: like possible worlds, but

partial + purely cognitive status (no role in an objectivist semantics)

the structure of cognitive models

- given basic-level and image-schematic concepts, it is possible to build up complex cognitive models

- image schemas provide the structures used in those models

categories are understood in terms of CONTAINER schemas

hierarchical structure – PART-WHOLE

relational structures – LINK

radial structures – CENTER-PERIPHERY

foreground - background structures – FRONT-BACK

linear quantity scales – UP-DOWN

two roles of image schemas:

- directly understood in their own
- they are used to structure other complex concepts

Overview

conceptual categories are not merely characterized in terms of objective properties of category members:

they are determined also by **bodily nature** of the people

and by **imaginative processes**

a “theory” of cognitive models in very general terms

in order to give some idea of what they look like in detail: case studies

criticism:

philosophical problems

vagueness

distinction between metaphor and metonymy

arguments against realism and model theoretic semantics have no impact for linguistic semantics

the notion of motivation is underspecified

my personal view:

symbol grounding

the role of a preconceptual background in (cognitive) semantics

the role of imaginative aspects of human mind

a step toward a (proper) semantics of verbs and sentences