

Relating Language to Other Cognitive Systems

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1. The Overlapping Systems Model of Cognitive Organization

this is a "lay of the land" type of investigation:

a heuristic delineation of the overall character of cognitive organization,
not a detailed demonstration of any one portion of it

1.1 Cognitive Systems

human cognition appears to comprehend certain relatively distinct major cognitive systems, including:

language; perception in general or in its several modalities: vision, hearing, kinesthesia, etc.;;
a reasoning - inferencing - understanding system;
affect; a cognitive system for cultural structure; motor control

1.2 Organizing Factors

the major cognitive systems each have certain properties of organization
many of these properties are comparable across systems (= an "overlap" of the systems)
some properties are shown by only one system, some by several, some by all

the distinction made here between cognitive systems that get organized ("substantive systems")
and factors that organize them ("organizing/structuring factors")
is partly relative: some organizing factors (e.g., attention)
are elaborate, themselves subject to organizing by other factors

heuristic list of organizing factors

- constitutive factors

- a. schematic structure: the abstracted schematic delineations and partitionings that structure a system, e.g.,:
content-structure distinction: presence of a schematic or abstractive level of organization
distinguishable from a substantive level of "content"
delineation of component "units", part-whole structure, hierarchical embedding, structural complexes
- b. temporal structure: temporal characteristics of different aspects of a system, e.g.,:
"phase": starting, continuing, stopping, nonoccurring
"interrupts": putting on hold, resuming, waiting (until triggering event)
"rate": functioning quickly, functioning slowly, speeding up, slowing down
coordination with the timing of another process: synchronizing, sequencing, concurrence, alternation
- c. causal structure: (assessments of) causality / force interaction applying to different aspects of a system
- d. categorial structure: any form of categorization exhibited by a system, e.g.,:

prototype structure, hierarchical category inclusion,
tagging a particular type of unit with a particular "identity"

- e. type of metric: the discrete/gradient, absolute/relative, etc. character of different aspects of a system
- f. quantity structure : the (absolute or relative) amount or intensity (strength) of different aspects of a system, e.g.,: scope, granularity, density
- g. degree of differentiation in different aspects of a system, e.g.,: approximate/precise, sketchy/elaborated, vague/clear character

- cognizing factors

- h. attentional structure: deployment of attention over a system, e.g.,:
 - current foregrounding / backgrounding of different aspects of the system
 - general level of accessibility to consciousness by different aspects of the system
- i. perspectival structure: the ways an adopted perspective point interacts with a system
- j. memory structure: how different aspects of a system relate to memory, e.g.,:
 - properties governing "storage", and "retrieval", including: learning
 - familiarity/novelty (= remembered/nonremembered)
 - recognition and identification
- k. epistemic structure: assessments of (a) one's knowledge of, or (b) the reality of, different aspects of a system, e.g.,:
 - ascribed degrees of (a) one's doubt/hesitance/certainty
 - (b) veridicality, likelihood, evidentiary corroboration
 - experience of a phenomenon as originating within oneself or externally
- l. evaluation: assessments applied to different aspects of a system, e.g.,:
 - significance (important/irrelevant), value (good/bad),
 - esthetic quality (beautiful/ugly [not modality specific]), appeal (appealing/unappealing)

- processing and housekeeping factors

- m. on-line monitoring of different aspects of a system, e.g.,:
 - error detection and correction, tailoring of system inputs and outputs to each other
- n. affectability: the degree to which and the ways in which the states a cognitive system enters can be (intentionally) affected or controlled, either by
 - (other cognitive systems within) the individual or by an outside agent
 - (includes: scale of a system's modular autonomy vs. its integration with other systems)
- o. plasticity: type and degree of long-term modifiability exhibited by different aspects of a system, e.g.,:
 - developmental changes through life span, response to environmental changes,
 - response to internal or neighboring injury
- p. maintenance: a system's upkeep of its functions and operations, and of its internal integrity, across local and neighboring changes

- integrative factor

- q. framework structure: a system's type of containing and integrating matrix in which

all other organizing factors are combined and coordinated in their specific interrelations

1.3 Overlapping Systems Model

I call the above the "overlapping systems model" of cognitive organization

-- called "systems" since they are not autonomous Fodorian "modules" due to their overlap

1.4 Three Neural Accounts of Overlap

three main ways to account for such comparability of properties across substantive cognitive systems:

1. the neural mechanism that underlies the manifestation of that property exists independently in the brain and all the overlapping systems tap into that mechanism
2. one system has the neural mechanism and other systems tap into that mechanism there
3. each system has its own "copy" of the neural mechanism

1.5 Evolution of Cognitive Systems and their Overlap

one's view of this neural underpinning for cross-system comparability interacts with theories of how cognitive systems evolved:

for "1": a later-evolved system would have established connections with the already existing neural mechanism located outside the other systems

for "2": a later-evolved system would have established connections with the already existing neural mechanism that is part of one of the earlier systems

for "3", a later evolved system would have developed its own duplicate instance, or variant, of the mechanism
 either a: by replication of the neural mechanism already present elsewhere
 or b: by evolutionary convergence
 or c: as an accidental coincidence

NB: any one system could have a combination of the above for its different organizing factors

language and cultural structure were the last major cognitive systems to evolve.

language, in particular, may have duplicated or tapped into many of the extant organizing mechanisms
 -- perhaps more so than any other major cognitive system.

-- and this perhaps because language evolved as a general purpose kind of system

1.6 Language Organization perhaps in part Unique among Cognitive Systems

1.6.1 two co-systems: expressional and conceptual

perhaps uniquely, language comprises 2 interlocked co-systems: the expressional and the conceptual
 depending on the syntactic theory, the organizational properties of the expressional co-system

correspond either more or less to those of the conceptual co-system

1.6.2 two subsystems: open-class/contentful and closed-class/structural

the expressional co-system has an open-class subsystem and a closed-class subsystem, formally distinguishable

these specify conceptual content and conceptual structure, respectively, in the conceptual co-system

NB: nothing obviously comparable to these co- and sub-systems in other cognitive systems, e.g., in visual perception, affect, motor control

1.7 problems of cross-system comparisons of structure

a. not clear what constitutes "structure" in a cognitive system other than language

e.g., there is no clear "grammar of vision"

= a principled basis for determining what is structural in visual perception

-- e.g., is color a structural feature of perception?

b. not clear which level of a processing continuum to select for a comparison of structure

e.g., in vision, from retinal to high-level processing,

no principled basis for choosing one point as definitive of structure

c. use of the language system as possible entree into this difficulty

closed-class reference constitutes the fundamental conceptual structuring subsystem of language

thus, perhaps uniquely, language has an explicit dedicated component representing/constituting

a) what is structural, b) which level is structural

and so may offer the best entree to a cross-system study of cognitive organization

1.8 This Study: each system has which factors, not each factor appears in which systems

a study of the present kind can start either with cognitive systems to see what organizing factors they have

-- representable by partially overlapping Venn circles --

or with organizing factors to see which cognitive systems they appear in

this talk does the former, and shows that language's closed-class-represented conceptual structure

has much overlap with structure in the visual, kinesthetic, reasoning and understanding systems

-- but not much with the systems of affect and cultural structure

here, the starting point of all cross-system comparisons is language, the area of my expertise

2. the fundamental conceptual structuring system of language

2.1 A fundamental formal property (design feature) of language

it comprises 2 subsystems: the open-class and the closed-class

2.1.1 Open-class or "lexical" (open-class forms = OCs):

any category of linguistic forms that are large in number and easy to augment

in any language, can comprise the roots of: nouns / verbs / adjectives / ? ideophones
as well as collocations ("lexical complexes")

2.1.2 Closed-class or "grammatical" (closed-class forms = CCs):

any category of linguistic forms that are relatively few in number and difficult to augment

in any language, can include:

overt (phonologically substantive):

bound: inflections / derivations / clitics

free: determiners / adpositions / conjunctions / particles / ...

suprasegmental: intonation/stress patterns (if comprising a small closed set)

abstract / implicit:

word order

grammatical categories (e.g., N, V, A, NP, VP)

grammatical relations (e.g., subject, direct object, indirect object)

grammatical complexes:

syntactic structures / grammatical constructions /

phrase structure & immediate constituency / complement structure

2.2 A semantic distinction correlates with this formal distinction

2.2.1 OCs are almost unconstrained as to what they can refer to

2.2.2 CCs are highly constrained, in two ways:

a. as to categories of concepts

number but not color

space, time, causation, but not food, health, work

b. as to member concepts even within acceptable categories

number: singular / dual / trial / plural / paucal

not: even / odd / dozen / numerable

OCs not subject to these constraints, as preceding lexical items attest

2.3 A functional distinction correlates with this semantic distinction

OCs represent conceptual **content** / CCs represent conceptual **structure**

These semantic and functional distinctions appear in two venues:

- within any specific portion of discourse, e.g., a sentence
- within the lexicon of any language and within language in general

2.4 First venue: OCs / CCs semantic + functional differences in discourse

in any portion of discourse, e.g., a sentence,

semantically: OC meanings are characteristically rich (much meaning of many different categories together); referentially unconstrained

CC meanings are characteristically spare / schematic; within referential limits

functionally: in the cognitive representation evoked by a portion of discourse

most of the **content** is contributed by the OCs

most of the **structure** is determined by the CCs

2.4.1 Demonstrating OCs / CCs differences in a Single Sentence

(1) A rustler lassoed the steers.

a. the closed-class forms in this sentence:

- (a) -ed 'occurring at a time before that of the present communication'
- (b) the 'speaker infers that addressee can readily identify the specific referent'
- (c) a 'speaker infers that addressee cannot readily identify the specific referent'
- (d) -s 'multiple instantiation of object'
- (e) a ...-∅ 'unitary instantiation of object'
- (f) -er 'performer of the specified action'
- (g) grammatical category "verb" for *lasso*
'eventhood'
- (h) grammatical category "noun" for *rustler / steer*
'objecthood' (for one possibility)
- (i) grammatical relations "subject" / "object" for *rustler / steer*
'agent'/'patient' (among the possibilities)
- (j) active voice
'point-of-view at the agent'
- (k) intonation, word-order, character of auxiliaries
'the speaker "knows" the situation to be true and asserts it to the addressee'

an OC-type notion of ‘attack’ is incorporated in *upon*, but not in *towards* / *past*

as with any concept expressed by a CC, the ‘attack’ concept:

- (a) is attentionally backgrounded -- unlike when expressed in a verb, as in: We attacked them.
- (b) is difficult for speakers to associate with the word *upon*
- (c) may acquire a structural character as a kind of path notion

2.5 Second venue: OCs / CCs semantic + functional differences in Language / a Language

2.5.1 Within language in general as a system

considering the meanings of OCs and CCs cumulatively across all (possible) languages:

a. semantically:

the semantic freedom of OC meanings entails: they constitute an open-ended conceptual pool

the semantic constraint on CC meanings entails:

- there is a relatively closed inventory of conceptual categories and member concepts that can ever be expressed by CCs

properties of this inventory:

(a) hierarchical in the extent of occurrence across languages:

universal: e.g., polarity (positive / negative); mode (declarative / interrogative)

widespread: e.g., number

rare: e.g., rate (fast / slow)

absent: e.g., color

(b) fuzzy lower boundary: occasional concepts appear as a CC in perhaps just one language

e.g., English ‘at the interior of a vehicle with a walkway and in use’: *on* / otherwise: *in*

in a car / on a bus; in a grain car / on a train;

in a helicopter / on an airplane; in a rowboat / on a ship

The kids played in/*on the abandoned bus.

b. functionally:

OCs can potentially represent all of conceptual content

CCs meanings together constitute the fundamental conceptual structuring system of language

2.5.2 Within any specific language

the inventory is a universally available set of conceptual categories and member concepts

from which each language selects a different subset for representation by its CCs

this subset constitutes that language’s particular conceptual structuring system

3. non-overlap of structural properties between language and visual perception

[for the specific structural properties cited here and below,
the particular organizing factors of which they are a part are shown in brackets]

3.1 prominent in visual structuring, minimal in language structuring

3.1.1 in vision

- A. bilateral symmetry [< schematic structure]
- B. rotation [< schematic + temporal structure]
- C. dilation (expansion/contraction) [< schematic + temporal + quantity structure]
- D. pattern of distribution / texture (e.g., of wood grain, foliage, pond ripples, surf foam)
[< schematic (+ temporal) structure]
- E. color?

3.1.2 in language

languages may have minimal CC counterparts for these, e.g., English perhaps only:

- A. reciprocal: *each other* (*They kissed each other*).
- B. *around / over* (*The pole spun around / fell over*).
= orientation of spin axis: horizontal vs. vertical

generally not:

- a. amount of rotation
turning less than vs. exactly vs. more than vs. several times one full circuit
- b. relation of spin axis to object's geometry
at center: perpendicular disk (CD disk) vs. perpendicular line (propeller)
vs. aligned cylinder (pencil spinning on point)
at boundary: line ("hammer" swung in hammer toss) vs. transverse plane (swinging gate)
vs. parallel plane (swung cape)
at an external point: a point (earth about the sun) vs. a circle (spinning hoop)
- c. uniformity of rotation
uniformly through object (spinning rope) vs. differentially through object (twisting rope)

C. *in / out* (*spread out / shrink in*)

= sign of the dilation: expansion vs. contraction

generally not:

a. geometry of dilating entity

1D: (stretched bungee cord) vs. 2D (stretched rubber sheet) vs. 3D (leavened dough)

b. continuity of the entity

continuous (as above) vs. set of objects (2D: dispersing crowd, 3D: expanding universe)

c. geometric part represented by the entity

whole (as above) vs. periphery (2D: stretched rubber band, 3D: blown up balloon)

D. distinctions with respect to the following parameters:

dispersion: dispersion-neutral vs. dispersion-positive

density: sparser vs. denser

motive state: stationary vs. moving

dimensionality: 1D vs. 2D vs. 3D

stationary--

dispersion-neutral: be on/in/... *There are some peas on the table / in the aspic.*

dispersion-positive: sparser: here and there on/in/...

There are peas here and there on the table / in the aspic.

denser: 1D: all along; 2D: all over; 3D: throughout

There are peas all along the knife / all over the table / throughout the aspic.

moving--

dispersion-positive 2D: sparser: (here and there) about / around

I walked (here and there) about the town.

denser: all about / all around / all over

I walked all about/around/over the town

generally not:

regularity: evenly vs. unevenly distributed

clustering: presence vs. absence of clumps

exhaustiveness: wholly adjacent vs. spaced apart

geometric form + arrangement: e.g., lines that are parallel vs. criss-crossed vs. intertwined

NB: American Sign Language does structurally mark many of the preceding distinctions

E. "color" absent

3.2 prominent in language structuring, minimal in visual structuring

Language has closed-class forms that represent:

A. reality status ("mood"): indications that an event is --

actual / potential / conditional / counterfactual / negative [< epistemic structure]

vision: a situation currently viewed is apparently perceived only as actual

B. modality: the pattern of forces acting for or against the occurrence of an event, [< causal structure]

e.g.: can / should / must / may

vision: a situation currently viewed is apparently perceived simply as being in occurrence

C. addressee's inferred knowledge status ("definiteness"): [< epistemic structure]

a. definite: the speaker infers that the addressee can readily identify the referent

b. indefinite: the speaker infers that the addressee cannot readily identify the referent

a. I fed the cat. b. I fed a cat.

vision: an object currently viewed is apparently not regularly perceived

as to its identifiability for another viewer

D. speaker's knowledge status ("evidentials") [< epistemic structure]

indications that a represented situation is, e.g.,:

known from personal experience as factual

accepted as factual through generally shared knowledge

inferred from accompanying evidence

inferred from temporal regularity

entertained as possible because of having been reported

judged as probable

vision: the visual system does not flag objects in the visual field for their evidentiary status

Thus, visual perception does not flag a partially occluded configuration

as being 'unknown' or 'inferred as present'

Rather, it generally "fills it in" unconsciously with the expectable characteristics.

NB: the reasoning / inferencing system involves:

naive reasoning (a la Kahneman and Tversky), problem-solving

and perhaps includes many of the linguistic evidential distinctions

thus here having much overlap with the language system, unlike vision

4. overlap of structural properties between language and visual perception

4.1 pertaining to schematic structure

A. configurational structure: the structure of objects and arrangements of objects

[<schematic (+ temporal) structure]

language: the referents of such linguistic closed-class forms as spatial prepositions

vision: e.g., the perception of particular spatial relations between objects in a scene

perhaps comparable: the linguistic representation and the visual perception of:

‘in’: a Figure object occupying a region of a certain volume of space,

where the Ground object is schematizable as a plane so curved as to define this volume of space

e.g., water in a vase / a radio in a dumpster

‘along’: a Figure object moving so as to define a line that is parallel and adjacent to a second line,

where the Ground object is schematizable as this second line

e.g., The hunter walked along the trail. / The ball rolled along the ledge. /

The caterpillar crawled along the twig.

B. interior structuring within bulk [<schematic structure]

language: the schemas represented by CCs are bulk-neutral

The caterpillar crawled up along the filament / tree trunk

vision: cf. Marr’s representation of human figure in terms of axes of elongation

cf. children’s stick figure drawings as explicitization of structure sensed within bulk

C. the topological character of such structuring [<schematic structure]

language:

in: magnitude neutral: in the thimble / volcano

shape-neutral: in the well / trench

closure neutral: in the beachball / punchbowl

discontinuity neutral: in the bell jar / birdcage

vision: perhaps one could perceive all the preceding examples for *in*

as structurally involving inclusion: one object included / surrounded by another

D. factive/fictive representation [< schematic + temporal + attentional structure]

proposal: both a "factive" and a "fictive" representation of the same entity

can be concurrently in cognition in language and, in a parallel way, in visual perception

one type: factive stationariness + fictive motion represented for the same entity
 this type in language: factive form represented by our knowledge about the entity
 fictive form represented by the literal reference of the expression
 this type in vision: high-palpability representation seen explicitly as stationary
 low-palpability representation sensed implicitly as moving

1. coextension path:

language: The fence goes from the plateau down into the valley.

vision: a two-stroke perception of a "+"?

2. demonstrative path:

language: The arrow points toward / away from / past the town.

vision: cf. Palmer: perception of equilateral triangles' direction of pointing

3. radiation path:

language: The light shone from the sun into the cave.

vision: perception of directionality in light rays?

4a. site-arrival:

language: The palm trees clustered together around the oasis.

[cf. real motion: The children quickly clustered together around the ice cream truck.]

vision: Pentland: perception of figurine as torso with limbs moved into attachment

Leyton: perception of an arbitrary curved surface as a deformation of a simple surface

Gestalt psychology: perception of, e.g., a pac-man shape as a circle with a wedge removed

4b. structural history and future [<schematic + temporal structure (+ inference)]

language: can represent a putative default history

e.g., in Japanese, not (a) but (b) is generally said:

(a) There are leaves / toys on the ground under the tree.

(b) Leaves are fallen on the ground under the tree. / Toys are placed on the ground under the tree.

vision:

Does the perception of a tilted picture frame include

1) a putative default history of its having been displaced from the true?

2) a projection of a future act of righting the frame?

E. reference frames [< schematic structure]

language: can impose a selected reference frame on objects being referred to

field-based: The bike is west of the church.

ground-based: The bike is behind the church.

observer-based: The bike is left of the church.

rectilinear frame: The boat sailed further and further away from the island.

radial frame: The boat sailed further and further out from the island.

vision: low-palpability perception/imputation of comparable reference frames?

-- e.g., the sensing of compass directions in viewing scenery around one?

F. multiple hierarchical embedding of structure [< schematic structure]

language

in space:

- | | |
|---|---------------------|
| a. I saw a duck. | [...in the valley.] |
| b. I saw ducks. | " |
| c. I saw a group of 5 ducks. | " |
| d. I saw groups of 5 ducks each. | " |
| e. I saw 3 acres of groups of 5 ducks each. | " |

in time:

- The beacon flashed (as I glanced over).
- The beacon kept flashing.
- The beacon flashed 5 times in a row.
- The beacon kept flashing 5 times at a stretch.
- The beacon flashed 5 times at a stretch for 3 hours.

the structural complexes that are represented:

- !
- ...!!!!!!...
- [!!!!!!]
- ... [!!!!!!] - [!!!!!!] ...
- [[!!!!!!] - [!!!!!!] ... [!!!!!!] - [!!!!!!]]

vision:

- overall framework (e.g., of a restaurant)
- > constellational pattern of contained elements (e.g., of tables, people)
- > individual elements of the constellation (e.g., an individual table, person)
- > external features or internal structural schema of each individual element
(e.g., a person's facial/bodily/clothing features or internal Marrian structure)

4.2 pertaining to causal and force-dynamic structure

G force interaction

language: force dynamics --

the linguistic representation of the interactions of opposing forces such as
 an object's intrinsic tendency toward motion or rest,
 another object's opposition to this tendency,
 resistance to such opposition,
 the overcoming of such resistance,
 and the presence, appearance, disappearance, or absence of blockage.

1. be VPing / keep VPing —physical
 - a. The ball was rolling along the green. b. The ball kept rolling along the green.
2. not VP / can not VP —physical/psychological
 - a. John doesn't go out of the house. b. John can't go out of the house.
3. not VP / refrain from VPing —intra-psychological
 - a. She didn't reply. b. She refrained from replying.

visual perception:

Engel and Ruben (1986): perception of force added/lost at the cusps on viewing a dot "bouncing" to the right with progressively increasing/decreasing curves

Jepson and Richards (1993): on viewing 2 blocks forming a "T", perception of an attaching force when the "stem" block is horizontal to the right of the "cap" block but only of contact when the "stem" block is vertically above the "cap" block

and consider perception of force dynamics on viewing a large cement slab leaning at a 45 degree angle upon a rickety wooden shed

NB:the kinesthetic perception system

the part of kinesthesia involved with experiencing pressures, force
 -- both upon body surface and internally

Kinesthesia is probably the, or one of the, earliest perception systems to start functioning already in the embryo

hence is probably fundamental in subsequent cognitive development

4.3 pertaining to attentional and perspectival structure

H. distribution of attention over a represented / perceived scene [< attentional structure]

language:

1. windowing of attention
 e.g., the windowing / gapping of attention over portions of a path

The ball I'd thrown up on top of the house fell--

- A. with maximal windowing over the whole of the path:
--off the roof, through the air, onto the ground.
- B. with gapping over one portion of the path:
 - a. medial gapping = initial + final windowing
--off the roof onto the ground.
 - b. initial gapping = medial + final windowing
--through the air onto the ground.
 - c. final gapping = initial + medial windowing
--off the roof through the air.
- C. with windowing over one portion of the path:
 - a. initial windowing = medial + final gapping
--off the roof.
 - b. medial windowing = initial + final gapping
--through the air.
 - c. final windowing = initial + medial gapping
--onto the ground.

2. level of attention

greater attention on the componential level

The bricks in the pyramid came crashing together / toward each other.

greater attention on the level of the Gestalt whole:

The pyramid of bricks came crashing in upon itself.

vision: perhaps attention can be distributed over a path /a composite object
in different patterns comparable to those in language

-- cf. control over attentional distribution in the signing systems spontaneously developed
by deaf kids without exposure to language

I. deployment of perspective point relative to a represented/ perceived scene

[< perspectival structure]

language:

1. perspective point's distance away

mid-range: She climbed the fire ladder in 5 minutes.

distal: Moving along on the training course, she climbed the fire ladder exactly at midday.

proximal: She kept climbing higher and higher up the fire ladder as we watched.

2. location of perspective point

interior: The lunchroom door slowly opened and two men walked in.

exterior: Two men slowly opened the lunchroom door and walked in. (adapted from Fillmore)

3. motility of perspective point

stationary: There are some houses in the valley.

moving: There is a house every now and then through the valley.

vision:

distance away: moving to a closer or further viewpoint, or projecting one's viewpoint there

location: moving to a view from one or another location, or projecting one's viewpoint there

-- including: projecting what someone else is seeing

motility: standing or moving along while viewing, or projecting one's viewpoint

-- cf. control over perspective point in the signing systems spontaneously developed

by deaf kids without exposure to language

4.4 pertaining to the content vs. structure distinction and to framework structure

J. complementary "content" and "structure" subsystems [<content vs. structure distinction]

their contrastive properties: substantive vs. schematic / quantitative vs. qualitative /

absolute vs. relative / Euclidean vs. topology-like /

bulk-based vs. lineament-based / precise vs. approximative

language: the open-class vs. the closed-class subsystems, as used in a sentence

open-class forms: substantive content and Euclidean specifics of shape, size, bulk, angle;

closed-class forms: topology-like schematic structure

vision: proposed:

one subsystem for the explicit / concrete / high-palpability perception of objects

another subsystem for the implicit / abstract / low-palpability perception of structure

many language-vision parallels above; one example:

language: OCs: pill/thimble/radio/dumpster, CC: in: The pill is in the thimble. The radio is in the dumpster.

vision: the high palpability subsystem: concrete Euclidean perception of pill/thimble/radio/dumpster

the low palpability subsystem: abstract, "sensed" topological, schematic perception of "inclusion"

both: the construct in the structure subsystem is abstracted away from particulars of:

the objects' size, shape, state of closure, discontinuity, relative orientation, relative location

since the language system evolved later, much of its closed-class subsystem apparently

tapped into or duplicated much of the neural mechanism for schematic structure

that the visual system already either tapped into or had within itself

K. integrative structure [< framework structure]

language: closed-class forms, in conjunction with open-class forms --

over space: -- help form coherent structured Gestalt of a static scene in reference

through time: -- help form coherent structured Gestalt of a temporal sequence in reference

and of interlocutor intentions through discourse

A: "John staggered along through the restaurant tables

and then bumped into a waiter carrying a tray. Did you see him?"

B: "Yes, but he was dizzy from some medicine he'd taken, not drunk."

from each other's utterances, B and A each integrate into a coherent conceptual model a mix of factors, including:

spatial geometry: "along through", "tables"

John generates a path curving through the interstices between tables

causal structure: "staggered"

often drinking too much makes someone stagger

reasoning: "staggered"

A apparently infers that John had drunk too much

spatial geometry: "carry"

the Waiter is generating a path, and causes an adjacent object (the tray) to move along the same path

temporal structure: "and then" + knowledge about staggering and waiter motion

the latter part of John's stagger temporally overlapped the waiter's motion

spatial geometry: "bumped into"

collision of 2 trajectories

temporal structure: past tense on "staggered" and "bumped"

A has this event in his memory, having witnessed it, and

is tapping this memory for the present speech situation

speech act setup: "Did you see?"

A switches from recounting his memory to the present moment to tap into B's memory

temporal structure: tense of "did" + OCs

A believes that B was there (maybe at a different table)

argument structure: "Yes but"

B indicates that A's physical description stands, but his implication or assumption fails

temporal structure: "had taken"

B adds a point on the time line before the start of the stagger event for a medicine taking event

causal structure: "dizzy from"

two things can cause staggering, dizziness and drunkenness

model construction: "..., not ..."

B directs A to redo his understanding of the cause of the staggering event

affect control: tone of B's utterance

B chides A for having assumed that John was drunk, a reproachable characteristic,

rather than in fact deserving of compassion over his medical impairment

vision:

over space: scene parsing, forming a Gestalt of structural delineations
 through time: integration of motion of observed objects as well as of observer

example: witnessing of the above-recounted scene

Continuation of the Overlapping Systems Model: Relating Language to Further Cognitive Systems

5. Language and the Affect System: apparently little overlap

languages do have a scattering of closed-class forms indicating affect:

diminutive: ‘affection’ / pejorative: ‘dislike, distaste’
 subjunctive: ‘wish’ / optative: ‘hope’ / desiderative: ‘want’
 undergoer construction (*My plants all died **on me***): ‘unpleasantness’
lest (I cleared the path lest he trip): ‘concern’
so/such (It’s so vivid!): ‘surprise, amazement’

But little is systematic. Thus, apparently no language has a subsystem of closed-class forms that subdivides the affect domain in a way comparable, e.g., in English to that of prepositions subdividing the domain of spatial relations, or to that of modals subdividing the domain of force-dynamic relations.

what an affect system might look like: from the physico-emotional complex experienced by a parent about a child standing near an open window on tenth floor:

spatial aspects usually expressed: Get away from the window!
 affective aspects could be expressed: Act AFEAR the window!

about a child standing near a freshly painted wall:

spatial aspects usually expressed: Get away from the wall!
 affective aspects could be expressed: Act AFAVOR the wall!

thus, affect low in hierarchical inventory of CC meanings; surprising, given its role in our psychology its low rank militates against grammaticization down to CCs with affect meanings;
 so, of verbs in *I keep/hate skiing*, only *keep* is likely to become auxiliary

6. Language and the Cognitive Culture System: apparently little overlap

6.1 cross-linguistic + cross-cultural comparison of conceptual structure

6.1.1 George Murdock's (1965) list of 73 cultural universals

age-grading, athletic sports, bodily adornment, calendar, cleanliness training, community organization, cooking, cooperative labor, cosmology, courtship, dancing, decorative art, divination, division of labor, dream interpretation, education, eschatology, ethics, ethnobotany, etiquette, faith healing, family, feasting, fire-making, folklore, food taboos, funeral rites, games, gestures, gift-giving, government, greetings, hair-styles, hospitality, housing, hygiene, incest taboos, inheritance rules, joking, kin groups, kinship nomenclature, language, law, luck superstitions, magic, marriage, meal times, medicine, modesty concerning natural functions, mourning, music, mythology, numerals, obstetrics, penal sanctions, personal names, population policy, postnatal care, pregnancy usages, property rights, propitiation of supernatural beings, puberty customs, religious ritual, residence rules, sexual restrictions, soul concepts, status differentiation, surgery, tool making, trade visiting, weaning, weather control

6.1.2 linguistic closed-class representation of categories on Murdock's list

only 8 categories have any closed-class representation; only 3-4 extensively so

(1) "status differentiation"

e.g., S. American Spanish 2nd person singular: vos/tu/usted + verb inflections
elaborate pronominal + inflectional forms of Japanese/Thai

(2) "etiquette"

e.g., grammatically represented by various markers and constructions for
requesting as against commanding
(*Could you please speak up?* vs. *Speak up!*)
for suggesting as against directing
(*Why not go abroad?* vs. *You should go abroad.*)

(3) "Property rights"

perhaps those CCs expressing ownership and transfer of possession
e.g., Russian *u* + *GEN* 'in the possession of'
DAT 'into the possession of'

(4) "Personal names"

as a subset of proper nouns, have distinctive syntactic characteristics in some languages

- (5) "kinship nomenclature" (see next)
- (6) "greetings"
- (7) "numerals"
- (8) "calendar"

6.2 Single-Culture + Single-Language Comparison of Conceptual Structure

In Mparntwe Arrernte (Wilkins, 1988, 1993) CCs reflect cultural structure, but only in some 6-8 cases, out of perhaps thousands of forms. Two best examples:

6.2.1 pronoun distinctions

1st, 2nd, 3rd person dual and plural pronouns have 3 distinct forms for people of different patrimoieties; same patrimoiety, different generation; same patrimoiety, same generation

6.2.2 the way in which switch-reference is applied

In a sentence of the type: "Location A became defiled, when location B broke apart"
"broke apart" can take 'same subject' inflection if A and B have same totemic affiliation

In: "The little boy cried, as they walked along."
if "walked" has 'different subject' inflection, to indicate that the boy is socially different from the others in the group, can only mean that he is of a different harmonic generation (odd-number generation apart)

NB: Language and the culture system are perhaps the only two cognitive systems whose organization and structural properties include both a general portion and a "local" portion that varies from group to group and is developmentally learned therefrom.

In our model, the Whorfian hypothesis is equivalent to an extensive overlap between the local organization of the language and that of the culture for the same group. The evidence of this section, 6.2, challenges the hypothesis.

The Whorfian hypothesis does not apply to general overlap between cognitive systems, hence, not to the language-culture comparison of section 6.1, nor to this model's other comparisons

6.3 example of overlap across culture, language, gesture, vision: schema projection

culture: "ghost physics" (Boyer 1994): seemingly universal properties of spirits:

invisible / pass through solid material (e.g., walls)

also: evil eye, power emanations, magical influence

gesture: pointing to the next town while standing inside a building

language: demonstrative paths in fictive motion: The arrow points toward the town.

?vision: low palpability ception of line emanating from a vertex

7. Language and the Understanding System:

the putative understanding system generates mental models that one experiences as accounting for / explaining the structure and function of some domain of phenomena at whatever level of consistency, elaboration, or sophistication, from idiosyncratic personal accounts to folk cultural accounts to scientific theories

7.1 conceptual structure in language and in early science: examples of overlap

certain conceptualizations in early scientific theories may have arisen as

writ-large theoretized versions of conceptual structuring

in the closed-class subsystem of language (as well as of that in other cognitive systems)

A. force dynamic opposition in language's closed-class forms

and in Freud's psychological theory of psychodynamics

a. intra-psychological force dynamic opposition

I [Antagonist] held myself [Agonist] back from responding.

b. Freud: id-superego conflict

B. in linguistic force dynamics, an object's tendency toward motion or toward rest

and classical/medieval physics ideas of impetus and an object's tendency to come to rest

C. causality in language's closed-class forms and Newtonian "billiard-ball" physics

a. causal distinctions commonly marked by closed-class forms across languages:

non-causative (The plate slid across the table.)

direct physical causation (I slid the plate across the table.)

mediated physical causation (I made the plate slide / got the plate to slide across the table.)

[as well as: inducive (The director had the actor slide across the table.)]

not interactive concepts like: 'foster' / 'guide' -- perhaps amenable to dynamical systems theories

b. mechanics: an object continuing in its state of motion unless acted on;

one object acting on another; a succession of such actions

D. representation of perception in language's closed-class forms and in early science

a. "sensory-path" type of fictive motion, going from the Experiencer to the Experienced

I looked toward / into / past / away from the canyon.

b. ancient Greek and medieval "extramission" theory of visual perception

E. topology in language's closed-class forms and in mathematics
 a. magnitude- + shape- + bulk-neutrality b. family of topologies

F. language distinction between 'something' and 'nothing' not continuous with 'degrees of something'
 and the Roman numeral system lacking a zero

a. zero quantity vs. (degrees of) positive quantity

X: Did you see any dogs there? Y: Yes, several. / Yes, one. / No, none.

X: Did you see a dog there? Y: Yes, (I saw one.) / Yes, several. / No, I didn't.

stationariness vs. (rates of) motion (stationariness is not a form of total slowness)

I sped/crept through/*at the woods. I stayed at/*through the woods.

b. Roman numerals: I, II, III, V, X, L, etc. but no "0"

7.2 conceptual structure in language and in certain realizations of the understanding system: much overlap

preceding: comparison of just one component from different conceptual subsystems

here: comparison of the whole subsystems

speculatively, conceptual structure in the understanding system has a basic and an advanced portion
 the basic portion = the whole of what appears developmentally early in any area of understanding
 and persists as the core of that area as it matures, there joined by advanced material

perhaps the basic portion largely comprises all of the following,

which should thus show much structural overlap:

grammar, child conceptualization, naive science, traditional lore, early science, casual science

fuller characterization of these areas:

the semantics of the closed-class subsystem of language

developmentally early conceptual organization in various "modes of construal"

naive conceptual organization in adults (naive physics, etc.)

traditional cultural lore?

the concepts of early science

the concepts that sophisticated science expresses when being casual, not rigorous

my previous work suggests: all languages' CCs are semantically constrained,

both as to the conceptual categories and as to the member concepts they can ever express
 so there is an apparently universal inventory of categories & notions

that each language draws from for its CC meanings

What has determined the contents of this inventory? It may approximately correspond to
 conceptual structure in other developmentally early cognitive systems

e.g., closed-class force dynamic representation in language expresses:
 most: 2 forces diametrically opposed; a bit: radially centripetal force; minimal: 2 forces aligned
 not: 2 forces converging at angle; 3 or more forces; force acting along a curve
 those FD concepts that make it into the CC system may roughly correspond to
 the force concepts in the child's basic understanding system
 the CC system then (gradually) closes off, so all more advanced force concepts
 can enter only open-class forms & the advanced portion of the understanding system

relation between these findings and George Lakoff's findings that the conceptual structure
 of scientific/philosophical theories largely corresponds to that of everyday metaphors:
 his metaphors generally have phrasal scope and include advanced material of the understanding system
 e.g., concepts like 'war', 'a building', 'a journey'
 but the concern here: the conceptual structure only of the closed-class subsystem,
 which is largely only a subset of the conceptual structure of everyday metaphor
 and corresponds to the most basic portion of the understanding system

8. Examples of Organizing Factors Apparently Common across Cognitive Systems

such factors epitomize nature of conceptual structure for human cognition

8.1 the relating of one structure to another [< schematic structure]

this relating involves two main parameters:

the mereological relation of one structure to the other: inclusion, coextension, partial overlap, separation
 parity: (a) the dual-entity conceptualization; (b) the single-entity conceptualization

- (a) the two structures are conceptualized as representing two different entities
- (b) the two structures are conceptualized as representing the same entity

8.1.1 inclusion

a. dual-entity conceptualization: embedding

language: any embedding; semantic: The beacon kept flashing 5 times at a stretch for 3 hrs.

syntactic: The woman [holding the baby [that's drooling]] is my sister.

vision: the multiple structural embedding of, e.g., a restaurant viewed from a corner

reasoning: resolving one subproblem and plugging that into a larger problem to be resolved

motor control: twisting one's wrist as one raises one's arm as one approaches a vending machine to
 insert a coin

b. single-entity conceptualization: part-whole relation

language: any constituent of a construction; semantic: the Figure of a Motion event

my pen fell off the table.

syntactic: a determiner in a noun phrase- *the* red book

vision: any component of a perceived entity, e.g., a vertex of a cube

reasoning: any component of a coherent train of thought; step in a proof

motor control: any component of a coherent movement, e.g., bending forward at the waist in sitting down

8.1.2 coextension

a. dual-entity conceptualization -- in space: co-penetration; in time: concurrence

exemplified here: temporal concurrence

two types: (i) coordinated (ii) non-related or conflicting

language: expressed by English CCs like (i) during, while, as, participial -ing; (ii) meanwhile

He slept while she worked. / Dad was in the kitchen cooking dinner; meanwhile, Suzie was in school learning fractions.

perception: e.g., (i) seeing 2 cars moving toward collision, lips seen moving + speech heard;

(ii) seeing jogger on one side of street and cat fight on other side

affect: e.g., (i) concurrent feelings of love and compassion for someone; (ii) ambivalence

motor control: e.g., (i) moving head forward in raising soup spoon to mouth; (ii) scratching itch while talking

b. single-entity conceptualization: identity / equality

language: e.g., equational sentences: George Bush is the president of the U.S.

or coreference / deixis -- cf. deictic "I" in: *I ate snails for breakfast.*

imagine 2 filmstrips of (1) a person eating snails, (2) a person talking about this to others

deixis here: equating the 2 persons as instantiations of the same single entity

perception: identifying a current percept with an earlier percept of the same object

equating views from different perspective points as being of the same object

motor control: equating 2 different executions of the same action pattern

8.1.3 partial overlap

perhaps has little role in cognitive structuring, e.g.,

language lacks spatial prepositions with meanings like: 'half on and half off'

*The book lay *belap* the table.

and temporal conjunctions like 'partly during & partly not during': **He slept halfway while she cleaned*

vision may have little beyond percept of "crossing", as in a "+" formed of 2 lines/rectangles

8.1.4 separation

a. dual-entity conceptualization: two distinct entities

b. single-entity conceptualization: a single discontinuous entity -- the only type exemplified:

language: discontinuous constituent, e.g., French: ne...pas 'NEG', English: what...for 'why'

vision: the 2 end segments of a centrally occluded line

motor control: the <hugging> pattern realized by the 2 separate arms

8.2 relative quantity [< quantity structure]

realized at 3 levels, each larger level embedding the next smaller level

A. scope: the relative amount of some entity being considered together at the same time
for the structural properties that exist at that choice of quantity

B. granularity: the relative size of the subdivisions into which this amount is internally partitioned
in one's attention

C. density: the relative number of elements within any such subdivision that enter into consideration

vision & discourse: directing attention to via perceiving or referring to --

A. a. large (global): a town; b. small (local): a room

for the room: B. a. coarse: furniture, people, architecture b. fine: knickknacks, cracks

for fine: C. a. sparse: ashtray + wallpaper design

b. dense: these + crack in ceiling, sunbeam on portrait, stain on butler's tie

motor control: attentive monitoring and guidance over --

A. a. large (global): whole body b. small (local): e.g., right arm

for arm: B. a. coarse: chunked as to upper arm + lower arm, as in waving

b. fine: chunked as to upper arm + forearm + wrist + palm + fingers + knuckles, as in piano playing

for fine: C. a. sparse: forearm + wrist + first finger, as in playing "Chopsticks"

b. dense: all the fine-grained arm parts, as in playing Chopin

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especially Chapters 1: the relation of grammar to cognition;
 2: fictive motion in language and "ception"; 3: how language structures space;
 4: the windowing of attention in language; 5: Figure and Ground in language;
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