

Relations across Cognitive Faculties: An Addition to the Taxonomy of Cognitive Semantics

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Abstract

Language is often approached as a self-contained system, one with its own specifically linguistic elements of organization, generally independent of other systems in cognition. But by the analysis here, language shares parts of its organization with other systems in cognition and could not function without their participation. For this analysis, cognition is heuristically divided into a number of cognitive faculties, each judged to perform some integrated function. Some faculties, including language, are treated as “cognitive systems” and others as “cognitive organizers”. Language is examined both in its evolutionary relation to other faculties and as an interface among them.

Keywords

language evolution – cognitive faculties – cognitive systems – cognitive organizers – combinant structure – group-level organization

This article is an addition to *A Taxonomy of Cognitive Semantics* (Talmy, 2022), which appeared as the Foreword to the *Handbook of Cognitive Semantics* (Li, 2022). It addresses the relations of language to other cognitive faculties—the topic of one of the sections omitted from the Foreword due to space limitations. This addition is written in the same summary style as the taxonomy, starts numbering and lettering where it leaves off at section 14 and J, and cites sections in it within brackets.

15. K. Relations across Cognitive Faculties

Language is often approached as a self-contained system, one with its own specifically linguistic elements of organization, generally independent of other systems in cognition. But by the analysis here, language shares parts of its organization with other systems in cognition and could not function without their participation. We start with a theoretical background to this analysis.

Cognition can be heuristically divided into more or less extensive “faculties”, each judged to perform some integrated function. Under alternative analyses, a cognitive faculty can

be treated either more as a medium that is organized or more as the organization of a medium. “Organizing” here is meant to cover both static structures and dynamic processes in the medium. A faculty will here be called a “cognitive system” when treated as the former alternative and a “cognitive organizer” when treated as the latter. Language itself is here treated as a cognitive system.

With general regard to what are here treated as cognitive systems, major ones appear to have evolved at different times in phylogenesis. Presumably among the earliest were motor control and perception in general or in its various modalities, including the chemical, tactile, visual, and auditory. Later evolving systems may have included affect and ideation (having and manipulating ideas). And cognitive systems that seem to have evolved in the lineage leading to humans—whether anew or from a prior more elementary form—include language, gesture, music, dance, art, and culture. Seemingly also co-evolving with these were much elaborated forms of affect and ideation (including intellectual processes like imagining, inferring, and reasoning).

In turn, cognitive systems can represent or exhibit a range of cognitive organizers. Here, a group of “patterning” organizers includes patterning in general as well as particular forms of it such as spatial, temporal, causal, categorial, and analogic organization. Another group of “cognizing” organizers includes (the structuring and processing provided by) attention, memory, learning, and epistemology. And a further group of “constitutive” organizers includes (the degree to which a cognitive system manifests) intensity, elaboration, plasticity, and consistency.¹

A given cognitive organizer can occur in just one, some, or all cognitive systems. Thus, cognitive systems can share particular cognitive organizers in what Talmy (2015) calls the “overlapping systems model of cognitive organization”.²

Language can be related to other cognitive faculties both externally—where its organization resembles or differs from theirs—and internally—where its functioning requires their participation. The next two sections address these two types of relation in order.

15.1 K1. Language’s External Relations to Other Cognitive Faculties

The organization of language can be compared with that of other cognitive systems—its “external” relations with them. Such comparisons suggest how cognitive systems can be alike or different and hence how they might relate to each other evolutionarily. The next two sections look at cognitive organizers that language respectively does not and does share with other cognitive systems. Evidence for organization in language is here based wholly on its closed-class morphemes, since these underlie one of its most fundamental structuring mechanisms (Talmy, 2000a, chapter 1; Talmy, 2011).

¹ Under a different analytic emphasis, as suggested, many of these cognitive organizers, e.g., attention, can be readily treated as cognitive systems.

² The term “systems” is here used over “modules” (Fodor 1983) because, unlike the autonomy ascribed to modules, they regularly share cognitive organizers and interact.

15.1.1 K1a. Non-Commonality of Organization

A comparison of language with any other major cognitive system generally shows that certain cognitive organizers are prominent in one while minimal in the other, in both directions. Such a comparison is proposed next for language and visual perception (Talmy, 2015).

K1a1. Prominent in Language Organization, Minimal in Visual Organization

Prominent in language but only minimal in visual perception are two categories within the cognitive organizer of epistemology. These two are (the judgment of) reality status and evidentiality—addressed next in order.

First, seemingly all languages have closed-class—hence, structural—representation of reality status (Talmy, 2000a, chapter 6). For example, the conceptual content represented by a sentence can be designated as actual (*I danced*), negative (*I didn't dance*), counterfactual (*I should have danced*), potential (*I might dance*), or conditional (*I would dance if I had the time*).

Though requiring empirical confirmation, it can be conjectured that visual perception by contrast lacks a range of ways to interpret the reality status of a scene. It seems that, when viewed, a scene is simply taken to be actual.

Second, perhaps all languages have closed-class representation of evidentiality—whether the speaker takes the sentence's proposition as factual or infers it as probable (*He is home now / must be home by now*). Some languages obligatorily mark this judgment and, with regard to inference, distinguish several types of it. For example, they might direct a hearer to infer the occurrence of an event based on its after-effects; its periodicity of occurrence; the non-visual stimuli it produces; or reports about it (Talmy, 2000a, chapter 1). Thus, if the Atsugewi after-effect evidential *-it'* is suffixed to the verb root *am-* 'eat', the result can express the likelihood that people were eating at a table on the evidence of dirty dishes there.

Though again needing experimentation, visual perception by contrast seemingly does not mark elements within a scene for their evidentiary status but rather represents them as they appear or in accord with expectation.

To illustrate the latter, the visual system does not flag an occluded portion of a configuration—say, the portion of a molding located behind a cabinet—as being 'unknown' or 'inferred as present'. Rather, the perceptual system generally "fills it in" unconsciously with the expected characteristics. In effect, such conformance with expectation is "anti-evidential".

K1a2. Prominent in Visual Organization, Minimal in Language Organization

The opposite balance—minimal in language but prominent in visual perception—is seen within another cognitive organizer, spatial organization, for two of its categories: rotation and dilation.

First, some languages, including English, have closed-class representation of rotation. But these mostly mark only one structural aspect of rotation, the orientation of the spin axis, and

within that aspect distinguish only vertical and horizontal, as seen respectively in *I turned the bucket around / over*.

By contrast, visual perception can apparently represent diverse structural aspects of rotation with some granularity. Thus, a viewer can perceive many different orientations of spin axis, as of a baton twirled around at various angles. She can also perceive certain different geometric relations that the spin axis has to the rotating object: at the object's center—e.g., a disk spinning around; at its endpoint—e.g., an arm swinging around; and outside it—e.g., a squirrel scrambling around a tree trunk. As the examples just cited show, English here can only use *around* for all three cases. She can further perceive different extents of rotation—from part of a circuit, to one complete circuit, to a few circuits, to many circuits. English can again use only *around* while indicating the extent through, say, inference of it from the temporal expression, as in *I ran around the house for 20 seconds / in one minute / for five minutes / for hours*.

Second, some languages, including English, have closed-class representation of “dilation”. But these mostly mark only two structural aspects of it: its sign, that is, contraction vs. expansion, and number, whether one or more objects engage in it. Thus, English represents contraction vs. expansion for a single object with *in* and *out*—e.g., *The large air bladder suddenly snapped in / out*; and for plural objects with *together* and *apart*—e.g., *The ball bearings all rolled together / apart*.

Contrast this with visual perception. To be sure, within a viewed scene, a dilation's sign and number can certainly be visually perceived. But a viewer can also perceive further structural aspects. One is the dimension of a single dilating object, like expansion in the one, two, or three dimensions of a bungee cord stretching out, an oil slick spreading out, or dough puffing out—all of which English uses *out* to represent without further differentiation. A viewer can additionally perceive whether dilation involves a solid entity or only a perimeter, as with expansion in a rubber sheet vs. a rubber ring stretching out or in dough vs. a balloon puffing out. Again, English here only uses *out*. And vision can perceive whether an object's apparent contraction or expansion is due to an increase or decrease in the distance between it and the viewer—a structural category unrecognized in language.

15.1.2 K1b. Commonality of Organization

Complementarily, language shares some cognitive organizers with every other cognitive system. We next address such commonalities between language and visual perception, ideation, and the cognitive systems that co-evolved with language in the lineage leading to humans (Talmy, 2015).

K1b1. Commonalities of Organization between Language and Vision

While section 15.1.1 addressed differences in organization between language and visual perception, we here address commonalities. One such commonality is seen in spatial schematization—another category within spatial organization, the cognitive organizer that just

above was cited for other categories showing a visual advantage. Spatial schematization in turn includes two subcategories, conformation and topology, addressed next in order.

With regard to spatial conformation, perhaps every language has closed-class forms representing some geometric type properties of a Figure object's site or path relative to a Ground object (Talmy, 2005). For one English site example, the preposition *in*, as in *The large rock (F) is in the fish tank (G)*, indicates that the Ground can be conceptually schematized as a plane so curved as to define a volume of space, and that the Figure occupies a portion of that volume. Though needing experimental confirmation, a viewer, on perceiving the rock and the tank, may well also perceive the former as occupying a portion of the space enclosed by the latter. That is, she may visually perceive a structural relation of an 'in' type of conformation.

We next consider topology, an abstraction that disregards specific Euclidean form. To illustrate again with *in*, this preposition is neutral to magnitude—(*a pill*) *in a thimble* / (*lava*) *in a volcano*; to shape—*in a well / trench*; to closure—*in a beach ball / punch bowl*; and to discontinuity—*in a bell jar / bird cage*. But it can be conjectured that visual processing—beside a Euclidean representation specific to form—also produces a topological representation, so that a viewer of the eight scenes just represented linguistically would also perceive an abstract visual representation consisting simply of one object included in or surrounded by another.

K1b2. Commonalities of Organization between Language and Ideation

We posit that, in evolving, the cognitive system of ideation has come to include a subsystem of "explanation". This subsystem generates mental models experienced as accounting for the structure and function of some domain of phenomena in terms of concepts already accepted. An explanation can range over various levels of consistency, elaboration, and sophistication.

Linguistic closed-class concepts seem to have much overlap with concepts in certain less sophisticated types of explanation and may have been the model for them. Such less sophisticated types include naive personal accounts, traditional cultural lore, casual science, and early science. Of the eight examples detailed in Talmy (2015), two are summarized next.

Linguistic Fictive Sensory Paths and the Extramission Theory of Perception. Many languages can represent an event of perception as fictive motion (motion conceptualized but unperceived) of a particular type: a "sensory path". Where the perceiver initiates the event agentively, the direction of this path is generally conceived as going from the perceiver to the perceived entity. For the visual modality, English can represent this circumstance with the verb *look* as in *I looked down into the valley*. It has no construction in the "perceived-to-perceiver" direction, say, something like **The valley "looked" up out to me*.

But this linguistic bias matches the "extramission" theory of vision, in which the eyes emit beams that project through the air until they contact the perceived object. This theory was held by the early science of classical Greece and persists today as the naive view of up to 50% of

adults (Winer & Cottrell, 1996). Modern sophisticated science has replaced this conception of vision with the “intromission” theory of photons proceeding from an object to the eye.

Linguistic Force Dynamics and the Early Impetus Theory of Motion. In one basic force-dynamic pattern (Talmy, 2000a, chapter 7)—the extended causing of motion—a moving entity’s tendency toward rest is overcome by a stronger external entity and so continues moving, as seen in *The ball rolled on because of the wind blowing on it*. Correspondingly, the medieval theory of impetus continued Aristotle’s view that a moving object will intrinsically come to rest unless some external force keeps it in motion. By contrast, modern physics holds that an object has no internal tendency toward a particular state of motion but continues at its current velocity unless affected externally.

K1b3. Commonalities of Organization across Language and the Other Human-Lineage Cognitive Systems

Language and the other five cognitive systems cited above that appeared in the lineage leading to humans share particular forms of certain cognitive organizers. Specifically, all these cognitive systems exhibit “combinatory structure”, a form of patterning, and “group-level organization, a form of consistency. These systems may share those two forms because they co-evolved with language or evolved later partly modeled on it. This is one area in which organizational relations across faculties have implications for their evolutionary relations.

Combinatory Structure. Language seems to be the cognitive system with the most combinatory structure, exhibiting numerous forms of it across many subsystems and levels, as detailed in Talmy (2018b). It appears, for example, in the combination of phonetic features into phonemes, phonemes into morphemes, morphemes into multimorphemic words, single- and multi-morphemic words into phrases, phrases into clauses, clauses into multi-clausal sentences, single- and multi-clausal sentences into single-speaker discourses, and such discourses into dialogues.

But many forms of combinatory structure appear as well in the other five late-evolving human systems. The cognitive system of music, for example, can be analyzed as having at least the following three types of combination. In one type, there is an inventory consisting of the notes of a pitch set or scale, and each instantiation includes a selection of those notes arranged consecutively in accord with rules of tonal sequencing. Another type of combination has an inventory consisting of distinct temporal lengths, and each instantiation includes a selection of such durations assigned consecutively to each note and each inter-note interval in accord with rules of rhythmic organization. And the third type has an inventory consisting of distinct degrees of emphasis or intensity, and each instantiation includes a selection of such accenting for assignment to the notes in accord with rules of pulse or beat patterning. When these three types of combination are themselves combined, the result is an emergent higher-level unit, a melody.

Group-Level Organization. Pre-human cognitive systems are largely invariant across a whole species. For example, across the entire species of bald eagles, cognitive systems generally consistent in their operation include visual perception and motor control as relates to flight. The same holds for the cognitive system of communication (a more elementary precursor of language) across vervet monkeys (Seyfarth and Cheney, 2012).

But a different form of organization appears in all the cognitive systems arising in the human lineage, and this new form itself had to have arisen through evolution. While on the one hand these systems do each have certain aspects of organization in common across the human species, they also exhibit distinct patterns of organization across different geographically or socially based groups. Thus, beside linguistic universals, distinct languages exist that can differ extensively in their phonology, morphology, syntax, semantics, and lexicons. Such group-level differences—again beside certain pan-human structural commonalities—are also present in the cognitive systems that co-evolved with language, including culture, gesture, music, dance, and art. Certain disciplines have formed specifically to analyze such group-level differences in these cognitive systems, such as anthropology for culture and ethnomusicology for music.³

15.2 K2. Language's Internal Relations to Other Cognitive Faculties

While the preceding section addressed how language independently resembles or differs from other cognitive faculties in organization, the present section addresses how language directly engages other cognitive faculties in its use—its “internal” relations with them. To amplify, language interfaces between a number of other faculties (or between particular components or applications of them). It coordinates them and integrates their functions. It can associate them in an established lexicon as well as in novel expressions.

To be sure, attention has been directed, especially in the psychological literature, to various respects in which other cognitive faculties relate to and play a role in the use of language. But the present section may be the first attempt to directly address such relations and roles in their collectivity as part of the intrinsic organization of language and as an issue in its own right. The following four subsections address different aspects of such internal faculty relations in language.

15.2.1 K2a. Faculties Underlying Morphemes

In mostly every morpheme of a language's lexicon, there is an association of the cognitive faculties underlying language's three main divisions of form, meaning, and grammar (Talmy, 2005). Underlying form is the cognitive organizer of patterning—specifically that of a phonological representation—which organizes the cognitive systems of motor control for vocalization in the speaker and of auditory perception in the hearer. Underlying meaning are the

³ The Sapir-Whorf hypothesis, in proposing a conceptual alignment between a language's grammar and the speaker's culture, makes sense only under an assumption of group-level variation.

cognitive systems of ideation and affect (below equally designated as “conceptual”). And underlying grammar are, with regard to its formal aspect, the cognitive organizers of categorization and of patterning more generally and, with regard to its semantic aspect, the same faculties just cited as underlying meaning. In any given morpheme, then, the pertinent particular values of all these faculties are associated with each other.

We can use the English morpheme spelled *puny* to illustrate this association across three sets of faculties as particularized for that morpheme. The morpheme’s form is underlain by the cognitive organizer of patterning particularized as the phonological representation /pyuni/, as well as by the two cognitive systems in play in a speaker’s sequential motoric production of the sounds [p^h], [y], [u], [n], [i] and a hearer’s auditory perception of the corresponding phonemes. The morpheme’s meaning is underlain by the cognitive systems of ideation with its particular concept ‘small in size’ and of affect with its particular attitude ‘derogation’. And the morpheme’s grammar in its formal aspect is underlain by the cognitive organizers of categorization, particularized as the lexical category “adjective”, and of patterning more broadly, particularized as <generally occurring before and in construction with a noun or after and in construction with a copula>. In its semantic aspect, the morpheme’s grammar is underlain by the cognitive system of ideation particularized as the concept ‘attribute’. Again, all these cognitive faculties in their particularizations are associated with each other in the morpheme through the intrinsic organization of language.

15.2.2 K2b. Faculties Underlying Basic Communication

An association of the faculties underlying form, meaning, and grammar similar to that just seen for individual morphemes continues when morphemes are combined into an expression, as in, for a random example, *Whales swim in pods*.

But the meaning of such expressions can be extended or modulated in what might be viewed as an expanding sphere of basic communication, first by gesture and then by context. These communicative additions are in turn underlain by cognitive faculties in part beyond those already cited.

K2b1. Gesture

Spoken language is often accompanied by co-speech gesture. Such gesture expresses semantic content about the same topic that the verbal content is about, but often distinct from it. This gestural meaning is underlain as before by the cognitive systems of ideation and affect. But it also requires the integration of further (particular applications of) cognitive faculties. Four cases of such additions are addressed next.

First, in the basic case, a gesture requires additional motor control by the speaker—now not of the vocal apparatus but of the rest of the body—and, newly here, visual perception by the hearer, specifically of the speaker’s body.

To illustrate with an example from Beattie and Shovelton (1999), while describing a comic book story involving a vintage car, the respondent says *So the hand is now trying to start the car* and gestures by circling in the air with his hand as if winding a crank. The hearer here visually perceives the speaker's bodily movement and integrates its distinct conceptual content with the verbal content.

Second, if the gesture is of the targeting type (Talmy, 2018a, chapter 5), the hearer must include his visual perception not only of the speaker's body but also of the environmental surroundings. To illustrate, a speaker entering an airport with a companion might say *That's my father* and gesture by pointing a finger at a particular man some distance away there. To interpret the speaker's utterance, the hearer must regard not only the speaker's gesture but also the man in the environment as well as how both the gesture and the man are situated within that environment.⁴

Third, Talmy (2018a, chapter 5) proposes that, in viewing a targeting gesture, the hearer cognitively constructs a "fictive chain" of imaginal elements progressing through space from the gesture to the targeted object. In the preceding example, this can consist of the hearer imagining the speaker's extended finger as coaxially emitting a fictive linear projection that progresses rapidly through space until it intersects with and stops at the distal object to mark it as the speaker's intended target. Such a fictive chain generated in the hearer's cognition is based on the cognitive system of visual perception, but is attenuated under the cognitive organizer of intensity to function at the "Semi-Abstract Level of Palpability" (Talmy, 2000a, chapter 2).

Fourth, a gesture can require the integration of yet another cognitive faculty, the cognitive organizer of analogy. For example, after saying *My sister in Dublin has a tattoo*, a speaker might add *right here* and gesture by placing her right palm onto her left shoulder. In addition to bringing in the cognitive systems of motor control in the speaker and perception in the hearer, this gesture initiates in the hearer's cognition an analogical mapping of the tattoo's location from the speaker's left shoulder to that of the cognitive representation expressed by the subject NP (Talmy, 2018a, chapter 14).

K2b2. Context

The context (Talmy, 2000a, chapter 5) of an expression and any gesture accompanying it can affect their meaning. And such context largely requires certain applications of particular cognitive faculties. Instances of these include visual perception of the physical surroundings, knowledge (epistemology) of the culture, and memory of the interlocutors history together.

⁴ While some deictics—like the *that* in the present example—are often accompanied by a targeting gesture, some require one. English examples are *thataway* and *yay*, as in *The gunman rode off thataway* and *The fish I caught was yay big*—said while gesturally indicating respectively a direction and a linear extent (Talmy 2018a, chapter 5). Significantly, our thesis that language can interface between a number of cognitive faculties is advanced by the observation that a morpheme can be lexicalized to associate together the faculties underlying not only the usual form, meaning, and grammar but also gesture.

For example, if in a restaurant one family member says to another *Don't lick the knife this time*, the appropriate interpretation of the sentence by those present rests contextually on their visually identifying the relevant knife in the addressee's hand, knowing that licking one's knife in public is inappropriate in their culture, and remembering that the addressee had done this in the past.

15.2.3 K2c. Faculties Underlying Certain Semantic Distinctions

It can be posited that particular cognitive faculties are responsible for certain semantic distinctions present in language. Proposed next are four such distinctions and the faculties underlying them.

K2c1. Factivity

Every morpheme or sensible expression has what can be called a “conceptual representation”. This is the conceptual content that, to take the hearer's perspective, is evoked in his cognition on hearing the form. But in a speaker's or hearer's belief system, a conceptual representation can exhibit a particular distinction. It can be held either to correspond or not correspond to something in reality—respectively a “factive representation” and a “fictive representation”. The cognitive organizer of epistemology can be held to have a component of “factivity” responsible for ascribing actuality or non-actuality to a conceptual representation.

To illustrate this distinction for morphemes, both *bucket* and *dragon* equally evoke a conceptual representation—here, one including an image—in a hearer when they are uttered. But these conceptual representations likely engage the hearer's epistemological faculty and further evoke a sense of being respectively existent and nonexistent as factive and fictive representations.

And to illustrate this distinction for expressions, the subjects of *My sister in Dublin has a tattoo* and of *The hero in my novel has a tattoo* both have a conceptual representation—that of a person. But a hearer would likely judge these representations to be respectively factive and fictive.

K2c2. Specificity

Under another distinction of “specificity”, a conceptual representation can be either specific or nonspecific. That is, it has either a particular instantiation or only a generic or potential realization. This distinction is underlain by the cognitive system of ideation and generally also by the faculties that underlie grammar.

This distinction exists both for a fictive conceptual representation, as in *The chief dragon approached me* vs. *I went in search of a dragon* (from a fantasy novel), and for a factive one, as in *The lawyer approached me* vs. *I needed to find a lawyer*.

K2c3. Access

A conceptual representation that is both factive and specific is commonly called a “direct referent” in linguistics and philosophy. Such a direct referent can exhibit a further distinction of “access”. It is either accessible or inaccessible. In the former case, a speaker or hearer can currently perceive it or motorically act on it—operations of the cognitive systems of perception and motor control—whereas in the latter case they cannot.

To illustrate, the subject of the earlier example *My sister in Dublin has a tattoo* has a direct referent inaccessible to the speaker’s or hearer’s perception. But that in *The man across the room has a tattoo* has a direct referent that *is* accessible to their perception. And the hearer integrates this perception into the meaning of the expression.⁵

Some further characteristics of access can be cited. First, direct reference to the perceived and to the unperceived can be sequential—the transition often drawing little attention—as in *The chef here is slicing a parsnip that was grown in Paris*. Further, conceptual representation of the unperceived—whether factive or fictive—can continue indefinitely in a “narrative / story world” (Costello et al., 1995) with its own “internal timeline” (Talmy, 2018a). And such a narrative of the unperceived can be conducted even amidst a welter of current perceptions, as when two speakers discuss an unrelated topic while walking down a busy street.

K2c4. Targeting

For a fourth case, a linguistic target (Talmy, 2018a) exhibits a particular distinction—it is either deictic or anaphoric. And these alternatives are underlain by partly distinct cognitive faculties.

Thus, say that a speaker points through a store window at an object and says *That’s the new iPhone*. The morpheme *that*, here a deictic, directs the hearer to coordinate the cognitive faculties underlying the meaning of the current clause with the cognitive system of visual perception—his current viewing of the gesture and of the object within their environment.

But say that a speaker instead says *The new iPhone was just announced; that’s what I’d like for Christmas*. The same morpheme *that* is now an anaphor. It again directs the hearer to coordinate two sets of faculties. As before, one set consists of the cognitive faculties underlying the meaning of the current clause. But the other now consists of the cognitive organizer of memory—his working memory of the meaning of the previously uttered nominal.

15.2.4 K2d. Limitations on Faculty Coordination

⁵ Note that a speaker can add the earlier-seen phrase *right here* and hand-on-shoulder gesture to any of the three “tattoo” sentences, showing that analogical mapping can be applied to an object whether it is accessibly factive, inaccessibly factive, or fictive.

The coordination that language carries out among faculties can be great, as in the cases above, but it also has limitations. We next address three areas, each with sectors that do and do not exhibit certain associations across faculties. These contrasts in faculty participation can help sharpen the contours of language's coordinating role.

K2d1. The Sapir-Whorf Hypothesis

The Sapir-Whorf hypothesis (e.g., Whorf, 1956) proposes a strong alignment between the conceptual organization of a language's grammar and that of the speakers' thought and culture. In terms of faculties, the proposal is that ideation and affect (cognitive systems) exhibit a similar patterning (a cognitive organizer) on the one hand in the semantic aspect of a language's grammar and, on the other hand, in the speakers' thought (i.e., their individual psychology, itself here mainly involving the cognitive system of ideation) and in their culture (a cognitive system).

Evidence for a grammar-thought alignment is relatively ample. For example, speakers of a verb-framed language without ready syntactic means for representing Manner evidently tend not to include Manner in their thoughts about a Figure's motion or to take note of it in an observed situation (Slobin, 2006).

But evidence for a grammar-culture alignment is quite slight. For example, kinship relations and totemic affiliations have great cultural elaboration and attention in Aboriginal Australia (Heath et al., 1982). But the language of the Mparntwe Arrernte there (Wilkins, 1993) may have only one fully explicit grammatical reflection of such attention. Specifically, there are distinct personal pronouns for plural referents with certain kinship relations. But this is minute relative to the entire grammatical system of the language (Talmy, 2000b, chapter 8).

K2d2. Embodiment

As used in linguistics, embodiment is generally the idea that the semantic organization of a language as well as speakers' understanding of expressions in it, whether concrete or abstract, are largely based on the speakers' experience with their own perception and bodily action. The idea hence posits a coordination between two sets of faculties. The first set consists of the cognitive systems of ideation and affect underlying linguistic meaning, while the second consists of the cognitive systems of perception and motor control.

But of the areas where embodiment might be expected to appear, some seem to show it extensively while others only slightly (Talmy, 2011). Two such areas, respectively, might be the meanings of open-class as against closed-class morphemes.

Thus, the meanings of many open-class morphemes seem to accord with a partitioning of the phenomenal continuum consistent with how the human body interacts with other physical phenomena—what might be called its “bulk encounter” with them. The human body is here understood in terms of its particular mesoscopic size and anatomy, as well as its possible actions

and perceptions. Examples of such morphemes might be the nouns *hand*, *tree*, *star*, and the verbs *grab*, *run*, *look*.

But the meanings of many closed-class forms are topological in character and neutral to Euclidean distinctions (Talmy, 2000a, chapter 1), and so do not accord with bulk encounter. If bulk encounter mattered here, it should help determine how physical phenomena are categorized linguistically. Yet this seems rarely the case.

For example, the English preposition *along* requires that the Ground be schematizable as linear and that the Figure execute a linear path adjacent to it. But, as seen in *The ant climbed up along the matchstick* and *The squirrel climbed up along the tree trunk*, the Ground object can be of any size—it is magnitude neutral. Now, one's body will encounter these two Ground objects—a matchstick and a tree trunk—quite differently. Yet the preposition, by abstracting out their common geometric feature of linearity, groups them together—contrary to bulk encounter notions of embodiment.

Comparably, the preposition *across* requires that the Ground be schematizable as a horizontal planar strip and that the Figure execute a path from one edge perpendicularly to the opposite edge of the strip. But, as seen in *The bug crawled across my palm* and *The bus drove across the country*, the path and Ground are again magnitude neutral. Yet one's body encounters a hand's breadth and a cross-country span quite differently. Again, the morpheme's abstractive topological schema trumps Euclidean bodily specifics.

K2d3. Iconicity

Iconicity in language occurs where linguistic form represents meaning through similarity with it (Talmy, 2018a, chapter 2). In terms of cognitive faculties, the patterning (a cognitive organizer) of a morpheme's form is similar to the patterning exhibited by the ideation or affect (cognitive systems) represented by its meaning.

To illustrate, the increased length of the vowel in *waaay* as in *The cell tower is waaay over there* is similar to and thereby represents an increased length in the tower's remove above what simple *way* would have indicated. Or again, the sequence of the verbs in *We arrived, ate, and left* is the same as and so represents the sequence in which their referents took place. And the sound of the noun *caw* is judged to resemble and thereby to help represent the call of a crow—an instance of onomatopoeia.

But there are also opportunities for iconicity that are rarely used (Talmy, 2018b). For example, the rate of a Figure's Motion, from stationary to slow to fast, is seldom represented by the rate of speech, from slow to moderate to fast, as suggested in (1) respectively by spaced lettering, ordinary lettering, and italics. And pauses between events are seldom represented by pauses between the phrases expressing those events, as suggested in (2) by sequences of dots.

1. T h e p e n l a y o n t h e t a b l e, rolled to the edge, *and fell down*.
2. He entered sat down and pulled out her letter.

Further, most morphemes exhibit a certain fundamental absence of iconicity. They lack any coordination between the faculties underlying form and meaning. That is, the form of such a morpheme is unrelated to its meaning. This arbitrariness is what renders the form a “symbol” of the meaning it is associated with.

15.3 K3. Conclusion

Language is not autonomous and self-subsistent but has both external and internal relations with other cognitive faculties. These faculties themselves can be treated as either cognitive systems or cognitive organizers. Language is here treated as a cognitive system. Externally, it has or fails to have particular cognitive organizers in common with each cognitive system outside itself. This pattern of organization across cognitive systems can help assess their evolutionary relationships. And language relates internally to other cognitive faculties in that, within its intrinsic organization, it coordinates them and, in its use, it cannot function without them.

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