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Commonsense Knowledge and Conceptual Structure in Container Metaphors

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Abstract

Cognitive grammar provides an analytic framework in which the semantic value of linguistic expressions is characterized relative to domains of presupposed knowledge. Cognitive metaphor theory holds that metaphorical language involves a mapping of conceptual structure from a source domain to a target domain. Containers are one such pervasive structure. This investigation proposes a detailed representation for the domain CONTAINER and applies it in the analysis of metaphorical expressions mapping CONTAINER onto target domains ARGUMENT and LINGUISTIC EXPRESSION. Each source domain word is analyzed with respect to which aspects of the CONTAINER domain structure it refers, and whether it refers to a 2D or 3D bounded region. The pattern of aspects mapped suggest that spatial containment, content, and material container object comprise major aspects of the 3D CONTAINER domain. The target domains are demonstrated to be structured according this container organization. The results demonstrate that cognitive semantic analysis can reveal specific structures of commonsense knowledge which are prerequisite for language use.

0 Introduction

Language use is a cognitive process which necessarily involves conceptual knowledge and reflects the structure of this knowledge. Talmy (1983) provides detailed analysis of how spatial prepositions (e.g. *at, along,* and *in*) structure our understanding of the world in terms of schematic properties such as dimensionality, sequentiality and physical boundedness, demonstrating that language indeed structures our understanding of space and spatial relations. Containers are another pervasively recurrent structure of human experience. This investigation explores the structure of containers and the way commonsense knowledge of containers bears on the metaphorical organization of two domains: arguments and linguistic expressions. First, the theory of cognitive domains and the theory of metaphor is introduced, then a detailed representation of container structure is proposed. This structure is then employed for the analysis of metaphors involving containers, and the results are argued as supporting a specific organization of container knowledge. The analysis of cognitive domains is relevant to specifying the structure and organization of conceptual representations of commonsense knowledge.

0.1 Domains

This investigation adopts the theory of semantic domains from Langacker's (1987, 1991) cognitive grammar. As in other cognitive linguistic theories (§0.2 below) human knowledge is held to be organized into domains of experience (e.g. SPACE, LIVING THINGS, LOVE). For Langacker (1987:162) domains function as an organized background against which concepts may be characterized—a concept being a pattern of activation in the encyclopedic network comprising a person's experiential knowledge.

Characterizing a concept with respect to a domain (or set of domains) is what Langacker calls the 'profile-base' distinction. A profile is the activated concept in the network and its base is the domain (background knowledge) presupposed by the concept profile. A linguistic meaning is a concept profile which is symbolized by a linguistic expression. For example, the meaning of the word "circle" is a concept profile (i.e. *circle*) which presupposes the domain SPACE as its base.[1] In Fig. 1(a) the profile *circle* is the bold image inside a box which represents the domain SPACE (Langacker 1987:184).

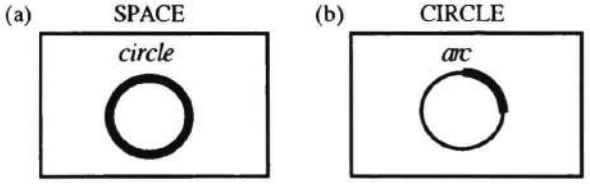

Fig. 1: Circle and arc profiles

Langacker also distinguishes a part-whole relation among domains, such that any profile may in turn function as the base for other profiles. For example, *arc* is profiled relative to CIRCLE which functions as the presupposed domain (Fig. 1b).

Croft (1994) formulates Langacker's definition of a domain as "a semantic structure which functions as the base for at least one concept profile (typically many profiles)." A

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[1] Throughout this paper italics are used for concept profiles and small capitals for domains.

domain is not merely a collection of concepts but the structural potential to support concept profiles. The domain CIRCLE supports not only the concept *arc*, but also *diameter, tangent, chord,* and other concepts specifiable relative to a circle.

Domains also have dimensionality. The domain 3D SPACE is a coordination of the three canonical spatial dimensions: vertical, horizontal and depth. The profiles *sphere* and *circle* are distinguished by the number of dimensions they presuppose.

The internal structure of a domain (i.e. its organization, part-whole relations, dimensionality) may be illuminated by investigating which aspects of the domain are highlighted by different word meanings. Metaphorical meaning will be used for the below analysis because it provides a means of profiling different aspects of the same domain. The theory of metaphor adopted for this investigation employs structures similar to Langacker's theory of domains.

0.2 Metaphor

Lakoff and Johnson (1980) propose that metaphorical expressions are understood by means of a mapping from one domain of experience to another. Structure from a source domain S maps onto a target domain T. The domain mapping is a metaphor, denoted as T IS S. Any one metaphor may be manifested by many metaphorical expressions. For example, the expressions ***buy** time, **spend** time* and ***waste** time* are all about time, but they are understood in terms of commercial exchange. They are all manifestations of the metaphor TIME IS MONEY, which the theory holds to be conventional knowledge structure necessary for understanding these ordinary English expressions.

The cognitive theory of metaphor (Lakoff 1987, Johnson 1987, Lakoff and Turner 1989) holds that the structures which are mapped between domains, called "image-schemas" are highly schematic knowledge structures such as containers, paths, causal links, part-whole relations, verticality, dimensionality, etc.

For example, the container image-schema gives rise to concepts from many different domains by structuring those domains in terms of a container. Many domains which are not actually containers, are nonetheless (partly) understood in terms of containers—e.g. VISUAL FIELD (*coming **into** sight*), EMOTIONS (*being **in** love*), LIFE (*a **full** life*), TIME (*in ten hours*), LINGUISTIC EXPRESSIONS (*capture it **in** words*), and ARGUMENTS (*an **airtight** argument*).[2] The pervasiveness of container structure makes it an interesting domain for semantic analysis. This first requires a characterization of the domain CONTAINER, which is described in the next section.

1 Container Domain Structure

CONTAINER, like SPACE, is a pervasively recurrent structure of our experience and presumably fundamental to our representations of commonsense knowledge. This section proposes a structure for the domain CONTAINER, which is the knowledge necessary for understanding concepts in this domain. Domains and their presupposed structures define an experientially based ontology. The CONTAINER domain structure is a schematization of our commonsense experience of containers, the major aspects of which are depicted in the bold box (Fig 2); these are the material CONTAINER OBJECT, its CONTENT and the relation of spatial CONTAINMENT. Croft (personal communication) suggests that these aspects may be understood as a figure-ground organization, where the CONTENT is the figure, CONTAINER OBJECT is the ground, and CONTAINMENT is the figure-ground relation.

Concepts profiled relative to the CONTAINER OBJECT, such as *smooth textured, transparent,* and *lid,* presuppose the aspects surface, barrier and material closure, respectively. The aspect CONTENT characterizes concepts such as *empty* or *full*. Container concepts characterized relative to CONTAINER OBJECT or CONTENT profile material aspects of a container, hence they presuppose the domain MATTER. This is distinct from CONTAINMENT which has the non-material spatial aspects location, direction, and closure. These aspects characterize concepts such as location *in* or *out* of a container, the scalar direction *into* or *out of* a container, and non-material closure, such as the property of being *sealed up*. Concepts characterized relative to CONTAINMENT presuppose the domain SPACE, which is a coordination of three spatial dimensions.

The aspects described above are not features that combine to form a container, but are co-present aspects of a single domain. It is not a sum of many parts, but a gestalt having different aspects. Consequently, a word referring to some container aspect symbolizes a concept profile highlighting parts (or all) of the CONTAINER domain structure. This structure is applied in the next section to the analysis of metaphors having the source domain CONTAINER.

2 Container Metaphors

Two metaphors having the source domain CONTAINER are analyzed in this section: A LINGUISTIC EXPRESSION IS A CONTAINER and AN ARGUMENT IS A CONTAINER. The data are collected from the studies which propose the existence of these metaphors and are supplemented with original data. For each of the linguistic manifestations of the mappings, the words from the source domain are analyzed with respect to which container aspects they refer and their dimensionality. Each of the source domain words has a profile specified relative to the domain structure CONTAINER, which is determined with respect to each of the aspects: location, direction, (spatial) closure, content, barrier, surface, material, and material closure. Each word from the container source domain is also judged as to whether it could refer to a 2D or 3D bounded region.

2.1 A LINGUISTIC EXPRESSION IS A CONTAINER

Recall that metaphor involves conventional knowledge. The domain LINGUISTIC EXPRESSION (henceforth, LE) is a commonsense knowledge of language.

[2]Throughout this paper bold denotes source domain words.

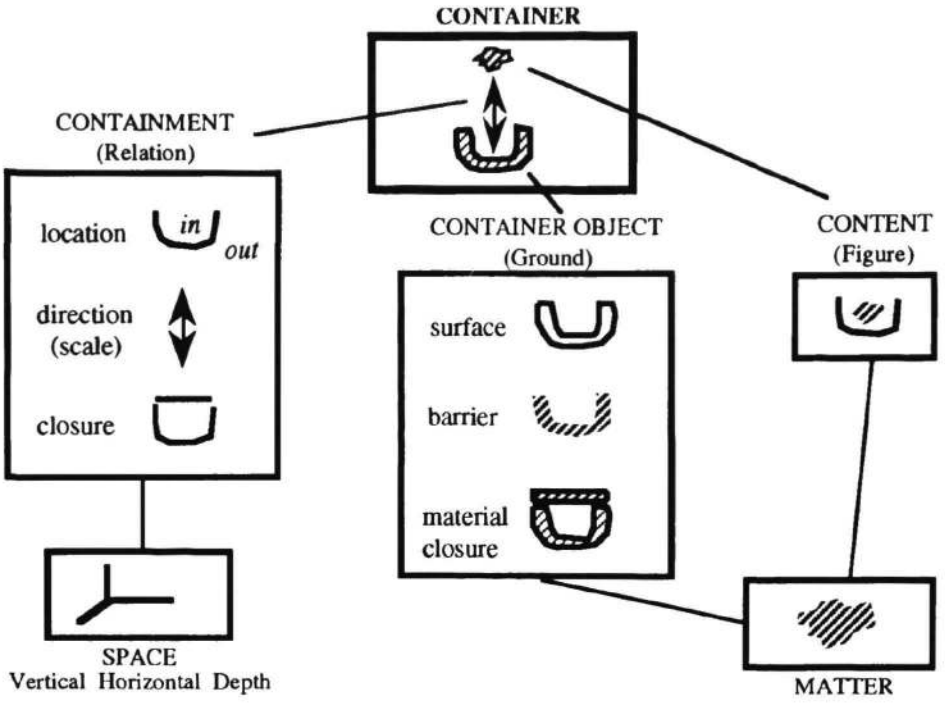

Fig. 2: CONTAINER Domain Structure

The metaphor LE IS A CONTAINER is part of a larger metaphorical system called the Conduit Metaphor (Reddy 1979), which structures our commonsense knowledge of words and sentences in terms of containers (e.g. *putting ideas into words*) and conveyance (e.g. *getting an idea across*). Unless otherwise indicated, the data in (1)-(15) are from Reddy (1979). The organization into groups reflects the analysis of this investigation discussed below.

(1) Location
(a) *When you have a good idea, try to* ***capture*** *it immediately* ***in*** *words.*
(b) *The meaning is* ***right there in*** *the words.*

(2) Direction
(a) *Try to* ***pack*** *more thought* ***into*** *fewer words.*
(b) *Don't* ***force*** *your meanings* ***into*** *the wrong words.*
(c) *They* ***pour*** *their meaning* ***into*** *our terminology* (attested: National Public Radio)
(d) *It's difficult to* ***put*** *my ideas* ***into*** *words.*
(e) *You can't simply* ***stuff*** *ideas* ***into*** *a sentence any old way.*
(f) *I always* ***get*** *a lot* ***out of*** *every word she says.* (author)

(3) Closure
(a) *Whatever Emily meant, it's likely to be* ***locked up in*** *that cryptic verse forever*
(b) *He writes sentences in such a way as to* ***seal up*** *the meaning* ***in*** *them*
(c) *That remark is completely* ***impenetrable***

(4) Content
(a) *His words* ***carry little*** *meaning.*
(b) *The introduction* ***has*** *a great deal of thought* ***content.***
(c) *Your words seem* ***hollow.***
(d) *The sentence* ***is without*** *meaning.*

The analysis of the LE IS A CONTAINER metaphor data reveals that the aspects CONTAINMENT and CONTENT map onto LE, but there is a lack of reference to the CONTAINER OBJECT. Limitations of space herein preclude a full tabulation of the analysis (for details see Clausner, 1993); instead, selected examples are analyzed below.

None of the source words which refer to CONTAINMENT or CONTENT refer to aspects of the CONTAINER OBJECT. For example, in (1)(a) *capture in* refers to the static location of content but does not refer to barrier, surface, material, or material closure. Similarly, the direction data (2) refer to aspects of CONTAINMENT; e.g. *pack into* is clearly directional, but makes no reference to aspects of the CONTAINER OBJECT. Closure in this metaphor crucially involves CONTAINMENT (e.g. *locked up*) but not the CONTAINER OBJECT. The infelicity of (5), demonstrates that source concepts *the lid* and *the opening* refer to material closure as well as to barrier, surface, and material.

(5) **Sam keeps* ***the lid/the opening*** *on his words so secure that you never know what he means*

The source domain concept *impenetrable* (3)(c) is a marginal counter-example, because in addition to referring to spatial closure it is a material property. However, the reference is ambiguous between material and non-material

senses, and is vague with respect to any container-like geometry. Finally, the data in (4) all refer to container content or its properties. Although the concept *carry* in (4)(a) refers to a conveyance function—the adjectival modifying value of *little* refers to a property of content and not to the object of conveyance.

For each of the source words in (1)-(4), the concept profiles are collectively compatible only with a 3D bounded region. A few concepts are compatible with a 2D or 3D geometry (e.g. content can be *captured in* either a ring or a bowl). However, most of the source concepts (e.g. *pour into*) are necessarily profiles of a 3D container.

The analysis of the LE IS A CONTAINER data demonstrates that this metaphor maps CONTAINMENT and CONTENT, but not the CONTAINER OBJECT structure of a 3D container domain. The target domain structure of this metaphor profiles the process of encoding thoughts into words as location or direction, the accessibility of those meanings in terms of closure, and the meaning of the words as contents in a container. The container itself is always expressed in terms of the target domain LE (e.g. "words", "expressions"). However, there are plausible target structures for the aspects of CONTAINER OBJECT, but they do not map. A barrier could be the boundary between words. A surface could map onto the shape of words. Material might be the quantity of expression. And material closure could map onto the accessibility of a meaning. Therefore, the constraint on the mapping of CONTAINER OBJECT is not due to incompatible target structure. Perhaps, the targets are insufficiently conventional (i.e. most people do not talk about linguistic expressions), but this is not a sufficient explanation . There is no obvious impediment to mappings such as *his words are really* ***short****, those are oddly* ***shaped*** *words,* or *your words* ***broke*** *up,* but the target domain of these container object expressions are ORTHOGRAPHY, TIME, or COMMUNICATION, and not LINGUISTIC EXPRESSION. The significance of the pattern of mapping for LE IS A CONTAINER will be discussed in comparison with different mappings of CONTAINER. The next container metaphor investigated does profile its target structure in terms of the CONTAINER OBJECT, but not all aspects of the CONTAINER domain.

2.2 AN ARGUMENT IS A CONTAINER

The metaphor AN ARGUMENT IS A CONTAINER structures our understanding of argumentation in terms of the CONTAINER domain. The metaphor data (6)-(10) are grouped according to which aspects of CONTAINER they refer, according to the results of the below analysis.[3]

(6) Barrier, Surface, Material, and Material Closure
(Integrity of the material container)
(a) *your argument* ***won't hold water*** (L&J)
(b) *that argument* ***has holes in it*** (L&J)
(c) *that's an* ***airtight*** *argument sure to convince her.*
(d) *I was able to* ***poke/punch holes*** *in his argument*
(e) *their argument* ***fell apart***
(f) *all we managed to do was* ***put a dent in*** *their argument; we really wanted to* ***smash*** *it*

(7) Barrier and Material properties (L&J)
(a) *this is a remarkably* ***transparent*** *argument*
(b) *since your argument isn't very* ***clear****, I can't see what you're getting at.*
(c) *your argument has no* ***content*** *at all—I can* ***see right through it***

(8) Material Closure
(a) *I think it's time to* ***put a lid on*** *this argument*
(b) *we* ***smashed*** *his argument* ***wide open*** *and revealed that it was empty*
(c) *Look, that argument is* ***closed****; I'm not going to talk about it again*

(9) Matter
(a) *you don't have* ***much of*** *an argument, but his objections have even* ***less substance*** (L&J)
(b) *there's something* ***weak/*empty*** *about her argument, it's lacking in* ***substance****.*

(10) Content
(a) *that argument is* ***filled with /full of*** *inaccuracies*
(b) *I'm tired of your* ***empty*** *arguments* (L&J)
(c) *your argument doesn't have much* ***content*** (L&J)
(d) *your argument is* ***vacuous*** (L&J)

The expressions in (6) refer to the integrity of the CONTAINER OBJECT. These concepts (e.g. *has holes*) clearly refer to aspects of the CONTAINER OBJECT and not to any of the aspects of CONTENT or CONTAINMENT. The concepts *hold water* (6)(a) and *airtight* (c) refer to material content but not to location or direction. The closure they specify necessitates a material barrier and surface, hence they refer to material closure.

In (7) the barrier properties refer to barrier and material but not other aspects, except possibly content, depending on whether it too possesses the material property of transparency. Material closure (8) involves closure and some material aspect of the barrier or surface. In (8)(b), *smash wide open* crucially involves a verbal semantic reference to material deformation. In (8)(c), *closed* is ambiguous between material and non-material closure; cf. (3)(c). The expressions in (9) refer to the material *substance* of the container object and not that of the content. This is demonstrated by the felicity of *weak argument* in (9)(b) and the infelicity of *empty argument* with respect to the material of the container itself. On the other hand, the concept *vacuous* in (9)(c) refers to the state of being devoid of matter, a profile of either CONTENT or CONTAINER OBJECT. Finally, the expressions in (10) refer to content but not other aspects of the domain.

The geometry of the expressions of the ARGUMENT IS A CONTAINER metaphor are consistent with a 3D container, but not that of a 2D container. For example, only a 3D geometry can *hold water* or be *airtight*. Some source domain concepts (e.g. *empty* and *content*) may presuppose

[3]The data are the author's, unless indicated by "(L&J)" for Lakoff and Johnson (1980).

either 2D or 3D containers, but only a 3D geometry is consistent with all of the metaphor data.

Consideration of every aspect of the CONTAINER domain structure for every source domain concept in the above data demonstrates that the ARGUMENT IS A CONTAINER metaphor maps CONTENT and CONTAINER OBJECT, but not CONTAINMENT. Defense of this claim requires consideration of (11)-(14) which Lakoff and Johnson (1980) propose are manifestations of this container metaphor but which are argued below to be non-container metaphors.

(11) Radial [AN ARGUMENT IS A 3D RADIAL SOLID]
(a) *those points are **central** to the argument—the rest is **peripheral***
(b) *I still haven't **gotten** to the **core** of his argument*

(12) Leveled [AN ARGUMENT IS A 3D LEVELED OBJECT]
(a) *we have now **covered** all the topics at the appropriate **levels***
(b) *we have **come to a point** where we must **explore** the issues at a **deeper level.***

Two different non-container geometries are manifested in (11) and (12), a 3D radial solid and a 3D layered object, respectively. The radial solid has a central-peripheral structure which supports profiles of paths through the solid and through a central core, but this is distinctly not direction into a container, or its content (e.g. the core of a planet is not its contents). The other construal of this concentric geometry is that of a leveled solid (like layers of an onion). A *covering* of this geometry involves a traversal of its levels. As claimed by Lakoff and Johnson, expressions such as (11) and (12) are coherent with the metaphor AN ARGUMENT IS A JOURNEY[4], but as demonstrated below, the paths in these expressions are not profiles of a container.

(13) Location [PART IS IMMERSED IN THE WHOLE]
(a) *I didn't see that point **in** your argument* (L&J)
(b) *you won't **find** that idea **in** his argument* (L&J)

(14) Direction [FORCE OF ARGUMENTATION IS MOTION]
(a) *that conclusion **falls out of** my argument* (L&J)

(15) Closure
Her ideas get **sealed up in the argument making them incomprehensible*

Not every use of "in" or "out" refers to CONTAINMENT. Although (13) and (14) refer to location and direction, respectively, they are attributable to metaphors other than AN ARGUMENT IS A CONTAINER. The verbal semantics of *see* and *find* suggest that (13) involves and AN ARGUMENT IS A JOURNEY metaphor; furthermore, the locationality expressed by *in* is that of being at one part along the whole argumentative journey. In (14) volitional force is necessary to motivate the falling. The directionality is conclusive pragmatic force being understood in terms of the motion of one part of the argument (the conclusion) away from the whole discourse. The aspects location and direction map onto ARGUMENT, but these are attributable to other metaphors in that the target structures of part-whole relations and pragmatic force are not CONTAINMENT. Finally, spatial closure does not map (15), although it plausibly maps onto the accessibility of an argument's meaning. Therefore, we can conclude that no aspect of CONTAINMENT maps onto the domain ARGUMENT.

2.3 Discussion of the CONTAINER metaphors

The metaphors analyzed above are summarized in Table 1. There are two distinct metaphors, which map different aspects of CONTAINER domain structure. Those aspects which map are denoted with "X" and those which do not by "*". CONTAINMENT and CONTENT, but not CONTAINER OBJECT, map onto LE. And the aspects CONTENT and CONTAINER OBJECT, but not CONTAINMENT, map onto ARGUMENT.

Although both container metaphors map CONTENT, their respective metaphorical targets are distinct. LE metaphors map container content onto the meaning of words and sentences, whereas ARGUMENT metaphors maps content onto the pragmatic convincingness of the collection of sentences which comprise the argument. Pragmatic force typically requires a large, often complex, sequence of discourse units, because an individual word typically does not possess such force. Presumably, this also accounts for why one can utter a *clear argument* or *clear sentence*, but not a *clear word*. Thus, *clear sentence* refers to pragmatic clarity and not to the linguistic expression per se; hence, it is not an LE metaphor.

The mapping of CONTAINER onto LE is distinct from the mapping of CONTAINER onto ARGUMENT. That is, the ARGUMENT metaphors are not about linguistic expressions and the LE metaphors are not about arguments. Although arguments do consist of linguistic discourse, the distinction between the two lies in the difference between purposeful activity and having meaning—argumentation involves both, but words and sentences involve only the latter.[5] But this does not explain why the two metaphors map different aspects of CONTAINER structure.

We have seen above that the unmapped container aspects are not constrained by incompatible target structure. There is nothing inherent about LE that precludes the mapping of CONTAINER OBJECT. Similarly, CONTAINMENT does not map onto the ARGUMENT aspects part-whole relation, pragmatic force and accessibility, but this is not a necessary consequence of the non-container metaphors. A full treatment of metaphor mapping constraints (Turner 1990) is beyond the scope of this paper; nonetheless, the unmapped aspects of the above container metaphors remains unexplained.

The crucial aspects of CONTAINER which do not map are demonstrated with respect to semantically infelicitous examples or they are attributed to non-container metaphors. This result is unlikely to be an aberrant consequence of the particular examples analyzed. This is because the data from

[4] JOURNEY and CONTAINER are two of several source domains that map onto ARGUMENT.

[5] I thank William Croft for suggesting this distinction.

Table 1: Summary of LINGUISTIC EXPRESSION and ARGUMENT mappings

Source Structures	Target Structures	
CONTAINER	LINGUISTIC EXPRESSION	ARGUMENT
CONTAINMENT	X	* (other metaphors)
location	coded/uncoded	part-whole
direction	coding/decoding	pragmatic force
closure	accessibility of meaning	accessibility of meaning
CONTENT	X	X
content	meaning, ideas, thoughts	convincingness
property of content	property of the meaning	degree of convincingness
CONTAINER OBJECT	* (plausible targets)	X
barrier	word boundary	clarity, convincingness
surface	shape of the words	convincingness
material	quantity of expression	quantity of expression
material closure	accessibility of meaning	accessibility of force

Reddy (1979) and Lakoff and Johnson (1980) substantially cover their respective domains, and additional original data expressly explores the proposed CONTAINER domain structure (Fig 2).

The analysis demonstrates that the target domains ARGUMENT and LINGUISTIC EXPRESSION are (partly) organized according to different aspects of a 3D CONTAINER domain structure with respect to the pattern of mappings summarized in Table 1. The different metaphors map dissociated (but not mutually exclusive) aspects of CONTAINER, suggesting that the domain CONTAINER has internal organization such that CONTAINER OBJECT, CONTENT and CONTAINMENT are different parts of a whole 3D CONTAINER structure.

3 Conclusion

This paper began with an introduction to the cognitive theory of domains and the cognitive theory of metaphor. Then a detailed representation of the domain structure CONTAINER was proposed as the base in which different container concepts may be profiled. This structure was employed for the analysis of two metaphors: LE IS A CONTAINER and ARGUMENT IS A CONTAINER.

The application of domain theory to the container metaphors yields a detailed account of their domain relations, specifically which aspects of CONTAINER structure are utilized by the two metaphors and which target structures the mappings profile. The analysis suggest that CONTAINER is an organized whole having the structural parts: CONTAINER OBJECT, CONTENT and CONTAINMENT. This is, language structures containers according to these aspects.

This investigation demonstrates that a detailed cognitive semantic analysis can yield a detailed representation of a specific conceptual structure. Cognitive semantic analysis also applies to other domains. Clausner (1993) investigates the source domains TEMPERATURE and TASTE, arguing for their specific structure.

The application of Langacker's theory of semantic domains to Lakoff and Johnson's view of metaphor extends this theory such that the structure of single domains may be detailed. Such knowledge representations may be considered cognitive ontologies of the conceptual structure prerequisite for language use. If the tenets of cognitive semantics are correct, and the domains implicated in metaphor are those necessary for human language processing, then the degree to which these domains can be specified is the degree to which cognitive science will benefit from detailed knowledge representations.

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