Spatial Understanding: On the Conceptual Semantics of *In*

Christopher Hart, University of East Anglia 2004

Submitted for MA in Linguistics, Society and Culture

Dissertation submitted in partial fulfilment of the requirement of the degree of Master of Arts

Preposition: an enormously versatile part *of* grammar, as *in* "What made you pick this book I didn't want *to* be read *to out of up for*?

(Winston Churchill)

Investigating the meanings associated with spatial particles will offer fundamental insights into the relation between language, mental representation and human experience.

(Tyler and Evans 2003:2)

ABSTRACT

Spatial understanding is not unique to human beings, but the particular form of understanding that human beings have of the spatial world is a uniquely human understanding. As human beings we have the most complex, systematic means of communicating information about space to have evolved anywhere in the biosphere. Investigation into this communicative and cognitive capacity is a topic of great interest to cognitive science.

A central premise in this paper is that semantic structure reflects conceptual organisation at an underlying level. This paper is an exercise in conceptual semantics, carried out within the cognitive linguistics paradigm. I am investigating the polysemy network associated with the English preposition *in*; that is, the different kinds of scenes which can be coded by the single form *in*. In doing so I am also investigating conceptual structure with specific regard to the concepts linguistically realised as *in*. Two modes of enquiry are presented: (i) an investigation to establish a proto-scene and (ii) an investigation into the conceptual relations between further senses of *in* and the proto-scene.

Whilst this paper is an investigation into *in* specifically, it will construct a model for investigation and analysis appropriate for all spatial terms, and draw conclusions relevant to any such study.

Index

Introduction

Space, in human cognition, is a domain that is constantly functioning, and yet it is a domain of which we are rarely, if ever, conscious. Spatial understanding is so fundamental to human survival, to negotiating the physical world, that it is difficult to get across just how pervasive it is in everyday experience.

Every morning, as we awaken but before we open our eyes, we construct a mental image of the room *in* which we are situated. This image contains masses of spatial information. We might, with our eyes still closed, reach across and switch *off* the alarm, avoiding the bedside lamp and glass of water. When we open our eyes bundles of information in the form of light hits the retina, and from this information the brain constructs a three dimensional image of all the objects *in* the room and the distance and relation *between* them. We walk *out* of the bedroom and *into* the bathroom where we pick *up* the toothpaste and put some *on* our toothbrush. We climb *into* then *out* of the shower before going *down* the stairs to make some coffee. In making the coffee we reach for a cup (without ever missing it) and pour *in* the coffee. Having taken the toast *out* of the toaster we spread the butter *over* it then consume our coffee and toast by placing them *in* our mouths and taking them *into* our bodies.

Throughout this morning routine we have constantly, but subconsciously, been assigning spatial relations between objects and between objects and ourselves. Our world is structured in terms of space and spatial relations. Without the various classifications in the above passage (*in, on, off, out, over, between, up,* and *down*), and more besides, our world would have no structure and be very difficult to make any sense of and negotiate with any degree of success. The fact that this all happens subconsciously and apparently without any great amount of mental effort is no mean feat. Interactions with objects in space and classifications of spatial relations require an enormously complex kind of processing involving many different specialised areas of cognition. But because of the centrality of spatial understanding in survival, natural selection has evolved a brain capable of doing this instantly and subconsciously.

In the past, philosophers and scientists of the mind have marvelled at the extraordinary rather than the ordinary. However, since the cognitive revolution[1], cognitive scientists have become interested in areas of cognition so familiar that it is perhaps their familiarity which has deprived them of study before. Yet it is precisely this familiarity which makes cognitive science so interesting. What is the nature of the mental processing involved in our everyday experiences? It is questions such as this which have led to the recent movements in cognitive linguistics and, more specifically, conceptual semantics.[2]

> One difficulty in the psychological sciences lies in the familiarity of the phenomena with which they deal. A certain intellectual effort is required to see how such phenomena can pose serious problems or call for intricate explanatory theories. One is inclined to take them for granted as necessary or somehow "natural".
>
> (Chomsky 1968)

Semantics is the study of meaning in language and logic, *conceptual* semantics is the study, through language, of meaning in the mind. This dissertation is an exercise in conceptual semantics. It is intended to constitute a study of the underlying mental representations of the different senses of the English preposition *in* and how they are conceptually related. This, in essence, is to ask "what does *in* mean?". *In* seems to be the most frequently occurring spatial preposition in any text or discourse of English and containment seems to be one of the most basic concepts in human cognition. It is for these reasons that I have chosen to conduct a study into the semantics of this preposition over and above any other. The study will be carried out within the cognitive semantics framework pioneered by Lakoff and Johnson (Lakoff and Johnson 1980, 1999; Johnson 1987; Lakoff 1987).

---

[1] Usually cited as beginning in 1959 with the publication of Chomsky's critique of B. F. Skinner, which led to the demise of behaviorism.

[2] Conceptual semantics is a branch of cognitive linguistics which is specifically concerned with meaning and concepts, whereas cognitive linguistics is a broader field which has to do with language and cognition. However, conceptual semantics is often termed 'cognitive semantics' or simply comes under the banner of

A position often assumed in cognitive linguistics is that a linguistic classification, such as *in*, reflects some underlying representation within a conceptual system that is meaningful to the individual and is shared with other individuals within his[3] community. That is, a basic premise in the field of cognitive linguistics is that to study a linguistic system is to study a conceptual system. One aim of this dissertation is to justify this assumption and, indeed, this will be the subject of section 1.1. Upon this premise one may assume that a speaker who codes a variety of spatial and abstract non-spatial scenes with the same lexical entry is conceptualising those scenes as somehow related, as members of the same category. Categorisation will be the subject of section 1.3. My intention in this dissertation is to show (i) *that* those relations are not arbitrary but motivated, ultimately derived from the proto-scene, or a core sense, and (ii) *how* different senses of *in* are related to the proto-scene. Chapter two will be concerned with what kind of spatial configurations can be coded by *in*, and with establishing the proto-scene. Chapter three will examine further senses of *in* that have derived from the proto-scene. It will consider how this meaning extension is motivated and how these different senses of the same lexical entry are conceptually related. The first chapter is intended to serve as something of a literature review, surveying important ideas in conceptual semantics. Section 1.4. will consider the concept of containment and its relation to the embodied mind issue.

Whilst this study will concentrate specifically on the conceptual semantics of the preposition *in*, it will be conducted against the grander backdrop of cognitive linguistics and questions as to the nature of the relation between language, thought, and the external world.

---

cognitive linguistics. 'Conceptual semantics' and 'cognitive semantics' will be used interchangeably throughout this dissertation.

[3] Throughout this dissertation I will use the masculine form of the pronoun and possessive pronoun merely as a matter of convenience for typing.

Key terms and their definitions as to be taken throughout this dissertation[4]:

Scene: spatial array or mental representation of abstract notions. Coded by a preposition
Proto-scene: akin to prototype for spatial categories. The spatial scene most central to a given category
Core sense: most central sense of preposition. Codes for proto-scene
Image schema: more basic, permanent, non-linguistic mental model for concepts upon which our reality is constructed. Product of the nature of the body and experiences with it
Polysemy: multiple meaning or senses of the same lexical entry
Radial category: a range of senses coded by the same lexical entry and thus understood as being conceptually related. Defined by a central prototype (core sense)
Semantic network: network of relations between different senses in same radial category
Conceptual metaphor: mapping of concrete domains of cognition onto abstract domains of understanding in order to achieve structure and deduce meaningful conclusions
Meaning extension: process of lexical entry becoming polysemous
Conceptual commonality: when a property with meaningful consequence is common to both proto-scene and novel scene, thus motivating the meaning extension from the proto-scene to code for that novel scene

Trajector (TR) entity related to Landmark by a preposition
Landmark (LM) entity to which a Trajector is related by a preposition

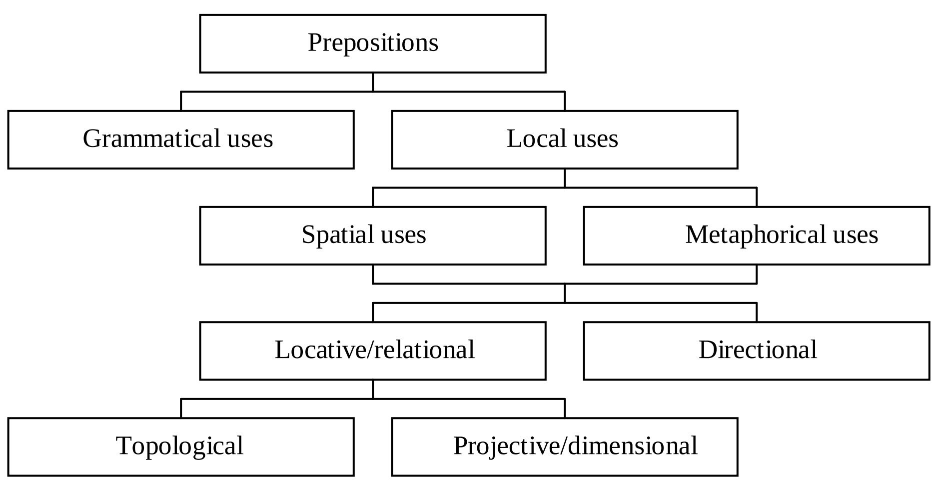
[4] Note that that the precise definition of these terms differs from author to author and that different authors use different terms to mean the same thing.

Typical properties of TR relative to LM in any spatial scene (adapted from Talmy 2000: 183)[5]:

Trajector	**Landmark**
Has unknown spatial properties to be determined	Acts as a reference entity, having known properties that can characterise the TR's unknowns
More movable	More permanently located
Smaller	Larger
Geometrically simpler in its treatment	Geometrically more complex in its treatment
More recently on the scene/in awareness	Earlier on the scene/in memory
Of greater concern/relevance	Of lesser concern/relevance
Less immediately perceivable	More immediately perceivable
More salient once perceived	More backgrounded once TR is perceived
More dependent	More independent

Preposition: grammatical class used to describe the relation between TR and LM

Breakdown of classifications of prepositions (adapted from Coventry and Garrod 2004: 7):



[5] Other terms for Trajector and Landmark include Figure/Ground, Located/Reference objects. Throughout this dissertation I will follow Langacker's Cognitive Grammar Framework and use the terms Trajector and Landmark.

There are only between 80 and 100 prepositions in the English language (Coventry and Garrod 2004:6) and yet this relatively small number of lexemes (in contrast with the number in other syntactic categories, for example, there are around 10,000 count nouns in the standard lexicon (Ibid.)) codes for a seemingly infinite number of possible spatial and non-spatial scenes. "Despite this small number of prepositions, each can be used in a diversity of different ways both semantically and syntactically" (Ibid.).

In is usually classed as a topological preposition, though it can be used otherwise. It is the topological nature of the preposition that I am interested in analysing in this dissertation.[6] Whilst 'topology' refers to geometry, non-spatial scenes coded by a spatial preposition can be topological precisely because they are coded by a spatial particle, which is to say they are conceptualised in terms of space.

When used grammatically a preposition carries little meaning, functioning only as a syntactic marker. *Local* uses of a preposition locate a TR somewhere in space. These can code for spatial relations between objects in space or, metaphorically, for relations between abstract notions. Both kinds of local uses can be further broken down to describe the nature of that relation. *Locative/relational* prepositions describe the location of a TR in relation to a LM. *Directional* prepositions describe a change of position or direction in which an object is located. Locative/relational prepositions can, in turn, be broken down still further into *topological* and *projective* prepositions. Topological prepositions describe a scene in terms of the location of, and relation between TR and LM with respect to one another. Projective prepositions describe a scene in terms of the location of, and direction of TR and LM with respect to a *frame of reference*[7]. Topological prepositions include, for example, *in* and *on*.[8] Projective prepositions include *in front of* and *to the left of*.

---

[6] Dictionary definition of topology: a branch of geometry describing the properties of a figure that are unaffected by continuos distortion.

[7] Seeing as we are interested here in *in*, a topological preposition, I am not including in the text anything on frames of reference. However, it is a very interesting feature of spatial cognition which demonstrates high levels of cross-linguistic variation (see Levinson 2003).

[8] Though it should be noted that there is an argument to suggest that *in* and *on* should be classified as different kinds of prepositions. For *on* can only be used with respect to an axis naturally projected from the LM, the direction of this axis being a product of the function of LM in any scene coded by *on*, namely,

This dissertation will hopefully culminate in a detailed account of the semantics of the English preposition *in*, the conceptual relations between different senses of the preposition, and an account of how and why such a semantics came to be part of the conceptual system of native speakers of English.

support. Hence, the vertical axis (and in prototypical scenes, its gravitational pull), as well as TR and LM, is a meaningful element in any spatial scene coded by *on*. The meaning of *on* is defined with respect to the vertical axis. *In*, on the other hand, is not defined with respect to any axis, but only in terms of the relation between TR and LM. Thus, the topological prepositions *in* and *on* should be further distinguished into two subcategories of their classification.

Chapter one

Meaning, Mind, and Reality

> 'Reality' is determined by the nature of our bodies and our neuro-anatomical architecture, as well as the physical world we inhabit. Hence, the meanings we encode in language relate to and reflect our conceptual system, which constitutes our 'representations' or reality.
>
> (Tyler and Evans 2003:x)

1.1. Meaning and Mind

An outline of the Cognitive Linguistics paradigm adapted from Evans (2004a:6-7) is as follows:

> **Cognitive commitment** – language as 'in touch' with other cognitive faculties. It reflects conceptual structure, and organisation, rather than being distinct and isolated from it.
>
> **Experiential commitment** – all humans have similar experiences of the environment and have evolved to accommodate certain aspects of this structured environment.
>
> **Sociocultural commitment** – cultural transmission is the medium which facilitates the evolution and change of linguistic conventions.

"The consequence of these commitments, in particular the cognitive commitment" as Evans (2004a:7) writes, "is that language reflects cognitive structure and organisation in a non-trivial way".

It is the aim of Cognitive Linguistics to study conceptual systems of the human mind through the study of language. A linguistic system is considered to be a representation of its speaker's conceptual system. Language is a window to the mind. As Evans (2004b:2;3) writes:

> As language reflects conceptual structure in important ways, it accordingly represents a crucial window into the human conceptual system… to study linguistic meaning constitutes a study of the conceptual system.

And Lakoff and Johnson (1980:3) state:

> Since communication is based on the same conceptual system that we use in thinking and acting, language is an important source of evidence for what that system is like.

Since language is a system designed to communicate information stored in cognition, for that communication to be successful, linguistic structure must accurately represent conceptual structure. The relation between the language one speaks and the way one thinks cannot be an arbitrary one, but must be meaningful. In this sense, to study a linguistic system constitutes a study of the conceptual system of its speakers.

Language does not refer directly to the 'real world', but to what is represented in the conceptual system. Consider Jackendoff's *Projected world* (1997:29):

> We have conscious access only to the *projected world* – the world as unconsciously organised by the mind… [Thus,] the information conveyed by language must be about the *projected world.* [My italics]

If our world is not a real objective world but a world mediated by our cognitive systems, a projected world, and if we have access only to this projected world, then it follows, since language refers directly only to entities in this projected world, that is, concepts, that the semantics of a language reflects the conceptual structure of its speakers.

Words do not contain meanings (the CONDUIT metaphor) but prompt for complex conceptualisations, that is, trigger mental scenes or schemas. Langacker (1987:155) states: "linguistic expressions are not meaningful in and of themselves, but only through the access they afford to different stores of knowledge that allow us to make sense of them".

Langacker (1991:108-9) also writes:

> Semantic structures are conceptual structures established by linguistic convention… Thus semantic structure is conventionalised conceptual structure.

In which case, Evans' (2004a:8) claim, that "by studying language we are directly investigating the nature and organisation of the conceptual system", holds true. However, one must be careful not to assume that linguistic structure reflects conceptual structure in equal detail. Language must be less specific for, as Levinson (2003:15) points out:

> The metric precision involved in seeing a cup before me, judging its distance from me and reaching for it – there is nothing like this metric precision in ordinary language locative descriptions.

I will examine in detail in chapter three the notion of *motivated meaning extension*, but for our purposes in this chapter it is sufficient to summarise one aspect of the argument as polysemy occurring not just arbitrarily but due to the various senses of a single lexeme being conceptually related. If it is the case that polysemy arises due to conceptual relations, then, by studying what scenes are coded by the same lexeme in any language, we are studying the organisation of the conceptual systems of speakers of that language. Scenes coded by the same lexeme must be conceptually related. Lakoff (1987:334) also puts forward this line of argument:

> The generalisations governing polysemy can only be described and explained in terms of conceptual organisation. Thus the study of linguistic phenomena leads to hypotheses concerning conceptual organisation.

1.2. Mind and Reality

> The world we perceive to be out there is as much a product of cognition in a human body as it is the result of an external reality. Hence, our view as human beings is exactly that, a view from one possible ecologically viable perspective among many possible perspectives.
>
> (Evans 2004b: 4-5)

When we think about space we tend to consider it as being an inherent part of the physical makeup of the world we inhabit. Interactions amongst, and relations between objects in space are viewed as uniform and as reflecting some natural order. However, this cannot be the case. If, as cognitive linguistics maintains, the linguistic system of a culture reflects the conceptual system of its speakers in important ways, then, since languages differ in how they structure space, the structure of space cannot have some objective natural order but must be an experience-dependant, subjective phenomenon. This is not to say that the spatial world does not exist outside the human mind, for what is known from the science of physics confirms that it does, but that the nature of how we as human beings view the spatial world is uniquely human and is one of many evolutionary solutions to the same problem. The fact that members of the same species show cross-cultural variation in spatial cognition (see Levinson 2003) illustrates that the way we think about space is precisely that, the way *we think* about the structure of space, rather than being direct access to a natural organisation of the spatial world. "We take our spatial relations for granted because they work for us. But it is mistaken to think that they are just objectively given features of the external world" (Lakoff and Johnson 1999:575). Of course, there is much in spatial cognition that is shared across all cultures, but this universality in spatial cognition does not suggest a universal spatial structure in an objective sense. More that these features of spatial cognition, unique to, but common to all human beings, evolved during the Environment of Evolutionary Adaptiveness

(EEA)[9], and the subsequent variability is a product of the divergence of cultures since the end of the EEA.

If linguistic representation and therefore the conceptual structure of space varies across cultures, then the structure of space, as the layman (rather than the physical scientist) ordinarily sees it, should be understood to take different forms in different cultures. This leads to the conclusion that the structure of space cannot be a completely universal, objective structure within the world, but must be a variable, subjective product of language, mind, and culture, which has evolved to *represent* in the mind, in one form or another, space as it is 'out there'. As Lakoff and Johnson (1999:26) state:

> Cognitive science and neuroscience suggest that the world as we *know* it contains *no* primary qualities in Locke's sense, because the qualities of things as we can experience and comprehend them depend crucially on our neural makeup, our bodily interactions with them, and our purposes and interests.

Cognitive semantics drastically undermines, if not destroys, the objectivist paradigm.

> What we directly experience is not an objectively real world. Rather, what we experience as everyday reality is mediated and shaped by human conceptual organisation to which we necessarily and unconsciously subject sense-perceptory input… In essence, the patterns and organisation we perceive as reality do not in fact exist independently in the world itself, but are largely the result of our cognitive processing.
>
> (Tyler and Evans 2003:19)

[9] The environment in which the brain of Homo Sapiens evolved and the environment to which our brains are tuned.

1.3. Categorisation

The human mind, in order to make sense of the world we inhabit, has evolved the cognitive ability to organise our world into distinct conceptual categories. These categories are not of a natural kind but are subjective, culture-specific, conceptual categories. “Without the ability to categorise, we could not function at all, either in the physical world or in our social and intellectual lives” (Lakoff 1987:6). Without the imposition of order upon our mental representations of the world, that world would be highly confusing and difficult to negotiate. Categories are organised on conceptual principles such as being in the same domain of experience. This means that cultures that experience more prominently different aspects of the world will have different categories. For example, the urban dweller (botanists excluded) will have a relatively general PLANT category, as opposed to a jungle dweller who will have cause (i.e., it is important for survival and a prevalent experience within his environment) to categorise plantlife more specifically. The jungle dweller’s categories might include distinctions between EDIBLE/INEDIBLE, POISONOUS TO TOUCH, and MEDICINAL, for example. Categorisation depends on the nature of everyday human interaction both in a physical environment and in a given culture. Factors involved include gestalt perception, motor interaction, mental images, and cultural importance (Lakoff 1987:112).

Most cognitive categorisation is an automatic and unconscious process. It functions in every domain of conceptual cognition. Our phonological systems, for example, categorise arbitrary sounds into meaningful units of contrast. Different languages and therefore cultures surrounding that language develop different phonological categories. That is, they carve up the phonetic range in different ways. Similarly, different languages carve up the colour continuum into different numbers of categories. Welsh conflates *green* and *blue* into the same category. On the assumptions outlined in 1.1., linguistic categorisation is of fundamental significance to the understanding of the organisation of conceptual systems. The fact that Welsh conflates the English categories *green* and *blue* into a single category means that speakers of Welsh see green and blue as related instances of the same concept, whereas English speakers see them as distinct concepts.

Categories become part of a language because they are important conceptual distinctions in that culture. The language then serves to reinforce conceptual organisation into language-specific categories. The language one speaks shapes the categories one draws.

Categories are organised with respect to a central member of that category known as a *prototype*. Other members of a category radiate outwards from this prototype as they become less like the central idea of that category. Even where cultures share similar categories their ideas of prototypes may vary depending on experience.

Euclidean space is a fixed system. Topological space is a qualitative system. Languages structure space qualitatively. The spatial world contains no natural categories. The spatial categories we distinguish between, we ourselves impose on the spatial world. If we did not categorise the spatial world into a small number of general categories we would not be able to interact with objects in the world, negotiate physical space, or communicate information concerning the spatial world – "to talk about motion and location we must partition space into a discrete number of basic spatial categories" (Bowerman 1996a;145).

With an infinite number of possible spatial scenes it is necessary to minimise cognitive effort by assigning them to a far smaller number of more general categories. "All languages make categorical distinctions among spatial configurations for the purpose of referring to them with relatively few expressions" (Bowerman 1996a:149). However, they do not all do it in the same way. Spanish, for example, conflates the English categories *in* and *on* (coding for containment and support relations respectively) into the single category *en*. Korean, on the other hand, carves up the English *in* and *on* into three categories; *kkita*, *nehta*, *nohta*, which distinguish respectively between tight-fit path events (e.g., put video in case/put lid on jar), loose-fit containment relations (e.g., put apple in bowl), and loose-fit support relations (e.g., put orange on table) (Coventry and Garrod 2004:158). So for a Korean speaker, degree of fit is just an important a distinction as are notions such as support and containment in how he carves up the spatial world.

Is it possible then, to speak of universal 'building blocks' such as CONTAINMENT and SUPPORT in the conceptual organisation of space? Seeing as both these features correspond directly to the English categories *in* and *on*, it is tempting to suggest that it is not possible. That to do so is simply using English categories to make sense of the categories in other languages, a feat, which if this is the case, would be impossible to ever truly achieve at a conceptual level. As Bowerman (1996a:160) conjectures: "Our ideas about plausible 'primitives' in the language of thought may themselves be conditioned by the language we have learned". Ideas such as containment and support seem to function differently in some languages (e.g., Dutch) and seem of little relevance indeed in others (e.g., Mixtec or Tzeltal). Similarly, notions such as shape of LM play a greater role in defining categories in some languages than in others. However, children must be equipped with some rudimentary spatial superstructure by the time they begin acquiring language because they seem to know what kinds of properties are relevant to spatial categorisation (Bowerman 1996a:168). We will see in section 2.4. that knowledge of notions such as containment and support are universal at some level of cognition, but not at the level of semantic structure and conceptual organisation.

1.4. Schematic Representation

Without categorisation the human mind would have to learn and retain more information than the size of the brain could allow or it would have to learn everything on-line in every situation. Instead, it has evolved the capacity for categorisation, which allows an infinite number of relations to be assigned to a finite number of schemas. A schema is the general underlying representation of a scene. As Talmy (2000:219) notes:

> A fundamental character of the way that space is represented at language's fine structural level is that it is *schematic*. That is, only particular selections of all the aspects present in spatial scenes are actually referred to by linguistic elements.

After two decades without any kind of clarification there is presently much debate surrounding the nature of image schemas. It is not my intention here to enter this debate, but it is necessary to offer my understanding of the term as used in this paper. In spatial semantics, each preposition codes for a network of senses. That is, each preposition covers a number of different kinds of scenes. For each of these different senses there is an underlying mental representation, an image schema. "Thus, every fine structural[10] spatial expression actually represents a family of spatial configurations that all share certain abstractable characteristics" (Talmy 2000:220). When a scene is observed certain relational information is abstracted from it. *Idealisation*[11] is a process that "involves the systematic selection of certain aspects of a referent scene to represent the whole, while disregarding the remaining aspects" (Talmy 2000:177). What is selected corresponds to a particular schema. All spatial scenes are 'boiled down' to a schema. This process is probably one similar to that involved when children draw stick figures as representative of people. Perhaps human beings conceptualise the world through some kind of 'skeletal' structure. If this is the case, then Levinson's challenge (sited in 1.1.) that language cannot reflect concepts in equal detail is refuted since no such detail is present in the conceptualisation of any scene. That is, no such information is detailed in a spatial schema.[12] A schema is not concrete but merely relational.

A scene is categorised according to the relational information abstracted corresponding with information detailed in a particular schema. Just as some senses of a preposition are more central to a category so are their corresponding image schemas. These schemas are acquired as language develops and, consequently, are language-specific. The number and nature of these schemas will depend on the categories drawn in the language one speaks. However, some are more likely to occur more frequently because they correspond with a

[10] Talmy distinguishes between two levels of language: 1. Macroscopic expository level – the level at which "one can convey conceptual content of any sort, including feelings, local gossip, and practical medicine – or indeed, the organisation of space and time, and causality. E.g., open-class lexical elements, stems of nouns, verbs, adjectives"; 2. Fine structural level – closed-class 'grammatical' forms including categories and closed-class particles (e.g., prepositions). These forms represent only certain conceptual categories: space, time, perspective point, distribution of attention, force, causation, knowledge state, reality status, and the current speech event, hence, on-line inferencing strategies (Talmy 2000:178).

[11] Talmy (2000) seems to use *idealisation* and *schematisation* as interchangeable terms.

[12] Of course, such metric precision must be detailed somewhere in cognition but it need not be part of the image schema as conceptualised for a scene.

second kind of image schema, which Johnson (1987) refers to as *kinesthetic image schemas.* These schemas are contenders for universal (and Johnson argues innate) models and exist for basic concepts such as CONTAINMENT, SOURCE-PATH-GOAL, UP-DOWN, BALANCE etc. They are governed by the nature of our bodies and are deeply embedded in cognition.

An image schema for a proto-scene of *in*, which corresponds to the concept of containment, may look as follows where TR is located within container LM, bounded by all sides:

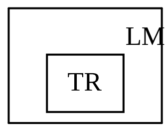


Figure 1

Which elements of a spatial scene are idealised and which are ignored will differ across languages depending on the structure of, and distinctions in the categories of that language. Depending on the focus of any spatial configuration, different schemas may be applied to the same configuration. Particular elements of a scene are idealised with different schemas, e.g., when TR is located *in* a box, the inside of the box is idealised. When TR is located *on* a box, the supporting surface of the box is idealised. Given the small number of spatial particles (and thus categories) in any language, any spatial scene is categorised in terms of 'nearest fit' to one of the inventory of available categories.

1.5. Conceptual Metaphor and the Seeds of the Conceptual System

Nearly all of human understanding is metaphorical (see Lakoff and Johnson 1980, 1999). That is, one domain of experience is structured in terms of another. Concrete domains are projected onto abstract domains of understanding in order to deduce meaningful conclusions within the abstract domain. This projection is not a conscious one but a conceptual one, of which we are rarely (except as cognitive linguists) aware. During the evolution of the mind there must at some point have been a 'metaphor mutation' which gave rise to much of our conceptual system from the most concrete and basic of our cognitive capacities. The most basic cognitive capacity for any roving creature must be the ability to negotiate space. And indeed, as we shall see in chapter three, space is the source domain utilised in metaphorising many non-spatial target domains.

> Space… itself may play a central role by functioning as a (metaphoric) model for the structuring of other domains.
>
> (Talmy 2000:179)

It makes both evolutionary and developmental sense that one basic domain such as space should be so central in the rest of cognition. In terms of development, functional-spatial-relations concepts are established very early. By 6 months, infants show surprise when containers without bottoms hold objects (Mandler 1992), suggesting an established understanding of both containment and support.[13] By 9 months, infants have a concept of containers as places where objects disappear and reappear (Lloyd, Sinha and Freeman 1981). From the moment an infant is born he is engaged in interacting with the spatio-physical world and acting under the constraints of the forces within it.

> Some of the earliest formative experiences humans undergo involve battling with gravity to remain upright, attempts to achieve balance and discovery of force dynamics.
>
> (Tyler and Evans 2003:28)

In evolutionary terms, an understanding of space must be amongst the most primitive of understandings in the cognitive system of any creature who, in order to survive, must be able to negotiate and interact with objects in the spatio-physical world. We can assume

[13] The fact that distinct knowledge of the functional consequences of configurations involving containment and support are universal does not entail that they are categorised in a universally uniform pattern. At an embedded level of cognition, knowledge of the consequence of containment and support is universal. But at a higher level of cognition, the conceptual level, organisation of such knowledge depends on the categories drawn in language. We will come back to this distinction in section 2.4.

then, that spatial cognition is one of the earliest domains to form part of the conceptual system. If this is the case then our knowledge of space formed the foundations upon which we built our representations of other aspects of our physical and intellectual world. Since evolution works incrementally and cannot 'start from scratch' but must build on top of what is already in place, when other domains of understanding evolved they must have 'piggy-backed' on conceptions of space – "over the course of evolution, newer parts of the brain have built on, taken input from, and used older parts of the brain" (Lakoff and Johnson 1999:43). Further domains could, in turn, have piggy-backed on these new domains, resulting in a conceptual system which is ultimately grounded in our understanding of space. In fact, our concepts of space must have evolved out of our facilities for spatial perception.

> Since spatial-relations concepts are about space, it should not be suprising if our capacities for vision and negotiating space are used in constituting spatial-relations concepts and their logics.
>
> (Lakoff and Johnson 1999:39)

1.6. The Embodied Mind

> *Conceptual Embodiment:* the idea that the properties of certain categories are a consequence of the nature of human biological capacities and of the experience of functioning in a physical and social environment. It is contrasted with the idea that concepts exist independent of the bodily nature of any thinking beings and independent of their experience.
>
> (Lakoff 1987:12)

The theory of the embodied mind (see Johnson 1987, Lakoff 1987, Lakoff and Johnson 1999) holds that the way we think is a direct result of the kind of bodies we have and the kind of experiences we have with them and the physical world we inhabit. The consequence of this is that the nature of our conceptual systems is based on bodily experiences: perception, sensorimotor cognition, and knowledge of the physical forces we encounter during development. A hummingbird's conceptual system will be radically different from ours (yet equally real since reality is subjective) as a result of its different experiences: different physiology, different neural architecture, being under different constraints from forces such as gravity, different needs and different biological solutions to those needs.

Embodied experience gives rise to conceptual structure, thus meaning is embodied. Meaning is necessarily embodied because meaning is derived from experience (experientialism), which is governed by the nature of our bodies (embodiment). Hence, meaning is embodied. When embodied experiences in the world are universal they are more likely to give rise to universal concepts. Universal concepts then, need not be innate. However, Johnson (1987) argues that innate kinesthetic image schemas such as containment determine experience. We will see in section 2.4. how it is possible to account for experiential and embodied universals on the one hand, but the linguistic and therefore conceptual variation seen in section 1.3 on the other hand.

The embodied/experiential basis for the concept of containment is the fact that our bodies are containers, and that we constantly find ourselves interacting with containers. As Johnson (1987) states:

> Our encounter with containment and boundedness is one of the most pervasive features of our bodily experience. We are intimately aware of our bodies as three-dimensional containers into which we put certain things (food, water, air) and out of which other things emerge (food and water wastes, air, blood, etc.)… We move in and out of rooms, clothes, vehicles, and numerous kinds of bounded spaces. We manipulate objects, placing them in containers (cups, boxes, cans, bags, etc.).
>
> (Johnson 1987:21)

And as Wierzbicka (1996:95) states:

> Among the natural ‘containers’, the most salient is perhaps the mouth, presumably conceptualised all over the world as a part of the body meant for, roughly speaking, ‘putting something in’.

Metaphoric projections of containment and non-typical spatial senses of *in* result from experiential correlation between the nature of the target domain/scene and our concept of containment. The most experientially common sense of containment is that of TR being contained within a three or four-sided LM. It corresponds to the image schema for the proto-scene of *in* illustrated in figure 1.

Having presented key ideas in conceptual semantics which are fundamentally necessary for any study into the semantics of a particular category, let us now turn to an investigation into the semantics of the English preposition *in*. This investigation will consist of two parts. The first (chapter two) will establish the proto-scene for *in*; that is, the spatial configuration most central to the category coded by *in*. The second part (chapter three) will consider further senses of *in* and the conceptual relation to the sense established in chapter two. Note that this investigation is into the *English* preposition and the data presented has no claim to universality since, as has already been illustrated, not all languages have a category that maps directly with the English category *in*. However, the investigation may raise hypotheses as to a universal concept of containment at a level of cognition below that of semantic categorisation.

Chapter two

Extra-geometric factors

In surveying the principle ideas in conceptual semantics, so far we have only considered the geometric factors (i.e., relational information) in any scene as contributing to spatial categorisation. Whilst this clearly does contribute to the meaning of a preposition, it is not the only contributing factor. This chapter will consider the extra-geometric as well as the geometric features of spatial scenes coded by *in*.

2.1. The Inadequacy of Geometry Alone

First order logic or formal semantics cannot alone provide the meaning of a preposition. The reason for this is that the meaning of any preposition is more complex than being simply a geometric description of the relative positions of objects in space. To illustrate this consider the following formula expressing use conditions for *in* (cited in Coventry and Garrod 2004:16):

In (X,Y) iff Located (X, Interior (Y))

This formula, whilst appealing, can instantly be falsified by the configuration in figure 2. This configuration breaks the conditions of the formula because fruit (X) is not located interior to bowl (Y), yet the use of *in* is perfectly permissible.

(1a) The fruit (X) is in the bowl.

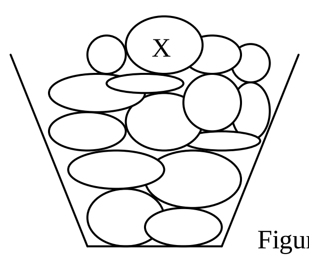


Figure 2

Also consider Herskovits's (1986:149) *ideal meaning*, which only takes into account geometric factors: "inclusion of a geometric construct in a one-, two-, or three-dimensional geometric construct".

Figure 3 shows the exact same geometric relation between fruit (X) and bowl (Y), yet in this scene *in* is not permissible.

(1b) ** The fruit (X) is in the bowl.[14]

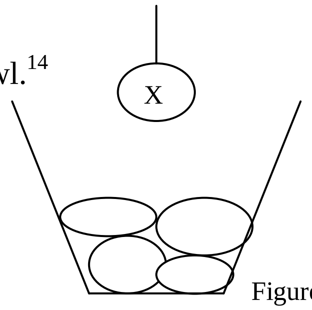


Figure 3

The apparent contradiction between permissible uses of *in* in two scenes with identical geometric relations between TR and LM highlights the fact that extra-geometric factors must be taken into account when categorising any spatial scene. These extra-geometric factors must account for the dichotomy between the possible uses of *in* in figures 2 and 3.

Similarly, it is permissible for scenes involving different geometric relations to be coded by the same preposition. This again illustrates that geometric factors alone cannot define the meaning of a preposition. Whatever the extra-geometric factors which fill this gap may be, they must also account for the use of *in* to code for both scenes depicted in figures 4 and 5.

(2a) The flowers are in the vase.

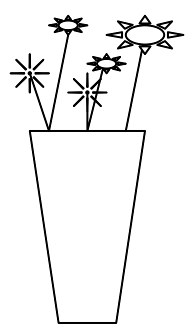


Figure 4

[14] Conventionally, in linguistic analyses, a single star marking a sentence indicates that it is syntactically incorrect. Throughout this paper I shall use two stars to mark a sentence that is pragmatically incorrect.

(2b) There is a crack in the vase.

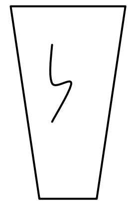


Figure 5

It is clear from the scenes presented in figures 2–5 that any complete semantics of a preposition must take into account both geometric and extra-geometric features as contributing factors to the meaning of that preposition.

> We do not deny that there is a relationship between spatial language and geometric relations in the scene being described, but we do question the completeness of any account that focuses on geometric relations exclusively.
>
> (Coventry and Garrod 2004:34)

My aim in this chapter is to explore these extra-geometric relations between TR and LM in spatial scenes coded by *in*. Examples of extra-geometric factors include the functions of the objects in a scene and the kinds of forces they exert on each other. How objects interact with each other in space and the consequence of the function of LM on TR are important influences on the categorisation of spatial scenes. The application of a particular preposition to a given scene is a product of both geometric relations and extra-geometric relations between objects in that scene. Geometric relations contribute to the selection of preposition as relational information corresponding to image schemas is abstracted from the scene. Equally, extra-geometric relations, such as purpose or function, contribute to the selection of a preposition as information about the function of the objects is stored in background knowledge. Function of objects can actually determine how two scenes identical in geometric relations are viewed, that is, what geometric information is idealised and thus which image schema is applied to that scene.[15] For example, figures 6 and 7 show a LM that can either be categorised as *a plate* or as *a bowl*. The two scenes are geometrically identical. Yet, as a result of the difference in function between a plate and a bowl, they would be coded differently depending on whether the LM is classed as a plate or bowl. Thus, as a result of the different classification given to LM in sentences (3a) and (3b), in figures 6 and 7, TR and LM are conceptualised as having different relations to each other.

(3a) The fruit is in the bowl.

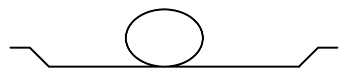


Figure 6

(3b) The fruit is on the plate.

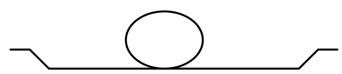


Figure 7

Coventry and Garrod (1994) showed that when an identical LM object was labeled a dish, *in* was more frequently selected for to complete a sentence of the form *the located object* [TR] *is* ___ *the reference object* [LM]. When the LM object was labeled a plate *on* was more frequently selected for.

Vandeloise (1994:172) offers a similar example. The scene depicted in figure 8 below can either be construed as a bottle or a light-bulb.

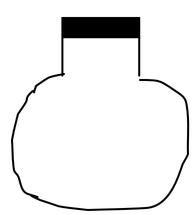


Figure 8

[15] This is probably achieved through a relevance processing model such as described by Sperber and Wilson (1995). Coventry and Garrod (2004:140) claim that "viewers attempt to construct and test the most informative spatial model… The most informative model is the one that supports the strongest inferences about the situation that are consistent with the information present in the scene". It seems likely that in selecting a preposition to describe a scene one selects the most relevant, that is, the one which produces the greatest cognitive effects for minimum cognitive effort.

Whilst the spatial relation is the same whether the scene is construed as one involving a light-bulb or a bottle it is not conceptualised as the same. Hence, it is felicitous to say *the bulb is in the socket* but it is infelicitous to say ***the bottle is in the cap*. This has to do with the functional nature of light-bulbs and bottles. Whilst the functioning of a light-bulb is contingent upon it being located in its socket this is not the case with bottles. The function of a socket is also to hold in place the light-bulb and prevent it from falling, whereas this is not a function of bottle caps. As Vandeloise (1994:173) states: "While the socket exerts a force on the bulb and determines its position, the opposite occurs with the cap and the bottle".

For an individual to negotiate the spatio-physical world it is crucial that he understands whether objects/entities are likely or not to remain in the same relative position over time. Furthermore, knowledge of how objects interact and function is of great survival value. It makes sense, therefore, that spatial language should be as much about how objects function and interact as it is about position in Euclidean space.

The forces that objects exert on each other are very important features of the meaning of a preposition when applied to a scene describing the relation between those objects. For example, if TR is located inside LM, then a consequence of this is that LM constrains or determines the location of TR. As Coventry and Garrod (2004:52) state:

> One of the consequences of enclosure is that enclosure affords *location control*. For an object to be *in* another object, the reference object [LM] needs to be able to constrain the location of the located object [TR]. [My italics]

Another way of putting this is that if the function of LM is containment and LM constrains or determines the location of TR in any scene, and if the geometric information abstractable from that scene corresponds to the information detailed in an image schema for containment, then *in* is an appropriate spatial particle for describing that scene.

'Inness' is a hybrid relation defined by both geometric relations (i.e. containment) and extra-geometric relations such as location control whereby LM (container) affords control over location of TR (LM's contents). For example, *the fruit is in the bowl* is an appropriate use of *in* to code for the scene in figure 9 because the location of the bowl will determine the location of the fruit, and because the geometric information abstractable from that scene corresponds to the geometric information detailed in the image schema for containment.

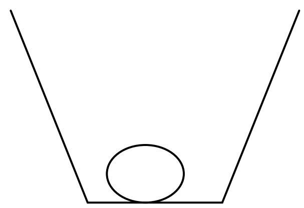
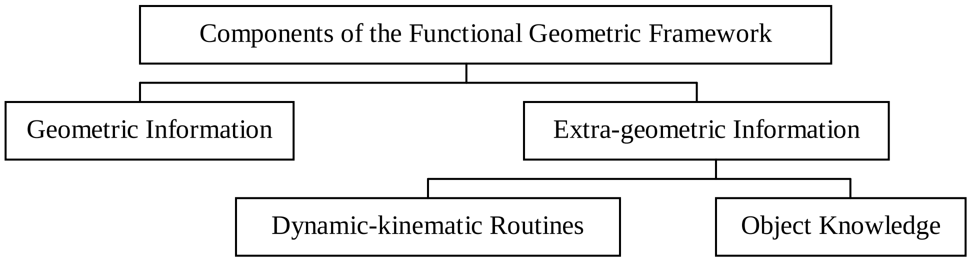


Figure 9

Given this necessary extra-geometric feature of meaning for *in* (location control), we can now go back to figures 2 and 3 and explain why the scene in figure 2 can be described by *in*, but figure 3, which contains identical geometric properties, cannot. In the scene depicted in figure 2 the bowl exerts location control over the fruit, where as in figure 3 it does not. Similarly, whilst figures 4 and 5 are geometrically different, in both scenes depicted the vase exerts location control over the flowers and the crack, hence allowing for the relation between TR and LM in both scenes to be coded by *in*. In cases of weak containment but strong location control (e.g., scene in figure 4) and visa versa, the use of *in* is appropriate. The degree of appropriateness for the use of *in* is as much a product of extra-geometric relations as it is geometric relations.

2.2. Coventry and Garrod's Functional Geometric Framework

Outline of Functional Geometric Framework (adapted from Coventry and Garrod 2004:55):



> The Functional Geometric Framework aims to capture the representation of spatial relations not just in terms of how viewers see such relations, but also in terms of how they act on the world they see, and in terms of how objects meaningfully interact in that world.
>
> (Coventry and Garrod 2004:54)

As the above chart displays, extra-geometric information comes from two sources:

- Dynamic-kinematic aspects of scenes – e.g., location control
- Function knowledge of objects – e.g., how they interact with each other in particular situations

To demonstrate the importance of these features consider the logical deductions one must make based on geometric information alone.

In logical terms if X is *in* Y and Y is *in* Z, then X is *in* Z

However, this topological deduction does not always give rise to permissible uses of *in*. For example, if X = golf club, Y = hand, and Z = glove, then the logical deduction is ***the golf club is in the glove*. By contrast, if one takes into account the extra-geometric information - knowledge of the nature (i.e., hands are animate, gloves are inanimate) and function of golf clubs, gloves, and hands, as well as the consequential results of their function - then one can draw more inferences which hold true.

How is extra-geometric information acquired and how is it related to geometric information? Object knowledge is acquired as one meets new objects and interacts with them. Dynamic-kinematic knowledge is acquired as one experiences dynamic-kinematic routines, that is, as one observes the recurring consequence of the dynamics and kinematics in spatial scenes.[16] Concepts of spatial configurations (geometric information) are acquired first and then become, through interaction with the physical world and the objects within it, associated with the functional relations (extra-geometric information) of that spatial configuration. Then, during the development of the conceptual system, the proto-scene for spatial configurations of that kind becomes the one which best accommodates the functions associated with it. In the case of *in*, that function is location control. For *in*, location control and geometric enclosure are highly correlated (Coventry and Garrod 2004:58). The result of this is that the configurations associated with a particular function may, in less prototypical scenes, be geometrically diverse. For example, in the scene depicted in figure 4, the part of the flowers which metonymically represent the concept of flowers is not contained within the vase, but through experience of dynamic-kinematic routines in similar configurations one has associated this kind of configuration with location control and thus *in* is permissible in such a scene. Consider again the scenes in figures 6 and 7. Objects are associated with particular functions. Retrieval of this functional information from stored knowledge may promote particular schemas.

[16] Dynamics = the forces that cause the changes of motion. Kinematics = the changing pattern of the motion itself.

> What a spatial preposition means in a specific context is a function of information present in the visual scene [geometric information corresponding to image schemas], knowledge of the objects in that scene, and an appreciation of how those objects are functioning in that particular context [dynamic-kinematic information].
>
> (Coventry and Garrod 2004:128)

There is neurophysiological evidence which supports the claim that the categorisation of any scene involves both geometric and extra-geometric information. For any scene to be conceptualised it must first be perceived. Neurophysiological studies show two neural pathways connected with the visual systems (Coventry and Garrod 2004:62):

Ventral pathway: extracts information sufficient to establish the identity of objects in terms of their colour and form;

Dorsal pathway: assumed to extract visuo-motor information that specifies the size, location, and orientation of objects.

The dorsal pathway carries information regarding the geometric relation between objects in space whilst the ventral pathway carries information for identifying objects. Part of the stored knowledge of any identified object will be knowledge of its function. Visual representation seems to reflect both the geometric and extra-geometric information which together form the meaning of spatial terms.

2.3. Establishing the Proto-scene

For a TR to be *in* a LM, this entails more than just containment; it also entails location control. A proto-scene for *in* must be one where the geometric information abstractable corresponds to an image schema for containment and where location control is strongest. In experiments conducted by Coventry (1992, 1998 (reported in 2004:74)) participants were presented with video images of TRs in various spatial relations with a container (LM). These images are shown in figure 10 below (taken from Coventry and Garrod 2004:75):

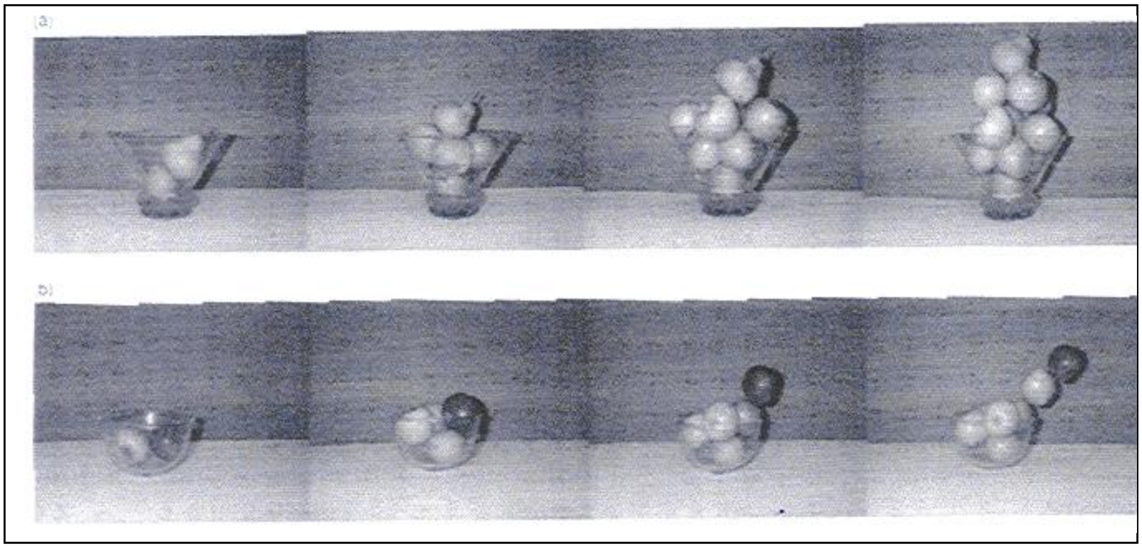


Figure 10: Examples of the video scenes used by Coventry (1992, 1998). The scenes shown are static. For the location control condition, the whole scene (bowl plus complete contents) was shown to move smoothly from side to side at the same rate. For the non-location control condition the located object (the pear in (a) and the red apple in (b)) was shown to wobble from side to side, but to remain in contact with the other fruit.

Participants were asked to complete a sentence of the form *the located object* [TR] *is* ___ *the reference object* [LM] for each of these scenes. In the scenes presented, the TR was positioned at four different heights on top of other objects in the LM. These scenes were shown in two conditions: (i) location control condition, whereby the bowl is moved such that it continues to determine the location of the fruit and (ii) non-location control condition, whereby the pear in (a) and the red apple in (b) are not stable but the bowl remains stationary. *In* was produced most often (in comparison to other prepositions) in those cases where location control was strongest, namely the first scene in (a). The scenes in (a) are natural, as are the first two scenes in (b). The latter two scenes in (b) are not natural. However, although *in* was produced much less often for the unnatural scenes in (b), the marked difference in frequency between the non-location control condition and the location control condition was the same in both (a) and (b). This experiment shows that the stronger location control is, the more appropriate is the use of *in* in coding for that scene. It may be concluded from this that the greater degree of location control a LM exerts over a TR in any scene, then the closer that scene is to the proto-scene for *in*, the more central to its category is that use of *in*.

Perception of degree of location control is affected by different factors. If a container is tilted, then (assuming the container is three-sided rather than four-sided) the further it is tilted the lower the level of location control and hence, the less prototypical is the scene. This is due to the decreased capacity of LM to afford location control over TR for the likelihood that TR may fall out of container (LM). Similarly, as has already been noted, perception of location control is affected by whether or not the objects being described are animate or inanimate. Inanimate TRs are subject to greater degrees of location control. Also, animate LMs are capable of manipulating the level of enforced location control. Feist and Gentner (2003) found that *in* is more likely to be selected for in coding for scenes involving an animate LM (a hand) than for those involving an inanimate LM (plate, bowl, dish). Feist and Gentner also found (ibid.) a lower proportion of '*in*' responses to scenes depicting an animate TR (firefly) than in comparable scenes depicting an inanimate TR (coin).

Likewise, consider how different objects interact in different environments. Can *in* mean the same thing to an astronaut in Space as it does on Earth? Without gravity the location control element of the meaning of *in* would be different. For without gravity location control would require full enclosure. So whilst a proto-scene for *in* would be the same in space as it is on Earth – TR completely enclosed within LM such that LM determines location of TR – less central scenes such as depicted in figure 2 and scenes such as figure 9 where enclosure is not complete may not be coded by *in* since the location control element of its meaning is absent.

Because, through experience of dynamic-kinematic routines, the image schema (geometric-relational element of meaning) for containment has come to be associated with location control (extra-geometric element of meaning), and because the prototypical configuration coded by *in* is the one which affords the greatest degree of location control, the proto-scene for *in* has come to be one which contains geometric properties corresponding to the central image schema for containment and in which container (LM) exerts maximum possible location control over its contents (TR) (Schematically represented in figure 1).

2.4. Developmental issues

Infants have a prelinguistic understanding of spatial relations. This prelinguistic knowledge is of both a geometric and extra-geometric nature. Prelinguistic geometric knowledge exists in the form of the basic kinesthetic image schemas such as containment, which may be constructed from earliest visual experiences and experiences with motor control or may possibly be innate. Within the first few months, infants are able to perform grasping tasks and are able to distinguish between left and right, and above and below (Coventry and Garrod 2004:147). However, as Coventry and Garrod (2004:148) state: "in addition to learning basic geometric relations, infants learn much about the physical properties of objects and the world in which they are found". Hespos and Baillargeron (2001) conducted an experiment in which infants (as young as 2.5 months) were shown an object lowered either behind or inside a container. The container was then moved forward and to the side, revealing the object to be behind it. Infants looked longer in the condition where the object was placed inside the container. This illustrates that in this condition the infant's expectations of location control were not met. At 2.5 months, infants must possess some knowledge of the consequence of containment.

The function of specific objects is also an important part of prelinguistic knowledge for the infant. Function of objects seems to become important for infants at around 12 months. In another preferential looking task (Madole, Oakes, and Cohen 1993), infants were presented with objects and allowed to interact with these objects. After familiarisation with an object the infants visual attention to the familiar object and a novel object was measured. The novel object differed from the familiar object only in either function, appearance, or both function and appearance. 14-month-olds examined for longer a novel object when it differed in function from the familiar object but not in appearance. 10-month-olds did not. Madole et al. (1993) also showed that infants treat function and appearance as independent characteristics until 18 months, whence the geometric properties of a scene start to become intrinsically associated with the functional consequences of such a scene. By the time language starts to develop, geometric information and extra-geometric information are inextricably linked, such that both are fundamental elements in the meaning of spatial prepositions. Children begin to produce spatial terms in their second year of life. The first acquired are the topological prepositions *in*, *on*, and *under*. The development of spatial language then continues until around 8 years.

Given that a notion of the consequence of containment is present at 2.5 months, one may assume that this is universal. This is not necessarily to say that it is innate. Of course it may be, but it could also be acquired from the earliest interactions with those features of one's body and the world one inhabits which are common to all human beings. However, despite universals in knowledge of physical laws and expectations of their consequence on how objects interact, there is great variation in how different languages categorise the spatial world (see Levinson 2003). To account for this universality in expectations of the consequence of certain spatial configurations but the variation in how those configurations are classified in different languages, one must hypothesise two distinct levels of cognition:

Embedded level: the level at which universal non-linguistic knowledge of physical laws and their consequences for object interaction is stored;

Conceptual level: the level at which semantic categorisation and conceptual organisation occurs.

Both levels of cognition rely on perceptual (mainly visual) cognition and stored object knowledge. The knowledge stored at the embedded level is universal and is a result of the embodiment of meaning and our minds evolving in an environment governed by physical forces such as gravity and cause and effect etc. It includes the kinesthetic image schemas, a product of the embodied mind. The embedded level is likely to have some influence over the conceptual level but does not structure it. The knowledge stored at the conceptual level is variable across languages and cultures. This knowledge is structured by the language one speaks and is a product of the need to communicate information about spatial scenes with a limited number of terms. It includes the category-specific image schemas. Expectations of location control and the image schema for containment are universal at the embedded level of cognition, but are not defining meaning elements of a spatial category at the conceptual level in all languages. For this reason, the universal 'concept' of containment would perhaps be better referred to as a *percept*.

In this paper we are concerned with the conceptual level - with specific regard to the category of *in* in English - and as we have seen, location control and the concept of containment are defining meaning elements in this case.

The proto-scene for *in* is the earliest established sense of the word. It is achieved through abstracting geometric properties common to the most frequently encountered scenes coded by *in* and then observing and interacting with those scenes so that location control becomes correlated with these configurations. The linguistic input a child hears will structure how his categories are formed and the prototypes for those categories. Having acquired this proto-scene the child will draw properties from it which are present in other scenes, forming a conceptual link between these scenes and leading to the extension of *in* for scenes other than the proto-scene. The child's linguistic environment enforces these conceptual links. That is, systematic linguistic structure (polysemy) shapes the child's conceptual structure. Basic notions of containment etc. are present in cognition prelinguistically. Categorisation, though, occurs with the development of language. It is the process of categorisation, at the conceptual level, which bounds, language specifically, certain spatial relations together. Bowerman (1996a, 1996b) presents evidence supporting the claim that the language one learns structures the construction of spatial categories. Bowerman suggests that children learn how to structure space for language. Levinson (2003) also argues that spatial categories in language must shape conceptualisation of space. Levinson believes that this is a product of the structure of the mind. Namely, language is an output system, and since, as

Levinson demonstrates, there can be no proper translation between opposed conceptual systems, then the input to that system must be coded in the same way as it is to be communicated. Hence, “the imprint of language-specific categories will run deep in cognitive processes” (Levinson 2003:301). Levinson (2003:305) reports on an experiment conducted by Choi (in preparation) in which 18-month-old Koreans, in contrast to same age English infants, are shown to attend (in a preferential looking task) only to distinctions in scenes coded for in their language. However, at 9 months infants were shown to have equal facility to make Korean and English distinctions. This suggests that a child’s linguistic environment plays a crucial role in much of conceptual development. We divide up space according to our linguistic environment.

In this chapter we have established the need for both geometric and extra-geometric information in defining the meaning of the English preposition *in*. This twin-component meaning of *in* and associations made between them has given us a proto-scene for *in* which possesses abstractable geometric properties corresponding to an image schema for containment, and which demonstrates LM exerting maximum location control over TR. The earliest acquired sense of *in*, the core sense, codes for this proto-scene. The following chapter will explore further senses of *in* and how they are conceptually related to this proto-scene.

Chapter Three

Motivated Meaning Extension

This chapter aims to explore senses of *in* different from that established as the proto-scene in the previous chapter. In doing so we will be considering the conceptual relations between these senses and the core sense (coding for the proto-scene) rather than assuming an arbitrary relation. First it is necessary to demonstrate why meaning extension from a proto-scene must be motivated, and thus all senses of a particular preposition be cognitively organised with respect to a network of conceptual relations surrounding the central proto-scene. Tyler and Evans (2003) call this *principled polysemy*.

3.1. Principled Polysemy

There are three approaches to the relatedness of distinct senses for one lexical entry:

Homonymy: holds that the conceptual system contains several distinct meanings which just happen to be coded by the same form;

Monosemy: holds that the conceptual system, in long term semantic memory, contains one highly abstract sense from which, through contextual knowledge, other meanings are constructed on-line.

However, there are fundamental problems with both of these approaches (Tyler and Evans 2003:4-7). For homonymy, if meanings coded by the same form are not related, then why not coin a novel form? In order for communication to be successful, meaning extension must be motivated and systematic. To use a code with an already established meaning to represent an alternative unrelated meaning would cause communication to break down. For monosemy, it is demonstrable that some extended meanings are context independent (pragmatic knowledge alone is insufficient in predicting all the distinct meanings associated with a preposition), suggesting that for communication to be successful, meanings coded by the same form must be conceptually related, not only contextually related. That is, whilst much of meaning construction is a creative process, not all meaning can be a product of situated (i.e. contextual) interpretation, but must be stored in semantic memory.

This leaves the polysemy approach:

Polysemy: "holds that a linguistic form is paired at the conceptual level, not with a single meaning, but with a network of distinct but related meanings" (Tyler and Evans 2003:7).

The principled polysemy approach assumes the meaning of prepositions to be a non-static, growing phenomenon (Evans and Tyler 2004:4). At some point, language must have had a more restricted use of a preposition. As the conceptual system has evolved in complexity, language has co-evolved with it. Since our world is structured in terms of spatial understanding, forms coding for this basic spatial understanding have been extended to reflect the expansion of the conceptual system (hence, the study of a linguistic system equates to a study of the conceptual system). It is in this sense that the twin-component meaning of the core sense of *in* has given rise to further senses.

During the course of the evolution of the conceptual system, if a novel relation is conceptually related to a proto-scene, then it makes sense for that relation to be coded by the same form as codes for the proto-scene. For a speaker to use a form with an already established meaning to indicate something other than that meaning he must assume that the hearer could draw the intended implicature. That is, both speaker and hearer must be able to 'see' the conceptual relation between the core sense and the novel sense being coded for. "In order for a novel use to be readily interpretable by the hearer, meaning extension must be somehow constrained and systematic" (Evans and Tyler 2004:4). It is in this sense that one can claim that polysemy occurs through communicative goals – "polysemy networks form as a result of speakers perceiving communicatively useful connections between a non-primary sense and the primary sense" (Tyler and Evans 2003:32). However, this connection is communicatively useful precisely because it is already conceptually connected. "When categories get extended in the course of history, there has to be some sort of cognitive basis for the extension" (Lakoff 1987:111). Since our conceptual system is constructed from basic spatial understanding, one is forced to conceptualise a novel scene in spatial terms. Which spatial term selected will depend on the speaker's communicative intention in describing that scene. Once this form is established as the conventional form coding for that particular novel scene, this linguistic structure then serves to reinforce, during development, the conceptual relation between this scene and the proto-scene. Unlike Tyler and Evans, who believe that once conventionalised and established in semantic memory, the associations between an extended sense and the core sense may be lost over time, it is my belief that these conceptual relations are, in fact, set firm in the conceptual system as a result of these scenes being coded by the same form and the conceptual commonality between them.

In order to illustrate the fact that *in* is polysemous consider the following examples offered by Evans and Tyler (2004:4):

(4) a. The toys are in the box.
  b. She is in love.
  c. Ok, class, put your chairs in a circle.
  d. She cut the pie in half.

It is clear in these examples that *in* is functioning in a semantically different way in each sentence. In (4a), *in* relates to the notion of containment by a three-dimensional LM and is very near to describing an example of the proto-scene. In (4b), *in* defines a person's state. In (4c), *in* relates to the notion of a boundary as a shape, while in (4d) *in* designates that an entity is divided.

According to Evans and Tyler (2004:7) the semantic network for *in* has nearly thirty distinct senses. A semantic network (the range of conventional senses associated with a word) can be modelled or organised with respect to a core sense, which codes for the proto-scene. Thus, some scenes coded by *in* are closer to the proto-scene than others. Here I intend only to investigate ten of the more central senses. How do we determine, though, when a scene is an example of the core sense or a further distinct sense? There are two criteria for determining a distinct sense:

(i) Must contain additional meaning to that of proto-scene. That is, must involve non-spatial meaning or spatial configuration with different geometric or extra-geometric properties from proto-scene;

(ii) Must be context independent. That is, stored in memory rather than meaning being formed on-line.

Figure 11 shows the partial semantic network for *in* which will be investigated here.

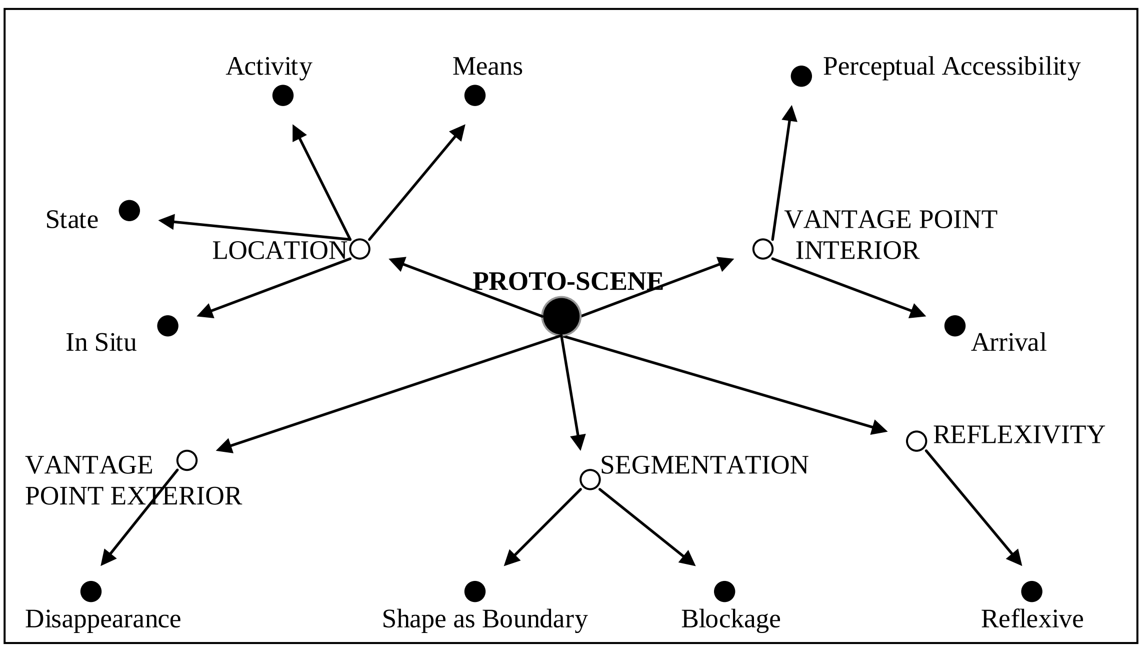


Figure 11 (adapted from Evans and Tyler 2004:12)

The fact that the same form codes for these different scenes is not coincidence but is a product of conceptual commonality between these scenes, grounded in experience of dynamic-kinematic routines in the proto-scene. During the course of the evolution of the language, speakers have used existing forms to code for novel senses because it has been communicatively useful to do so (communicatively useful due to conceptual commonality). This meaning of the preposition is at this stage formed on-line but then becomes conventionalised. In this sense, the categories of a language are a product of language history. Once established as conventional usage, this extended linguistic structure reinforces the categories and distinctions that an infant draws during development, as well as the conceptual commonality between the core sense and this extended sense.

> A theory of lexical organisation requires a motivated account of the experiential and conceptual factors that facilitate the derivation of new conventional senses, and thus an account of the nature and origin of polysemy.
>
> (Evans and Tyler 2004:3)

3.2. The Case of *In*

Here I shall exemplify the senses of *in* given in figure 11 above, which are arranged in clusters according to related experiences, and to consider how they are conceptually related to the proto-scene. Given that all of these senses are ultimately derived from the proto-scene it is worth just reminding ourselves of what constitutes the proto-scene.

Proto-scene for *in*: Spatial relation in which TR is located within LM. LM has three salient structural elements: an interior, a boundary, and an exterior. As a consequence of the structural elements of LM, TR being located within LM, and real-world force-dynamics, the proto-scene for *in* is, in addition to geometric properties, associated with the functional element of containment and resulting extra-geometric factors such as location control.

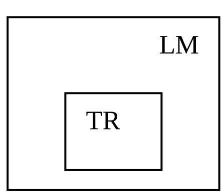


Image schema for proto-scene

The functional nature of containment, shown in chapter two to be a fundamental meaning component for *in*, gives rise to the meanings extended from the proto-scene.

> In the guise of containers, LMs constrain and delimit movement of their TRs.
>
> (Evans and Tyler 2004:8)

The image schema for the proto-scene also seems to apply for non-canonical bounded LMs such as fields, deserts, towns, countries etc. Due to the flexibility of human conceptualisation *in* can be used to code for scenes involving these two-dimensional LMs, as well as the canonical three-dimensional LMs. For example, in the following examples the LM is planar but the fact that such LMs are conceptualised as possessing the three salient structural elements of containment mentioned above (interior, boundary, exterior) warrants the use of *in* to describe such scenes:

(5) a. The bull is in the field.
b. Norwich is in the east of England.

In (5a), the field is conceptualised as having a boundary and hence an interior and an exterior. The interior is the part which itself constitutes the field, the boundary perhaps a track, ditch or hedgerow, and the exterior all which is not contained within the boundary (i.e., that which is not the field). These three structural features of a field, corresponding to the structural elements of the proto-scene, gives rise to the relationship between TR and LM in the scene described in (5a) being construed as one of containment and hence, permitting the use of *in*. Similarly, in (5b), the geo-physical divisions of England into four quarters (North, South, East, and West) leads to each of those quarters being conceptualised as having an interior (that area which is described by East, for example), a boundary (the arbitrary geographical marker which designates the division), and an exterior (the area which is not, for example, East). This conceptualisation determines that the relation between TR and LM in the scene described in (5b) be construed as one of containment, thus making felicitous the use of *in*. An analogous example is as follows, whereby political and geographical borders provide boundaries and hence designate an interior and an exterior:

c. Beijing is in China, which is in Asia.

The proto-scene image schema is also employed in scenes involving other kinds of non-canonical LMs. These LMs are conceptualised as having some enveloping property, whereby LM (typically some atmospheric condition) envelopes TR. Examples include:

(6) a. John got soaked in the rain.
b. The tourists struggled in the humidity.
c. The rabbit froze in the headlights.

One other kind of scene in which the proto-scene image schema is used to conceptualise a scene involving non-canonical LMs is one in which the LM is a collective of individual entities conceptualised as one single entity. For example, *the crowd* in the scene described below is conceptualised as a single entity, but in reality is comprised of a number of individual entities:

(7) a. John stood out in the crowd.

Evans and Tyler (2004:11) point out the experiential origin for this conceptualisation. Whilst up close to a crowd of people, those people are easily identified as individual entities. However, as one becomes more distant from that crowd, identifying individuals within it becomes increasingly difficult. At some point, the distance becomes such that one cannot see individual entities, but perceives the crowd as a single bounded entity. Also, one's knowledge of a crowd and experience of being located in a crowd holds that the crowd may constrain or even determine one's location, the conceptual relation to the functional element of containment and the proto-scene giving license to the use of *in*. Whilst in the other examples offered as utilising the proto-scene image schema LM does not afford location control over TR, the location of TR is defined only with respect to the location of LM. In other words, for *the rabbit froze in the headlights* to be a true statement, the location of the rabbit is dependent on the location of the headlights.

Given that there is an almost infinite number of spatial relations that one can observe but only a limited number of classifications with which one can communicate about these spatial relations, each classification has come to code for a wide variety of different scenes. This meaning extension, as discussed in 3.1., must be motivated by some degree of conceptual commonality between the proto-scene (the first scene a child learns to code for and the earliest in a language's history) and novel scenes. Much of this conceptual commonality is derived from interaction with containing LMs, and as Evans and Tyler (2004:11) state:

> Due to the ubiquity of bounded LMs in our everyday experience and the range and differences in such LMs, it is hardly suprising that we interact with bounded LMs in many different ways.

This range of different experiences with containing LMs is reflected in the organisation of the polysemy network associated with the preposition *in*. Let us now turn to this network and exemplify those different senses of *in*.

As has already been suggested, the number of distinct senses of *in* has been counted at over thirty by some scholars. To illustrate this entire semantic network is beyond the scope of this paper. Instead, I will carefully consider the limited range of distinct senses given in the partial semantic network illustrated in figure 11. The network is arranged into clusters (non-filled circles) according to related domains of experience. Distinct senses are marked with filled circles.

3.2.1. Location

As demonstrated in chapter two, the meaning of the preposition *in* consists of two basic component meanings. Geometric information and extra-geometric information such as location control. As such, location control has come to play an important part in meaning extension from the proto-scene for *in*. As Evans and Tyler (2004:12) put it: "one aspect of the notion of containment relates to the movement or action of an entity being constrained, by virtue of being enclosed by a bounded LM". Johnson (1987) similarly argues that a consequence of containment is that the location of the contained TR is determined by the location of the containing LM. Evans and Tyler (2004:12) also point out that if a TR is located within a bounded LM, then the location of TR is known "with surety" even when not immediately within sight. For example, if the hamster is *in* its cage, then its location is known with surety even when one steps out of the room in which the hamster's cage is situated.

The In Situ Sense: "An experiential correlate of being located with surety is that the TR crucially remains in a particular location" (Evans and Tyler 2004:13).[17] It is this correlation which has given rise to the extension of *in* to senses such as below (taken from Evans and Tyler 2004:13):

(8) a. What are you in for? [asked in a hospital or prison, for example, meaning 'what's wrong with you?' or 'what were you convicted of?' respectively]

b. He stayed in for the evening.

In (8a), the TR is located at the LM (hospital or prison) for an extended period of time and is unable to leave voluntarily. As such, the LM is constraining (and more so in the case of prison, determining) the location of TR. Hospitals and prisons also have geometric properties of containment. As with the *hamster in the cage* example, if an

[17] Of course, this is grounded in experience with static LMs such as buildings or LMs which are likely to remain in the same location over time. The same cannot be said for animate LMs for example, which may move autonomously.

individual is in prison, then his location is known with surety, for he is contained within an inescapable bounded LM. In (8b), *he* (TR) remains located at home (LM), his location known with surety. *In* has also come to develop a sense in which TR is located in some 'default location'. A home is often considered the default location for persons. In these examples the TR remains in a particular location, governed by the location of LM, for an extended period of time. These scenes are conceptualised as examples of containment, thus allowing the use of *in* to code for these scenes, because the consequences of LM on TR share conceptual commonality with the dynamic-kinematic routines observed in the proto-scene for *in*.

The State Sense: Through experiencing certain emotional states in particular locations, a correlation between location and emotional states becomes established. If a location becomes associated with an emotion, then it becomes communicatively useful to describe that emotion in terms of a spatial particle. To give an example, a child may come to associate feelings of love and safety with being enclosed in his parent's arms and a sense of abandonment and vulnerability when alone outside of his parent's reach.

> Through recurring instances of a particular emotional state being experienced in a specific locale, the correlation between location and emotional and/or physical state becomes established. This correlation gives rise to conceptual associations such that we conceptualise and hence lexicalise states in terms of location.
>
> (Evans and Tyler 2004:14)

Lakoff and Johnson (1980) demonstrate a large number of examples of the EMOTION AS CONTAINER metaphor but here just consider the example in (9):

(9) to be in love.

Emotions may be conceptualised as containers because it feels as if they have control over one's actions, as container (LM) has control over TR in the proto-scene. If one is *in* *love*, then one tends to act differently to if one has fallen *out of love*. In this sense, emotions (LM) exert control over the activities of the individual (TR). In the same way as it is difficult to escape prison, one can draw (metaphorical) parallels with emotion, and say that once in love it is not easy for one to voluntarily escape that emotional state. Similarly, if one is *in trouble*, then one is conceptualised as being in a situation that is difficult to escape. The degree of control perceived in a particular state will affect the choice of preposition to code for that scene. For example, location control is weaker in the proto-scene for *on* (it does not involve boundaries and complete enclosure) than it is for *in* and, consequently, states perceived as affording less control over TR are coded with *on* (or sometimes *at*), whereas states conceptualised as exerting greater control over TR are coded with *in*. Consider the contrast between being *in love* or *in trouble* and the scene described in (10) below:

(10) to be on the take.

In (10), *on* is selected for because the scene is conceptualised as the individual (TR) having some capacity to escape that state (LM), hence the state possessing less potential for control. In (9) however, *in* is selected for because the state is conceptualised as exerting greater control over TR.

So *in* can be employed for describing states which are conceptualised as constraining the TR in some way. Clearly, in the examples given above there is no geometric information corresponding to that detailed in the image schema for containment, but the extra-geometric consequences of LM on TR in these scenes correlate strongly enough to those observed in the proto-scene to result in a containment conceptualisation and thus motivate the extension of *in* to code for these scenes. Further examples of states in scenes coded by *in* are given in (11) below:

(11) a. We are in a state of war.
b. We are in a state of emergency.
c. He wasn’t in the right state of mind.

The Activity Sense: In the same sense as there is an experiential correlation between an emotional state and a certain location, there is a correlation between a particular activity and the space in which it typically takes place. Through such correlation, an activity can come to be conceptualised and hence linguistically expressed in spatial terms. For example, *Henman is on court now* implies that 'Henman is playing tennis now' (due to the correlation between the location and the activity that typically takes place there). This example uses *on* for similar reasons as given for the State Sense uses of *on*. Henman is *choosing* to play tennis. However, in the scenes described in (12) below, which are coded by *in* and as such must be conceptualised in terms of containment, LM must exert some control over TR to warrant this conceptualisation rather than any other.[18] Because of this, the activities conceptualised as containing LMs are typically ones to do with employment rather than, say, hobbies.

(12) a. He works in finance.
b. He is in the building trade.
c. He is in exports.

The control element may be the fact that one must work in order to get by, and that the type of work one is involved in determines one's activities for a large proportion of one's time. One cannot say, for example, ***he is in chess* because one has full choice over the hobbies one pursues.[19]

The Means Sense: The conceptual commonality between the proto-scene and this sense, which allows for this meaning extension, comes again from the functional nature of containment. The means used to accomplish any task can be conceptualised as constraining a person engaged in completing that task. For example, in the scene

[18] It has been argued (Evans and Tyler 2004) that the tale behind this sense of *in* is a much simpler one. Evans and Tyler believe that, as a consequence of the correlation between an activity and the bounded LM in which it typically takes place, the notion of an activity can come, through pragmatic strengthening, to be reanalysed as a distinct meaning associated with *in*. And that once instantiated in semantic memory, *in* can code for a relation between TR and LM despite the fact that that association is now lost.
[19] Note, though, that one can say *he is into chess.* This use of *in* is not, however, in the same sense as it is being used in the examples given in (12).

described in (13a), the activity of writing is constrained in its nature by the means used in completing the activity, namely, writing in ink as opposed to, say, pencil.

(13) a. He wrote in ink.
b. He spoke in Flemish.
c. He struggled to put his thoughts into words.

Another good example of the Means Sense of *in* is to be found in the CONDUIT metaphor (see Lakoff and Johnson 1980). In (13b), Flemish is conceptualised as a containing LM because language is conceptualised as limiting communication. The language one speaks determines the way one communicates. Similarly, in (13c), words are conceptualised as containing one's thoughts because words are the principle means through which one can communicate thoughts. In this sense, words constrain and determine the means one employs for the task of communication.

So, because of the means with which one completes any activity placing limits on the individual engaged in the activity, and the conceptual commonality between this and the constraining feature of location control in the proto-scene for *in*, *in* has been used in this novel sense and become conventionalised as a distinct but related sense in the semantic network.

3.2.2. Vantage Point Interior

"In spatial scenes involving a bounded LM, one obvious vantage point is interior to the bounded LM" (Evans and Tyler 2004:17). If the vantage point in the scene being conceptualised is interior to the salient space bounded within the LM, as opposed to being conceptualised from an external observer's point of view, then this has important consequences for the kinds of scenes that can come to be coded by *in*. The Vantage Point Interior position has the observer within the scene being conceptualised, bounded by LM, and highlights the perspective of TR (it throws the deictic point of reference to within the scene).

The Perceptual Accessibility Sense: A consequence of an observer being located within a containing LM together with the contained TR is that the TR and the interior environment of LM are perceptually accessible to the observer.[20] Through experience of the necessity of being located within a containing LM in order to gain perceptual access to its contents (for example, to view the contents of a room, one must usually be located within that room) perceptual accessibility becomes associated with being located interior to a containing LM. Hence, the relation between observer, TR, and LM in the scenes described in (14) is construed as one of containment, and thus linguistically coded by *in*.

(14) a. The plane is in view.
b. She stayed (with)in earshot of her baby's cry.

The above argument is the one put forward by Evans and Tyler (2004:17). However, there seems to be a more obvious line of argument to explain the motivation behind the extension of *in* to code for scenes involving perception (although it may be connected with the argument above). In (14a) for example, our area of vision is bounded by our physiology and the capacity of our visual apparatus to view only parts of the world we know to be out there.

> The metaphor [visual field as container] is a natural one that emerges from the fact that, when you look at some territory (land, floor space, etc.), your field of vision defines a boundary of the territory, namely, the part that you can see.
>
> (Lakoff and Johnson 1980:30)

Our experience with bounded LMs informs us that where there is a boundary there is also an interior and exterior to that boundary, and that being located interior or exterior to that boundary has different consequences. The boundary set by the fact that we cannot 'see everything at once' designates an interior and an exterior (respectively, that which

[20] This contrasts with what we will see in examining the Vantage Point Exterior cluster when the TR and interior space of LM are not perceptually accessible and hence, from this deictic point of reference, a Disappearance Sense has arisen.

we can see and that which presently we cannot). That which we can see is conceptualised as being *inside* the field of vision and that which we cannot see as *outside* the visual field[21] because of the conceptual commonality between the three structural elements of containers in the proto-scene (boundary, interior, exterior) and the limitations of our visual capacity.

Human beings have a certain range within which sense perceptory information is detectable. In (14b), as with (14a), a consequence of this range is that there is an area in which the baby's cry is detectable (the mother's earshot) and an area in which it is not. As such, a boundary defines these two areas (the point at which the cry is no longer detectable). If we conceptualise a scene as having a boundary, then this feature being one of the three salient structural elements of containing LMs in the proto-scene entails also the conceptualisation of the other two structural elements. This leads to a conceptualisation of containment and provides the motivation for the meaning extension of *in* to code for this kind of scene. A less abstract, analogous example would be something like (15):

(15) The shop is in walking distance of the house.

The Arrival Sense: Not all spatial scenes are static; they may involve locomotion whereby TR moves from exterior to LM to interior to LM. When the intended final destination of TR is interior to LM, then when TR 'arrives' it is located interior to LM, thus licensing the use of *in* in an arrival sense. Consider (16):

(16) The train is now in.

The geometric properties in a scene with a train (TR) being located within a train station (LM) allows for this static scene to be coded by *in*. Because the motion scene results in the static scene, and the purpose of the motion scene is to 'arrive' at the static scene, the

[21] Incidentally, the noun 'field' in the expression *field of vision/visual field* reflects the conceptualisation of vision as a bounded LM since fields are typically bounded LMs with interiors and exteriors.

implicature of arrival in the static scene has given rise to a conventionalised Arrival Sense.

This Arrival Sense of *in* has come, by association, to code for scenes involving arrival but not involving containing LMs. Consider, for example, arriving at a finish line, as in (17):

(17) Best Mate [winner of Grand National 2004] came in first.

If the deictic point of reference in a scene is interior to LM (Vantage Point Interior) then a consequence of scenes such as (16) is that TR gets closer to the observer. Experience of these scenes and their associations with TR getting closer to observer has resulted in other scenes where a TR gets closer to the observer but with the absence of a containing LM also being coded by *in*, e.g. (18) below:

(18) He reeled the fish in.[22]

3.2.3. <u>Vantage Point Exterior</u>

In contrast to the observer's location with regard to the scene in the examples given in (3.2.2.), another common point of observation is external to the scene. This position (Vantage Point Exterior) has different experiential consequences for the observer and as such gives rise to different senses of *in*. Depending on the deictic point of reference adopted, one will get a different experience of containment. These different experiences can motivate meaning extension in different directions. In other words, different senses of *in* will arise due to conceptual commonality with different experiences of containment.

[22] It is possible, though, that human beings conceptualise some kind of 'personal space' surrounding ego, and that we feel uncomfortable when people (with whom we are not intimate) 'invade' this space. As such, a boundary is conceptualised as defining that space which is our personal space and that which is not. If a boundary is conceptualised, then this entails an interior and exterior to that boundary. *To reel a fish in* may be analogous to (rather than extended from) *the train coming in*, in that the fish is being drawn *in* to one's personal space, conceptualised as a bounded LM.

The Disappearance Sense: An important feature of many containing LMs is that they are often made of opaque substances. Consequently, the interior content of that container is not visible. Indeed, it is a principle function of many containers to hide from exterior observation their contents. Upon TR being placed in opaque container LM, TR disappears. One of the most basic of human experiences, feeding, involves food (TR) being placed into one's mouth (LM), whence the food is seen to disappear. Other experiences in early infancy of TRs disappearing into LMs (offered by Evans and Tyler 2004:20) come from toes and feet being put into socks and gloves, toys being put into cupboards, people moving into a different room. Due to the conceptual commonality between entities disappearing and the occlusion property of containment in the proto-scene, *in* has been extended to code for scenes such as described in (19), thus giving rise to a conventionalised Disappearance Sense of *in*.

(19) a. The wine soaked in.
b. He rubbed the lotion in.
c. The sun went in.

3.2.4. Segmentation

As has already been discussed, any containing LM has three salient structural elements, an interior and an exterior, defined by boundary. A principle function of the boundary part of LM is to "serve to partition the environment, providing a physical means of separation and delimitation" (Evans and Tyler 2004:21). That is, the boundary separates the LM's contents from the world external to that containing LM. It is clear in the scene described in (20), which is an example of the proto-scene, that the boundary of LM has the specific function of segmenting that which is inside the LM from that which is outside.

(20) She locked herself in the bathroom [for some peace and quiet].

The Shape as Boundary Sense: Since the boundary part of any containing LM is its defining element, the shape of the boundary designates the shape of the LM. As such, there is a conceptual correlation between the boundary element of containing LMs and shape. This correlation has given rise to the conceptualisation of shapes as boundaries, thus licensing the use of *in* to code for scenes such as described in (21), where LM is a shape.

(21) a. Put the chairs in a circle
b. Cut the sandwiches into triangles
c. Can you get in a line

The conceptual commonality between the nature of a shape being designated by a boundary marking that shape and the boundary element of containing LMs has motivated the meaning extension of *in* to code for shape LMs. In (21a) and (21b), the shape formed constitutes a bounded LM but (21c) demonstrates that the correlation is so instantiated in the conceptual system that the shape need not necessarily form a bounded LM.[23]

The Blockage Sense: "One consequence of being located within a bounded LM is that the boundary can serve to prevent the TR from moving beyond the LM" (Evans and Tyler 2004:22). Scenes in which an obstacle prevents an individual from passing it or escaping it share conceptual commonality with proto-scenes for *in*, in that the obstacle functions in the same way as the boundary element of a containing LM; the TR's movement is restricted to within the area bounded by the obstacle. This conceptual commonality has motivated the meaning extension of *in* toward a conventionalised Blockage Sense coding for scenes such as described in (22) overleaf:

[23] Though it could be simply that a line designates a one-dimensional boundary – a boundary of itself.

(22) a. My car was boxed in.

b. We were snowed in.

where if one is blocked in, then one is contained within an area defined by the obstacle causing the restriction on movement.

3.2.4. Reflexivity

The Reflexive Sense: Any containing LM has a boundary which designates an interior space. If a TR occupies this interior space, then it is proto-typically described as being *in* the LM. In fact, any entity that comes to occupy this space is located *in* the area marked by the boundary of the containing LM. In the scenes described in (23) (offered by Evans Tyler 2004:23), the boundary of the LM (walls in (23a)) or the LM itself comes to occupy the space originally marked as interior.

(23) a. The walls of the castle fell in.

b. The house caved in.[24]

In this Reflexive Sense, the same entity is conceptualised as constituting both TR and LM – hence, *it collapsed in on itself*. As such, the TR collapses into the space which, when the entity was intact, was construed as interior of LM. The fact that TR (LM) is conceptualised as coming to occupy, in a motion scene connecting two static scenes, a canonical interior of what was a bounded LM, this allows for such a scene to be coded by *in*.

[24] Even in (23b), *the house* would be construed as the bricks and mortar which make up its boundary.

Conclusion

It has been the aim of this paper to examine the semantics of the English preposition *in.* In order to do this successfully it was first necessary to survey important ideas in cognitive linguistics and, indeed, this was the purpose of the first chapter. Whilst the first chapter was a chapter on cognitive linguistics in general, it was my intention to steer this chapter specifically toward spatial semantics and the concept of containment.

In the second chapter, the proto-scene for *in* was established, from which all of the extended senses of *in* discussed in chapter three arose. The core sense of *in*, which codes for the proto-scene, has two meaning-components: geometric properties corresponding to the image schema for containment and extra-geometric properties, such as function and location control, associated with this spatial configuration. The proto-scene has three salient structural features: an *interior* and an *exterior,* defined by a *boundary*.

The various properties/features of the proto-scene have different observable consequences in the dynamic-kinematic routines associated with that proto-scene. Where there is conceptual commonality between the consequence of one of these properties/features and a meaningful property/feature of a novel scene, the form coding for the proto-scene has been extended to code for the novel scene. In this sense, meaning extension is motivated by conceptual commonality. Once established in a language as conventional usage, this linguistic structure reinforces the conceptual commonality between extended senses and the proto-scene during development of the conceptual system.

Different languages will have had different motivations for meaning extension from different proto-scenes of different categories and therefore, once conventionalised, will serve to enforce the construction of a different conceptual system. However, a concept (or rather a percept) of containment seems to be universal at a level of cognition beneath that of semantic, and therefore conceptual structure.

Conceptual semantics is still, relatively speaking, in its infancy and further research is much needed. In particular, theoretical studies such as this need to be brought together with neuro-psychological science, in order to substantiate their claims. Evidence from neuro-psychology may provide the very basis of meaning, and may well be able to answer questions as to the nature of schematisation, the number and nature of image schemas and the form(s) they take in the brain, as well as the processes involved in conceptual metaphor. Experiments measuring neurological activity and reaction times in neuron firing may provide hard evidence for conceptual commonality between the extended senses of a preposition and the proto-scene it typically codes for. Neurology may also be able to show a two-level architecture in the cognitive/conceptual system.

Always welcome, and needed indeed, is an expanding body of cross-linguistic data; investigation into which will provide insights into both universals in human cognition and the variance with which different cultures conceptualise the world around them.

References

Bowerman, M., 1996a. 'The origins of children's spatial semantic categories: cognitive versus linguistic determinants'. In Gumperz and Levinson (Eds.), *Rethinking Linguistic Relativity* (pp. 145-176). Cambridge University Press.

Bowerman, M., 1996b. 'Learning how to structure space for language: a cross linguistic perspective'. In Bloom, Peterson, Nadel and Garrett (Eds.), *Language and Space* (pp. 385-486). MIT Press.

Bloom, P., Peterson, M., Nadel, L. and Garrett, M. (Eds.), 1996. *Language and Space.* MIT Press

Chomsky, N., 1968. *Language and Mind*. Harcourt Brace Jovanovich Inc.

Coventry, K., 1992. *Spatial Prepositions and Functional Relations: The case for Minimally Specified Lexical Entries*. Doctoral dissertation, University of Edinburgh.

Coventry, K., 1998. 'Spatial prepositions, functional relations and lexical specification'. In Olivier and Gapp (Eds.), *The Representation and Processing of Spatial Expressions* (pp. 247-262). Lawrence Erlbaum Associates Inc.

Coventry, K and Garrood, S., 2004. *Saying, Seeing and Acting: The Psychological Semantics of Spatial Prepositions.* Psychology Press.

Evans, V., 2004a. *Time, Space, and Experience: A Cognitive Linguistics Approach to Conceptual Structure*. www.cogs.susx.ac.uk/users/vyv/

Evans, V., 2004b. *The Problem of Time.* Online extract from Evans (forthcoming), *The Structure of Time: Language, Meaning and Temporal Cognition.* www.cogs.susx.ac.uk/users/vyv/

Evans, V. and Tyler, A., 2004. *Spatial Experience, Lexical Structure and Motivation: The Case of In*. www.cogs.susx.ac.uk/users/vyv/

Feist, M., 2004. 'Talking about Space: A Cross-linguistic Perspective'. *Proceedings of the Twenty-sixth Annual Meeting of the Cognitive Science Society*.

Feist, M. and Gentner, D., 1998. 'On Plates, Bowls, and Dishes: Factors in the Use of English IN and ON'. *Proceedings of the Twentieth Annual Meeting of the Cognitive Science Society* (345-349).

Feist, M and Gentner, D., 2003. 'Factors Involved in the Use of In and On'. *Proceedings of the Twenty-fifth Annual Meeting of the Cognitive Science Society*.

Garrod, S., Ferrier, G., and Campbell, S., 1999. '*In* and *On*: Investigating the Functional Geometry of Spatial Prepositions'. *Cognition* (72: 167-189).

Gumperz, J. and Levinson, S. (Eds.), 1996. *Rethinking Linguistic Relativity*. Cambridge University Press.

Herskovits, A., 1986. *Language and Spatial Cognition: An Interdisciplinary Study of the Prepositions in English.* Cambridge University Press.

Hespos, S. and Baillargeon, R., 2001. 'Reasoning about Containment Events in Very Young Infants'. *Cognition* (78: 207-245).

Jackendoff, R., 1997. *The Architecture of the Language Faculty*. MIT Press.

Johnson, M., 1987. *The Body in the Mind: The Bodily Basis of Meaning, Imagination, and Reason.* University of Chicago Press.

Lakoff, G., 1987. *Women, Fire, and Dangerous Things: What Categories Reveal about the Mind.* University of Chicago Press.

Lakoff, G. and Johnson, M., 1980. *Metaphors We Live By*. University of Chicago Press.

Lakoff, G. and Johnson, M., 1999. *Philosophy in the Flesh: The Embodied Mind and its Challenge to Western Thought.* Basic Books.

Langacker, R., 1987. *Foundations of Cognitive Grammar. Volume 1.* Stanford University Press.

Langacker, R., 1991. *Foundations of Cognitive Grammar. Volume 2.* Stanford University Press.

Levinson, S., 2003. *Space in Language and Cognition: Explorations in Cognitive Diversity*. Cambridge University Press.

Lloyd, S., Sinha, C. and Freeman, N., 1981. 'Spatial Reference Systems and the canonicality effect in infant search'. *Journal of Experimental Child Psychology* (32: 1-10).

Madole, K., Oakes, L. and Cohen, L., 1993. 'Development Changes in Infant's Attention to Function and Form-function Correlations'. *Cognitive Development* (8: 189-209).

Mandler, J., 1992. 'How to Build a Baby II: Conceptual Primitives'. *Psychological Review* (99: 587-604).

Mandler, J., 1996. 'Preverbal Representation and Language'. In Bloom, Peterson, Nadel and Garrett (Eds.), *Language and Space* (pp. 365-384).

Sperber, D. and Wilson, D., 1995. *Relevance: Communication and Cognition (2nd Ed.)*. Blackwell Publishing.

Talmy, L., 2000. *Toward a Cognitive Semantics. Volume 1*. MIT Press

Vandeloise, C., 1994. 'Methodology and Analyses of the Preposition *In*'. *Cognitive Linguistics* (5: 157-184).

Wierzbicka, A., 1996. *Semantics: Primes and Universals*. Oxford University Press.

NB. Where titles have been accessed on-line, the date of publication is given as the year accessed, 2004.