

## 9 From the spatial to the non-spatial: the 'state' lexical concepts of *in*, *on* and *at*

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### 1 Introduction

This paper is concerned with modelling the lexical representation of spatial relations, particularly as encoded by English prepositions, and examining how these spatial relations give rise to non-spatial meanings. In previous work Andrea Tyler and I (Evans and Tyler 2004a, 2004b; Tyler and Evans 2001, 2003) modelled the extensive polysemy exhibited by prepositions, and sought to provide a principled framework for characterising their distinct sense-units. We also sought to establish boundaries between senses as they inhere in semantic memory. In so doing, we attempted to account for this polysemy in a motivated way, as an outcome of situated language use, the nature of human socio-physical experience and the relevant cognitive mechanisms and processes.

Nevertheless, the framework of *Principled Polysemy* we developed was not primarily concerned with modelling the complexity of the spatio-geometric and functional semantic properties, and the extremely complex functional knowledge that prepositional sense-units assist in conveying. This follows as it was primarily concerned with addressing perceived methodological weaknesses in early work in cognitive lexical semantics, as exemplified by the work of Brugman and Lakoff (Brugman [1981] 1988; Brugman and Lakoff 1988; Lakoff 1987). In particular, it is becoming clear that Tyler and I, in our work on Principled Polysemy, may, in fact, have underestimated the functional complexity that 'spatial' prepositional sense-units provide access to.

Accordingly, the goal of this paper is to present a more recent theory of lexical representation which builds on and refines the framework of Principled Polysemy. This approach, I argue, better accounts for some of the complexities I will be describing with respect to the sorts of knowledge structures that prepositions provide access to in the minds of language users, as evidenced in language use. Following Evans (2004a 2004b; see also Evans 2006, to appear), this theory employs two central constructs, the notion of the *lexical concept*, and the *cognitive model*. In brief a lexical concept is a relatively complex sense-unit which is conventionally associated with a specific form. Moreover, certain kinds of lexical concepts afford access to large-scale multi-modal knowledge structures. These I refer to as cognitive models. Cognitive models constitute relatively stable, non-linguistic knowledge structures, which are subject to ongoing modification as we continue to interact in the world and in communicative settings. Moreover, cognitive models provide the complex informational characterisation lexical concepts invoked in meaning construction processes. As the constructs of the lexical concept and

1 the cognitive model are of central importance, the theory of lexical representation to  
 2 be presented is termed the theory of *Lexical Concepts and Cognitive Models*, or LCCM  
 3 Theory for short. The theoretical discussion presented later in the paper is based on  
 4 more detailed explications of LCCM Theory (Evans 2006, to appear).

5 The main analytical focus of the paper is the so-called 'state' senses of English prepo-  
 6 sitions, as associated with prepositions such as *in*, *at*, and *on*. While these sense-units  
 7 presumably derive from, and are certainly related to 'spatial' senses encoded by the same  
 8 forms, they are not, in and of themselves, primarily spatial in nature. Representative  
 9 examples are provided below.

- |    |   |                 |
|----|---|-----------------|
| 10 | (1) We are in love/shock/pain                             | 'state' sense   |
| 11 | cf. We are in a room                                      | 'spatial' sense |
| 12 | (2) We are at war/variance/one/dagger's drawn/loggerheads | 'state' sense   |
| 13 | cf. We are at the bus stop                                | 'spatial' sense |
| 14 | (3) We are on alert/best behaviour/look-out/the run       | 'state' sense   |
| 15 | cf. We are on the bus                                     | 'spatial' sense |

16 In these examples, *in*, *at* and *on* mediate a relation between human experiencer(s) and a  
 17 particular state. While some of these expressions, for instance, to be 'at daggers drawn'  
 18 are clearly idiomatic, the contention of cognitive lexical semantics is that while such  
 19 expressions may be highly conventionalised, and the source of the idiom may not be  
 20 accessible to contemporary language users, the fact that *at* is employed is, diachronically  
 21 at least, motivated (see Evans and Green 2006: chapter 10, for a review; see also Evans,  
 22 Bergen and Zinken 2007).

23 If the perspective offered by cognitive semantics is correct, namely that the use of  
 24 *in*, *at* and *on* to encode a 'state' meaning is motivated, deriving from historically earlier,  
 25 and synchronically, perhaps, more primary 'spatial' senses, then there are a number  
 26 of issues which await explanation. Firstly, how do we account for the derivation of  
 27 non-spatial, what we might dub 'abstract' senses from historically earlier spatial senses?  
 28 One solution to this problem has been to posit underlying conceptual metaphors as the  
 29 solution (Lakoff and Johnson 1999). That is, due to the conceptual metaphor, qua sub-  
 30 symbolic knowledge structure, of the sort glossed as STATES ARE LOCATIONS, states of  
 31 the type captured in (1) to (3) inclusive are conceptualised as locations. On the metaphor  
 32 account, the existence of an independently motivated conceptual metaphor licenses the  
 33 development of new polysemous senses associated with *in*, *at* and *on*.

34 Despite the intuitive appeal of the conceptual metaphor account, this cannot be the  
 35 whole story. After all, each of the 'state' senses associated with the prepositions evident  
 36 in (1)-(3) exhibit distinct patterns in terms of the semantic arguments with which they  
 37 collocate. Put another way, the 'state' senses associated with the different prepositional  
 38 forms: *in*, *on* and *at*, are not equivalent. For instance, the 'state' sense associated with *in*  
 39 relates to semantic arguments which have to do with emotional or psychological 'force'  
 40 such as being 'in love', 'in pain' and so on. In contrast, the semantic arguments associated

1 with *at* have to do, not with emotional force but, rather, with mutual (or interpersonal)  
 2 relations, such as being 'at war'. Meanwhile, *on* relates to semantic arguments that have  
 3 to do with time-restricted activities and actions which involve being currently active in  
 4 some sense. These include being 'on alert', 'on duty', and so forth. That is, the semantic  
 5 arguments associated with each of the 'state' senses for these prepositions is of a quite  
 6 different kind. This suggests that the 'state' meanings conventionally associated with each  
 7 of these prepositional forms is also of a distinct kind. While this does not preclude a  
 8 conceptual metaphor account as part of the story, positing a unified metaphoric account  
 9 for examples of the kind provided in (1) to (3) does not, in itself, adequately account  
 10 for the linguistic facts.

11 The challenge, then, for a theory of lexical representation, which assumes that the  
 12 'state' sense-units are motivated and related, is to account for the fact that i) each of  
 13 these prepositions exhibits a conventional 'state' lexical concept, and ii) that each of the  
 14 'state' lexical concepts diverges. Put another way, we must account for the differential  
 15 motivation that gives rise to the similar, yet distinct, 'state' lexical concepts associated  
 16 with each of these prepositions. Thus, the 'state' lexical concepts present an intriguing  
 17 challenge which, I shall argue, existing theories of lexical representation, notably the  
 18 theory of Principled Polysemy, cannot, at present provide an account for. For this reason,  
 19 we require a more sophisticated account of lexical representation.

20 I will employ linguistic data associated with these 'state' lexical concepts in order  
 21 to provide a reasonably detailed illustration of how LCCM Theory accounts for the  
 22 functional complexity of the semantics involved. I argue that LCCM Theory facilitates  
 23 i) a revealing descriptive analysis of the 'state' lexical concepts of these prepositions,  
 24 including the way in which these sense-units are in fact distinct from one another; and  
 25 ii) a revealing account of the spatio-geometric and functional knowledge that the core  
 26 'spatial' lexical concepts associated with *in*, *at* and *on* encode; and finally, in view of this,  
 27 iii) a revealing account of how each of the 'state' lexical concepts involved is motivated  
 28 by, and related to, the core 'spatial' lexical concepts associated with each preposition.

29 A further reason for selecting the 'state' lexical concepts as a case study is as follows.  
 30 While there is now a voluminous literature on spatial semantics, especially within cogni-  
 31 tive lexical semantics, this work has primarily been concerned with examining the range  
 32 of distinct sense-units associated with a given preposition, including a now impressive  
 33 body of research which has focused on principles for determining sense-boundaries,  
 34 including psycholinguistic and corpus-based approaches (e.g., Sandra and Rice 1995  
 35 and Gries 2005 and the references therein). However, hitherto, there has been, in relative  
 36 terms, comparatively little research on the non-spatial lexical concepts associated with  
 37 prepositional forms, and how they are related to one another and derived from spatial  
 38 lexical concepts. This lack of research makes an examination of the 'state' lexical concepts  
 39 of different prepositions an issue worthy of attention.

40 There are two claims that I make, and which the findings presented serve to  
 41 substantiate. Firstly, 'new' lexical concepts derive from already extant lexical con-  
 42 cepts by virtue of inferential processes, relating to situated instances of language use.  
 43 Hopper and Traugott (1993) refer to such a mechanism as *pragmatic strengthening*:  
 44 an inferential process whereby a new semantic representation is abstracted from an

1 extant semantic representation in what has been referred to as a *bridging context* (N.  
 2 Evans and Wilkins 2000). A bridging context is a context of use in which the new  
 3 lexical concept emerges as a situated inference (or an ‘invited inference’, Traugott and  
 4 Dasher 2004). A polysemous relationship thereby holds between the extant and the  
 5 derived lexical concept. I argue that the polysemous lexical concepts associated with  
 6 the prepositional forms to be examined arise due to new *parameters* being encoded,  
 7 giving rise to distinct lexical concepts. These parameters arise due to the functional  
 8 consequences of spatio-geometric properties in situated language use, about which I  
 9 shall have more to say below.

10 The second claim is as follows. The ‘state’ lexical concepts for each prepositional  
 11 form are distinct, as revealed by an examination of their *lexical profiles*: the semantic  
 12 and grammatical selectional tendencies exhibited. Moreover, each form has a number  
 13 of conventional ‘state’ lexical concepts associated with it, which are different from one  
 14 another. Put another way, there are clear differences in terms of ‘state’ lexical concepts  
 15 both across and within the prepositions I address here.

## 16 2 The functional nature of the spatial semantics of prepositions

17 The point of departure for this study relates to the functional nature of the semantics  
 18 associated with spatial relations as lexicalised by prepositions. Recent work in the  
 19 framework of cognitive semantics (e.g., Herskovits 1986, 1988; Vandeloise 1991, 1994)  
 20 has shown that the received or traditional view is descriptively inadequate in terms of  
 21 accounting for how the core, prototypical or ideal ‘spatial’ sense-units associated with  
 22 prepositions are actually used. The received view, which following Herskovits I refer  
 23 to as the *simple relations model*, holds that the prototypical sense-unit associated with  
 24 a given preposition straightforwardly encodes purely spatio-geometric properties, i.e.,  
 25 ‘simple’ relations.

26 My purpose in this section is to make the case for a functional characterisation of  
 27 the ‘spatial’ lexical concept associated with a given preposition. By ‘functional’ I mean  
 28 the following. To understand how language users employ the core ‘spatial’ lexical concept  
 29 of a preposition we must also allow for non-spatial parameters which form part of the  
 30 linguistic content encoded by the lexical concept. The use of the term ‘functional’ is moti-  
 31 vated by the observation that such non-spatial parameters are a functional consequence  
 32 of humanly relevant interactions with the spatio-geometric properties in question.  
 33 Moreover, the way ‘spatial’ lexical concepts are ordinarily employed by language users  
 34 would appear to require such a functional understanding if ‘spatial’ lexical concepts are  
 35 to be correctly interpreted in context.

36 Providing a functional account is of further importance as the derived lexical  
 37 concepts which result from sense-extensions (such as the ‘state’ lexical concepts of *in*,  
 38 *on* and *at*), cannot be adequately accounted for without first recognising that in addi-  
 39 tion to spatio-geometric parameters, the core ‘spatial’ lexical concept associated with  
 40 a prepositional form also includes functional information. That is, if we assume that  
 41 the derived lexical concepts are motivated by the prototypical lexical concept, as is the

1 case in cognitive lexical semantics, then we must assume a relatively complex (albeit  
2 schematic) body of 'functional' knowledge, if we are to account for the derivation of  
3 extended lexical concepts.

4 In this section, therefore, I briefly review some of the arguments made by Herskovits,  
5 and Vandeloise for thinking that functional information also constitutes part of the  
6 linguistic content associated with 'spatial' lexical concepts for prepositions (see also  
7 Coventry and Garrod 2004; Deane 2005, and Feist This volume for a related perspective).

8 I begin with Herskovits. In her work she observes that the received view has assumed  
9 that the 'basic' function of the spatial sense-units associated with prepositional forms is  
10 to encode purely spatial relations. On this view, the semantic contribution of any given  
11 spatial use of a preposition relates to spatio-geometric properties, typically designating  
12 a relation involving notions such as dimensions, axes or proximity (e.g., Bennett 1975;  
13 Miller and Johnson-Laird 1976 for representative examples).

14 This general approach, particularly as has been evident in formal and computa-  
15 tional accounts of prepositions, as noted above, Herskovits (e.g., 1988) refers to as the  
16 simple relations model. Yet, as Herskovits shows in detail, the simple relations model  
17 is descriptively inadequate. That is, the 'simple' spatial relations posited are unable to  
18 account for the range of spatial representations that prepositions ordinarily designate.  
19 Some of the descriptive shortcomings of the simple relations model relate to phenomena  
20 such as the following.

21 Firstly, the same preposition often appears to include quite distinct geometric  
22 descriptions:

- 23 (4) a. the water in the vase  
24 b. the crack in the vase

25 The example in (4a) relates to an entity: *the water*, the trajector (TR), 'contained' by  
26 the landmark (LM), *the vase*. That is, it relates to the volumetric interior of the LM. In  
27 contrast, in (4b) the semantic contribution of *in* concerns a relation between a 'negative'  
28 region, namely a lack of substance, *a crack*, which is not part of the volumetric interior of  
29 the vase, but rather forms part of the landmark-boundary, namely the physical structure  
30 of the vase. Put another way, *in* relates to quite distinct spatio-geometric relations in  
31 these examples. This is problematic for the simple relations model which assumes that  
32 a given preposition encodes a single spatio-geometric relation,

33 Secondly, the spatial relations encoded by prepositions often appear to diverge from  
34 straightforward 'simple' relations. For instance, the following expression:

- 35 (5) the dictionary on the table

36 can be used unproblematically to refer to a dictionary placed on top of another book  
37 which is 'on' the table. That is, the dictionary is not actually 'on' the table, but rather 'on'  
38 the book which is in direct contact with, and therefore 'on', the table.

39 Thirdly, there often appears to be what Herskovits refers to as 'added constraints'  
40 which apply to prepositions. For instance, in examples of the following kind:

- 1 (6) a. the man at the desk  
 2 b. the schoolboy at the bus-stop

3 the relation implied is more specific than ‘simple’ spatio-geometric relations. That is, the  
 4 example in (6a) implies, and is understood to mean, that not only is the TR in question,  
 5 *the man*, in close proximity to his desk, but he is also working at his desk (or at least  
 6 in a position to do so). Similarly, in (6b), in addition to the co-locational relation, this  
 7 expression implies that the schoolboy is ‘waiting’ at the bus-stop, presumably for a bus.  
 8 In other words, part of the meaning of these utterances is functional in nature. The  
 9 schoolboy is co-located with the bus-stop *in order to* catch a bus. Implications such  
 10 as these are not explained by the simple relations model. In fact, we seldom employ  
 11 prepositions simply to describe a purely spatio-geometric relationship.

12 Fourthly, there are often unexplained *context dependencies* associated with preposi-  
 13 tions which the simple relations model fails to account for. In an example such as the  
 14 following:

- 15 (7) Max is at the crèche

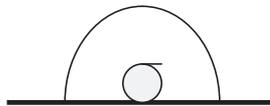
16 this utterance appears only to work when both speaker and addressee are not also present  
 17 at the crèche. In the case when the speaker and addressee are located at the crèche, the  
 18 following would be more likely:

- 19 (8) Max is (somewhere) in the crèche

20 Finally, there are a number of other restrictions which appear to relate to discursive  
 21 salience and/or relevance. Again, these are not accounted for by the simple relations  
 22 model. For instance, in a scenario such as that represented by Figure 1, in which there  
 23 is an apple located beneath an upturned bowl, the following expression is semantically  
 24 anomalous:

- 25 (9) #the apple in the bowl

26



27 **Figure 1.** The apple beneath the bowl

28 Herskovits argues that in view of the failure of the simple relations approach a modified  
 29 view of the lexical representation for spatial prepositions is required.

30 A related perspective has been presented by Vandeloise in his work. Vandeloise  
 31 (1991, 1994) argues compellingly that any account of spatial semantics that leaves out  
 32 the functional nature of prepositional lexical concepts fails to properly account for

1 how they are actually employed. That is, spatio-geometric relations have functional  
 2 consequences, consequences which arise from how we interact with objects and entities  
 3 in our physical environment, and in our daily lives. To illustrate, take the mundane  
 4 example of a cup of coffee. Imagine holding it in your hand. If you move the cup slowly  
 5 up and down, or from side to side, the coffee moves along with the cup. This follows as  
 6 the cup is a container with a bottom and sides and thus constrains the location of any  
 7 entity within these boundaries. Tyler and I (2003) referred to this property of bounded  
 8 landmarks as 'location with surety'.

9 The force-dynamic properties associated with a cup as a container also show up  
 10 in linguistic content, as illustrated by the semantic contribution of the preposition *in*.  
 11 Consider the diagram in Figure 2 drawn from the work of Vandeloise (1994).



13 **Figure 2.** A bottle or a light bulb? (adapted from Vandeloise 1994)

14 Vandeloise observes that the image depicted in Figure 2 could either represent a bottle  
 15 or a light bulb. As example (10) shows, we can use the preposition *in* to describe the  
 16 relation between *the light bulb* (TR) and *the socket* (LM).

17 (10) The bulb is in the socket

18 In contrast however, we cannot use *in* to describe the relation between a bottle and its  
 19 cap, as illustrated by (11).

20 (11) #The bottle is in the cap

21 Vandeloise points out that the spatial relation holding between the TR and LM in each of  
 22 these utterances is identical, and yet while (10) is a perfectly acceptable sentence (11) is  
 23 semantically odd. Vandeloise suggests that it is not the spatial relation holding between  
 24 the TR and LM that accounts for the acceptability or otherwise of *in*. He argues that the  
 25 relevant factor is one of force-dynamics: '[W]hile the socket exerts a force on the bulb  
 26 and determines its position, the opposite occurs with the cap and the bottle' (Vandeloise,  
 27 1994: 173). In other words, not only is the position and the successful function of the  
 28 bulb contingent on being *in* (contained by) the socket, but the socket also prevents the  
 29 bulb from succumbing to the force of gravity and falling to the ground. In contrast,  
 30 the position and successful functioning of the bottle is not contingent on being *in* the  
 31 cap. This suggests that our knowledge of the functional consequences associated with  
 32 located containment affects the contextual acceptability of a preposition such as *in*.

### 1 3 Principled polysemy revisited

2 Having begun to consider the functional nature of the spatial semantics of prepositions,  
 3 I now reconsider the model of Principled Polysemy as an account of spatial semantics. In  
 4 developing this model Tyler and I (e.g., Tyler and Evans 2001, 2003) sought to model the  
 5 nature of the lexical representations associated with spatial particles such as prepositions.  
 6 In so doing we were concerned with two sorts of issues. Firstly, we were concerned with  
 7 accurately describing the nature and range of the distinct (albeit related) lexical concepts  
 8 (what we referred to as ‘senses’) associated with lexical categories such as prepositions.  
 9 That is, we were concerned with providing a constrained (i.e., principled) methodology  
 10 for establishing sense-units and thus sense-boundaries.

11 Secondly, we were concerned with accounting for how sense-units (lexical concepts  
 12 in present terms) arise. We posited that the lexical concepts which populate a semantic  
 13 network for a given preposition are diachronically related, and the derivation of ‘new’  
 14 lexical concepts (i.e., sense-extension) is motivated (see Evans and Tyler 2004a in  
 15 particular). Both these issues required detailed analysis of the lexical representations  
 16 associated with the various lexical concepts for a given preposition. Moreover, this in  
 17 turn entailed examination of spatio-geometric, and non-spatio-geometric, aspects of  
 18 prepositional lexical concepts.

19 For instance, while an important part of the semantic representation for *over* in (12)  
 20 has to do with the spatio-geometric relationship holding between the TR and the LM,  
 21 in (13) an important part of the lexical representation relates to non-spatio-geometric  
 22 aspects, i.e., occlusion.

23 (12) The picture is over the sofa

24 (13) The veil is over her face

25 In (12) the semantic contribution of *over* relates to an ‘above’ relation, which concerns  
 26 the spatio-geometric relationship in a 3-dimensional region holding between the TR  
 27 and LM. In (13), while part of the linguistic content of *over* must also encode spatio-  
 28 geometric information – as occlusion is a consequence of a physical relationship holding  
 29 between artefacts and the vantage point of a perceiver from which the artefacts are  
 30 viewed – nevertheless, the semantic contribution of *over* is more saliently identifi-  
 31 able as the functional notion of ‘occlusion’. Examples such as this, in which *over* is not  
 32 interpreted as providing a semantic contribution relating to ‘above’ but rather ‘occlusion’,  
 33 provide good evidence that the occurrence of *over* in (13) is *sanctioned* by a distinct  
 34 lexical concept: we are dealing with a lexical concept which is distinct vis-à-vis the  
 35 ‘above’ lexical concept which sanctions the use of *over* in (12).

36 In our analyses, Tyler and I made the point that functional lexical concepts such as  
 37 what we referred to as the Covering Sense of *over* (i.e., the [OCCLUSION] lexical concept in  
 38 present terms), obtain because spatial experience is inherently meaningful for humans.  
 39 That is, as human beings we interact with objects around us in our spatial environment  
 40 (see Johnson 1987; 2007). Particular spatial relations, as manifested by the linguistic

1 content encoded by prepositional lexical concepts, have functional consequences. These  
 2 functional consequences we described as arising from *experiential correlations*, an idea  
 3 we borrowed, and adapted from the work of Grady (1997).

4 For instance, a consequence of the spatio-geometric property associated with *over*  
 5 in examples such as (12), i.e., an 'above' relation, is that in certain contexts, occlusion  
 6 occurs. To illustrate consider (14):

7 (14) The tablecloth is over the table

8 In this example, the use of *over* is sanctioned by a lexical concept that encodes a spatio-  
 9 geometric relation in which the TR is in an 'above' relation with respect to the LM.  
 10 However, a functional consequence of how we interact with TRs such as tablecloths,  
 11 and LMs such as tables, and given the dimensions of tablecloths, such that they often  
 12 have a greater extension than tables, is that by virtue of being over (i.e., above), the  
 13 tablecloth thereby occludes the table. Thus, we argued that due to such contexts of  
 14 use, *over* can, by virtue of the process of reanalysis termed pragmatic strengthening  
 15 (as briefly introduced above), lead to the 'occlusion' reading becoming 'detached' from  
 16 the context in which it grounded, and reanalysed as a distinct sense-unit of *over* in  
 17 its own right.

18 A related idea that was important in the Principled Polysemy framework was the  
 19 notion of a *functional element*, an idea inspired by the work of Vandeloise (e.g., 1991,  
 20 1994) in his functional approach to spatial semantics. This notion related to the central  
 21 or core sense in a semantic polysemy network. Such lexical concepts we termed *proto-*  
 22 *scenes*. The proto-scene for *over*, what we termed the Above Sense as exemplified in (12),  
 23 constitutes an abstraction over spatio-geometric properties associated with the range  
 24 of spatial scenes in which a given preposition, such as *over*, is used.

25 However, as already noted, a large part, perhaps the majority, of uses of the proto-  
 26 scene of a given prepositional form relate to usages which are not purely or even wholly  
 27 spatio-geometric in nature (see Vandeloise 1991, 1994 and especially Herskovits 1986,  
 28 1988 as described above). Thus, Tyler and I argued that functional information forms  
 29 part of the semantic representation of any given proto-scene (see Evans and Tyler 2004a;  
 30 Tyler and Evans 2003 for details).

31 In sum, Principled Polysemy posits two kinds of lexical concept which popu-  
 32 late a prepositional polysemy network. The first kind, the proto-scene, is primarily  
 33 spatio-geometric in nature. Moreover, the proto-scene corresponds – for most of the  
 34 prepositions we surveyed – to the historically earliest lexical concept associated with  
 35 a given prepositional form (Tyler and Evans 2003). Nevertheless, proto-scenes include  
 36 a functional element, reflecting the way in which proto-scenes are ordinarily used.  
 37 That is, language users typically employ proto-scenes in ways which draw upon the  
 38 functional consequence of interacting with spatial scenes of certain kinds in humanly  
 39 relevant ways. Thus, linguistic knowledge associated with proto-scenes appears to  
 40 involve more than simply knowing the particular spatio-geometric properties encoded  
 41 by a particular form.

1       The second sort of lexical concept – the remainder of the senses in a prepositional  
2 polysemy network – we hypothesised as being motivated by, and ultimately derived  
3 from, the proto-scene. This said, we observed that the derivation is often complex  
4 and indirect (see Tyler and Evans 2003 for detailed discussion). These derived lexical  
5 concepts we referred to as *sense-extensions*. These ‘new’ lexical concepts, we argued,  
6 were derived by virtue of the process of re-analysis (pragmatic strengthening) due  
7 to experiential correlations of the sort described above for the development of the  
8 Occluding Sense from the Proto-scene (i.e., the Above Sense).

9       One issue which Tyler and I largely side-stepped, in the version of Principled  
10 Polysemy which appeared as Tyler and Evans (2003), concerned how best to account  
11 for ‘common’ lexical concepts of different prepositions, such as the ‘state’ lexical concepts  
12 for *in*, *on* and *at*, illustrated above in the examples in (1) to (3). The difficulty here is that  
13 as the ‘state’ lexical concepts associated with *in*, *at* and *on*, for instance, are all identified  
14 by a common label, this might be construed as suggesting that there is common semantic  
15 representation. Yet, the ‘state’ lexical concepts appear, on the contrary, to be distinct  
16 sense-units as evidenced by the distinct semantic arguments with which they each  
17 collocate: their *lexical profiles*, in present terms. What is required is a theory of lexical  
18 representation which has methodological tools for distinguishing between ostensibly  
19 ‘similar’ lexical concepts associated with different forms.

20       A further difficulty is that it is unclear, in Principled Polysemy, what the nature of  
21 the functional relationship is holding between the lexical representation associated with  
22 the proto-scene, and the diverse ‘functional’ lexical representations associated with the  
23 range of derived senses we posited. That is, while Principled Polysemy posited a single  
24 functional element associated with each proto-scene, it is not clear how this would  
25 motivate the functional complexity apparent in the plethora of functionally diverse  
26 extended senses, posited for each prepositional form.

27       Thus, while an important construct, there is good reason, therefore, to think that the  
28 notion of a functional element associated with the proto-scene, as presented in Evans  
29 and Tyler (2004b) and Tyler and Evans (2003) actually underestimates the functional  
30 complexity that must be readily available to language users, as encoded by the range and  
31 various combination of parameters associated with the distinct ‘state’ lexical concepts  
32 across and within prepositions.

33       Ultimately, the difficulty for the Principled Polysemy framework is that while it  
34 attempted to provide a detailed account of lexical representation, because of its primary  
35 concern with detailing a rigorous methodology for establishing distinct sense-units,  
36 it failed to work out the implications of the functional nature of spatial semantics for  
37 lexical representation.<sup>1</sup>

#### 4 The lexical concepts and cognitive models (lccm) approach to lexical representation

In recent work (Evans 2006, to appear), I have begun to develop an approach to lexical representation which is consistent with the context-dependent nature of the meanings associated with words. Indeed, part of the focus of this particular research programme is to develop an account of how lexical representations give rise to situated meaning construction, and thus to provide a cognitively-realistic approach to meaning construction. While the issue of situated meaning construction is less relevant to the analysis of how best to represent the 'state' lexical concepts in the present paper, and won't be addressed further, Evans (2006) constitutes an attempt to model lexical representation that is relevant for any lexical class, including prepositions.

The starting point for the LCCM Theory account is the premise that linguistic knowledge is usage-based. That is, I assume that the organisation of our language system is intimately related to, and derives directly from, how language is actually used (Croft 2000; Langacker 2000; Tomasello 2003). Through processes of abstraction and schematisation (Langacker 2000), based on pattern-recognition and intention-reading abilities (Tomasello 2003), language users derive linguistic units. These are relatively well-entrenched mental routines consisting of conventional pairings of form and semantic representation. The semantic representations conventionally associated with a given unit of form, I refer to, as already noted, as a lexical concept.

While lexical concepts are mental representations, they underspecify the range of situated meanings associated with a given form in an individual utterance. Thus, I make a fundamental distinction between lexical concept as a mental unit, and its context-dependent realisation in an utterance. This is akin to the distinction in Phonological Theory between the abstract notion of a phoneme and the actual unit of realised context-dependent sound, the allophone. My claim is that there is an essential distinction between lexical representation and meaning. While meaning is a property of the utterance, lexical representations are the mental abstractions which we infer must be stored as part of the language user's knowledge of language, in order to produce the range of novel uses associated with situated instances of a particular word such as a preposition. The meaning associated with an utterance I refer to as a *conception*. Thus, conceptions are a function of language use.

There are a number of important properties associated with lexical concepts. I briefly review some of the most relevant here (for detailed discussion see Evans to appear). Firstly, and as noted above, linguistic units, as I use the term, are conventional pairings of form and meaning. From this it follows that lexical concepts are *form-specific*. Secondly, as mentioned above, although lexical concepts are form-specific, a single form can be conventionally associated with a potentially large number of distinct lexical concepts which are related to degrees as attested by the phenomenon of polysemy.<sup>2</sup> That is, forms are not *lexical concept-specific*. A consequence of this is that the lexical concepts which share the same form can be modelled in terms of a *semantic network* (see Evans and Green 2006: chapter 10 for discussion).

1           Thirdly, the definitional property of any given lexical concept is that it has a *lexical profile*, its unique ‘biometric’ identifier. A lexical profile is an extension of criteria  
 2 presented in Evans (2004a), and akin to the notion of an ‘ID tag’ (Atkins 1987) and  
 3 ‘behavioural profile’ (Gries 2005). While a lexical concept associated with a particular  
 4 form can be provided with a semantic gloss, as in the case of lexical concepts associated  
 5 with *over*, an example of which I glossed as [ABOVE] or the lexical concepts associated  
 6 with *in*, *at* and *on* to be examined later which I preliminarily gloss as [STATE], whether a  
 7 particular usage of a form relates to one lexical concept rather than another is a matter of  
 8 examining the ‘selectional tendencies’ (the lexical profile) associated with a given usage.  
 9 While any given usage of a lexical concept will have its own unique collocational pat-  
 10 tern, general patterns can be established, and form part of the conventional knowledge  
 11 associated with a particular lexical concept.

12           Two sorts of information form a lexical concept’s lexical profile. The first relates to  
 13 semantic selectional tendencies. In Evans (2004a) this was referred to as the Concept  
 14 Elaboration Criterion. The second relates to formal or grammatical selectional tenden-  
 15 cies. In Evans (2004a) I referred to this as the Grammatical Criterion. Gries (2005) has  
 16 advocated the way in which corpus methodologies can be used to examine the lexical  
 17 profile associated with a specific lexical concept. For instance, each of the ‘state’ lexical  
 18 concepts associated with *in*, *at* and *on* have distinct lexical profiles. In the remainder of  
 19 this chapter I primarily rely on semantic selectional tendencies for adducing distinct  
 20 lexical concepts.

21           To provide a preliminary illustration of the construct of the lexical profile, I briefly  
 22 consider two lexical concepts, both of which I provisionally gloss as [STATE] – although  
 23 I revise this gloss later in the chapter – and which are conventionally encoded by the  
 24 English prepositional forms *in* and *on*. These are evidenced by the following examples:  
 25

- 26 (15) a. John is in trouble/danger  
 27       b. Jane is in love/awe  
 28       c. Fred is in shock  
 29       d. Jake is in a critical condition

- 30 (16) a. The guard is on duty  
 31       b. The blouse is on sale  
 32       c. The security forces are on red alert

33           While both *in* and *on* have ‘state’ lexical concepts conventionally associated with them,  
 34 the lexical profile for each is distinct. For instance, the [STATE] lexical concept associated  
 35 with *on* selects semantic arguments which relate to states which normally hold for a  
 36 limited period of time, and which contrast with salient (normative) states in which the  
 37 reverse holds. For instance, being ‘on duty’ contrasts with being off-duty, the normal  
 38 state of affairs. Equally, being ‘on sale’ is, in temporal terms, limited. Sales only occur for  
 39 limited periods of time at specific seasonal periods during the year (e.g., a winter sale).  
 40 Similarly, being ‘on red alert’ contrasts with the normal state of affairs in which a lesser  
 41 security status holds. Further, the states in question can be construed as volitional, in

1 the sense that to be 'on duty/sale/red alert' requires a volitional agent who decides that  
 2 a particular state will hold and takes the requisite steps in order to bring such a state  
 3 of affairs about.

4 In contrast, the semantic arguments selected for by the [STATE] lexical concept for  
 5 *in* relates to states which do not necessarily hold for a limited period of time, and do not  
 6 obviously contrast with a 'normal' state of affairs. Moreover, while states encoded by *on*  
 7 are in some sense volitional, states associated with *in* are, in some sense, non-volitional.  
 8 That is, we do not usually actively choose to be in love, shock or a critical condition,  
 9 nor can we, by a conscious act of will, normally bring such states about. That is, these  
 10 states are those we are affected, constrained and influenced by, rather than those which  
 11 are actively (in the sense of consciously) chosen.

12 The fourth and final property of lexical concepts that I review here concerns the  
 13 position that they have bipartite organisation. That is, lexical concepts encode *linguistic*  
 14 *content* and facilitate access to *conceptual content*. Linguistic content represents the  
 15 form that conceptual structure takes for direct encoding in language, and constitutes  
 16 what might be thought of as a 'bundle' of distinct knowledge types. There are a large  
 17 number of different properties encoded by linguistic content which serve to provide a  
 18 schematic or skeletal representation, which can be encoded in language (for a review  
 19 see Evans to appear: chapter 6). The one which is relevant for the present study relates  
 20 to the notion of *parameterisation*.

21 One way in which knowledge, in general terms, can be represented is in terms of  
 22 richly inflected nuances that serve to reflect the complexity of experience. An alternative  
 23 way is to 'compress' such fine distinctions into two, three or more, much broader, and  
 24 hence, more general distinctions. These I refer to as *parameters*. Linguistic content  
 25 serves to encode content by adopting the latter strategy, which is to say, to employ  
 26 parameterisation. Parameters are hence part of the 'bundle' of information that a lexical  
 27 concept encodes.

28 To illustrate this notion, consider the complex range of expressions that a language  
 29 user might employ, in English, in order to 'locate' themselves with respect to time,  
 30 thereby facilitating time-reference. Any one of the following could conceivably be  
 31 employed, depending upon context: *today, January, 2008, the day after yesterday, the day*  
 32 *before tomorrow, this moment, now, this second, this minute, this hour, today, this week,*  
 33 *this month, this quarter, this year, this half century, this century, this period, the 8<sup>th</sup> day*  
 34 *of the month, this era, this millennium,* and so on. A potentially unlimited set of finer  
 35 and finer distinctions can be made (e.g., *1 second ago, 2 seconds ago, 1 hour 4 minutes*  
 36 *and 3 second ago, 2 days ago,* etc.), reflecting any manner of temporal distinction we  
 37 might care to make.

38 In contrast, parameterisation functions by dividing all the possible distinctions relat-  
 39 ing to a given category, such as time-reference, into a small set of divisions: parameters.  
 40 Such parameters might distinguish between the past, for instance, and the non-past.  
 41 Indeed, this is the basis for the tense system in English, as illustrated by the following:

- 42 (17) a. He **kicked** the ball Past  
 43 b. He **kicks** the ball Non-past

1 English encodes just two parameters that relate to Time-reference: Past versus Non-  
 2 past, as exhibited by the examples in (17), and thus manifests a binary distinction.  
 3 Some languages, such as French, have three parameters: Past, Present and Future. Some  
 4 languages have more than three parameters, distinguishing additionally remote past  
 5 from recent past, for instance. The language with the most parameters for linguisti-  
 6 cally encoding time-reference is an African language: Bamileke-Dschang with eleven.  
 7 Crucially, parameters are encoded by specific lexical concepts, and thus form part of the  
 8 knowledge ‘bundle’ that constitutes a lexical concept. For instance, the parameter ‘past’  
 9 is encoded by the lexical concept associated with the *-ed* form in (17a). However, other  
 10 lexical concepts also include the parameter ‘past’ such as the lexical concepts associated  
 11 with the following forms: *sang, lost, went, etc.*

12 I argue, then, that a key feature of linguistic (as opposed) to conceptual content is  
 13 that it only encodes knowledge in parametric fashion. This is not to say that conceptual  
 14 content does not parameterise knowledge. Indeed, parameterisation is simply a highly  
 15 reductive form of abstraction: it serves to abstract across the complexity exhibited by  
 16 a particular category. The point, however, is that the parameters encoded by linguistic  
 17 content serves to ‘strip away’ most of the differences apparent in the original perceptual  
 18 experience, thereby reducing it to a highly limited number of parameters.

19 In addition to encoding linguistic content, a subset of lexical concepts – those con-  
 20 ventionally associated with open-class forms (see Evans to appear for discussion of this),  
 21 serve as *access sites* to conceptual content. Conceptual content relates to non-linguistic  
 22 information to which lexical concepts potentially afford access. The potential body of  
 23 non-linguistic knowledge, what I also refer to as a lexical concept’s *semantic potential*, is  
 24 modelled in terms of a set of cognitive models. I refer to the body of cognitive models,  
 25 and their relationships as accessed by a given lexical concept, as the *cognitive model*  
 26 *profile*. A design feature of language is that it involves a bifurcation of lexical concept  
 27 types: those which are relatively more schematic in nature, such as those associated with  
 28 propositional forms, the subject of the present study, and those which are relatively richer  
 29 in nature. As I am dealing with lexical concepts associated with closed-class forms in  
 30 this study, namely prepositions, I will have little more to say about cognitive models in  
 31 the remainder of this chapter.

## 32 **5 Two factors in accounting for ‘state’ lexical concepts: lexical** 33 **profiles and parameters**

34 In the Principled Polysemy framework the prototypical (i.e., spatial) sense with respect to  
 35 which a semantic network is structured is a proto-scene. As we saw earlier, proto-scenes  
 36 have a single functional element associated with them. In LCCM Theory in contrast,  
 37 lexical representations, and thus proto-scenes, are representationally more complex  
 38 than this, especially with respect to their functional properties. In this section I briefly  
 39 reconceptualise the nature of the core lexical concept associated with a prepositional  
 40 polysemy network in the light of LCCM Theory.

1 The prototypical semantic representation associated with a preposition, like the  
 2 other lexical concepts in the prepositional polysemy network, is a lexical concept.  
 3 As we saw in the previous section, lexical concepts have bipartite organisation: they  
 4 facilitate access to conceptual content and encode linguistic content. As prepositional  
 5 lexical concepts are associated with prepositions: closed-class forms, they constitute  
 6 closed-class lexical concepts. As such, while they encode linguistic content they do not  
 7 serve as access sites to conceptual content.

8 There are two aspects of linguistic content that will be relevant for the discussion  
 9 of the polysemy exhibited by the range of 'state' lexical concepts in this study. The first  
 10 concerns the lexical profile exhibited by lexical concepts, as manifested by distinct  
 11 collocational patterns in language use. As we saw earlier in the chapter, two sorts of  
 12 information form a lexical concept's lexical profile: semantic selectional tendencies, and  
 13 formal or grammatical selectional tendencies. In this study I employ distinctions in the  
 14 semantic arguments which, I hypothesise, collocate with distinct 'state' lexical concepts  
 15 to uncover distinctions in lexical concepts both within and between prepositions.

16 The second aspect of linguistic content that will be relevant relates to parameterisation.  
 17 One characteristic that serves to distinguish between lexical concepts, both across  
 18 prepositions and within a single preposition, relates to the parameters encoded. For  
 19 instance, the prototypical 'spatial' lexical concept associated with *in*, which I gloss as  
 20 [ENCLOSURE], encodes the parameter Containment, as evidenced by the example in  
 21 (18). In contrast, the [EMOTION] lexical concept – one of the 'state' lexical concepts  
 22 associated with *in* – encodes the parameter Psycho-somatic State, as evidenced in (19),  
 23 but not the Containment parameter.

24 (18) The kitten is in the box    Parameter: Containment

25 (19) John is in love                    Parameter: Psycho-somatic state

26 That is, the [ENCLOSURE] lexical concept in (18) encodes a schematic dimension  
 27 abstracted from sensory-motor experience in which a TR is contained by the LM.  
 28 Notice that the relation encoded is highly schematic in nature; it says nothing about  
 29 whether there is contact or not between the TR and LM as in (20), nor as to whether  
 30 the TR represents part of the LM or not as in (21):

- 31 (20) a. The fly is in the jar    (i.e., flying around)  
 32        b. The fly is in the jar    (i.e., stationary on one interior surface)

33 (21) There's a crack in the vase

34 Indeed, the precise spatio-geometric nature of the TR, LM and their relationship is  
 35 a function of the TR and LM and their possible forms of interaction, rather than the  
 36 abstract parameter encoded by the [ENCLOSURE] lexical concept associated with the  
 37 prepositional form *in*. This information derives from the semantic potential accessed

1 via the open-class lexical concepts, as mediated by compositional processes (see Evans  
2 to appear for details).

3 In contrast, the [EMOTION] lexical concept associated with *in* encodes the parameter  
4 Psycho-somatic state. This information is highly schematic in nature. That is, the param-  
5 eter encoded does not determine which sorts of psycho-somatic states can collocate  
6 with this lexical concept. This is a function of the lexical profile: knowledge relating  
7 to the semantic selectional tendencies associated with this lexical concept, and hence  
8 the range of psycho-somatic states which can co-occur with the [EMOTION] lexical  
9 concept. Hence, while the parameters encoded by a lexical concept determine the pos-  
10 sible range of semantic arguments that can co-occur, the lexical profile, which relates to  
11 stored knowledge based on usage-patterns, provides information relating to the range  
12 of permissible states which can co-occur with this lexical concept.

## 13 6 Functional consequences of parameters

14 I now consider how the 'state' lexical concepts arise from historically earlier spatial lexical  
15 concepts, giving rise to the phenomenon of polysemy. Put another way, polysemy is a  
16 consequence of new, or derived lexical concepts emerging, thereby exhibiting a semantic  
17 relationship with a synchronically present – albeit diachronically antecedent – lexical  
18 concept.

19 Based on arguments developed in Tyler and Evans (2001, 2003) I argue that the  
20 spatio-geometric knowledge, encoded, in present terms, as abstract parameters by the  
21 'spatial' lexical concepts associated with prepositional forms gives rise to the develop-  
22 ment of non-spatial lexical concepts. In other words, 'state' lexical concepts emerge  
23 by virtue of parameters such as that of Psycho-somatic state arising as a functional  
24 consequence of spatio-geometric properties, in particular usage contexts. Hence, the  
25 emergence of derived lexical concepts is a consequence of the functional consequences  
26 of spatio-geometric parameters in a specific context of use. Such contexts of use Tyler  
27 and I (2001, 2003) referred to as *spatial scenes*.

28 For instance, there are a large number of distinct sorts of spatial scenes that involve  
29 the prototypical spatial lexical concept: [ENCLOSURE], associated with *in*, and which  
30 hence encode the parameter Containment. This follows as different *bounded land-*  
31 *marks* – a landmark which exhibits the structural properties interior, boundary and  
32 exterior – have different functions, are employed for different ends and are viewed from  
33 different vantage points. For instance, while a playpen, prison cell and a coffee cup all  
34 restrict the containee to a specific location, they do so in service of different objectives,  
35 respectively: safety, punishment and consumption. Hence, without understanding the  
36 functional consequence of being located 'in' a bounded landmark such as a prison (cell),  
37 the question in (22) would be uninterpretable:

38 (22) What are you in for?

1 After all, *in*, here, does not relate directly to a given spatial relation, but rather to the  
 2 specific sets of knowledge systems relating to the 'containment' function of prison in  
 3 a particular society. Thus, in (22), being 'in' relates not purely to containment, a func-  
 4 tional consequence of the [ENCLOSURE] lexical concept, but rather, and in addition, to  
 5 punishment, a functional consequence of being contained in enclosures (i.e., bounded  
 6 landmarks) of a certain kind, i.e., prisons, which occupy a certain position, and fulfil a  
 7 specified role in the socio-cultural and legal institutions of a particular society.

8 Now consider a different sort of functional consequence associated with the [ENCLO-  
 9 SURE] lexical concept for *in*. One consequence of certain sorts of bounded landmarks is  
 10 their utility in providing security. This is evident in the scenario involving a very small  
 11 child in a playpen for instance. But it is also true of bounded landmarks such as safes  
 12 used to safeguard valuable commodities such as money or jewels. Indeed, a functional  
 13 consequence of bounded landmarks of this sort is that the contents are occluded. This  
 14 of course assumes that the vantage point from which the bounded landmark is viewed  
 15 is exterior with respect to the volumetric interior of the bounded landmark in question,  
 16 here the safe. Thus, 'containment' or 'location with surety' is a functional consequence  
 17 of the spatial relation (i.e., the lexical concept) conventionally associated with *in*, i.e.,  
 18 of [ENCLOSURE].

19 The point is, then, that when *in* is employed in any given utterance, the conception  
 20 which derives will almost certainly always relate to a functional consequence attendant  
 21 on a specific sort of spatial scene, involving a containment relation, but doing so in  
 22 service of objectives and consequences specific to the sort of spatial scene in question.  
 23 Put another way, bounded landmarks are of many different kinds, a consequence of the  
 24 many different ways in which we interact with, and the complex range of functions to  
 25 which we put, bounded landmarks.

26 In terms of the phenomenon of polysemy, which is to say the emergence of derived  
 27 lexical concepts, it is precisely functional consequences of this sort which give rise to new  
 28 parameters. Such new parameters become conventionally associated with a lexical form,  
 29 and hence contribute to the formation of a new lexical concept. The occlusion afforded  
 30 by certain kinds of bounded landmarks, such as a jeweller's safe, is a consequence of  
 31 placing valuables in a landmark that serves to protect the commodity in question.  
 32 Typically, such landmarks are made of materials that serve to occlude the contents,  
 33 a consequence – rather than the objective – of employing the types of materials used  
 34 for constructing the safe. This functional consequence has become abstracted from  
 35 such spatial scenes to give rise to a distinct parameter. This forms part of the linguistic  
 36 content encoded by a distinct lexical concept. Evidence for this comes from examples  
 37 of the following sort:

38 (23) The sun is in

39 This utterance relates to lack of visibility of the sun, rather than the sun, the TR, being  
 40 enclosed by a bounded LM of some sort. That is, the functional consequence of certain  
 41 sorts of containment relations has given rise to a distinct lexical concept which has a  
 42 Lack of Visibility parameter encoded as part of its linguistic content.

## 1    **7 Lexical concepts for *in***

2    In this section I present an LCCM analysis of the ‘state’ lexical concepts associated with  
 3    *in*. That is, I argue that there is more than one distinct ‘state’ lexical concept conven-  
 4    tionally associated with the prepositional form *in*. I also show how these ‘state’ lexical  
 5    concepts relate to and are motivated by the functional consequences attendant upon  
 6    the range of spatial scenes which involve usages of *in* sanctioned by the [ENCLOSURE]  
 7    lexical concept.

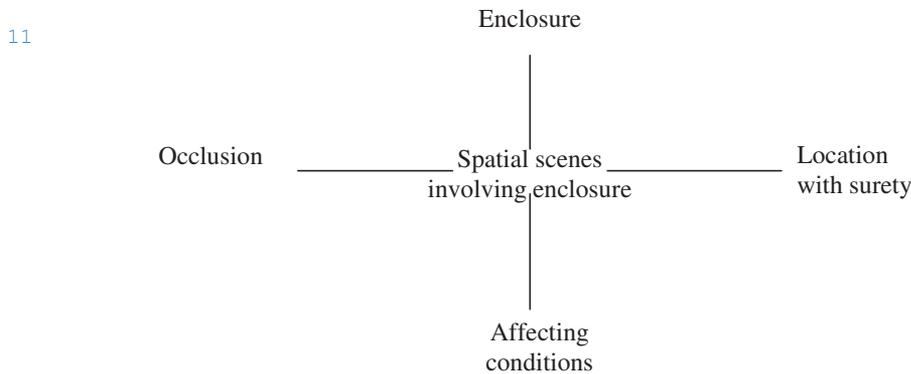
### 8    **7.1 ‘Spatial’ lexical concepts for *in***

9    As noted above, the central ‘spatial’ lexical concept associated with *in* I gloss as [ENCLO-  
 10    SURE]. This lexical concept encodes the parameter Containment. This parameter con-  
 11    stitutes an abstraction across the spatio-geometric properties associated with bounded  
 12    landmarks, such as a box, as lexicalised by the example in (18). The key spatio-geometric  
 13    components associated with a LM such as a box is that it has the structural elements inte-  
 14    rior, boundary and exterior (see Tyler and Evans 2003: chapter 7 for detailed discussion).  
 15    There are a diverse range of complex conceptualisations across which the parameter  
 16    Containment is abstracted. This includes, at the very least, experiences relating to a  
 17    TR: the entity enclosed, and a bounded landmark which serves to enclose the TR.  
 18    Bounded landmarks themselves consist of many types even in everyday experience. For  
 19    instance, a bounded landmark includes an interior, which further subsumes an interior  
 20    surface, and the volumetric interior bounded by the interior surface. It also subsumes  
 21    a boundary, which can be rigid, as in a metal safe, or non-rigid, as in a plastic carrier  
 22    bag. The boundary also has other physical characteristics such as permeability and  
 23    degrees of opacity. Finally, the bounded landmark has, by definition, an exterior: that  
 24    region which constitutes the inverse of the volumetric interior. Accordingly, part of the  
 25    exterior includes the exterior surface.

26    As observed earlier, due to our interaction involving enclosures, *in* is associated  
 27    with a number of functional consequences. That is, there are a number of identifiably  
 28    distinct sorts of *functional categories* associated with spatial scenes involving enclosure.  
 29    These include Location with Surety, Occlusion and Affecting conditions. Bounded  
 30    landmarks that are specialised for providing a Location with Surety function are known  
 31    as ‘containers’. These can provide a support function by virtue of containing (i.e., holding  
 32    and restricting) the location of the TR. This was illustrated with the discussion of the  
 33    light bulb in the socket example earlier. Alternatively, containers can restrict access (and  
 34    escape), as in the case of prisons, and safes. The second functional category mentioned  
 35    relates to Occlusion. A consequence of certain bounded landmarks, due to the opacity  
 36    of the material which forms the boundary, is that the figure located on the volumetric  
 37    interior is occluded, and hence hidden from view. The third functional category, that of  
 38    Affecting conditions, relates to the fact that an enclosure provides a delimited environ-  
 39    ment which thereby affects the TR located on the volumetric interior. For instance, a  
 40    prisoner held in solitary confinement in a windowless sound-proofed room is thereby

1 subjected to a particular sensory environment, which is a direct consequence of the  
2 nature of the bounded landmark in which s/he is located.

3 I suggest that it is these functional categories, which arise from the spatio-geometric  
4 property of Enclosure, that serve to become abstracted as distinct parameters. Put  
5 another way, abstracting across different sorts of sense-perceptory experiences, namely  
6 the spatio-geometric properties associated with enclosures, gives rise to an Enclosure  
7 parameter. Abstracting across re-occurring functional consequences of the spatio-  
8 geometric properties associated with enclosure gives rise to further parameters notably  
9 Location with Surety, Occlusion and Affecting Conditions. These parameters, which  
10 arise from spatial scenes involving enclosure, are diagrammed in Figure 3.



12 **Figure 3.** Parameters deriving from spatial scenes involving enclosure

13 I suggest that the emergence of the parameters: Location with Surety, Occlusion  
14 and Affecting Conditions, associated with the linguistic content encoded by *in*, can,  
15 under certain conditions, give rise to new 'state' lexical concepts. While the parameter  
16 Enclosure, entails, under certain conditions, all of the other parameters illustrated in  
17 Figure 3, the other parameters do not necessarily entail the Enclosure parameter. For  
18 this reason, as I shall argue, the Enclosure parameter can be seen to be primary; the  
19 other parameters arise from spatial scenes in which Enclosure is a key attribute.

20 The means whereby new lexical concepts arise is due to a disjunction between the  
21 various parameters. I illustrate this with the examples below which reveal the disjunction  
22 between the Enclosure and Location with Surety parameters.

23 To do so, consider examples of the following kind:

24 (24) The toy is in the box

- 25 (25) a. The bulb is in the socket  
26 b. The flower is in the vase  
27 c. The umbrella is in his hand

28 The example in (24) is, I suggest, a consequence of the two parameters: Enclosure and  
29 Location with Surety. That is, by virtue of being located in the interior portion of the

1 bounded landmark, the TR is thereby enclosed. Moreover, by virtue of being enclosed,  
 2 the TR is located with surety: if the box is moved, so also, is the TR – the toy – as a  
 3 direct consequence. This is what it means to say that Location with Surety is entailed  
 4 by Enclosure.

5 Evidence for thinking that the Location with Surety and Enclosure parameters  
 6 are, nevertheless, distinct units of knowledge encoded as part of a lexical concept's  
 7 linguistic content comes from spatial scenes involving partial enclosure. In the  
 8 examples in (25), the TR is only partially enclosed by the bounded landmark: only  
 9 the base of a bulb is enclosed by the socket as illustrated in Figure 2, above, only the  
 10 stem, and not the whole flower, is enclosed by the vase (see Figure 4); and only the  
 11 umbrella handle is enclosed by the hand (see Figure 5). Indeed, the reason that the  
 12 form *in* can relate to spatial scenes involving partial, as well as full, enclosure is due  
 13 to the parameter of Location with Surety. It is precisely because the bounded LM  
 14 that partially encloses the TR serves to provide location with surety that the form *in*  
 15 is sanctioned in these instances.

16

17 **Figure 4.** The flower is in the vase

18

19 **Figure 5.** The umbrella is in his hand

20 On the basis of the examples in (24) and (25), there is no reason, however, to be con-  
 21 vinced that Enclosure and Location with Surety constitute distinct parameters, and  
 22 hence distinct knowledge units encoded as part of the linguistic content associated with  
 23 the [ENCLOSURE] lexical concept.

24 However, the example in (26) illustrates a crucial disjunction between the two.  
 25 While the TR, the bottle, is partially enclosed by the bounded LM, *the cap*, in exactly  
 26 the same way as the relationship between the bulb and the socket, this use of *in* in (26)

1 is semantically anomalous, as indicated by the hash sign. In the spatial scene described  
 2 by this example, the bottle is not located with surety by virtue of being partially enclosed  
 3 by the cap. That is, the bottle's location is not determined by being partially enclosed by  
 4 the cap – although access to its contents are. Hence, in a situation where partial enclosure  
 5 applies, but location with surety does not, the [ENCLOSURE] lexical concept associated  
 6 with *in* cannot be applied. This reveals that in the absence of the Location with Surety  
 7 parameter, *in* cannot be applied to spatial scenes involving only partial enclosure.

8 (26) #The bottle is in the cap

9 The examples thus far considered reveal that the Enclosure parameter entails Location  
 10 with Surety. Hence, in spatial scenes in which there is no location with surety, yet  
 11 there is (partial) enclosure, as in the spatial scene to which (26) refers, the use of the  
 12 [ENCLOSURE] lexical concept cannot apply, as shown by the semantic unacceptability  
 13 of (26).

14 We must next examine whether the Location with Surety parameter can be employed  
 15 independently of the Enclosure parameter. If so, then we can posit that there is a distinct  
 16 lexical concept, which we can gloss as [LOCATION WITH SURETY], a lexical concept which  
 17 encodes the Location with Surety parameter as part of its linguistic content but does not  
 18 also feature the Enclosure parameter. Evidence for such a state of affairs is provided by  
 19 the following example, which relates to the spatial scene depicted in Figure 6.

20 (27) The pear is in the basket

21



22 **Figure 6.** The pear is in the basket

23 In this example, the pear (in the centre of the image) is not enclosed by the basket, as  
 24 it is supported by other fruit; although the supporting fruit are enclosed by the basket.  
 25 Yet, the form *in* can be applied to this spatial scene, as is evident in (27). I argue that  
 26 this is due to a [LOCATION WITH SURETY] lexical concept which sanctions this particular  
 27 usage. While the [ENCLOSURE] lexical concept apparent in (24) and (25) encodes the  
 28 Enclosure and Location with Surety parameters, the [LOCATION WITH SURETY] lexical  
 29 concept encodes the Location with Surety parameter but not the Enclosure parameter as  
 30 part of its linguistic content. This difference in linguistic content between the two lexical  
 31 concepts explains the difference in linguistic behaviour in the examples just considered.  
 32 The [ENCLOSURE] lexical concept requires full enclosure, or, partial enclosure *plus*

1 location with surety. However, in (27) neither full nor partial enclosure is apparent, yet  
 2 *in* is sanctioned. This follows as the independent, but semantically related (and hence  
 3 polysemous) [LOCATION WITH SURETY] lexical concept sanctions this use, I suggest.  
 4 Thus, we see that there are, plausibly, at least two ‘spatial’ lexical concepts associated with  
 5 *in*, [ENCLOSURE] and [LOCATION WITH SURETY], which encode different configurations  
 6 of parameters, and hence, subtly distinct linguistic content.

## 7 7.2 ‘State’ lexical concepts for *in*

8 I now turn to the ‘state’ lexical concepts, in order to see how these arise from the spatial  
 9 lexical concepts. Consider the following examples involving *in*.

- 10 (28) a. The cow is in milk  
 11        b. The girl is in love  
 12        c. John is in trouble/debt  
 13        d. He’s in banking [i.e., works in the banking industry]

14 While each relates to a ‘state’ of some kind, these examples in fact relate to slightly  
 15 different ‘states’: those that have a physical cause, as in (28a) – the state of being ‘in  
 16 milk’, which is a consequence of the physical production of milk – those that have a  
 17 psychological or emotional cause, as in (28b) – the state is a consequence of a subjective  
 18 state, which may (or may not) have physical, i.e., observable, manifestations – those  
 19 that have a social/inter-personal cause, as in (28c) – resulting from social/interpersonal  
 20 interactions which result in an externally-maintained state – and those that are a result  
 21 of a habitual professional activity, as in (28d). Put another way, each of these ‘states’  
 22 take distinct semantic arguments, relating a particular entity to quite different sorts  
 23 of states. In essence, I argue that these examples are sanctioned by four distinct ‘state’  
 24 lexical concepts for *in*. These distinct ‘state’ lexical concepts, as we shall see below, I  
 25 hypothesise to emerge from the functional category Affecting Conditions, which arises  
 26 from spatial scenes involving enclosure. I spell out the distinctions between the ‘state’  
 27 lexical concepts for *in*, below, with additional examples.

- 28                    Physiological state (resulting in a ‘product’)  
 29 (29) a. The cow is in milk  
 30        b. The cow is in calf  
 31        c. The woman is in labour  
 32                    Psycho-somatic state (i.e., subjective/internal state)  
 33 (30) a. John is in shock/pain (over the break-up of the relationship)  
 34        b. John is in love (with himself/the girl)  
 35                    Socio-interpersonal state (i.e., externally-maintained state)  
 36 (31) a. The girl is in trouble (with the authorities)  
 37        b. John is in debt (to the tune of £1000/to the authorities)

- 1 Professional state (i.e., professional activity habitually engaged in)  
 2 (32) a. He is in banking  
 3 b. She is in insurance

4 The fact that *in* collocates with semantic arguments of the distinct kinds illustrated in  
 5 (29–32), relating to physiological, psycho-somatic, socio-interpersonal and professional  
 6 conditions or properties suggests that we are dealing with four distinct lexical concepts.  
 7 This follows as LCCM Theory claims that each distinct lexical concept has a unique  
 8 lexical profile.

9 In addition to evidence based on semantic selectional tendencies, the position  
 10 that there must be a number of distinct 'state' lexical concepts associated with *in*, along  
 11 the lines illustrated by the distinct examples in (29) to (32) inclusive can also be dem-  
 12 onstrated by virtue of ambiguities associated with an utterance of the following kind:

- 13 (33) She's in milk

14 The utterance in (33) could potentially be interpreted as relating to a woman who is  
 15 nursing a baby, and thus lactating, or as relating to a woman who works in the dairy  
 16 industry. That is, given an appropriate extra-linguistic context, an example such as  
 17 this can be interpreted in at least two ways. The potential for divergent interpretations  
 18 is a consequence, in part, of our knowledge that *in* has a number of distinct lexical  
 19 concepts associated with it: what is relevant for this example is the distinction between  
 20 a [PHYSIOLOGICAL STATE] lexical concept and a [PROFESSIONAL STATE] lexical concept.  
 21 Moreover, ambiguities can be generated even when a relatively well entrenched example  
 22 is employed. For instance, even examples of the following kind:

- 23 (34) She is in labour

- 24 (35) He is in love

25 can be interpreted in alternate ways. For instance, (34) could be interpreted as relating  
 26 to childbirth or to a professional activity, e.g., the trade union movement. Similarly,  
 27 (35) could be interpreted as relating to an emotional state or a professional activity, e.g.,  
 28 marriage guidance counselling. The former reading is only possible by virtue of assuming  
 29 something akin to an [PSYCHO-SOMATIC STATE] lexical concept which is distinct from a  
 30 [PROFESSIONAL STATE] lexical concept. That is, both lexical concepts must exist if 'love'  
 31 can be interpreted in these ways in this example.

### 32 7.3 Derivation of the 'state' lexical concepts

33 I now consider how the 'state' lexical concepts for *in* exemplified in (29) to (32) inclusive  
 34 may have been extended from the prototypical [ENCLOSURE] lexical concept. I observed  
 35 above that in previous work with Andrea Tyler, Tyler and I argued that polysemy derives

1 from regular processes of semantic change, in which situated implicatures associated  
 2 with a particular context can become reanalysed as distinct semantic components,  
 3 in present terms, lexical concepts, which are associated with the relevant preposition  
 4 (Hopper and Traugott 1993; Traugott and Dasher 2004; cf. Levinson 2000). That is,  
 5 Tyler and I argued for a usage-based approach to language change, a position adopted  
 6 by LCCM Theory.

7 In terms of an LCCM account of the emergence of closed-class lexical concepts such  
 8 as the 'state' lexical concepts for *in*, the trajectory is as follows. Situated implicatures arise  
 9 in bridging contexts, as briefly discussed above. These are contexts in which a usage  
 10 sanctioned by the relevant 'spatial' lexical concept, such as the [ENCLOSURE] lexical  
 11 concept, also gives rise to a situated implicature, such as an affecting condition. If the  
 12 form is repeatedly used in such bridging contexts, the situated implicature may give  
 13 rise to the formation of a parameter: a highly abstract unit of knowledge, specialised  
 14 for being encoded as part of the linguistic content associated with a lexical concept, as  
 15 discussed earlier. I argue below that bridging contexts, involving the functional category  
 16 of Affecting Conditions, give rise to the formation of a number of related but distinct  
 17 'state' parameters, and hence lexical concepts.

18 In order to trace the development of the functional category Affecting Conditions,  
 19 we need to consider spatial scenes that might provide appropriate bridging contexts.  
 20 To illustrate, consider the following expressions:

- 21 (36) a. in the dust  
 22 b. in the sand  
 23 c. in the snow

24 While dust, sand and snow are physical entities which can 'enclose' they cannot, normally  
 25 fulfil the functions provided by, for instance, containers. That is, they do not typically  
 26 serve to locate with surety, exceptional circumstances such as quicksand and avalanches  
 27 excepted. For instance, dust, sand and snow, by virtue of enclosing, do not normally have  
 28 the structural attributes that allow an entity to be supported and thus transported (cf. a  
 29 bucket), nor do they normally restrict access in the way a prison cell does, for instance.

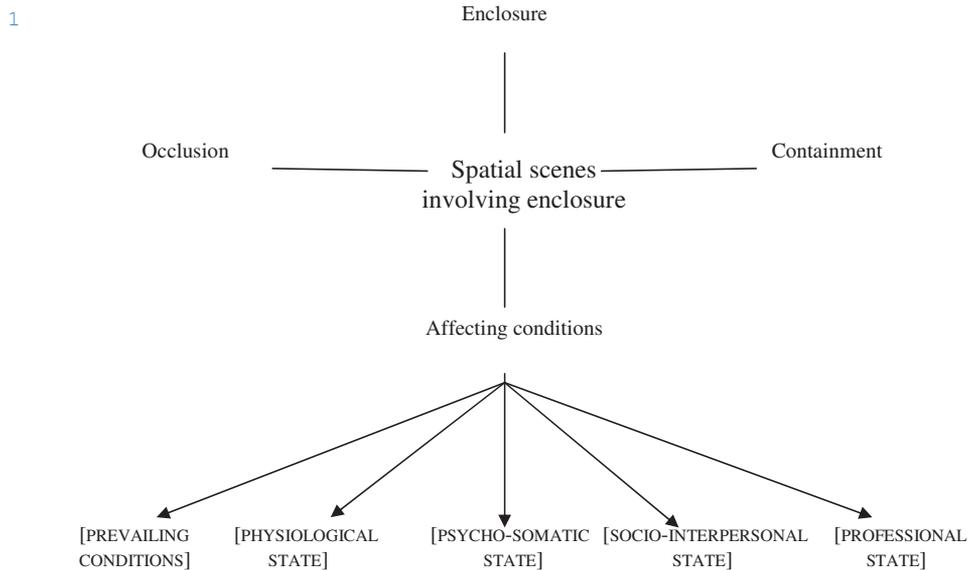
30 Nevertheless, these examples exhibit some of the spatio-geometric properties asso-  
 31 ciated with the [ENCLOSURE] lexical concept. This is a consequence of the properties  
 32 associated with these 'bounded' landmarks: they provide an affecting condition, an  
 33 environmental influence which affects our behaviour. For instance, they determine  
 34 the kinds of apparel we wear, and how we behave when we are exposed to the dust/  
 35 sand/snow, and so on. While examples such as sand, snow and dust can be construed  
 36 as enclosures with boundaries, there are other related examples of what we might refer  
 37 to as Prevailing Conditions which are much less clear-cut in terms of the nature of the  
 38 boundaries involved:

- 39 (37) a. the flag in the storm  
 40 b. the flag in the wind

1 I suggest that these instances of *in* are sanctioned by virtue of there existing a distinct  
2 parameter Affecting conditions, which forms part of the linguistic content encoded by a  
3 distinct [PREVAILING CONDITIONS] lexical concept. Clearly a storm and wind are much  
4 less prototypically enclosures, and more saliently provide prevailing conditions which  
5 thereby constitute an environment which affects us. As such, spatial scenes involv-  
6 ing more prototypical enclosures have given rise to the functional category Affecting  
7 Conditions, which has led to the formation of a distinct Affecting Conditions parameter  
8 in semantic memory. The existence of a distinct [PREVAILING CONDITIONS] lexical  
9 concept, as evidenced by examples in (37) provides suggestive evidence that such a  
10 distinct Affecting Conditions parameter must exist, and has come to form the core a  
11 distinct [AFFECTING CONDITIONS] lexical concept.

12 I argue that there are a number of distinct 'state' lexical concepts associated with  
13 *in* that encode the parameter of Affecting Conditions, rather than Enclosure – those  
14 evidenced in (29)-(32). Indeed, these lexical concepts are what I have referred to as 'state'  
15 lexical concepts, as the states invoked all provide, in some sense, affecting conditions.  
16 Moreover, all these 'state' lexical concepts are relatively, and to degrees, far removed  
17 from the physical notion of enclosure from which they most likely originally evolved.  
18 In essence, once an Affecting Conditions parameter becomes conventionalised, it can  
19 be applied to distinct kinds of affecting conditions, even those that are non-spatial  
20 in nature, such as states. This leads to the development of new lexical concepts, with  
21 correspondingly new lexical profiles.

22 The first such 'state' lexical concept relates to the physical condition of an organism  
23 which thus provides an affecting condition. Such physical conditions include good/ill  
24 health, pregnancy, and any salient physical aspect of the organism's condition which  
25 affects and thus impacts on the organism's functioning. This lexical concept I gloss  
26 as [PHYSIOLOGICAL STATE]. In addition to environmental and physical conditions,  
27 affecting conditions can be caused by psycho-somatic states, such as grief, happiness  
28 and sadness which are internal in nature. This 'state' gives rise to a [PSYCHO-SOMATIC  
29 STATE] lexical concept associated with *in*. In addition, social interactions which give  
30 rise to social or interpersonal relationships lead to conditions which may affect the  
31 individual. Such extrinsic or socially-induced affecting conditions might include debts,  
32 or other sorts of difficult situations which impose conditions on the behaviour of an  
33 individual. This set of affecting conditions gives rise, I suggest, to what I gloss as the  
34 [SOCIO-INTERPERSONAL STATE] lexical concept associated with *in*. Finally, one's habitual  
35 professional activity provides an affecting condition by virtue of the physical and social  
36 interactions that are attendant upon such activities. This provides an affecting condition  
37 giving rise to a lexical concept glossed as [PROFESSIONAL STATE] associated with *in*.  
38 These are illustrated in Figure 7.



2 **Figure 7.** Parameters and their relationship with 'state' lexical concepts for *in*

### 3 **8 Lexical concepts for *on***

4 In this section I deal, somewhat more briefly, with *on*.

#### 5 **8.1 The prototypical lexical concept for *on*: [contact]**

6 The spatial relation designated by *on* involves the relation of contact or proximity to  
 7 the surface of a LM, and so the functional consequence of being supported or upheld  
 8 by it. I gloss the prototypical 'spatial' lexical concept conventionally associated with *on*  
 9 as [CONTACT]. This serves to encode the geometric parameter Contact and functional  
 10 parameter Support as part of its linguistic content. This lexical concept licenses an  
 11 example of the following sort:

12 (38) the apple on the table

13 Note that evidence that the parameters Contact and Support are both encoded by the  
 14 lexical concept [CONTACT] comes from the fact that *on* can only felicitously be employed  
 15 to describe spatial scenes in which both parameters are apparent. For instance, if an  
 16 apple is held against a wall by someone, the utterance in (39) is semantically anomalous.  
 17 However, if the apple is affixed to the wall, for instance by glue, then (39) is entirely  
 18 appropriate.

1 (39) the apple on the wall

2 That is, while the apple is in contact with the wall in both scenarios, in the first scenario  
3 it is the person, rather than the wall, that affords support, while it is the wall (and the  
4 glue, which employs the wall as a means of affixing the apple) in the second. Hence,  
5 the example in (39) applies when there is both physical contact between the TR and  
6 the LM, and when the latter has a role in supporting the former.

7 Indeed, there are a number of distinct 'support' lexical concepts associated with  
8 *on* which privilege the Support parameter, at the expense of the Contact parameter, as  
9 illustrated by the following examples:

10 Body part which provides support

- 11 (40) a. on one's feet/knees/legs/back  
12 b. on tiptoe  
13 c. on all fours

14 In the examples in (40), the use of *on* relates to that part of the body which provides  
15 support, rather than being concerned with contact.

16 Means of conveyance

- 17 (41) a. on foot/horseback  
18 b. on the bus

19 With respect to the example in (41b), it is worth pointing out, as Herskovits (1988) does,  
20 that if children were playing on a stationary bus, for instance, that had been abandoned,  
21 then it would not be appropriate to say: *on the bus*, but rather *in* would be more natural.  
22 This supports the view that the [MEANS OF CONVEYANCE] lexical concept is a distinct  
23 'support' lexical concept encoded by *on*.

24 Supporting pivot

25 (42) The Earth turns on its axis

26 Drug dependency/continuance

- 27 (43) a. Are you on heroin?  
28 b. She's on the pill

29 Psychological support

30 (44) You can count/rely on my vote

31 Rational/epistemic support

32 (45) on account of/on purpose

## 1 8.2 The [active state] lexical concept for *on*

2 There is just one ‘state’ lexical concept for *on*, which I gloss as [ACTIVE STATE]. This  
 3 lexical concept derives not from the functional category of Support. Rather, it pertains  
 4 to a functional category concerning ‘functionality’ or ‘activity’. That is, in many spatial  
 5 scenes, a consequence of contact is that the TR, as it comes into contact with a particular  
 6 surface, becomes functional. This category I refer to as Functional Actioning. Removing  
 7 contact precludes functional actioning. Such forms of contact, for instance, invoke  
 8 scenarios involving physical transmission, such as the very salient one of electricity.  
 9 Many times a day we plug-in or switch ‘on’ electrical appliances. It is by facilitating  
 10 contact between the appliance and the electrical circuit that an appliance is rendered  
 11 functional. A ‘switch’ provides a means of facilitating this contact, which is why we  
 12 employ the term ‘switch on’ in English. In other words, I suggest that the [ACTIVE STATE]  
 13 lexical concept associated with *on* encodes a Functional Actioning parameter as part  
 14 of its linguistic content. It is this which makes it distinctive from the ‘spatial’ lexical  
 15 concepts of *on* discussed in the previous examples.

16 The [ACTIVE STATE] lexical concept associated with *on* relates to adjectives or  
 17 nouns of action which involve a particular state which can be construed as ‘active’ or  
 18 ‘functional’, as contrasted with a, perhaps, normative scenario in which the state does  
 19 not hold. In other words, states described by instances of *on* sanctioned by this lexical  
 20 concept are often temporally circumscribed and thus endure for a prescribed or limited  
 21 period of time. In this, the states referred to are quite distinct from those that *in* serves  
 22 to describe. Here, the notion of being ‘affected’, apparent with *in*, is almost entirely  
 23 absent. Consider some examples:

- 24 (46) a. on fire  
 25 b. on live (i.e., a sports game)  
 26 c. on tap (i.e., beer is available)  
 27 d. on sleep (as in an alarm clock on a particular mode)  
 28 e. on pause (as in a DVD player)  
 29 f. on sale  
 30 g. on loan  
 31 h. on alert  
 32 i. on best behaviour  
 33 j. on look-out  
 34 k. on the move  
 35 l. on the wane  
 36 m. on the run

37 Figure 8 depicts the parameter that underpins this lexical concept.



## 1 9.2 The 'state' lexical concepts for *at*

2 There are three distinct lexical concepts associated with *at* that might be described as  
3 relating to 'states'. These are illustrated below:

4 State (or condition) of existence

5 (48) *at rest/peace/ease/liberty*

6 (e.g., *He stood at ease, or He is at peace [=dead]*)

7 States relating to mutual relations

8 (49) *at war/variance/strife/one/dagger's drawn/loggerheads*

9 (e.g., *The EU is at war with the US over the imposition of steel tariffs*)

10 States relating to external circumstances

11 (50) *at peril/risk/hazard/expense/an advantage/a disadvantage*

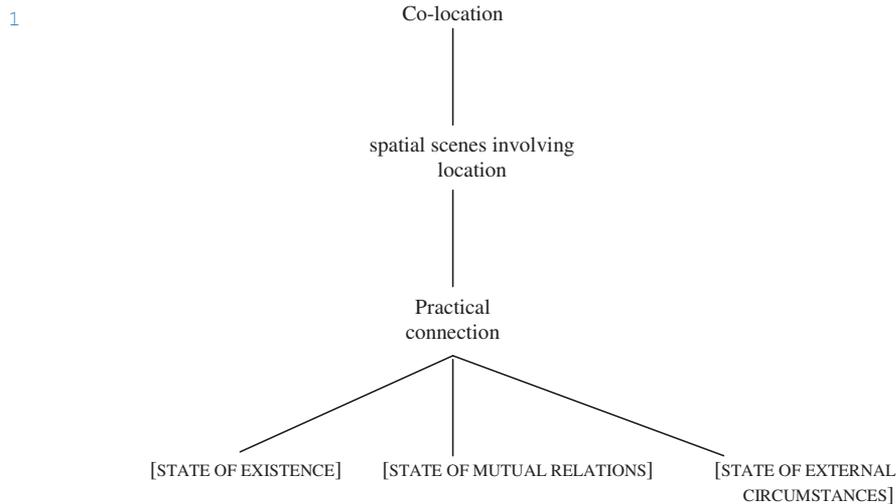
12 (e.g., *The company is at risk of going under*)

13 The 'state' lexical concepts for *at* appear to be motivated by the functional consequence  
14 of close-proximity between two point-like entities giving rise to the formation of a  
15 parameter: Practical Association.

16 In the case of the [STATE OF EXISTENCE] lexical concept, the practical association  
17 resulting from the co-location is the state of existence which holds. That is, there is a  
18 practical association which holds between a given entity and its state of existence.

19 The second lexical concept I gloss as [STATE OF MUTUAL RELATIONS], as evidenced  
20 by (49). This lexical concept arises due to a salient practical association resulting from  
21 co-location of two entities involving mutual relations. For instance, while warfare often  
22 involves combatants who must be proximal to one another, the state of being 'at war'  
23 need not, as evidenced by the so-called 'phoney war' which held during 1939 when  
24 the United Kingdom, France and Germany were officially 'at war', and yet no troops  
25 engaged. Thus, the use of *at* to designate a state of mutual relations, independent of  
26 spatio-geometric co-location, is due to the parameter of Practical Association being  
27 invoked as part of the linguistic content encoded by this lexical concept. Put another  
28 way, this lexical concept encodes a state of a particular kind, rather than the 'spatial'  
29 notion of proximity.

30 Finally, states pertaining to external circumstances may relate to evaluations con-  
31 cerning circumstances associated with mutual relations. This is instantiated by the lexical  
32 concept which I gloss as [STATES OF EXTERNAL CIRCUMSTANCES], as evidenced by the  
33 examples in (50). The relationship between the parameter of Practical Association and  
34 the 'state' lexical concepts is diagrammed in Figure 9.



**Figure 9.** Parameters and their relationship with 'state' lexical concepts for *at*

### 3 **10 Conclusion: *in* vs. *in* vs. *at***

4 Having presented an analysis of i) distinct 'state' lexical concepts for *in*, *on* and *at*, and  
 5 ii) how these encode distinct parameters which relate to functional categories arising  
 6 from spatial scenes involving spatio-geometric relationships, I now return to one of the  
 7 observations with which I began this study. I observed that each of the 'state' lexical  
 8 concepts associated with *in*, *on* and *at*, as exemplified in (1)-(3), is minimally distinct in  
 9 that it is associated with distinct semantic arguments. Consequently the lexical concepts  
 10 exemplified in these examples relate to states of distinct kinds. The analysis presented  
 11 here has supported this initial assessment, and elaborated on it in three ways.

12 Firstly, the perspective offered here, particularly with respect to the construct of  
 13 the lexical concept, allows us to establish in a reasonably precise way the nature of  
 14 the distinction between the 'state' lexical concepts associated with *in*, *on* and *at*. That  
 15 is, given that lexical concepts are form-specific and moreover have distinct lexical  
 16 profiles – for instance they collocate with distinct kinds of semantic arguments – we  
 17 are able to establish that the 'state' lexical concepts (within and between) prepositional  
 18 forms are distinct.

19 Secondly, by taking seriously the functional nature of spatial relations, and the  
 20 formation of parameters: highly abstract knowledge structures specialised for being  
 21 directly encoded 'in' language, this allows us to understand the sorts of functional  
 22 motivations, and thus distinctions, between the 'state' lexical concepts among different  
 23 forms.

24 Thirdly, prepositions, particularly *in* and *at* have more than one so-called 'state'  
 25 lexical concept associated with them. We have seen that the prototypical spatial lexical  
 26 concept associated with a given preposition is associated with a number of parameters,  
 27 including parameters derived from what I referred to as functional cognitive categories.

1 Providing an LCCM analysis gives us a way of establishing the sorts of distinctions that  
 2 exist between the 'state' lexical concepts associated with the same form. That is, we have  
 3 a means of understanding how these lexical concepts are distinct (based on a distinction  
 4 in parameters encoded) despite their conceptual similarity. We also have a means of  
 5 empirically verifying hypotheses as to distinctions in the underlying lexical concepts  
 6 which are assumed to sanction instances of use. This followed due to an examination of  
 7 semantic selectional tendencies, which relate to the theoretical construct of the lexical  
 8 profile in LCCM Theory: distinct lexical concepts are held to have a unique lexical profile  
 9 which forms part of the knowledge encoded by a given lexical concept.

## 10 Notes

- 11 1 This said, the framework developed in Tyler and Evans (2001, 2003) and Evans and  
 12 Tyler (2004a, 200b) remains important. Principled Polysemy, as articulated in those  
 13 publications, was and remains an important theoretical development in terms of what  
 14 it brings to descriptive accounts of spatial semantics. In particular, it sought, for good  
 15 reason, to address the sorts of methodological criticisms that had been levelled at the  
 16 early pioneering work of Brugman and Lakoff (Brugman [1981] 1988; Brugman and  
 17 Lakoff 1988; Lakoff 1987) in developing cognitive lexical semantics. While it doubtless  
 18 requires modification (see Evans 2004a), it nevertheless provides a relatively robust  
 19 set of methodologically constrained, and above all principled 'decision principles' (in  
 20 Sandra's 1998 terms) for identifying and distinguishing between senses-units, and for, a  
 21 principled means of modelling lexical polysemy with respect to spatial relations. While  
 22 important developments in the use of psycholinguistic testing (see Sandra and Rice  
 23 1998; Cuyckens et al. 1997) and corpus-based techniques (see Gries 2005) have added  
 24 to the arsenal of cognitive lexical semanticists in this regard, empirical methods will  
 25 always require a theoretical framework in order to motivate the sorts of questions that  
 26 can be asked and to provide a lens for interpreting results, even though this may mean  
 27 modifying the theoretical framework. Indeed, this perspective is in fact compatible with  
 28 the desire to have more empirical methods in cognitive lexical semantics.
- 29 2 See Evans 2005 and Tyler and Evans 2001, 2003 for detailed discussion of polysemy.

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