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Book review

Vyvyan Evans and Paul Clifton (eds.) *Language, Cognition and Space: The State of The Art and New Directions*. London: Equinox Publishing Company, 2010, 672 pp., ISBN: 9781845532529. Hardback 90.00 GBP / 175.00 USD. Paperback 35.00 GBP / 68.00 USD.

This book presents a collection of papers that focuses on cognitive and linguistic representations of Space. As the title suggests, these papers present recent interdisciplinary advances in the ever-growing topic of “Space”, on how the mind instantiates linguistic and cognitive spatial representations. The book contains eight parts, each including one to three chapters per part. An introductory chapter by Paul Chilton, which presents the contents of each chapter, rounds off the volume. In this review, I present the contents of the book in some details, followed by a critical discussion on the merits and flaws of the work as a whole. Let us begin with the contents.

Part I focuses on Perception and Space. The chapter by Vyvyan Evans offers a thorough introduction to the neurophysiological and conceptual foundations of spatial representations, cognitive and linguistic alike. The contents are as follows. The first four sections present an account of how perceptual information is processed and allows the emergence of higher-level (cognitive) spatial representations to emerge. It explains in detail how the core perceptual systems process information about objects and the body in the environment. The author introduces two theories of object- and motion-detection and their respective notions of *textons* and *geons* (i.e. Julesz 1981; Biederman 1987). Textons are defined as basic perceptual units that represent the geometric-visual properties of objects (e.g. straight lines), geons are defined as “shapes” representing objects (e.g. a sphere for an apple). He then introduces basic principles of visual organisation found in Gestalt psychology (e.g. figure-ground, Proximity, Similarity), and the notion of *Cognitive maps*, mental representations of the environment (O’Keefe and Nadel 1978). Cognitive maps can be conceived as mental representations of objects and their spatial relations. They can be centred on an agent’s perspective (i.e. *ego-centric* maps), or represent a perspective-independent, three-dimensional model of Space (i.e. *allocentric* maps). The fifth and final section presents the thesis of *Embodied Cognition* for spatial prepositions. Spatial prepositions (e.g. *in*, *out of*) express abstract spatial concepts (respectively, CONTAINMENT and EXCLUSION) that arise from perceptual experience. These concepts “filter” more specific information. If we say that a ball is “in” the box, for instance, we do not express whether the ball is in contact with the box or not. So, linguistic spatial represen-

tations appear to be based on how our perceptual systems are able to “reconstruct” a mental model of space. So, they represent a higher-order information which emerges from perceptual, lower-level representations.

Part II focuses on the interplay between spatial Language and Cognition, and includes two chapters. In the first chapter, Landau and associates discuss the neo-Whorfian hypothesis by suggesting that linguistic representations may play a strong influence on non-linguistic representations in a momentary way. Their proposal is as follows. Language may guide and modulate the online processing of visual information, by the two principles of *selectivity* and *enrichment*. Selectivity is defined as the property of Language to select which bits of non-linguistic spatial information are represented at a linguistic level. Enrichment is defined as the property of Language to enrich spatial representations with extra non-spatial information. In support of their view, they report several studies suggesting that linguistic expressions may influence which events speakers may pay attention to. In particular, they suggest that cross-linguistic differences may influence attentional focus (e.g. Greek speakers focusing on end-point events, English speakers on manner events: Papafragou, et al. 2002). They also report that various kinds of non-spatial linguistic information may guide spatial non-linguistic tasks (e.g. colour of relevant objects: Dessalegn and Landau 2008). As these studies appear to support a short-term, rather than long-term effect on memorization, the authors suggest that neo-Whorfian effects may be real, although temporary.

The chapter by Bergen and associates reviews neurophysiological research on the neural substrates of spatial representations in Language and Cognition. The authors discuss Bergen et al. (2007), an experiment in which participants were asked to first look at a computer screen and imagine a mule climbing a location as it could have appeared on screen. Afterwards, they were asked to imagine the same scenario when an actual picture of a mule climbing a mountain appeared on screen. The main finding was that participants were slower in recognising the actual shape of a climbing mule on screen. This result suggested that imagined and real pictures were processed by the same representational systems, so they had to share the same memory resources. This and several other works are seen as supporting the hypothesis that spatial language, whether it represents spatial and non-spatial information, rests on the same neurophysiological substrates that represent spatial perceptual information.

Part III includes three chapters that present experimental works on the nature of spatial representations. These works investigate whether extra-geometrical aspects of meaning have a role in the semantics of spatial prepositions. The chapter by Michele Feist combines semantic typology and psycholinguistic insights, extending previous research by the author (e.g. Feist 2008). The author describes an experimental study about the interpretation of *in* and *on*, and whether

1 non-geometrical factors may play a role in the production and acceptance of
2 these prepositions. The experimental findings suggest that factors such as me-
3 chanical support or animacy for the figure and ground may determine whether,
4 for instance, a ball is judged as being “in” a hand, rather than “on” a hand. Sim-
5 ilarly, the cross-linguistic evidence studied by the author suggests that, although
6 languages may use different prepositions to encode the same concept, the basic
7 inventory of spatial concepts appears to be the same, cross-linguistically.

8 The chapter by Laura Carlson also extends previous research by the author
9 (e.g. Carlson 2003), as it studies in detail how English speakers associate the in-
10 terpretation of spatial term such as *front* with a certain visual scenario matching
11 this term. The data offered in this chapter suggest that the functional properties
12 of the ground play a role in the computation of the “optimal” frontal positions,
13 similarly to Feist’s data. For instance, participants in one experiment were asked
14 to evaluate whether a doll was in front of a toy closet. In offering their answer,
15 participants showed to discriminate whether the toy closet’s door opened on the
16 right or left side, a subtle detail that determined which was the exact front axis of
17 the ground. The author concludes that the ideal “regions” individuated by spatial
18 terms may vary according to several factors other than geometric ones alone.

19 The chapter by David Kemmerer reviews much recent Nero-scientific litera-
20 ture, involving both healthy and brain-damaged patients, in an attempt to pin-
21 point the regions of the brain that process cognitive and linguistic spatial repre-
22 sentations. The author reviews evidence stemming from different experimental
23 paradigms (e.g. fMRI, Noordzij et al. 2008). He thus suggests Supra Marginal
24 Gyrus and the Angular Gyrus, both part of the Inferior Parietal Lobe, appear to
25 be brain zones involved in the processing of most spatial terms. He also suggests,
26 however, that these zones may include Language- and Cognition-specific “spatial
27 strata”. The key evidence is from studies on lesioned patients, who could process
28 spatial prepositions without any problems (e.g. *in front of*), but could not pro-
29 cess matching visual information (e.g. an object being in front of a second object;
30 Kemmerer 2006).

31 Part IV includes three theoretical approaches to spatial representations in
32 Language. The chapter by Vandeloise proposes a taxonomy of spatial concepts
33 that takes in consideration the subtle differences between “geometrical” and
34 “mechanical” prepositions. She suggests that prepositions may be divided in two
35 groups, based on how they express the location of the figure with respect to the
36 ground. One group defines the position of the figure via a geometrical/topological
37 relation. The second group defines whether the figure’s position is a consequence
38 of the ground physically “controlling” the figure. The first group can be further
39 defined in topological and projective prepositions (e.g. *at*, *behind*, respectively),
40 the second group in “force dynamics” prepositions, i.e. prepositions including

a mechanical component in their meaning (e.g. *in*, *on*, *against*: Talmy 1988). In support of her theory, the author discusses previous literature from different domains (e.g. cross-linguistic research, psycholinguistic and language acquisition studies). She then suggests that the proposed model of spatial meanings can offer a “universal” approach to their semantics that it is more comprehensive than geometry-only models (e.g. Levinson and Meira 2003).

The chapter by Zwarts studies the representation of “force” in spatial terms (e.g. *against*) via a simple “vector calculus”. The author extends his previous work on spatial prepositions modelled as vectors (i.e. Zwarts and Winter 2000), to include force dynamics aspects of meaning, as also suggested in Vandeloise’s chapter. The basic proposal is that, once we model both forces and geometric properties as vectors on an abstract model of space, it is possible to give a remarkably simple semantics for several prepositions with a “physical” component. For instance, the preposition *on* can be modelled as expressing a set of “abstract” vectors. These vectors are projected from ground to figure. Each vector includes a geometrical component (i.e. the figure is outside the ground), and a mechanical component (i.e. the figure is supported by the ground). Such an approach can thus be extended to several other prepositions, such as *in*, *against* and so on.

The (second) chapter by Evans uses the *Lexical Concepts and Cognitive Models* (LCCM) framework to analyze how spatial prepositions can have non-spatial meanings. The author focuses on the locative prepositions *in*, *on* and *at*, and how these prepositions can express various types of abstract states, such as being “in” love, or being “at” war. The author suggests that these adpositions can receive a “state” interpretation because of the metaphor STATES ARE LOCATIONS, as found in *Metaphor Theory* (e.g. Lakoff and Johnson 1999). From this metaphor, the type of state associated to a given preposition is assumed to depend on its underlying spatial concept. While *in* is usually associated with emotional states that may “constrain” an individual’s actions (e.g. *in love*), *on* is instead usually associated with an individuals’ activity or functionality (e.g. *on the run*).

Part V offers three studies on Language-specific spatial terms. The chapter by Ibarretxe-Antuñano studies in detail the semantic properties of the various parts of speech expressing static spatial relations in Basque (e.g. spatial case markers, spatial nouns, motion verbs). The author offers elicitation data suggesting that Basque speakers mostly describe static spatial relations via the combination of the copula *egon*, ‘be’, with nouns marked for spatial case. These data also suggest that the combination of spatial case and a spatial noun may express more specific locations (e.g. *barru-an* for English ‘in front’, lit. ‘front-LOCATIVE’).

The chapter by Shakova and Tyler focuses on the polysemy of Russian particle *za*, which appears to license several spatial meanings (e.g. English ‘behind’, ‘at’, ‘near’). It offers a (mostly) corpus-based analysis of the possible meanings of

1 this spatial particle. This analysis offers evidence that the central meaning of *za*
2 can be translated as English ‘behind’. Several other meanings of this particle can
3 be seen as extensions of this central meaning, possibly via the interaction of this
4 particle with other spatial case markers or spatial terms.

5 The chapter by Shinohara and Matsunaka studies in detail how extra-linguis-
6 tic information about frames of reference influences the licensing of Japanese
7 spatial particles *mae*, *ushiro* and *saki*, respectively ‘front’, ‘back’ and ‘ahead’.
8 Based on experimental findings, the authors suggest that speakers may interpret
9 these prepositions according to a viewer-centred (or relative) frame of reference
10 when a scenario involves objects moving towards the participants. Participants
11 may prefer, however, an interpretation based on an object-centred (or intrinsic)
12 frame of reference when objects moved away from the participants. So, informa-
13 tion about frames of reference is at least in part encoded in these spatial particles
14 (as suggested in e.g. Levinson 2003).

15 Part VI consists of two chapters on spatial representations in Sign Language
16 and Gesture. The chapter by Leonard Talmy, a revision of the original Talmy
17 (2003), reviews in thorough detail the conceptual differences between spoken
18 language and sign language. It also reviews how sign language implements differ-
19 ent cognitive strategies to convey spatial information. The main suggestion is that
20 spatial sign language forms more closely resemble non-linguistic information,
21 since sign language expressions often have an iconic component in representing
22 non-linguistic spatial relations. This is to an extent lacking in spoken language.
23 Talmy suggests that although the two linguistic modalities share several common
24 features, these modalities also display differences which are significant enough
25 to assume that the Language system must also interact with other non-linguistic
26 modules. So, Language may involve neural functions which are not necessarily
27 Language-specific.

28 The paper by Mittelberg studies how gestures can be implemented in stan-
29 dard spoken language to convey spatial information. The author suggests that,
30 when speakers use spatial language, they may employ non-linguistic gestures
31 as a means to make more precise the abstract, metaphoric relations that are ex-
32 pressed by utterances. The case example she offers concerns how linguists teach
33 linguistic concepts via spatial gestures, e.g. the notion of “circumfix” represented
34 as the teacher’s hands surrounding a virtual morpheme. The author thus sug-
35 gests that abstract spatial representations are embodied, since they are based on
36 more basic, sensori-motor forms of spatial representation such as gesturing, and
37 thus offer a form of support for the Embodied Cognition thesis.

38 Part VII presents two chapters which focus on the often understudied topic
39 of “motion”, and its representation in Language. The first chapter by Zlatev and
40 associates proposes a fine-grained analysis of how motion events are expressed

in Language, extending Talmy's (1985) classical distinction between verb-framed 1
and satellite-framed languages. The authors suggest that motion events find their 2
way in language via the expression of key sub-events, in particular manner and 3
path events. They also suggest that the non-linguistic salience of these concepts 4
in visual spatial representations may influence how speakers may express motion 5
events in a language. For instance, elicitation task experiments involving French, 6
Swedish and Thai speakers found that speakers placed a stronger emphasis on 7
the manner event, in "manner-framed" languages (Thai, French). The reverse 8
held true in the "path-framed" Swedish. So, speakers appear to be influenced by 9
Language in non-linguistic event conceptualisation. 10

The chapter by Stéphanie Pourcel focuses on theoretical aspects of motion 11
and events. The author reviews existing experimental evidence (e.g. Pourcel 12
2005), supporting the view that several layers of meaning contribute to the defi- 13
nition of motion meanings in Language. Some layers are those of directionality 14
(i.e. the direction of moving entities) and telicity (whether an event of motion 15
has a final part). Other layers include causality (motion may be caused, e.g. *Tom* 16
pushed the pram across the street), animacy (of figure and ground), agency (of 17
figure) and force dynamics. 18

Part VIII offers three chapters. The first chapter, by Daniel Casasanto, dis- 19
cusses in detail whether non-linguistic spatial representations underlie other 20
mental representations. He draws a parallel between spatial language and other 21
linguistic domains (e.g. temporal and modal), using Metaphor Theory as a frame- 22
work. This possibility is assessed via a thorough review of experiments analysing 23
whether individuals could perform non-linguistic tasks of temporal organisation 24
via spatial tools (e.g. estimate intervals of time via their segmental representa- 25
tion on screen). These experiments also offered cross-linguistic evidence span- 26
ning English, French, Spanish and Greek, obtained via the analysis of corpus 27
evidence. Further evidence for this hypothesis was also offered via experiments 28
on non-linguistic organisation of musical pitch. 29

The second chapter, by Jörg Zinken, studies in detail the hypothesis that 30
frames of reference may also be found in linguistic representations of tense, ac- 31
cording to the predictions of Metaphor Theory. The author suggests that two types 32
of temporal organisation are found in natural language, the *A-type* and *B-type*, 33
which are derived from spatial frames of reference. The *A-type* of temporal orga- 34
nisation involves events as they occur from an observer's point of view, and can be 35
thus thought of as a relative or intrinsic reference of temporal organisation. The 36
B-type instead involves an ordering of events which is irrespective of an observ- 37
er's perspective, and can be thus thought of as equivalent to an absolute temporal 38
frame of reference. The author observes that spatial terms easily lend themselves 39
as being part of the *A-type* expressions (e.g. *a fun afternoon in front of me*), while 40

1 “proper” temporal expressions tend to be absolute (e.g. *Wednesday before Thurs-*
2 *day*). These differences, as the author suggests, appear to be cross-linguistically
3 valid, since most if not all languages may encode these differences in a systematic
4 way.

5 The third chapter, by Paul Chilton, studies the possible correlation between
6 the dorsal and ventral streams in visual processing, and spatial Language. The
7 author observes that ventral and dorsal stream can respectively represent ego-
8 centric (“self-centred”) and allocentric (“external”) representations of spatial
9 information. These perspectives appear to be realised in Language as well. For
10 instance, a scenario in which John breaks a vase can be represented via an active
11 sentence or a passive one (*John breaks a vase* vs. *the vase is broken by John*). Active
12 sentences appear to express a personal, egocentric perspective, while passive
13 sentences appear to express an allocentric (impersonal) one. The author shows
14 that, if this approach is on the right track, then several other linguistic phenom-
15 ena can be explained (e.g. counterfactual sentences).

16 Summing up, the topics covered by these chapters thus range on most, if
17 not all the most important themes about research on Spatial Cognition and Lan-
18 guage. Several merits of this collection of works can be highlighted, which offer
19 several good reasons to consider the book a necessary purchase for the scholar
20 interested in “Spatial research”. Three merits appear to be particularly important.

21 First, the book offers a remarkably interdisciplinary approach to the complex
22 topic of spatial representations, both in the range of discipline-specific discus-
23 sions (e.g. Linguistics, Psychology, Cognitive Neuroscience, Typology), and the
24 interdisciplinary approach that permeates all the chapters. Since the first chap-
25 ter, the topic of “Space” is discussed from several, interrelated perspectives; from
26 the most basic aspects of spatial perception and geometric representations, to the
27 most abstract forms of representation in Language. At the same time, it proposes
28 several works which touch topics that received relatively little attention in this
29 field of research. One important topic is how motion and “dynamic” spatial rela-
30 tions are expressed in language (Zlatev’s and Pourcel’s chapters). A second topic
31 is how spatial Language is expressed in Sign Languages and interacts with other
32 modalities of representation (e.g. gestures, Talmy’s and Mittelberg’s chapters). A
33 third important topic is how non-spatial aspects of meaning may be part of spa-
34 tial prepositions’ meaning (e.g. Zwarts’, Feist’s, Vandeloise’s, Carlson’s chapters).

35 Second, the role of experimental evidence in support of the views and theo-
36 retical proposals offered in the book appears to mark an important “empirical
37 shift” within Cognitive Linguistics. As recently discussed in Jing-Schmidt (2010),
38 past research in Cognitive Linguistics suffered to an extent of a dearth of experi-
39 mental support for the hypotheses put forward in this framework. Most, if not all
40 the chapters appear to offer a strong case for the importance of experimental find-

ings for Cognitive Linguistics theorising. So, they suggest that the discipline has found an empirical “maturity” in its methods of research. An important aspect is that several works offer distinct types of empirical evidence in support of their claims (e.g. Corpus studies, psycholinguistic experiments, neurophysiological evidence, cross-linguistic research). They also combine these methods into various blends of inter-disciplinary analysis. Thus, the book offers strong evidence that the marriage of Cognitive Linguistics and experimental methods is fruitful, and that it offers new and important avenues of Cognitive research.

Third, the general discussion of several key topics in the literature is always kept at a sober and objective level of analysis. One clear example is the discussion of the relation between Spatial Cognition and Language, which plays an important role in the important debate on (neo-)Whorfian hypotheses about Language and Thought. Chapters such as Landau’s, Carlson’s and Feist’s seem to be tipped slightly in favour of a more “universalist” perspective. Chapters such as Evans’, Casasanto’s and Talmy’s suggest that carefully thought neo-Whorfian hypotheses may find their justification from the discussion of the relevant data. Given the strong emphasis on empirical research, all authors who touch this topic tend to discuss in detail whether the data support either hypothesis. This suggests that the debate appears to be more complex, but also more fruitful, than it may seem at first glance. Therefore, these works offer a remarkably balanced discussion of the reasons that can be adduced to defend both sides of the debate, offering several sources of inspiration for further research on the argument.

One very minor criticism is that the book has a small formatting mistake. The chapters by Landau and associates, and Pourcel present their end notes after the references, whereas all other chapters correctly present the canonical order. Aside this small detail, the printed quality of the work is excellent.

In conclusion, the book represents an important addition to the ever-growing literature on spatial Cognition and Language, and appears to be critically successful in offering novel data and experimental methods on several topics within this important stream of research. At the same time, it offers many methodological innovations and suggestions that appear quite relevant to the field of Cognitive Linguistics at large. So, the book offers several arguments that interdisciplinary approaches are not only necessary, but also fruitful. The book appears to be a necessary reading for all scholars interested in this topic, and can be suggested to all Cognitive Linguists that want to discover the latest theoretical and experimental advances on spatial representations in Cognition and Language.

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