DOCTORAL THESIS

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Technology, Language and Thought:
Extensions of Meaning in the English Lexicon

Marlene Johansson Falck

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Linguistics in the Midnight Sun

Marlene Johansson Falck

Technology, Language, and Thought
- Extensions of Meaning in the English Lexicon

Abstract

In this thesis, the relationship between technological innovation and the development of language and thought is analysed. For this purpose, three different fields of technology are investigated: 1) the steam engine, 2) electricity, and 3) motor vehicles, roads and ways. They have all either played an extremely important part in people's lives, or they are still essential to us. The overall aim is to find out in what ways these inventions and discoveries have helped people to develop abstract thinking and given speakers of English new possibilities to express themselves. Questions being asked are a) if the correlations in experience between the inventions and other domains have motivated new conceptual mappings? b) if the experiences that they provide people with may be used to re-experience certain conceptual mappings, and hence make them more deeply entrenched in people's minds? and c) if the uses of them as cognitive tools have resulted in meaning extension in the English lexicon?

The study is based on metaphoric and metonymic phrases collected from a number of different dictionaries. In the material a large number of metaphorical and metonymic expressions including terms connected to the inventions and discoveries that are part of this thesis are found. As is clear from the expressions, the steam engine, electricity, motor vehicles, roads and ways have all provided us with ample tools for structuring our thoughts, and for conveying our thoughts to others. Primarily, it seems to be the different functions of the discoveries and inventions, or the effects that they have on other objects that have motivated the mappings. In addition to analysing the cognitive role of the inventions that are part of this thesis, some general conclusions concerning the relationship between language, thought and world are suggested.

Marlene Johansson Falck

Technology, Language and Thought –
Extensions of Meaning in the English Lexicon

To Markus, Arvin, Hilda and Hanna

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Acknowledgements

IF A PURPOSEFUL ACTIVITY IS A JOURNEY, WRITING A THESIS IS SAILING AROUND THE WORLD IN A RATHER SMALL BOAT. To me, the sailor, the journey has been fascinating, demanding and time-consuming at the same time. To the people around me, however, it has primarily been something that has occupied my time or something that I have needed assistance with. I gratefully acknowledge the help and encouragement of a large number of people, who have all, in one way or another, contributed to the fulfilment of this thesis.

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CHAPTER 1. INTRODUCTION

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1.1. Technology, language and thought

In this thesis, written within the framework of cognitive linguistics, the cognitive or "defining function" (see Sundin 1991:75-83, see also Bolter 1984:8-42) of the steam engine, electricity, motor vehicles, roads and ways is analysed. The aim is to find out in what ways these inventions and discoveries have helped people to structure their thoughts and given speakers of English new possibilities to express themselves[1]. Questions being asked are a) if the correlations in experience between the inventions and other domains have motivated new conceptual mappings? b) if the experiences that they provide people with may be used to make certain conceptual mappings more deeply entrenched[2]? and c) if their use as cognitive tools has resulted in meaning extension in the English lexicon[3]?

   The study is important because it focuses on the use of objects around us as tools for working with experience, and hence for developing language. That being the case, it highlights the relationship between the structure of the world and the structure of our thoughts.

   In 1980, a number of important claims were made by Lakoff and Johnson. First, they argued that "most of our normal conceptual system is metaphorically structured; that is, most concepts are partially understood in terms of other concepts" (1980:56), and "human *thought processes* are largely metaphorical" (1980:6). Second, they claimed that conceptual metaphors are grounded in our experience (1980:19). Third, they put forward the view that metaphors are neither random nor isolated from one another but part of a whole system of

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[1] Cf. Kranzberg (1989:254-255).
[2] According to Langacker "the occurrence of psychological events leaves some kind of trace that facilitates their re-occurrence" (2000:93). Through repetition, even highly complex events may be routinised and automatised. That being the case, they become more deeply entrenched in people's minds and may be more easily elicited and more reliably executed.
[3] On the cognitive view, metaphorical and metonymic mappings "are means of extending the resources of a language" (Ungerer & Schmid 1996:128). Accordingly, the use of the inventions and discoveries that are the subject of this thesis as tools for working with experiences is related to their function as source domains or scaffoldings for metaphorical mappings.

conceptual metaphors (see e.g. 1980:7-9). In the wake of their pioneering work a multitude of conceptual metaphor studies have been made. The majority of these have tended to focus on the coherent way in which the system of conceptual metaphor is structured rather than on the experiential bases of the system.

In this thesis, an attempt will be made to pay attention both to the structure of conceptual mappings **and** to their experiential bases. The latter deserve attention because a system that is not innate (see e.g. Lakoff and Johnson 1980:56-57, and Kövecses 2002:69) can never "pre-exist"[4] (Gibbs 1999:146) in the heads of individual people, and ought not to be treated simply as a completed entity possessed by each individual speaker of a language. By necessity, it is the kind of system that is constantly being built up by individual speakers as they interact with the world they live in. Through this interaction, rising generations are provided with means for acquiring conventional conceptual structures that they are not yet familiar with. Hence they are able to understand the codifications in language of conceptual mappings made by earlier generations. Moreover, experiences gained by means of body-world interaction also make it possible for us to structure our thoughts in new ways. Like conventional conceptual structures, changes in the way in which we structure our thoughts are also evident from language. If language reflects the way in which we think and language is constantly changing, then conceptual structures, which are reflected in language, must constantly be under reconstruction too.

On the view adopted here, metaphor is "an emergent property of body-world interactions" (see also Steen and Gibbs 1999:2-4):

> The inseparability of mind, body, and world, and of cognitive and cultural models, points to the important idea that metaphor is an emergent property of body-world interactions, rather than arising purely from the heads of individual people. We need not talk of metaphor as only part of our mental representations for concepts (e.g., anger), or as expressed by language (e.g., She bursted [*sic.*] with anger). Metaphor is a kind of tool that arises from body-world interactions which we can "re-experience" in an embodied way, and is not simply accessed from long-term memory, in different ways in different real-world situations. As Kirmayer (1992:335) phrased it: "metaphors are tools for working with experience. (Gibbs 1999:156)

Spatial relations, our own bodies, codified aspects of language, man-made objects such as pictorial advertisements, art works, media images, tools and products etc. are probably continuously made use of in cognition processes. Since external objects provide us with structure we need not rely purely on an internalised system of conceptual metaphor. By using them as scaffoldings for

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[4] That is, "pre-exist as independent entities in long-term memory". (Gibbs 1999:146)

conceptual structure we may both routinise or automise (see Langacker 2000:93) conceptual structures and understand concepts in new ways.

In fact, the coherent way in which metaphors are organised substantiates the view that the conceptual system borrows its structure from things in the world. Because the system of conceptual metaphorical structures as described in different studies is both remarkably systematic and coherent, yet grounded in the experiences of a whole community of individual speakers, it is not very likely that it has arisen purely from the heads of these individuals once they have obtained a certain amount of input. A possible explanation of the coherent way in which metaphors are structured is that the system borrows its structure from the structure of the world, from the way entities in it work and relate to other entities, from the physical laws governing it etc., in short, from entities and relations that have the same structure no matter what individual speaker is observing it.

1.2. Why technological metaphors?

In order to learn more about the relationship between the structure of the world and the structure of language and thought, the interplay between certain technological innovations and discoveries, and the development of language and thought will be studied here. Like other entities or substances, the technological innovations and discoveries that are part of this study, that is, the steam engine, electricity and motor vehicles, roads and ways seem to be very useful scaffoldings for conceptual structure. They make it possible for us to see what is otherwise too abstract to be pictured, refer to what is otherwise too abstract to be referred to, categorise what is otherwise too abstract to be categorised, and reason about what is otherwise too abstract to be reasoned about (see Lakoff & Johnson 1980:25). Even though the technological innovations and discoveries discussed here make up a very small number of all the external representations that play an indispensable cognitive role, the relationship between this small fragment of the structure of the world and the structure of our thoughts seems to be particularly interesting.

First, they seem to be particularly apt source domains because they benefit from the fact that they have all, at some point, served many important, often crucial functions to us and thereby had a great impact on our lives. Because of their high degree of functionality and this great impact, people have tended to interact with them quite a lot and become very familiar with them. Because functional things that we consider important, frequently interact with and are

very familiar with provide us with a very familiar structure, they are good reference points (see Kövecses and Radden 1998:65). Hence they are extremely useful in metaphorical mappings, which typically build on our common knowledge and involve understanding the unfamiliar by means of the familiar. In Kövecses and Radden's terminology (1998:64-71), it would be possible to say that they are all particularly apt source domains because when it comes to perceptual selectivity we tend to choose according to the following cognitive principles (see Kövecses and Radden 1998:64-71):

FUNCTIONAL OVER NON-FUNCTIONAL
INTERACTIONAL OVER NON-INTERACTIONAL
IMPORTANT OVER LESS IMPORTANT

Furthermore, like the popular use of the works of a mechanical clock as a model of what our world was like during the 16th and 17th centuries (see Sundin 1991:111-112), the innovations and discoveries that are the subject of this thesis seem useful cognitive tools because they are involved in quite complex processes and thereby serve as good reference points for various kinds of relationships. According to Sundin (1991:76) technology, through its defining function, supplies our thoughts, "philosophy and science with metaphors, pictures, examples, models and symbols [---] [whereby it] shapes human thought in certain ways and colours [our] conception of the world" [my translation].

> Genom att förse filosofi och vetenskap med metaforer, bilder, exempel, modeller och symboler stöper den definierande tekniken det mänskliga tänkandet i bestämda former och färgar hennes världsbild (Sundin 1991:76).

Similarly, Bolter (1984:10) argues:

> Continually, redrawing the line that divides nature and culture, men have always been inclined to explain the former in terms of the latter, to examine the world of nature through the lens of their own created environment. [---] It is certainly not true that changing technology is solely responsible for mankind's changing views of nature, but clearly the technology of any age provides an attractive window through which thinkers can view both their physical and metaphysical worlds.

Second, the innovations and discoveries studied here are interesting target domains because they once represented something complex, new and abstract. That being the case, the mappings in which they are involved suggest the creative ways in which we proceed when we want to make sense of unfamiliar complex experiences. When the steam engine and the different applications of electricity

and motor vehicles first saw the light of day, they represented something that was strikingly new, strange and complex. Similarly, traffic systems of more modern times make up complex patterns. In one way or another, scientists had to turn their experiences of the inventions and discoveries into experiences that had a concrete and delineated structure, both to themselves and to ordinary people. Ordinary people also had to find a way to understand the inventions and discoveries. Words and phrases that have come to be associated with the steam engine, electricity, or motor vehicles, roads and ways through metaphorical or metonymic mappings are studied since they may give us clues as to what strategies people used in order to accomplish this. Metaphorical or metonymic expressions involving the inventions and discoveries as target domains, however, are not the main focus of this thesis.

1.3. Aims

As indicated in the previous section the overall aim of this thesis is to study the relationship between technological innovation on the one hand, and the development of language and thought on the other.

Primarily, the work is oriented towards investigating in what ways the technological inventions and discoveries studied here have enriched the language and thoughts of people not necessarily familiar with technological jargon. However, terms and expressions that were used to signify other entities before they became associated with the inventions and discoveries of this investigation are also analysed. The following questions are addressed:

- What source domains are involved when people structure their experiences of technological inventions and discoveries?
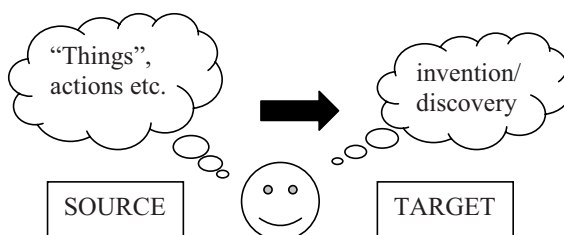
Figure 1. The use of various source domains to conceptualise technological inventions or discoveries.

- If technology may be used to develop abstract thinking, what precisely have these inventions and discoveries helped us to understand? That is, what novel conceptual mappings have the correlations in experience between the inventions and discoveries and different target domains motivated?
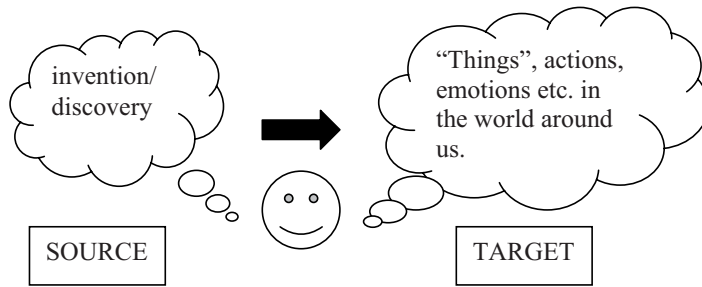
Figure 2. The use of inventions or discoveries to understand various target domains in new ways.

- To what extent is it possible to use them to re-motivate internalised mental structures and make conventional metaphorical structures more deeply entrenched in our minds? That is, in what ways may they be used as scaffoldings for conventional conceptual structures?
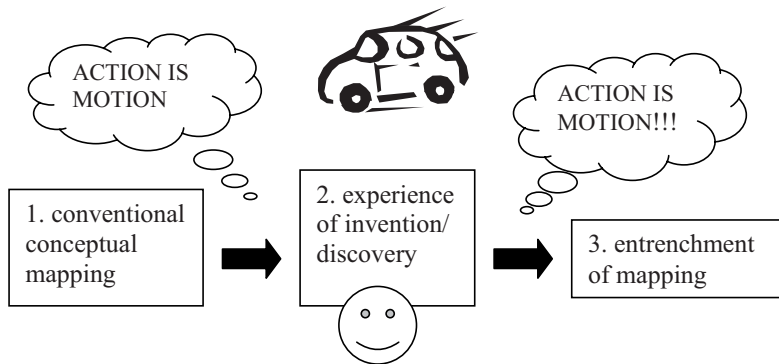
Figure 3. Entrenchment of conceptual mapping by means of technological discoveries or inventions.

As implied above, the focus of this thesis is somewhat different from most other studies of metaphorical expressions reflecting the use of technological

innovations or discoveries as source domains or scaffoldings for conceptual structure. In contrast to these, this investigation does not incidentally mention metaphorical expressions originating from the domain of technological innovation while dealing with the conceptualisation of various target domains[5], nor is it restricted to the use of a certain domain of technology, e.g. the computer, to conceptualise a certain target domain, e.g. the human brain[6]. In the present study, a survey is made of metaphorical expressions involving the inventions and discoveries studied here as source domains no matter what target domains are involved. Metaphorically speaking, technological innovations and discoveries are here at the hub of the entire investigation. They are the entities that motivate the choice of words and phrases, and hence only expressions associated with them are discussed. The study of the interplay between technological innovations and language and thought is considered to be a study of the interaction between our conceptual system and our continuous on-going contact with the world. The focus on the use of inventions and discoveries as source domains is thus intended to highlight the cognitive function of technological innovations, and external objects at large. In other words, it should be seen as a study of the way in which technological innovations, by functioning as scaffoldings and source domains for metaphorical mappings, help us to structure our thoughts and our language.

The purpose of the study of what source domains are involved when people structure their experiences of the inventions and discoveries is intended to serve as a background to the study of the use of them as source domains. This part of the study is similar to the fairly large number of studies dealing with scientific metaphors[7].

1.4. Method and material

First, a number of dictionaries have been consulted in order to collect a) metaphorical or metonymic expressions used to refer to the innovations or discoveries dealt with in this study, or to concepts related to them, and b)

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[5] The following metaphorical expressions are from Lakoff (1987:385) and Kövecses (1986:11) and their discussion of the way in which ANGER is conceptualised. *She got all steamed up, Billy's just blowing off steam, When I told him, he just exploded, She blew up at me, I blew a fuse* and *She's on a short fuse.* (Lakoff 1987:385, my italics) *Watch out! He's on a short fuse, He's just letting off steam,* and *When I told him, he blew up.* (Kövecses 1986:11, my italics).
[6] see e.g. Bolter 1984
[7] Until today quite a few studies discussing the role of conceptual metaphors in science have been written. An example would be Gentner & Gentner (1983:99-129), Pulaczewska (1999) another.

expressions originating from the world of technology but used metaphorically to refer to, or describe other domains. Occasionally, metonymic expressions are discussed and also sense developments due to referential extension. The following dictionaries have been used:

The Oxford Dictionary of New Words (1997) (*ODNW*)
20th Century Words (1999) (*20th CW*)
the *Oxford English Dictionary* on CD-ROM (2002) (*OED*)
The Barnhart Dictionary of Etymology (1988) (*Barn)*
the *Merriam-Webster Collegiate Dictionary* (2002) (*MWCD*)
the *Cambridge International Dictionary of English* (2001) (*CIDE*)

Naturally, it is not possible to discuss all the words and phrases associated with the steam engine, electricity, motor vehicles, roads and ways in an investigation of this size. The choice of words and phrases reflects the process of collecting them and does not fully cover the subject. Because the focus is on the way in which certain technological inventions have enriched the language and thoughts of people not necessarily familiar with technological jargon, words and phrases from the *ODNW* and the *20th CW* have been collected first. Both these dictionaries contain words that have found their way into the language of their time and have become part of the common ground of a great number of people. In the former dictionary, we find words that gained ground during the 20th century and in the latter, words that did so some time between the 1980s and the mid-1990s. The two dictionaries were searched from cover to cover and preliminary lists of words and expressions compiled. Initially, all the words that are connected with the different fields of technology were collected irrespective of whether their senses seemed to be the result of conceptual mappings or not. Subsequently, the preliminary lists of words and expressions were supplemented with information from the corresponding entries in the *OED, Barn., MWCD,* and *CIDE.* Because both the *ODNW* and the *20th CW* contain fairly modern words, *the OED* and occasionally *Barn.* were used in order to cover the earlier days of the inventions. The information in these dictionaries was then supplemented by consulting an American on-line dictionary, the *MWCD*, and a British one, the *CIDE*. As other words and phrases related to the inventions and discoveries were found under the different entries, these were also added to the list.

As previously mentioned, the points of departure are the inventions and discoveries, that is, the steam engine, electricity and motor vehicles, roads and ways. Because these correspond to three different fields of technology, three

different lists of words and phrases have been compiled, one for each field. The first contains words and phrases connected with the steam engine, the second words and phrases connected with electricity, and the third, words and phrases connected with motor vehicles, roads and ways.

Since the focus of this thesis is on **what kinds of** experiences have been conceptualised by means of mappings from these domains, it does not investigate **how often** the expressions reflecting these mappings are used today. The study is diachronic rather than synchronic, and metaphorical and metonymic expressions from the early days of the inventions and discoveries are discussed as well as expressions that are still in use. No claims about frequency are made.

1.5. Influential works

Among the great number of works within the framework of cognitive linguistics, those by Langacker, Lakoff & Johnson, Gibbs, Kövecses & Radden, and Turner & Fauconnier have been important for shaping the theoretical platform of this thesis. First and foremost, if not explicitly stated in the analytical chapters, the view of language and thought adopted here is essentially in line with Langacker's. In particular a series of lectures given by him in Lublin, Poland in May 2001 have been important for shaping my conception of language. Second, the view of the way our conceptual system is grounded, the systematic way in which we organise metaphors, and last but not least, the indispensable cognitive role they play is primarily a product of reading Lakoff and Johnson's seminal work *Metaphors we Live By* but also Lakoff's *Women, Fire and Dangerous Things: What Categories reveal about the Mind*. Third, the view of the role of figurative language in relation to literal language as accounted for in chapter 2 more or less follows Gibbs' ideas presented in *The Poetics of Mind. Figurative Thought, Language, and Understanding*. His work also provides references to psycholinguistic studies substantiating these ideas. Additionally, Gibbs' (1999) distributed view of conceptual metaphors may be seen as a theoretical bridge between technological inventions and metaphors in line with the view adhered to here, in other words, the view that they are indispensable cognitive tools that help us to structure our thoughts in new ways and to make certain conceptual mappings more entrenched. Finally, Kövecses and Radden's (1998) view of *metonymies*, and to some extent Fauconnier's view of *mental spaces* (1994), and Fauconnier and Turner's theory of *conceptual integration* (e.g. 1999, Turner and Fauconnier 2000) are important for taking this study from innovation to thought, to language, and back again. The interplay between technological developments

and the development of language and thought is considered to occur in a mental setting where language not only reflects meaning but also "guides" (see Lakoff and Sweetser 1994:XXII) it through the activation of mental spaces (see Fauconnier 1994:16)[8].

1.6. Orthographic conventions

Linguistic forms	Italics: *steam*
Meanings of linguistic forms	'vapour'
References to real-world entities	Ordinary words: steam engine
Quotations	Double quotes: "…….."
Emphasis	bold face: **steam engine**
Cognitive domains, (or parts of cognitive domains)	Small caps: ANGER
Cognitive metaphors	Small caps: ANGER IS HEAT
Cognitive metonymy	Small caps: LOCATION OF ACTION FOR ACTION

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[8] To quote Fauconnier (1997:37), "[a] language expression E does not have a meaning in itself; rather, it has a meaning **potential**" (my emphasis).

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CHAPTER 2. THEORETICAL BACKGROUND

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2.1. Metaphor

2.1.1. Introductory

Ever since Aristotle (*Poetics*, transl. Butcher 1951:77-78) back in the 4th century B.C. defined metaphor as "the application of an alien name by transference either from genus to species, or from species to genus, or from species to species, or by analogy, that is, proportion" a multitude of studies have been made in order to define the nature and functions of metaphors. The earlier traditional ones tend to be consistent with Aristotle's ideas. They have influenced not only traditionalists for a very long period of time but also, occasionally, theorists of completely different persuasions. The more recent ones generally follow the almost diametrically opposed cognitive view. This is the view adopted here, and it forms the platform for my thesis. In the following, the differences between the two views will be briefly discussed.

First, there is a fundamental difference in the definition of the term *metaphor*. To traditionalists, metaphors are linguistic expressions that refer to concepts they do not refer to in their 'normal' literal sense. Cognitive theorists, by contrast, consider metaphors to be conceptual mappings between domains, which in turn, give rise to linguistic metaphorical expressions. In addition to differing in their view of metaphor, and the mechanisms governing metaphor processing, the two schools differ also in their view of language.

Of the major models proposed so far in order to explain more fully the mechanism behind metaphor processing, that is, the *substitution theory, the comparison theory, the interaction theory* and *the conceptual theory,* the former two are here considered to be traditional, and the latter two cognitive. The substitution and comparison theories share the view of metaphor and language that will be described in section 2.1.2. They both claim that the sentence is the locus of metaphor. In essence, the only difference between the theories is that in the substitution theory, the sentence substitutes for a literal sentence and in the comparison theory, it is based on some underlying analogy or similarity in the form of a condensed or elliptical simile. According to Black (1962:35), *the comparison theory* may be seen as a "special case of the substitution view".

The latter two theories, *the conceptual theory* and *the interaction theory,* are not fully compatible but share the fundamental view of metaphor as a cognitive instrument. In 2.1.3. some further points of similarity will be discussed. Interestingly enough, the interaction theory introduced cognitive ideas (see. Black e.g. 1962:46, 1979:21, 37) before the conceptual theory as developed by Lakoff and Johnson entered the linguistic scene in 1980.

2.1.2. The traditional view of literal and metaphorical meaning

As implied above, scholars have traditionally claimed that metaphoric transfer takes place at the level of words, not sentences, and that metaphors are ornamental devices deviant from literal language. Quite in line with the ancient Greek philosopher's ideas, but contrary to the view adhered to in this study, they argue that the meanings of sentences, on the one hand, "are entirely determined by the meanings of their component words (or morphemes) and the syntactical rules according to which these elements are combined" (Gibbs 1994:60, cf. Fodor & Katz 1964:493, Lyons 1977b:548). Individual words, on the other hand, can be specified objectively and definitely. Each word is either considered to have a "set of properties or attributes that is critical for defining the class of objects that satisfies its description in the real world" (Gibbs 1994:28[9], cf. Fodor & Katz 1964:35) or, as one version of this container view of language argues, it is possible to identify the meaning of a particular word only by identifying its referent. Words whose meaning does not match their referents, that is, words that are used figuratively, are regarded as aberrations and should be kept apart from literal language because of their heavy reliance on pragmatic matters such as encyclopaedic information, facts based on general knowledge, beliefs about words, context and word users. Accordingly, literal language, which is intimately connected with notions of exactness, explicitness and truth (see Searle 1993:87), can and should be defined by semantic criteria only (see Fodor & Katz 1964:200). Only linguistic information should be included as part of the speakers' internal knowledge of their language. Sentences mean what the individual words mean literally, nothing more, and nothing less (see Searle 1993:84). While linguistic expressions are considered to have literal interpretations, metaphorical meanings are regarded as being additional to these. Metaphors are a matter of language, not thought and they violate communicative norms (see e.g. Levinson 1983:156-157, Searle 1993:103).

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[9] See Lyons (1977a: 317-335) for a discussion of *componential analysis*.

2.1.3. The interaction theory

In sharp contrast to the traditionalists, Max Black, who had found that metaphors may actually create new knowledge and insight, in the early 1960's presented a view of metaphors as indispensable tools for language users. In doing so, he was the first linguist to attribute metaphors a certain cachet. He claimed that most metaphors neither "substitute for a formal comparison" (Black 1962:37) nor any other kind of literal statement but may, in sharp contrast, *create* similarity. Only exceptional "trivial cases" (Black 1962:45) of metaphor can be substituted by literal language. On his view, a metaphorical statement consists of two subjects, a "principal" and a "subsidiary" one (Black 1962:44). It is only through the interaction of these two distinct subjects, which should be regarded as "systems of things" rather than "things", that certain things can be understood. When the distinct subjects interact, the metaphor operates by applying to the "principal subject" a system of associated implications" that normally applies to the subsidiary subject. Thereby, "the metaphor selects, emphasizes, suppresses, and organizes features of the principal subject" in such a way that new things can be understood. In the quotation below, Black explains how we are able to understand the 'principal subject' *battle* in a completely new way by applying features of the 'subsidiary subject' *game of chess*:

> The enforced choice of the chess vocabulary will lead some aspects of the battle to be emphasized, others to be neglected, and all to be organized in a way that would cause much more strain in other modes of description. The chess vocabulary filters and transforms: it not only selects, it brings forward aspects of the battle that might not be seen at all through another medium. (Stars that cannot be seen at all, except through telescopes.)
> (Black 1962:42)

Black thus presented ideas as early as the nineteen-sixties that could have been seen as the seeds of other cognitive metaphor theories (see 2.1.4). Not only is his recognition of the indispensability of metaphors as tools for creating new insight consistent with a cognitive theory of metaphor. His view that metaphors operate by applying to the "principal subject" a system of associated implications" that normally apply to the "subsidiary subject" is similar to Lakoff and Johnson's claim that metaphorical concepts are "ways of partially structuring one experience in terms of another" (Lakoff & Johnson 1980:77). His idea that a metaphor may select, emphasize, suppress, and organize features is also brought up in Lakoff & Johnson (e.g. 1980:10, 149, 152) as is Black's much-debated claim that metaphors may create similarity (Lakoff & Johnson 1980:147-155). In fact, having recognised the "distinctive capacities and achievements" (Black 1962:37) of metaphorical statements, that is, that metaphors function as

"cognitive instruments" (Black 1979:39), he explicitly argues in favour of a cognitive view of metaphor in 1979:

> My interest in this paper is particularly directed toward the "cognitive aspects" of certain metaphors, whether in science, philosophy, theology, or ordinary life, and their power to present in a distinctive and irreplaceable way, insight into "how things are". (Black 1979:21)

In addition to arguing that "metaphorical thought" (Black 1979:32) is an important topic that deserves much more attention than it had previously received, his dismissal of the claim that metaphor can be defined as "saying one thing and meaning another" (Black 1962:32) is also consistent with cognitive theories of metaphor. The same is true of his dismissal of the following claims (see Black 1979:19-43):

a) Metaphorical utterances are literal.
b) Metaphorical statements have truth values.
c) Conceptual boundaries are rigid.
d) Using metaphors equals violating rules.

The differences between the interaction theory and the conceptual theory are found on a more practical level. An example would be his claim that metaphors are "bidirectional in the way their domains interact" (Gibbs 1994:239), which he presented in a modification of his view of metaphor operation in 1979 (Black 1979:28-29):

> In the context of a particular metaphorical statement, the two subjects "interact" in the following ways: (a) the presence of the primary subject incites the hearer to select some of the secondary subject's properties; and (b) invites him to construct a parallel implication-complex that can fit the primary subject; and (c) reciprocally induces parallel changes in the secondary subject. (Black 1979:29)

This claim is one of the more controversial issues in his way of treating metaphor. It has been met with valid criticism from many cognitive scholars. As Gibbs (1994) argues, the claim that "the topic and vehicle terms in metaphor cause reciprocal changes in meaning" (Gibbs, 1994:238) must be dismissed on the grounds of the different roles that topics and vehicles play in metaphor comprehension (see Gibbs, 1994:239) and because the meaning of the topic typically changes more significantly than the meaning of the vehicle[10]:

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[10] In this thesis, *vehicle* is defined as a conceptual entity that "provides mental access to another conceptual entity." (Kövecses and Radden 1998:39).

Following the given-new convention governing conversation, people assume that first the topic is given and that the purpose of the vehicle is to say something about the topic; thus the asymmetrical weight given each of these "systems" (Gibbs, 1994:239)

2.1.4. The conceptual theory

In 1980, Lakoff and Johnson with their seminal work *Metaphors We Live By* brought about a fundamental change in the view of metaphor for a great number of theorists, which resulted in an avalanche of literature on the subject. They developed the notion of the metaphor as a cognitive tool, that is, ideas that had formerly been briefly touched on by e.g. Black, but also developed by Reddy (1979), into a comprehensive theory. From their work on, a great number of metaphor theorists adopted a view of metaphor as fundamental to both language, thought and the way we perceive, think and act. On this *cognitive*, *conceptual* or, "*contemporary* "(see Lakoff 1993:202-251) view, metaphors, are "ways of partially structuring one experience in terms of another" (Lakoff & Johnson 1980:77) or "understanding and experiencing one kind of thing in terms of another" (Lakoff & Johnson 1980:5). In structuring our experiences, metaphors form "a major and indispensable part of our ordinary, conventional way of conceptualising the world". They may be the key to giving us an adequate account of understanding.

From Reddy, Lakoff and Johnson had learnt that speakers of English tend to conceptualise communication systematically as a conduit, which transfers thoughts bodily from one person to another. As in sentences (1) – (4) below, the conduit metaphor allows us to conceive of writing and speaking as placing internal thoughts or feelings within the external signals of the language:

> (1) Whenever you have a good *idea* practice *capturing it in words*.
> (2) You have to put each *concept into words* very carefully.
> (3) Try to *pack* more *thoughts into* fewer words.
> (4) Don't *force* your *meanings into* the wrong *words*.
> (Reddy 1979:287, ex: 4, 5, 6 & 8)

Influenced, as Lakoff and Johnson were (see Lakoff 1993:204) by the result of Michael Reddy's thorough analysis of the metalanguage of English accounted for in the essay 'The Conduit Metaphor' (Reddy 1979), they found that "metaphor is primarily conceptual, conventional and part of the ordinary system of thought and language" (Lakoff 1993:203) and that "everyday behavior reflects our metaphorical understanding of experience" (Lakoff 1993:204). In their study of the English language (1980) they found a very large number of conceptual metaphors that serve the purpose of structuring our experiences. They seemed to

be part of a huge and coherent system rather than a number of isolated and random cases.

They appeared to be organised in hierarchical structures in which "lower" mappings in the hierarchy inherit the structures of "higher" mappings. For example, subcases of events in life inherit the structure of events in general (see Lakoff 1993:222-225):

> Level 1. The event structure metaphor
> Level 2. A PURPOSEFUL LIFE IS A JOURNEY
> Level 3. LOVE IS A JOURNEY; A CAREER IS A JOURNEY
> (Lakoff 1993:222)

Moreover, they found that the coherent structure of the system originates from the experiential bases of the metaphors, that is, from the fact that conceptual metaphors are all grounded in our physical and cultural experiences.

In their view, concepts that occur in metaphorical definitions correspond to the most basic domains of experience, that is, those that are the products of human nature, our interactions with our physical environment and our interactions with other people within our culture, in short, "concepts that we live by in the most fundamental way" (Lakoff and Johnson 1980:57).

The structure of *spatial* or *orientational concepts* emerges from our constant interaction with the physical environment. More specifically, it originates from our experiences of basic spatial relations like *up-down*, *front-back,* and *near-far*.

> (5) I'm feeling *up*.
> (6) My spirits *rose*.
> (7) You're in *high* spirits.
>   (Lakoff & Johnson 1980:15)

Ontological metaphors, are based on our experiences of physical objects and in particular our own bodies and the way "we experience ourselves as entities separate from the rest of the world – as containers with an inside and an outside" (Lakoff & Johnson 1980:58). They facilitate conceptualisation by providing ways of viewing events, activities, emotions, ideas, etc. as entities and substances:

> (8) *Halfway into* the race, I ran out of energy.
> (9) He's *out of* the race now.
>   (Lakoff & Johnson 1980:31)

Personification metaphors, which are a special kind of ontological metaphors, help us to comprehend a wide variety of experiences in terms of human motivations, characteristics, and activities. As reflected in sentences (10) - (12)

below, they emerge when we impute human qualities to things that are not human.

> (10) *This fact argues* against the standard theories.
> (11) *Life has cheated* me.
> (12) *Inflation is eating up* our profits.
>   (Lakoff & Johnson 1980:33)

In addition to *orientational* and *ontological metaphors*, which are based on simple physical concepts, there are *structural metaphors*, which are based on systematic correspondences within our experiences. They allow us to orient, refer to, or quantify abstract concepts in terms of concrete ones. Typically, they use one highly structured and clearly delineated concept to structure another less clearly delineated concept. They thereby influence both our experience and our actions. In the metaphorical expressions below, RATIONAL ARGUMENT IS structured in the same way as WAR.

> (13) He *attacked every weak point* in my argument.
> (14) I *demolished* his argument.
> (15) He *shot down* all of my arguments.
>   (Lakoff & Johnson 1980:4)

We may thus understand things that are new to us by using our physical and cultural environment. It makes our experience coherent. When a concept fits an experience we see a correlation, dimension by dimension, between the concept and the experience in question.

Experiential correlations may be of two different types, *experiential co-occurrence* or *experiential similarity*. The former is grounded in the co-occurrence of different types of experiences. An example is the way the MORE IS UP metaphor is grounded in the experiences *adding more of a substance* and *seeing the level of a substance rise*. The latter is grounded in the perception of a similarity between different experiences like the ones between *life* and *gamble* in the metaphor LIFE IS A GAMBLING GAME.

Simple concepts, which may be extended in various ways for various purposes, are often extended to form more complex concepts, *experiential gestalts*. These are multidimensional structures that consist of a cluster of components. Their dimensions range from directly emergent concepts to concepts that are structured almost entirely metaphorically. Experiential gestalts are more basic than their parts and may not be decomposed into ultimate primitives. Complex concepts may be analysed along the natural dimensions of

experience in more than one way. We normally understand holistically in terms of entire domains of experience rather than in terms of isolated concepts.

Because meaning is grounded in the experiences, values, feelings and intuitive insights of people, concepts and categories are open-ended and impossible to define rigidly. Meaning is always meaning to *somebody* and never independent. To adhere to this view of language and understanding means rejecting the objectivist view that the world is made up of well-defined objects, which have properties that exist independently of those who experience them. It also means rejecting the objectivist ideas that words have fixed meanings, which can be clearly and precisely defined and allow us to say things that are objectively, absolutely and unconditionally true. However, adhering to Lakoff and Johnson's view of language and understanding does not mean adopting the diametrically opposed subjectivist view either. Even though they reject the extremes of the objectivist view, and agree with the subjectivist view that meaning is always meaning to somebody, they do not think that concepts such as emotions, intuitive insight, imagination, humaneness alone can account for our understanding. Even our most imaginative understanding, they argue, is never completely unconstrained. Understanding is a matter both of imagination and of constructing coherence. It involves both reason and imagination. Imagination is necessary for metaphorical thought, and reason for categorisation, entailment and inference.

To summarise, on the experientialist cognitive account, understanding is given in terms of a conceptual system that involves both categorising and metaphorical entailment[11], that is, an imaginative form of rationality. Human conceptual systems are metaphorical in nature and involve imaginative understanding. By using metaphors we may comprehend partially what cannot be comprehended totally. Examples would be feelings and aesthetic experiences. The act of defining concepts emerges from our interactions with one another and with the world. Hence only interactional properties and the kind of similarities that are experienced by people are relevant to metaphor.

On Lakoff and Johnson's view, metaphors may create both similarities and realities. When we perceive similarities between different experiences, similarities are created. When we use imaginative, creative or novel metaphors,

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[11] Metaphorical entailments are discussed in Kövecses (2002:93-105). When "rich additional knowledge about a source is mapped onto a target we call it metaphorical entailment" (Kövecses 2002:94). The knowledge that we can stray from a path is additional knowledge of the concept of JOURNEY. When it is mapped onto a target it may help us to make sense of new features of the target domain. The mapping of the knowledge that we can stray from a path onto the target ARGUMENT "manifests itself in the metaphorical entailment that we can also "digress from" the line of an argument". It helps us to understand the target domain better.

which along with conventional metaphors make sense of our experience in providing coherent structure, highlighting some things and hiding others, we give concepts new meaning. Thereby, we bring about changes in our conceptual system and in the way we perceive the physical world.

Metaphors are not only pervasive in language, but are also fundamental to both thought and the way we act. Since metaphorical expressions are "direct linguistic instantiations of pre-existing conceptual mappings between conceptual domains" (Gibbs, 1994:251), they are no more difficult to understand than literal expressions. They provide the only means for us to structure our conceptual system.

2.1.5. Discussion

2.1.5.1. The locus of metaphor

The perhaps most fundamental difference between the traditional view and the cognitive view is their different views on the locus of metaphor[12].
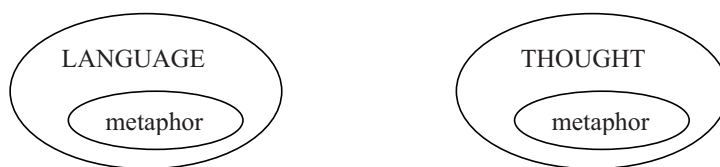
Figure 4. The locus of metaphor. On the traditional view, metaphors are located in language, and on the cognitive view, they are located in our thoughts.

Directly, or indirectly, the question whether metaphors are located in language or in thought is related to most other differences between the two schools. On the one hand, the view that metaphors are located in language, which contains words with fixed meanings, is connected with the idea that metaphors[13] are aberrations to 'normal' language. Sentences mean what the individual words mean literally, and metaphors[14] are used to refer to concepts that they do not 'normally' refer to. Hence literal language is prior to metaphorical language. On the other hand, the

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[12] A comparison between "constructivist" and "non-constructivist" views of metaphor, roughly cognitive and traditional views of metaphor, is made in Ortony (1993: 1-16). Lakoff and Johnson (1980:3-6) argue against a traditional view of metaphor and in favour of a cognitive one.
[13] The use of the term *metaphor* is intentional. It reflects the traditional view of metaphors as metaphorical expressions. In contrast to the cognitive view no distinction is made between metaphorical expressions and conceptual metaphor within this framework (see 2.1.1.).
[14] That is, metaphorical expressions. See footnote 15 above.

idea that metaphors are part of our thoughts is connected with the claim that they are indispensable tools for the structuring of our experiences.

According to some advocates of the traditional view, we are not really saying what we mean when using metaphors. To quote Searle, there is a difference between speaker meaning and sentence meaning.

> The problem of explaining how metaphors work is a special case of the general problem of explaining how speaker meaning and sentence or word meaning come apart. It is a special case, that is, of the problem of how it is possible to say one thing and mean something else, where one succeeds in communicating what one means even though both the speaker and the hearer know that the meanings of the words uttered by the speaker do not exactly and literally express what the speaker meant." (Searle 1993:83-84)

Goatly (1997:17), who adheres to one version of the comparison view, argues that there is a "gap" between speakers' thoughts and the propositions they express (see Sperber & Wilson (1995:231-232) to find a similar idea). He claims that only "[…].in the limiting absolutely literal case the proposition expressed will share all the semantic properties of the speaker's thought". Accordingly, when metaphorical language is used the gap between the proposition expressed and speakers' thoughts is larger:

> The larger the gap between the proposition expressed and the meaning intended, the more metaphorical the utterance will be. The smaller the gap the more literal the language use. (Goatly1997:15)

Very little, however, if nothing, substantiates the claims that metaphorical language originates from literal language, and that when using metaphorical language we are not really saying what we mean. It is true that there seems to be a gap between our thoughts and the linguistic utterances we make. Words do not directly correspond to our thoughts (see Sperber & Wilson 1995:232, Goatly 1997:17). "[M]eaning is a product of the interaction between linguistic forms and the minds of language users" (Lee 1992:27). Literal language, however, does not seem to be closer to our thoughts than metaphorical language. Language, whether literal or metaphorical, reflects our thoughts. When using language, we constantly strive towards lessening the gap between language and thought. Creative thinking and the "constant flow of new situations" (Lee 1992:27) that speakers of a language find themselves in engender constantly renewed needs for terms to express new meanings. This is as true of literal expressions as it is of metaphorical ones.

Indeed, it may be argued that the very idea of 'mapping' presupposes the existence of a source domain, which we designate by means of 'literal' language. However, even though metaphorical language consists of **terms** that were originally used literally, we are not dependent on literal language to map our experiences of one kind of thing onto another kind of thing. Rather than originating from a deviant use of literal language, metaphorical language reflects conceptual mappings. Hence the very idea of explaining metaphor processing by using 'normal' literal language as a basis is objectionable.

2.1.5.2. Language and thought

As is evident from the following quotations, Ferguson claims that we do not seem to be dependent on language to be able to think:

> Before a thing is made, it exists as an idea. The idea may be a clear vision or it may be little more than a glimpse of a possibility. (Ferguson 1992:3)

> Engineers learn a great deal during the process of design as they strive to clarify the visions in their minds and seek ways to bring indistinct elements into focus. (Ferguson 1992:3)

> If we are to understand the nature of engineering, we must appreciate this important although unnoticed mode of thought. It has been nonverbal thinking, by and large, that has fixed the outlines and filled in the details of our material surroundings. (Ferguson 1992:xi)

> Albert Einstein said that he rarely thought in words at all; his visual and "muscular" images had to be translated "laboriously" into conventional verbal and mathematical terms. (Ferguson 1992:45)

His position is favoured by our common experiences of sometimes not being able to **find the right words for our thoughts** or of not being able to **express what** we think. Language is thus not a prerequisite for our thoughts, but may be seen as a kind of toolbox, which we use for communicating our thoughts to others and for sharing our knowledge, beliefs and experiences with one another. It is the product of a dynamic interaction between speakers, minds and world with all that this implies (cf. Ortony 1993:6, Reddy 1993:186). According to Lee (1992:81), it is much more similar to "a catalyst in a chemical reaction" than to a vehicle that transfers meanings from speaker to addressee. In the same way as a "chemical reaction will not take place unless other substances besides the catalyst are present", communication will not succeed unless other "substances" besides the utterances are present. Factors such as the knowledge base of speakers, their different perspectives and positions, and other contextual factors "work themselves out" in language. Rather than being a secondary product of factors

internal to the language system, metaphor is the result of what goes on inside our heads:

> The locus of metaphor is not in language at all, but in the way we conceptualise one mental domain in terms of another. (Lakoff 1993:203)

When using metaphorical language we are thus neither using literal language in a deviant way nor breaking the rules of conversation. According to Gibbs (1994:435), experimental evidence clearly shows "that people need not recognize figurative utterances as violating communicative norms or maxims in order to understand what these expressions figuratively mean". Metaphorical language neither seems to be the result of algorithmic processes, nor should it be accounted for by "the rational account of metaphor understanding proposed by speech act theory" (Gibbs 1994:229). Cooper's (1986:33) claim that it is difficult to defend a view of metaphorical language as a deviation from semantic rules when communication obviously can happily proceed in violation of these rules seems justified.

2.1.5.3. Similar Processes

Not only is both literal and metaphorical language used for the purpose of communicating our thoughts to others, but the purpose is served in similar ways. Both literal and metaphorical language make use of a considerable degree of flexibility in the relationship between term and referent in order to meet the ever-changing contextual demands and to lessen the gap between language and thought. Both literal and metaphorical language operate by stretching the range of application of words that are already part of our vocabulary. Literal language tends to stretch its application to another concept within the same, or a similar category, and metaphorical language stretches its application to another domain. It seems likely that literal and metaphorical language often develop as a result of very similar mental processes. Sometimes the boundary-line between what is literal and what is metaphorical may be difficult to uphold:

> Our general conclusion will be that the distinction is often a matter of degree, and that literal language processing depends on, and has built into it, the same kinds of mental processes that we associate with metaphor. (Goatly 1997:14)

2.1.5.4. Literal and metaphorical language

As will be evident from the following, there are several findings favouring the view that literal language and metaphorical language are on an equal footing. Metaphorical meaning often reinforces and interferes with literal meaning (see

Gibbs 1994:102). Readers "of metaphor appear unable to ignore the figurative meanings of [literal] phrases even when instructed to focus exclusively on the literal meanings of sentences". Metaphors may be comprehended "as quickly as literal targets when preceded by longer story contexts" (Gibbs 1994:100). "[N]onliteral meanings of metaphorical statements can be determined automatically even in the absence of any special context favoring a figurative interpretation" (Gibbs 1994:101):

> We can conclude that understanding literal meaning is not an optional process that requires the triggering impetus of a defective literal meaning. There seems to be no general priority of the literal, and there is nothing optional about understanding the meanings of such fresh metaphors as "marriages are iceboxes," given an appropriate context. With respect to these broad issues, metaphor comprehension seems no different in principle from understanding utterances literally. (Glucksberg & Keysar 1993:406)

Furthermore, not even young children seem to prefer literal alternatives in language to metaphorical ones:

> The evidence from developmental psychology does not support the traditional idea that the ability to use and understand figurative language develops late. Instead, young children possess significant ability to think in figurative terms as long as they possess the domain-specific knowledge needed to solve problems and understand linguistic expressions. (Gibbs 1994:433)

The ubiquity of metaphor also substantiates the view that metaphorical language is "a direct, automatic, and natural reflection of the way people think, reason, and imagine" (Gibbs 1994:20) rather than the result of breaking the rules of communication or of 'normal' literal language.

> The overwhelming ubiquity of metaphor in language, thought, science, law, art, myth, and culture illustrates that metaphor is an integral part of human life. (Gibbs 1994:207, see also Lakoff & Johnson 1980:3)

Another reason why the traditional view of literal language as given needs revision is that not even literal terms can be precisely defined. Because language, literal or metaphorical, operates the way it does, the meanings of words are not fixed but constantly changed.

> [T]he diachronics of text production and interpretation introduce an indeterminacy and fuzziness into word-meanings, with the result that in co-text they may only approximate their decontextualized dictionary meanings. This textual play or instability with meanings both illustrates and suggests causes of the fuzziness of semantic concepts. (Goatly 1997:26)

If literal language is as fuzzy as metaphorical language and the meaning of many literal terms "have to be negotiated in the social context and according to the co-text" (Goatly 1997:23), there seems to be no motivation whatsoever for claiming that metaphorical language is inferior to literal language because metaphorical expressions refer to concepts they do not normally refer to. As is evident in language, fuzzy edges rather than fixed meaning "seem to be an intrinsic property of word meaning." (Aitchison 1994:47, see also Lee 1992:27), languages constantly change and polysemous words are extremely frequent:

> Most lexical items have a considerable array of interrelated senses, which define the range of their conventionally sanctioned usage. (Langacker 2002:2)

Not only words and categories have fuzzy edges, to each individual speaker of a language, each term, literal or metaphorical, will carry with it the history of all its past uses. Rather than having a specific limited literal meaning it "provid[es] access to indefinitely many conceptions and conceptual systems, which it evokes in a flexible, open-ended, context-dependent manner (Langacker 2000:4).

> A lexical item is not precisely the same in all its environments. Since elements are always shaped by the contexts in which they occur, it is only by abstracting away from the contextual variation that a constant representation emerges. (Langacker 2000:124)

2.1.5.5. Metaphor processing

Having once found that the system of conceptual metaphors reflected in language is both systematic and conventional with a highly fixed structure, cognitive linguists (e.g. Gibbs 1994:251, Lakoff 1993:227-228) have tended to focus on the conceptual system when explaining metaphor processing:

> Because it [i.e. the system] is conventional, it is used constantly and automatically, with neither effort nor awareness. Novel metaphor uses this system, and builds on it, but only rarely occurs independently of it. (Lakoff 1993: 227-228)

However, even though most metaphorical expressions indeed seem to reflect a whole system of conceptual metaphors that structures our thinking, reasoning, and understanding in a systematic way, the system neither influences "all aspects of how people understand idiomatic and conventional language" (Gibbs 1999:146) nor accounts for *all* aspects of metaphor processing (see Gibbs 1994:258). In addition to analysing the system, metaphor studies need to pay more attention to the way in which our ongoing contact with the world around us influences how we structure our thoughts and our language. Indeed, the very existence of image metaphors and completely novel metaphors in language and thought shows that metaphor processing is not motivated exclusively by an

internalised system of conceptual metaphor, even though both may easily be understood without the influence of "pre-existing conceptual metaphors" (Gibbs 1994:258, see also Gibbs 1994:260). Our continual contact with real-world source domains and scaffoldings for conceptual structure, and our continuous re-experiencing of metaphors as we conceptualise new situations also seem to be important.

> [C]onsciousness is the highest form of reflection of reality; it is, moreover, not given in advance, unchanging and passive, but shaped by activity and used by human beings to orient themselves to their environment, not only in adapting to conditions but in restructuring them. (Luria 1976:8)

When coming into contact with "public representations" (Gibbs 1999:160) of metaphors like the "natural kinds of experience" (Lakoff & Johnson 1980:117) emanating from our bodies, "our interactions with our physical environment" and "our interactions with other people within our culture", we may re-experience or even modify metaphors. Man-made objects such as pictorial advertisements, artworks, media images, tools and products may all be of use in the process. By way of example, once we have conceptualised ANGER as A HOT FLUID IN A CONTAINER (Lakoff 1993:241), we may, in addition to storing the mapping in our memories, re-experience the mapping or even modify it as we interact with the world around us. More specifically, this may be done whenever, having the 'container-like' bodies we have, we experience anger again, or whenever people or objects in our surroundings behave in a similar way to people who are angry. "Furiously" boiling saucepans *flipping their lids* and steam engines *letting off steam* are but two external objects out of many that may help us to re-experience the mapping. In functioning as scaffoldings for metaphors, objects like these serve an indispensable cognitive function. Embodied experience must not be seen only as an experiential *basis* for a set system. It is probably important **both** for the *grounding* of a coherent system of conceptual metaphors **and** for *continuously shaping* this system. Goatly (1997:28) claims that concepts are "constantly being adjusted by narrowing, widening or more wholesale classification". Rather than being static, mental representations seem to be dynamic scaffoldings constantly under construction.

External objects around us seem not only to refresh our memories, they also help us to understand concepts in new ways. Technological innovations, for example, which have the qualities of being concrete and tangible, of serving various distinct functions, and of being possible to manipulate in certain ways seem to be first-rate source domains or scaffoldings for new conceptual

mappings. According to Kranzberg (1989:254), technological development has been necessary for the development of abstract thinking[15]:

> The physical development of our species is apparently inextricably bound up with cultural developments, so that technology is classed as one of the earliest and most basic of human cultural characteristics, one helping to develop language and abstract thinking. Or, to put it another way, man could not have become Homo sapiens, "man the thinker", had he not at the same time been Homo faber, "man the maker." (Kranzberg 1989:254-255)

Technological artefacts that contribute something strikingly new or demonstrate very complex relationships seem to provide particularly excellent means for understanding concepts in new ways. Even though this area by no means has got a monopoly on providing the world with apt source domains and scaffoldings for conceptual structure, it is one that seems to have great "power to illuminate" (Black 1993:31). Technological artefacts are also apt for serving a cognitive function because they tend to be familiar to us. In being so they are deeply 'entrenched' in our minds, clear and distinct points of reference, and hence apt tools for metaphor processing. According to Gibbs (1994:134), language understanding, whether figurative or literal, is founded on the "common stock of experiences" of speakers. Technological inventions and discoveries, which are generally both popular and have a great impact on our lives, tend to become a living and activated part of the "common ground" (Gibbs 1994:135) of speakers fairly quickly and are hence very useful in cognition processes. An example would be the computer, which, as can be expected considering its importance, is an important source domain for theory constitutive metaphors[16] in cognitive psychology (see Boyd 1993:486) today.

Through the use of objects like technological innovations, speakers of a language thus extend not only their "shared [g]rounds", (Goatly 1997:160) but also their possibilities of making new successful conceptual cross-domain mappings. Since the conceptualisations surface also in language in the form of metaphorical expressions, innovations in the world around us indirectly enrich language too. In reverse order, the development of language thanks to

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[15] Cf. Luria (1976:10) who argues that it is our human social life that makes it possible for us to broaden the limits of our consciousness.

[16] In Boyd's (1993:486) definition *theory constitutive metaphors* are "metaphors which scientist use in expressing theoretical claims for which no adequate literal paraphrase is known." They are reflected by metaphorical expressions, which at least temporarily, constitute "an irreplaceable part of the linguistic machinery of a scientific theory" (Boyd 1993:486). In this thesis, no distinction is made between different kinds of metaphors, for example metaphors that are constitutive for popular models, and metaphors that are constitutive for scientific models (cf. Kuhn 1993:538:539). The distinction is not considered relevant for the purpose of this thesis.

technological development may develop our thoughts. The relationship between the "cognitive" and "social phenomenon" (Cienki 1999:190) called language and our thoughts seems to be a question of give and take. The more possibilities we have to "construe" (Langacker 2000:5) linguistic meaning, the smaller the gap between our thoughts and language is likely to be. The more intimate the relationship between our thoughts and our language, the more likely further developments in both thought and language will be. If cognitive models are like large computational webs extending far beyond the individual, "[…]one generation's realizations of a metaphor can become part of the next generation's experiential basis of metaphor" (Lakoff 1993:244).

Considering the constant interaction between body, mind, world, thought and language briefly accounted for above, Gibbs (1999:162) seems to be correct in arguing that cognitive models are like large "hybrid entities comprising brains, bodies, and a variety of cultural systems". He also seems to have made a point when claiming that metaphors are much more similar to cognitive "computational webs" extending far beyond the individual than pre-existing "cognitive models" possessed by individual speakers, which demonstrates once again the use of external objects to describe something less concrete. Because of the close relationship between language, thought and the world, we are practically unable to "ignore" our previous experiences and already acquired knowledge whenever experiencing new things. As shown by Basalla (1988, see also Bolter 1984:8-10), designers of new technology are practically unable to ignore old technology when inventing new things:

> Novel artifacts can only arise from antecedent artifacts – [---] new kinds of things are never pure creations of theory, ingenuity, or fancy. If technology is to evolve, then novelty must appear in the midst of the continuous. (Basalla 1988:vii-viii)

Not only are inventors or designers coloured by their past, so are all of us. When categorising artefacts around us, we constantly make use of our previous experiences. Without them, categorisation would not be possible. For example, in our minds a bird that we have never encountered before would not be a 'bird' if we were not leaning on our previous experiences of the concept 'bird'. As is evident from the following quotation, language functions in the same way:

> For the language speaker the concept or schema represented by a word carries in itself a history of all past uses, a history involving thousands of tiny adjustments or accommodations of that concept to an individual's experience of life and language. (Goatly 1997:29)

According to Lakoff & Johnson (1980:19) "no metaphor can ever be comprehended or even adequately represented independently of its experiential basis". The same seems to be true of literal language and of cognition in general. Presumably, it is precisely because of the ability of making use of our previous experiences, which in turn originate from body-world interaction, that we are able to make "our world 'thinkable'" (Lee 1992:69), in other words, thanks to our remarkable ability "to see resemblances" (Bolinger 1980:141) or "correspondences" (Lakoff 1993:245), to "perceive connections" (Black 1993:37), or "experiential similarities" "(Lakoff & Johnson 1980:154) or whatever we choose to call the ability that allows us to understand the unfamiliar in terms of the familiar.

> The perception of likeness makes our world 'thinkable'. It enables us to adapt both conceptually and linguistically to new situations without too much difficulty. (Lee 1992:69)

> This use of a "subsidiary subject" to foster insight into a "principal subject" is a distinctive intellectual operation (though one familiar enough through our experiences of learning anything whatever), demanding simultaneous awareness of both subjects but not reducible to any comparison between the two. (Black 1962:46)

As is evident also from the fact that "the same interpretative processes or strategies are involved in a child's acquisition of conventional meanings as operate in the adult interpretation of a metaphorical use of language" (Goatly 1997:27), metaphors are far from operating "according to a peculiar semantic or pragmatic principle which must be distinguished from those governing other sorts of non-literal utterances" (Cooper 1986:116). By contrast, they seem to be governed by the same general principle as literal language and cognition in general, that is, the principle of understanding the new only by reference to the old and familiar[17].

Even if we do dismiss the idea that linguistic metaphors are "arbitrarily generated through the random contrast of any two conceptual domains" (Gibbs, 1994:249) metaphors must not be regarded as merely reflecting "a constrained set of conceptual mappings". In addition to being part of a conceptual system that structures our thoughts, metaphors are what we get when, in our capacities as thinking and acting human beings, we interact with the world and when, in

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[17] According to Goswani (1991:18), analogical reasoning, which is far from developing late, "might consist of a metacognitive understanding of analogy rather than the development of the ability to reason about higher order relations per se." It seems likely that it lies at the core of development as children learn to structure their experiences of the world around them (see Goswani 1991:19).

coherence with our experiences, we understand the new by means of the familiar. While certain metaphorical expressions reflect already acquired conceptual knowledge, others may be based on experiences of more recent date. Even if a great number of metaphorical expressions are coherent because they reflect a coherent system of conceptual metaphors, the coherence does not originate from the system, but from the experiential bases of the system. New experiences inevitably lead to changes in the conceptual system.

By using our continuously renewed experiences of external objects we are able both to re-experience conceptual structures and to understand concepts in new ways (see Gibbs 1999:152).

Metaphor processing is further aided by the way in which speakers or writers "anchor" their utterances in their context. Contexts are all-important to the meaning of a sentence. Not only indexical items and deictic terms such as *yesterday, here, near, far* and *in* "require information about the context of use in order to specify their exact meanings" (Gibbs 1994:30), but this seems to true of most words and concepts[18].

> The prototypes of cognitive categories are not fixed, but may change when a particular context is introduced, and the same is true for category boundaries. More generally, the whole internal structure of a category seems to depend on the context and, in a wider sense, on our social and cultural knowledge, which is thought to be organized in cognitive and cultural models. (Ungerer & Schmid 1996:43)

In sum, pre-existing conceptual structures, new experiences, background information provided by the context of the utterance and the addressee are all factors that make it possible for different individuals to meet linguistically even if they "view their social world through different positions" (Lee 1992:21) or have varying linguistic and conceptual knowledge. Even if metaphorical language has traditionally been regarded with suspicion on the grounds of being too dependent on pragmatic factors, literal language shares this dependence.

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[18] An example is the use of the term *dog* in the following four sentences describing four different real world situations. Since the sentences call up different mental contexts, the use of *dog* is likely to be associated with "different kinds of mental images of the kind of dog that is denoted".

    1) *The hunter took his gun, left the lodge and called his dog.*
    2) *Right from the start of the race the dogs began chasing the rabbit.*
    3) *She took her dog to the salon to have its curls reset.*
    4) *The policemen lined up with the dogs to face the rioters.*
     (Ungerer & Schmid 1996:43)

> Surprisingly much of our discourse pertains to "virtual" or "fictive" entities. Even when our ultimate concern is with "actual" events and individuals, we commonly talk about them indirectly, by directly describing entities of a virtual nature. (Langacker 2001a)

Like other claims concerning the differences between literal and metaphorical language, the claim that metaphorical language is deviant from literal in not describing events and situations in a direct way can easily be dismissed. According to Langacker (2001c:1), language, metaphorical as well as literal, is not primarily used "for the direct description of events and situations". Metaphorical language thus shares this feature with literal language. The use of one domain in order to make sense of another is nothing but a natural process. It is the result of what generally happens when body, mind and language interact with the world.

2.2. The cognitive context of metaphors

Having in the previous sections argued in favour of a cognitive view of metaphor and language, I have in part already described the theoretical framework within which this analysis is developed. However, because the framework of cognitive semantics is adopted by a very large number of scholars whose views are not always unanimous, some additional aspects of the view taken here need to be clarified, in particular with regard to terminology. Even though cognitive scholars tend to agree about the central tenets of the framework, it would be far from correct to claim that this is true also with respect to the terminology used within this framework (see Steinvall 2002:33). Not only are different terms used for one and the same concept, the very same term is often used to denote different, or at least slightly different, things in different works. In the light of the terminological chaos some additional terms need to be discussed. Primarily, these are terms central to this thesis but not discussed so far. Some terms, however, are mentioned only because they are prerequisites for a proper definition of the more central ones. Examples are *sign metonymies*, which are merely discussed in order to clarify what is here intended by the term *conceptual metonymy*. Besides, although terms like *profile, base* and *scope* are not extensively used in this thesis, they are discussed because they serve the purpose of clarifying the view of conceptual metonymies adhered to here.

The terms in the following sections, however, are not discussed only in order to provide a definition of a number of isolated terms, but also to account for the way the concepts they signify are related to one another and to metaphors. The

aim of the discussion of *metonymies*, *mental spaces* and *blending theories* is to describe the cognitive "context" of metaphors, that is, some of the most important cognitive entities or processes that are intimately connected to conceptual metaphors.

On the view adopted here, the cognitive process of metaphorical mapping hardly ever operates isolated from other cognitive processes, at least, as regards what is transferred through language. By way of example, they are closely connected to metonymic mappings. In 2.2.1. a theory of the way metonymies may be used to access conceptual metaphors is presented. In 2.2.2 and 2.2.3. a framework is introduced that allows for the integration of metaphorical processes with other cognitive ones. The former section provides a summary of the theory of mental spaces, and the latter a summary of the theory of conceptual blending.

2.2.1. The nature of language, metonymy and meaning

In section 2.1.4. metaphors were defined as cognitive tools that we use for "experiencing or understanding one kind of thing" in terms of another kind of thing (see Lakoff & Johnson 1980:5). It was also argued that thought comes before language and that language merely reflects our thoughts (see e.g. 2.1.5.2). The claims, however, need to be supplemented by a discussion of the nature of the associative link between thoughts and words. If thought actually comes before language, how then do we manage to put ideas into words? What is the strategy that we use? In my opinion, Langacker's and Kövecses and Radden's views of language and metonymy indicate how this strategy works.

First, Langacker's observation that language is "symbolic in nature" (1987:11, see also Langacker 2002:292-301) is a key observation. To any language user wishing to dress his or her thoughts in words, it is essential that language may be used to symbolise conceptual structure:

> [T]he function of language is to effect the phonological symbolization of conceptual structure[…] (Langacker 1995:116)

> Semantic, phonological and symbolic structures of any degree of complexity are capable of being formed and coalescing as established units (i.e. well-rehearsed cognitive routines) [---] This much clearly *has to* be imputed to language. The central thesis of cognitive grammar is that *only this* need be imputed to it. (Langacker 1995:91)

What makes it possible for us to communicate is our capacity to establish symbolic links between phonological structures and concepts. All that speakers and hearers have to do is to agree that this phonological sequence or the other is the one to use to access a particular conceptual structure. In other words, agree

that "the name of a sign, that is Form (A), provides access to and stands for the meaning of this sign, Concept (A)" (Kövecses and Radden 1998:42) as described by the metonymy WORDS STAND FOR THE CONCEPTS THEY EXPRESS (see Lakoff and Turner 1989:108). Thus, in line with Kövecses and Radden's view (1998:42) it will be argued here that each pairing between concept and form will invariably give rise to the "FORM (A) FOR CONCEPT (A)" metonymy, that is, to a "sign metonym" (Kövecses and Radden 1998:42).

> The Form (A) – Concept (A) unity characterizes the form-meaning relationship of any sign and of language in general. Since we have no other means of expressing and communicating our concepts than by using forms, language as well as other systems of communication are of necessity metonymic in this sense." (Kövecses and Radden 1998:42)

However, even though "a lexical item represents a conventional way of *accessing* a set of domains" (Langacker 2001b:2, see also Langacker 2002:2-3), these are "flexibly and variably evoked, as determined by the context"[19].

> [T]he values of conventional units are neither static nor fully predetermined. A lexical item, for example, is quite unlike its standard metaphorical conception as a "container" holding a fixed quantity of a substance called "meaning" – it is better conceived as evoking certain realms of knowledge and experience (cognitive domains) in a flexible, open-ended manner. (Langacker 2000:262)

Meaning is thus always meaning in context, and different contexts invariably induce needs for new agreements on what may and may not be symbolised by a particular phonological sequence. When the context so requires, it seems inevitable that certain phonological sequences are used to gain access to mental entities not previously accessed by them. When a lexeme conventionally used to gain access to one mental entity is used to access another mental entity within the same domain, the relationship between the uses is best described as "conceptual metonym[y]" (Kövecses and Radden 1998:44). In the following *conceptual metonymy* will simply be referred to as *metonymy*. In this study, the term is defined in the following way:

> Metonymy is a cognitive process in which one conceptual entity, the vehicle, provides mental access to another conceptual entity, the target, within the same domain, or ICM. (Kövecses and Radden 1998:39)

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[19] According to Langacker (2002:35), cognitive grammar assumes that "the meaning of an expression is not fully given by an objective characterization of the scene it describes. People have the capacity to construe a scene by means of alternative images, so that semantic value is not simply received from the objective situation but instead is in large measure imposed on it". This is the view adopted here.

As is evident from the works of e.g. Barcelona (2000:52-53) and Kövecses and Radden (1998:61), quite a few metaphors seem to derive from metonymies. According to Barcelona (2000:51), metaphor is typically "based on one or more metonymic mappings". He even suggests that "all metaphors are ultimately motivated by metonymy". The close relationship between metaphors and metonymies is also evident from the difficulties people sometimes have in distinguishing between metaphor and metonymy.

> [T]he traditional distinction between metonymy and metaphor can no longer be maintained. The classical notions of metonymy and metaphor are to be seen as prototypical categories at the end points of a continuum of mapping processes. The range in the middle of the metonymy-metaphor continuum is made up of metonymy-based metaphors, which also account for the transition of metonymy to metaphor by providing an experiential motivation of a metaphor. (Radden 2000:105)

According to Barcelona (2000:52), "metaphors are necessarily based on metonymies", partly because we are simply not equipped to activate whole domains at the same time:

> A possible, more fundamental reason (but this requires further investigation) is that both perception and mental activation are normally "partial": just as we cannot possibly perceive *every* detail of a percept at the same time (Gregory 1998), we probably cannot activate *every* subdomain of a domain at the same time in our minds. This parallel between bodily perception and mental activation probably makes it inevitable to select metonymically both the aspects of the target domain to be "elucidated" by means of metaphor, and the main subdomains of the source to be mapped onto the target. (Barcelona 2000:52)

If not necessarily based on metonymies, metaphors are probably very often based on them. Indeed, it seems possible that our use of metonymies in order to access cognitive domains and thereby structure our thoughts by means of metaphor is connected with the limitations of our own mental capacities.

The strategy of accessing the whole by means of a smaller part is also evident from the way we use language. According to Langacker, linguistic expressions do not designate whole domains but rather "some entity within [their] scope[s]" (1995:96):

> A predication always has a certain scope [---] and within that scope it selects a particular substructure for designation. (Langacker 1987:183)

The decoding of a linguistic message typically begins with a small part of a whole, that is, with "a profile on the base" provided by the "scope" of the expression:

> As one aspect of meaning, every linguistic expression is construed as *designating* some entity within its scope. I will say that it imposes a particular **profile** on the base its **scope** provides. Intuitively, the entity accorded this special kind of prominence is something like a *focus of attention*.[20] (Langacker 1995:96)

The decoder may then "scan" "mentally" from this initial "focus of attention" in one direction or the other:

> What we want to say (based on intuition) is that the speaker or conceptualizer (as opposed to the subject) scans mentally through the scene in one direction or the other. (Langacker 1995:96, see also Langacker 2000:172, 207)

If we want to explain the way metonymies work and adopt Langacker's model, they may be seen as shifts in profile or reference point phenomena:

> [T]he entity that is normally designated by a metonymic expression serves as a reference point affording mental access to the desired target (i.e. the entity actually being referred to). (Langacker 2000:199, see also Langacker 2000:67)

To use Koch's (1999:146) wordings, metonymies may be said to lean on "salience effects within frames", that is, frames in the sense of "non-linguistic conceptual wholes" and may be described as "figure/ground effect[s]" within these frames:

> [E]very concept designated by a given lexical item appears as a figure in relation to (at least) another contiguous concept that – for the time being – remains the ground within the same frame. But at some moment, while we are using the same lexical item, certain pragmatic, conceptual or emotional factors may highlight the ground concept so that figure and ground become inverted. That is what we call metonymy. (Koch 1999:152)

In this thesis Langacker's terms *profile, base* and *scope* and *domain* are preferred to Koch's *figure, ground* and *frame*. However, they both seem to adhere to the same basic idea, that is, the idea adopted here. Whatever terminology we choose, to anyone adopting a cognitive view of language metonymy clearly does not begin with the extension of a meaning of a certain lexical item. Like metaphor, metonymy is a cognitive process inside our heads that may be used to associate words with meaning:

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[20]   An expression's profile can be thought of as its referent within a conceptualisation. Langacker (2000:7) emphasises that "profiling is reference within a conceptualisation, not in the "world"".

Access through conceptual connections is a powerful component of meaning construction that language reflects in general, regular, and systematic ways, independently of its particular domains of application." (Lakoff and Sweetser 1994: XXV)

From this view of metonymies it naturally follows that "[l]anguage does not carry meaning, it guides it" (Lakoff and Sweetser 1994:XXII, see also Langacker 2002:56).

[E]xpressions do not mean; they are prompts for us to construct meanings by working with processes we already know. In no sense is the meaning of an *xyz* metaphor or of any utterance "right there in the words." When we understand an utterance, we in no sense are understanding "just what the words say"; the words themselves say nothing independent of the richly detailed knowledge and powerful cognitive processes we bring to bear. (Turner 1991)

2.2.2. Mental spaces and cognitive domains

In this section, attention will be turned to the key concepts 'mental spaces' and 'cognitive domains'. The term *cognitive domain,* or *domain* for short, has in the foregoing been used both quite frequently and somewhat loosely to mean 'a cognitive or conceptual entity'. This definition will be used in the following too. However, henceforth a distinction will be made between the initial "mental scene" evoked by a certain expression and the network of cognitive domains accessed via this scene. The term *mental space* is introduced here to denote the former concept whereas *domain* will from now on exclusively be used for the latter. More specifically, mental spaces are understood here as initial "short-term" (Grady et al.1999:102) "on-line", "mental picture[s]" whereas domains are more permanent, "knowledge structures" (Grady et al.1999:102).

[M]ental spaces [---] [are]constructs distinct from linguistic structures but built up in any discourse according to guidelines provided by the linguistic expressions. (Fauconnier 1994:16)

The idea behind this distinction is that initially "[l]inguistic expressions pertain to conceived situations, or "scenes" (Langacker 1987:116). Conceptual structure, however, is "*dynamic*": it "emerges and develops through *processing time*, it resides in *processing activity* whose temporal dimension is crucial to its characterization" (Langacker 2000:361). Accordingly, mental spaces are only temporary constructs. As new things are said or heard, old spaces are either modified or replaced by new ones:

> [V]isible language is only the tip of the iceberg of invisible meaning construction that goes on as we think an talk. This hidden, backstage cognition defines our mental and social life. (Fauconnier 1997:1)

> Linguistic expressions will typically establish new spaces, elements within them, and relations holding between the elements. (Fauconnier 1994:17)

> An expression can be said to *generate* meaning: When the grammatical information it contains is applied to an existing cognitive configuration, several new configurations will be possible in principle (i.e. compatible with the grammatical clues). One of them will be produced, yielding a new step in the construction underlying the discourse. When approached in this way, the unfolding of discourse is a succession of cognitive configurations: Each gives rise to the next step, under pressure from context and grammar. (Fauconnier 1997:38)

The activation of a mental space thus typically leads to the activation of one or more cognitive domains. While mental spaces tend to "come and go", domains and the relations between them are more often kept in our memories as part of different cognitive structures. However, even though these are more permanent than mental spaces, domains are also characterised by dynamicity. Because they are "potentially open-ended knowledge systems" (Langacker 1995:93, cf. Langacker 2000:262), they may constantly be modified as we interact with the world around us. Like the activation of mental spaces, the activation of one domain typically leads to the activation of another:

> The entity designated by a symbolic unit can therefore be thought of as a **point of access** to a network. The semantic value of a symbolic unit is given by the open-ended set of relations – simple and complex, direct and indirect – in which this **access node** participates. Each of these relations is a cognitive routine, and because they share at least one component the activation of one routine facilitates (but does not always necessitate) the activation of another. The correspondence between the phonological pole and the semantic pole of a symbolic unit implies the ability of the phonological routine to activate the subroutine constituting the access node together with an indefinite number of relational routines that incorporate this subroutine. (Langacker 1987:163)

2.2.3. Conceptual blending

In the foregoing it was argued that different conceptual structures, like metaphorical ones, are typically accessed via smaller parts of whole conceptualisations and that the use of linguistic expressions typically results in the activation of conceptual spaces through which we may scan mentally in a number of different directions. In this section, the focus will be on what happens after the point of activation. Because the set of relations in which the "access node" of a network participates is open-ended (see 2.2.2. above), it is probably impossible to give an altogether accurate description of the cognitive processes and cognitive structures that participate in such a network. However, the

framework of 'blending', 'conceptual blending' or 'conceptual integration' (see Grady et al. 1999:101) proposed by Fauconnier and Turner (1998) seems to provide a fuller conceptual context of metaphorical mappings than has previously been done[21]. Even though this thesis primarily aims at investigating metaphorical mappings connected to different technological innovations and discoveries, Fauconnier and Turner's framework will be briefly discussed here because it unifies "the analysis of metaphor with the analysis of a variety of other linguistic and conceptual phenomena" (Grady et al. 1999:101) in a reasonable way. Above all, their theory allows for the integration of metonymic and metaphorical processes, which seem to be very closely connected but have traditionally been kept apart. In Fauconnier and Turner (1999) and Turner and Fauconnier (2000), they show that "[i]t is possible to find in even the most studied of basic metaphors examples of blending and of the way blending interacts with metaphor and metonymy" (Fauconnier and Turner 1999:80). An example is the integration of the conventional metaphor ANGER IS HEAT with "[t]he metonymy linking emotions to their physiological effects" in expressions like the following ones:

> (16) *He was steaming.*
> (17) *She was filled with anger.*
> (18) *I had reached the boiling point.*
> (19) *I was fuming.*
> (20) *He exploded.*
> (21) *I blew my top.*
> (22) *God, he was so mad I could see the smoke coming out of his ears.*
>   (Fauconnier and Turner 1999:80-81, Turner and Fauconnier 2000:135-136)

As is relevant for this thesis, in all these sentences different artefacts, technological innovations that are steaming, smoking, boiling or exploding serve as source domains to describe the target domain of an individual getting angry. As previously observed by Lakoff and Kövecses (Lakoff 1987:380-416), sentences like these "indicate the presence of anger via its supposed physiological effects" (Lakoff 1987:383), that is, via the metonymy PHYSIOLOGICAL EFFECTS OF AN EMOTION FOR THE EMOTION.

> The folk theory of physiological effects, especially the part that emphasises HEAT, forms the basis of the most general metaphor for anger: ANGER IS HEAT. (Lakoff 1987:383)

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[21] For a more detailed account of this framework. See Fauconnier and Turner (1994, 1997)

However, as observed by Turner and Fauconnier (2000:136) in their discussion of sentence (22), "the phrase *the smoke coming out of his ears* does not describe anything directly [---] in the target (where people's physiology does not include internal combustion)". Even though "the description of the emotion is *presented* as a physiological reaction of the individual [---] the content of this physiological reaction is not obtained through the metonymy in the target. It comes from the source (physical events pertaining to heated containers – smoke coming out, explosion, etc.". Nor does it "describe anything directly in the source (where smoke comes out of kettles on fire)" not out of ears. Because "anger does not produce smoke or explosion", the only way for us to understand the sentence is to create an integrated scene by means of selective projection from both the target and the source. In this integrated scene, the blend, projections from both inputs interact and "inferences in the blend" may be projected back to the target.

> In the blended space, we find the people and their emotions projected from a target input space: we find the corresponding physiological reactions projected either from the source Input [*sic*] of physical heat, explosion, and boiling, or from the target Input [*sic*] of the body physiology linked to the emotions. (Turner and Fauconnier 2000:136)

In contrast to the framework of conceptual metaphor theories, which focuses on relationships between pairs, the framework of conceptual blending prototypically involves four mental spaces: two inputs, a generic space, and the blend. As conceived within this framework three basic operations are involved in constructing the blend. First, in the *composition* process content from the inputs is selectively projected to the blended space. Second, in the *completion* process we "complete our understanding of the scenario" (Grady et al. 1999:107) in the blended space by matching it "to information in long-term memory". Third, as exemplified below, in the *elaboration* process the blended space is elaborated in ways "not fully determined by the inputs." (Fauconnier and Turner 1999:83) That is, through the latter two processes the blended space gets an "emergent structure of its own" (Fauconnier and Turner 1999:77):

> (23) God was he ever mad. I could see the smoke coming out of his ears - I thought his hat would catch fire! (Fauconnier and Turner 1999:83)

It should be noted, however, that the network discussed above is both simplified and minimal. "Networks in other cases of conceptual integration may have yet more input spaces and even multiple blended spaces" (Fauconnier &

Turner 2001). Because conceptual integration, as shown in Turner and Fauconnier (2000:140-141), is an extremely dynamic process it is not always possible to represent it in an adequate way by means of static drawing.

> The blending diagrams simply are not rich enough to represent most of what is going on -- either in metaphor, or in image-schemas, prototypes, frames, force dynamics, and so on. (George Lakoff, personal communication)

Accordingly, in this thesis no attempt will be made to fully describe either minimal or extremely complex networks. Although the central tenets of the blending theory are adopted as well as the general idea of the way cognitive processes interact, blends will merely be mentioned incidentally. Not only is it virtually impossible to fully describe what is going on in our minds by means of networks like the one discussed above, metaphors and to some extent metonymies are the main foci of attention of this thesis. It is true that the framework of conceptual blends is here considered to provide a fuller conceptual context of metaphors and metonymies than has previously been done. Accordingly, in the exceptional cases when blends are mentioned, they are taken to function according to the principles described in this section. The discussion of metaphorical and metonymic structures in chapters 4-6, however, generally does not include a discussion of the conceptual context of which they are a part.

Similarly, if not discussing them in detail, this thesis acknowledges mental spaces to be "the basic unit of linguistic organisation." In contrast to many metaphor theories, but essentially in line with the quotation below, this thesis embraces the view that mental spaces are the first cognitive entity we come up with when activating conceptual meaning through language. However, as expressed by Grady et al. below, spaces depend on domains because they are constructed by them.

> In BT [---] the basic unit of linguistic organization is not the domain but the 'mental space' (Fauconnier 1994 [1985]), a partial and temporary representational structure which speakers construct when thinking or talking about a perceived, imagined, past, present, or future situation. Mental spaces (or, 'spaces, for short) are not equivalent to domains, but rather, they depend on them: spaces represent particular scenarios which are constructed by given domains. [---] In short, a mental space is a short-term construct informed by the more general and more stable knowledge structures associated with a particular domain." (Grady et al. 1999:102)

They are part and parcel of the same cognitive unit, inextricably bound up to one another.

2.3. Summary and conclusion

In the present chapter the framework of this thesis has been presented along with the basic terminology used. I have argued in favour of a cognitive view of metaphor and language, and claimed that metaphorical processes are typically integrated with other cognitive processes. Although the focus in this thesis is on metaphor, and to some extent metonymy, rather than conceptual blends, it has been acknowledged that metaphor theories, blending theories and the theory of mental spaces are compatible. The dynamicity of language has also been emphasised as well as the fact that our experiences of the world around us continuously provide us with experiences that help us to structure our thoughts. On the experientialist cognitive account adhered to here, already internalised cognitive structures may be re-experienced by means of external objects around us, and novel conceptual structures defined by means of them. In the analyses in chapters 4-6, the interaction between the steam engine, electricity, motor vehicles roads and ways on the one hand, and mind and thought on the other, will be studied.

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CHAPTER 3. HISTORY OF TECHNOLOGY

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3.1. Introductory

In this chapter, a brief outline of the history of technology is made. The focus is on Great Britain and North America. The overview is intended both to serve as a historical background to the developments of the steam engine, the many different applications of electricity, motor vehicles, roads and ways, and to give an overview of the history of technology as a whole. As is quite in line with the claim that technology "comes in packages, big and small" (Kranzberg 1989:248), never in the form of isolated entities, the inventions and discoveries analysed here are part of a complex of relationships. Even though the relationships are too complex to be described in full in an overview of this size, an attempt is made here to describe some of them. In addition, this overview discusses a selection of important technological inventions and discoveries that are not directly linked to the ones that are part of this thesis. The aim is to reflect the fact that the number of inventions that have played an essential part in the development of today's technologically advanced society is very large. The steam engine, electricity, and motor vehicles are only some of these.

The outline falls into three main parts, the industrial revolution, the 19th century, and the 20th century. The periods are discussed in chronological order. The period of the "industrial revolution", however, is not "capable of sharp definition" (Kranzberg 1967:217). Approximately, it started in Britain in the closing decades of the 18th century, and lasted for about a hundred years. Its roots, however, stretch far back in time, and it does not have a sharp end. The developments during this period are highly relevant to this thesis because they make up the context of the development of the steam engine. Moreover, quite a few of them interacted with the invention.

As we move from a predominantly agricultural society to a highly industrialised one, the interaction between developments increases. Recent developments are thus less fully described than earlier ones. It should also be noted that several innovations do not belong in one single period, but have developed over a span from one period of time into another. While the many practical applications of electricity saw their light of day in the 19th century, the industry expanded enormously in the $20^{th.}$century. Similarly, the manufacture of

the motor vehicle was established in the 19th century, and in the 20th century mass production of motorcars was one of the major technological trends.

3.2. The industrial revolution

3.2.1. Factors behind the revolution

During the industrial revolution, a number of important innovations saw the light of day, among them, the steam engine, which is often considered the symbol of the industrial revolution above all others (see Hansson 1996:288). Britain was the cradle of the inventions (Singer et al. 1958:V).

Despite the implications of the phrase *industrial revolution,* which was coined by analogy with the *French Revolution*, the industrial revolution was neither violent nor sudden. It is best described as a gradual process, or "a series of fundamental technological, economic, social, and cultural changes", which taken together, "profoundly affected the whole pattern of civilisation" (Singer et al. 1958:V) and changed "man's relationship to natural resources". From Britain the industrial revolution spread to the European continent, North America and ultimately much of the rest of the world (see Singer et al. 1958:V). It was only revolutionary in the sense that it transformed society (see Kranzberg 1967:218).

Like the process referred to as *the industrial revolution*, several of the inventions of the period originate from a dynamic interplay of a great number of factors, technological, political, economic, cultural and social ones. These will be discussed in the following sections.

3.2.1.1. Political changes and industrial investments

At the turn of the 17th century a series of political changes had started in Britain and abroad, which all helped to stimulate industrialisation (see Kranzberg 1967: 219-230, and Hansson 1996:240-241).

On the domestic front, industrialisation was stimulated by the fact that the Declaration of Rights (1688-89) had caused a shift of power from the king to Parliament. The latter was controlled by people who were "devoted to the expansion of commerce and to the prosperity of agriculture" (Kranzberg 1967:227). They changed taxation issues and legislation for the better from the point of view of their special interests. The industrialisation process was further stimulated by free competition as a rising industrial bourgeoisie began to rival the power of the government. They demanded that the government should let business and industry develop on their own terms (see Kranzberg 1967:227).

Another driving force was Britain's political situation abroad. The nation was becoming increasingly more powerful on all fronts. Within Europe, a union consisting of Britain, Holland and Prussia showed its military superiority. Outside Europe, Britain played a more and more important part in colonising the world (see Hansson 1996:240-241). Britain's mercantilist colonial policy proved to be an essential factor for the industrial developments. It brought about a remarkable expansion of overseas trade in the seventeenth and eighteenth centuries. The nation obtained the necessary capital for industrial experiments and inventions thanks to the host of markets where Britain alone could manufacture goods free of duty. They made it possible and profitable for Britain to manufacture and supply low-quality goods in quantity to invest in the costly industrial machinery required for mass-production. The process of large-scale international trade inevitably made Britain's industrial leadership rise (see Kranzberg 1967:222-223).

The companionship between inventors and investors, which was a prerequisite for new innovations, was further aided by the efficient banking system. The foundation of the Bank of England in 1694 and the network of local banks around the country facilitated the mobility of capital and investments to a great extent (see Kranzberg 1967:220-221).

3.2.1.2. Attitudes

To develop the way Britain did during the Industrial Revolution, values, attitudes, and institutions favourable to industrialisation were also needed. To some extent the parliamentary revolutions (discussed in 3.2.1.1.) helped to pave the way for new ideas and processes. The break with the Roman Church was important, as were also the religious struggles (see Kranzberg 1967:228). A requisite change in values and attitudes "had arisen [---] during the early modern period as Western Europe moved from the medieval emphasis upon the spiritual aspects of life into a secular and quantitative approach to life". According to Kranzberg, the Renaissance gave people an open-minded attitude towards novelty, and hence made them more receptive of inventive ideas. The Protestant revolution also transformed people's values. Protestants, and other dissenters, played a prominent part in the industrial revolution (see Hansson 1996:254). In the German philosopher Max Weber's opinion, it was the Protestant ethic, which emphasises hard work, sobriety, thrift and the relentless pursuit of one's calling, that fostered the growth of capitalism (see Kranzberg 1967:228). This view has, however, been disputed. Protestants, like other dissenters, were also affected by

their living conditions (Hansson 1996:254) and more or less forced to do well. For example, since they were excluded from the Anglican school system they had to form their own schools. Instead of weakening them, their living conditions made them stronger.

The Scientific Revolution also helped to spread a general attitude of receptivity to new ideas. By the mid-18th century, the age was "running mad after innovation" (Kranzberg 1967:228). At the time, the application of science to technology played an increasingly effective part in many branches even though science was not yet a major force in industry. The formation of scientific societies bridged the gap between science and technology by bringing about a wider and more effective diffusion of talent, a new way of thinking and a new way of solving problems (Cardwell 1972:126). Not only the government, but society as a whole, came to approve of social, economic, cultural and political changes. It had a desire for material progress, a willingness to accept new ideas and techniques, and it approved of social mobility (see 3.2.1.1). British merchant adventurers were also willing to take risks and possessed a spirit of enterprise. Hence the capital Britain had gained by the expansion of trade (see 3.2.1.1.) could now result in investments. Accordingly, the unusually open attitude to ideas from elsewhere paved the way for "a vigorous technological dialogue" (Pacey 1990:111). A great deal was achieved because the British were extremely good at borrowing and modifying ideas from other cultures. The developments of the textile industries, for example, were the results of a dialogue with Asia and Italy, key ideas to the invention of the steam engine came from Italy and Germany, and the Netherlands and China played an important part in the technological development in Britain in general. The open-minded attitude of the British also came out in their tolerance towards people of different religious minorities in the country, who were allowed to contribute their knowledge and enterprise to the industrial advances (see Hansson 1996:254-255).

3.2.1.3 Agricultural improvements and mobile labour

Historians of technology agree that, in addition to the above developments, agricultural improvements in the 18th century also played an important part in the advancement of the industrial revolution (Hansson 1996:244). According to Kranzberg (1967:226), an "agricultural revolution played as large a part in the great industrial change at the end of the 18th century as did the engines and machines to which attention is usually directed." Agricultural improvements such as improved farm implements (see Hansson 1996:243), the development of

scientific stock-breeding, the introduction of the Norfolk (four-field) system, the use of nitrogen-restoring crops, and the enclosure of the open fields and commons (see Kranzberg 1967:227) all helped to augment the agricultural production in Britain. Thanks to the advances, the working capital and industrial investments increased. The improvements both made it possible to supply the large section of the population now working and living in the cities with food, and brought changes that helped to meet the want of labour in the industrial districts. Workmen, who had been forced off the soil as a result of the enclosure movement, became freer to move from farm to factory (see Hansson 1996:244). In combination with several other factors (see Hansson 1996:246-247), the agricultural advances made the rural population as a whole grow. Finally, the increasing demand for farm implements and machines that came with the agricultural revolution was another stimulus for industrial advance.

3.2.2. The textile industry

3.2.2.1. The emergence of the factory system

Many of the factors mentioned in the previous section came together in the textile industry, which was "the first manufacturing enterprise to undergo industrialisation" (Kranzberg 1967:230). The textile industry of the late 18th century "is marked by the development of power machinery and by the gradual emergence of the factory system as a form of organisation" (Payson Usher 1967:231) (cf. 3.2.2.2. and 3.2.5.). Various sources of power were used to run the machinery. Still in the 18th century water was the most important source of power. That role, however, was gradually taken over by the steam engine (see 3.2.5.). Unlike other sources of power, steam engines provided limitless power for factory buildings anywhere. They made it possible for the industry to grow also when there was a shortage of other sources of power.

According to Payson Usher (1967:230), the "introduction of power machinery into the textile industries of Great Britain, Europe, and America between 1750 and 1830 was fundamental to the success of the Industrial Revolution and the cause of enormous changes in Western society".

Formerly, the industry had been organised on the merchant-employer system in which the actual work was done on the farms and in cottages. These were either owned by the weavers themselves or rented fully equipped from the employer. Since the actual work was done on the farms, the merchant employers had difficulties exercising sufficient supervision of the work, enforcing standards of quality, maintaining a schedule for completing the work they had given out,

and preventing that the raw materials distributed by the merchant employer to the workers in their cottages were stolen. Hence they saw to it that the factory system gradually supplanted the old system. To the employers, the new system, with its centralised establishment and centralised control was clearly advantageous. It offered opportunities for supervision and discipline. To the workers, however, it offered "conditions of work, (and therefore of living) [that] were so distasteful [---] that they were accepted only when mechanization had proceeded so far that decentralized production could no longer compete in the market place" (Payson Usher 1967:230). The underlying factor for the change was the introduction of power machinery into industry.

In addition, the introduction of power machinery provided the only way to enter into competition with India, which had an abundance of labour and fabrics of superior quality (Hansson 1996:271). Before the introduction of power machinery, Britain had suffered from a want of labour and produced fabrics that were inferior in quality. At the beginning of the 18th century carding and combing remained hand processes, while the processes of preparation, spinning, and weaving were only slightly mechanised (see Payson Usher 1967:231). The nation was more or less forced to invent the new power machinery that, in combination with trade barriers, subsequently made it possible for Britain to supersede the Indians on the European textile market (see Hansson 1996:271). Since the new technological innovations, such as the spinning and weaving engines were unwieldy, they were not suited for use in small cottages but rather for factory use. Hence they too stimulated the emergence of the factory system (Hansson 1996:273).

3.2.2.2. Cotton – the spear head of the revolution

"[T]he first and most influential modern industry" (Payson Usher 1967:245) was the cotton industry. It "influenced not only the rest of the textile industry but the entire Industrial Revolution", and "[m]anufacturers in other fields drew their inspiration" from it.

Since the material was very strong it was by far the easiest to spin by mechanical means (see Hansson 1996:275). The new technology thus proved more efficient and mechanisation proceeded more quickly in the cotton industry than in the traditional 18th-century-woollen and worsted industries. The industry was also favoured by the changes in the supply of raw cotton (see Payson Usher 1967:244). With Eli Whitney's cotton gin in 1793, upland cotton from the United States became a major source of supply. It was much cheaper than wool, which

remained in short supply with prices at relatively high levels until the import of Australian wool started in the 19th century.

"About 1750, the cotton industry in Lancashire began to develop rapidly" (Payson Usher 1967:234). It brought about a strong demand for yarn and a great interest in the improvement of spinning. A number of ingenious and mechanically minded inventors, for example, James Hargreaves and Richard Arkwright were aware of the demand. They both managed to improve the process. Hargreaves, who had observed how cotton behaved when spun with a traditional wheel, invented his "spinning Jenny" in 1764, and patented it in 1770. In 1769, Arkwright took out his first patent for the "water frame". The motive-power of the "water frame" tended to be water, but in Arkwright's specification it was designed to be worked by a horse.

By chain effect, the improvements in spinning necessitated improvements in weaving. One of the first major inventions in weaving was made by John Kay in 1733 (see Payson Usher 1967:239). With his "flying shuttle", the speed of weaving, even on the narrow goods, was increased considerably.

3.2.2.3. Interaction with other industries

The result of the above developments was an increase in the supply of textiles. With the increase came a need for the development of a sewing machine (see Hansson 1996:277). One of the first innovators who managed to make a sewing machine that worked was Balthasar Krems in 1810. The development of the sewing machine was a prime example of the way in which machines replaced even the most complex manual work in those days. In addition to being important for the developments in the textile industry the sewing machine mothered developments in many other industries. Examples would be the chemical industry (see e.g. Hansson 1996:279) and the machine tool industry. The latter, which started to develop more rapidly in the 19th century (see 3.3.5.), interacted with the iron industry and was important for the improvements of the steam engine.

3.2.3. Deforestation and an increase in the use of coal

As a result of the expanding industry, the supply of wood and timber began to give out in the 17th and 18th centuries (Hansson 1996:255). Deforestation had gone furthest in Britain. There was a constant pressure to find alternative industrial fuels to charcoal, the essential fuel of many industries, and alternative

construction materials to wood. The solution was to begin to use coal and iron instead. Britain had plentiful resources of both materials, which became very important. The introduction of the steam engine, and the innovations in the use of coal made it possible to exploit new resources. Wherever they could, people began to replace charcoal with coke, which was obtained from coal. Since coal and iron were readily available in close proximity to one another, people also tried to use coke for smelting iron. Early attempts to do so failed, however, because coke contains impurities such as sulphur and phosphor. These spoiled the extremely sensitive iron (see Pacey 1990:109).

In 1709, a finding was made that released the British iron industry from the dependence on charcoal. In this year, Abraham Darby, proprietor and ironmaster of Coalbrookdale, where both iron ore and coke with unusually low concentrations of sulphur and phosphor were available, succeed in his experimenting and managed to introduce coke-fired iron-smelting (see Ferguson 1967:264, Pacey 1990:111). His finding is regarded as an important milestone in the British iron industry. The place of its introduction, Coalbrookdale in Shropshire, is considered "the birthplace of the industrial revolution" (Pacey 1990:111) The use of coal became a basis for further technological advance. Together with a complex of interacting innovations, it brought about enormous opportunities in the employment of iron.

3.2.4. The development of the iron industry

According to Ferguson (1967:264), the technologists' consideration of iron as an industrial material was vastly changed during the Industrial Revolution. In the middle of the 18th century "iron was used in machines and structures only where wood or another cheaper and more easily wrought material simply would not do, but by 1830 iron was the first material considered by engineers and mechanicians for a wide range of uses".

In 1800, wrought iron was the most important product of the iron works (see Ferguson 1967:267). The malleable metal could be worked up, shaped and welded by a blacksmith to form brackets, straps, wagon tires, nails and a variety of other ironmongery, or it could be rolled into rails (see Ferguson 1967:264).

Another important product was cast iron, which was hard, brittle, and not at all malleable. It was widely used for machine frames, water and gas pipes, and building members (see Ferguson 1967:264). As people started to make steam engines, the demand for this product increased. According to Ferguson (1967:266), "innovations in iron-making and in steam-engine building combined to produce an accelerating advance of techniques, augmentation of power, and

mastery over materials". On the one hand, the increase in the use of steam engines, which demanded stronger and more durable material than earlier prime movers, increased the demand for cast iron (see Ferguson 1967:264). On the other, the introduction of the steam engine into the iron industry increased the ironmaster's supply of power. Thereby, it became possible to increase the supply of iron. With the further developments of the steam engine the supply of power and iron increased even more. Steam engines could now be employed to drive a forge hammer directly, and be kept in operation also during the season when there were no natural water supplies. Steam engines thereby replaced an intermediate water wheel, and liberated the ironworks from the dependence on waterpower (see Ferguson 1967:267, Singer et al. 1958a:161). The improvements of the steam engines also resulted in growing pressures and incentives to develop the machine-tool industry since the way to precision in the making of steam engines was to clamp the relevant tool and material firmly in a machine (see Singer 1958a:162). With better machine-tools, the hard metal could be cut, both in its cast and wrought form (see Ferguson 1967:264), and large and really efficient steam engines be built (Cardwell 1972:116). This, in turn, further increased the quantities of iron that could be made economically.

3.2.5. The steam engine

Not only is the steam engine an important invention, it also "belongs to the very select group of major inventions that have decisively changed the course of world history" (Cardwell 1972:69) and "changed man's consciousness of his world" both radically and irrevocably:

> If, to seventeenth-century philosophers the universe seemed like a gigantic piece of clockwork, to nineteenth century thinkers it was to appear to have many of the attributes of the heat-engine. On a practical plane, the steam-engine has transformed the conditions of life and the civil economy of England. (Cardwell 1972:130)

However, it did not immediately replace earlier prime movers (Singer 1958a:151). Initially, the capital needed for the invention was large relative to its energy-output.

Before the 18th century, Great Britain's industrial activity depended on humans, animals, wind and water as sources of power. As late as the 18th century, water was still the most desirable of these:

> Water-wheels continued to play an important part in the mechanised industries of England till at least 1850. Cotton, the steam industry *par excellence*, still drew a quarter of its power from water in 1830 and one-seventh in 1850. The other textile industries drew even more of their energy from water. Only where there was no water-power was the steam-engine rapidly adopted. (Singer et al. 1958a:156)

Since water was the most important source of energy in the textile industry, the new textile inventions came in areas of hills, valleys, and streams (see Singer 1958a:151) and the early mills were built on riverbanks. The number of mill sites, however, "was limited by the number of streams [---] and the fall of water along these streams" (Ferguson 1967:245). The mill-owners eventually crowded in the valleys. Without steam engines no further growth would have been possible when all waterpower sites were taken up. By means of steam engines, it was possible to create artificial waterfalls. They were used as accessories to the water mills for pumping up the water that worked their wheels. About the middle of the 18th century, water wheels were still the prime source of power, but now in combination with steam engines.

According to Ferguson (1967:261-263), the 18th-century-steam engine had several far-reaching effects. It was extremely important to the factory system of manufacture since it provided limitless power for factory buildings anywhere. Since workers were brought together in these buildings, it also helped to reinforce working discipline. It "gave the transportation systems a power source of undisputed merit for more than a hundred years" (Ferguson 1967:262). It was also important for the development of the internal combustion engine since its disadvantages for example, bulk, danger of explosion, and latent heat mothered a need for a prime mover that would replace the steam engine entirely. In being the first large machine that was built of metal, it started a chain of developments that have "conditioned how we live and view the world today".

3.2.5.1. The first generation of steam engines

The first full-scale steam engine that was built for sale and not for laboratory use appeared in England in 1699. Steam engines, however, were by no means "the earliest known contrivances operated by steam-power" (Singer et al.1958a:168). As early as the first century A.D. Hero devised an elementary type of reaction-turbine, the "Sphere of Aeolus" or aeolipile. The turbine, however, did not yield much power. It was not until the 17th century that it was explained how power could be derived from heat. More specifically, Giovanni Battista della Porta (1538-1615) then described "how water could be forced upwards from a tank by

pressure of steam on its surface", and "how the condensation of steam could produce suction for drawing water from a lower level" (Singer et al.1958a:168). Furthermore, in this century Evangelista Torricelli (1608-47) discovered that it was the pressure of the atmosphere "that determined the height to which a liquid could be made to rise by suction" (Singer et al. 1958a:169), and Otto von Guericke (1602-86) showed that "vacuum could be established and re-established at will" (Singer et al. 1958a:170). As a result of these discoveries, the design of a useful engine working by atmospheric pressure was in sight.

The first man "to employ steam to move a piston in a cylinder and to indicate a cycle of operations afterwards" was Denis Papin (1647-1712?) (Singer et al. 1958a:171). His work was later put to practical effect by Newcomen.

Newcomen's steam engine was the first really practical and reliable one (Cardwell 1972:69). It was originally used for pumping water out of mines and was large enough to cope with great quantities of water (see Ferguson 1967:248). As opposed to the first steam-pump, the Savery engine, it could be used for depths of several hundred feet. Iron-works could now be carried on with cheap mineral fuel. It was no longer necessary to separate furnace, forge, and mill. The Newcomen engine soon became "the main factor in the exploitation of the mineral resources of Britain" (Singer et al. 1958a:181). It remained unchallenged in the field for more than 60 years. It was not until the Watt engine was invented that is became obsolete.

Together with, and encouraged by, the entrepreneur Matthew Boulton (1728-1809) Watt monopolised the steam-engine business with his patent for the Watt engine between 1775 and 1800. Since his engine could operate directly on the blowing cylinders of the blast furnace it made the blast much more powerful. The higher temperatures "simplified the problems of using coke for smelting" (Ferguson 1967:266). The engine, which could be employed to drive a forge hammer directly, replaced an intermediate water wheel and freed the iron masters and the mill owners from their dependence on water (see 3.2.5.). Since the Watt engine might be employed to turn a rolling mill, it brought about a sharp increase in the available quantities of hammered and rolled plates (see Ferguson 1967:267). This stimulated the substitution of iron for copper in the making of steam boilers. A limitation of the growth of the steam engine industry by the high costs of copper could thus be avoided. Newcomen's and Watt's contributions "determined, in many detailed ways, how the steam engine must further develop, and it is to the genius of these two men that we owe the steam engine as we know it" (Ferguson 1967:257-258).

3.2.5.2. High pressure engines

The next real development of the steam engine, the development of the mobile high-pressure engine, did not come until between 1800 and 1850 (see Singer et al. 1958a:163). In 1800 the Boulton and Watt monopoly expired and new builders were allowed to enter the field (see Ferguson 1967:258). By 1850 the steam engine had become a significantly more powerful prime mover (see Singer et al. 1958a:258).

The theories of gases and heat and "the further developments of the calculation of the constructional details of steam engines" (Singer et al. 1958a:163) were all important for the improvements of the steam engine. The theory of heat paved the way for the foundation of the new science of thermodynamics. Thanks to the new science, inventors gained knowledge about the conservation of energy and heat-economy. For instance, they learned "that heat cannot of itself pass from a colder to a hotter body" (Singer et al. 1958a:164). They realised that heat-economy and thermal efficiency were essential for the future of the steam engine and that the introduction of high-pressure steam was necessary for full exploitation of steam engines (see Singer et al 1958a:165).

Richard Trevithick (1771-1833) in England, and Oliver Evans (1755-1819) in the United States both built important high-pressure steam engines. They were more powerful, lighter and more compact than earlier ones (see Ferguson 1967:258-261).

Furthermore, Trevithick and Evans both saw the connection between their engines and locomotive power. In 1804, Trevithick became the first person in the world to demonstrate a clearly successful locomotive engine (see Ferguson 1967:259). Evans, whose first engines were used to propel boats and to drive saw mills, flour mills and boring machines, "saw immediately the possibility of using his engine to drive a carriage on a smooth paved road" (Ferguson 1967:260), and often wrote about the future of locomotive power.

3.3. The 19th century

3.3.1. Progress, technology and people

According to Cardwell (1972:143-147), most advances or innovations that came in the period after the high-pressure engine had been invented were not really

new and startling but improvements of old ones. In contrast to what had gone before, it was a "pedestrian and respectable" (Cardwell 1972:143) period "of consolidation, cautious reform and progressive evolutionary improvement". In the of middle of the century, much had been achieved in physical science, Charles Darwin had formulated his evolutionary biology, living standards had been raised, and social, economic and technological advances had been made (see Cardwell 1972:162). At the time, there was an extremely strong faith in progress. According to Singer (1958b:817), "[n]o event was more symbolic of the progressive optimism of the mid-nineteenth century than the Great Exhibition of 1851". It revealed that the United Kingdom was the foremost manufacturing country of the world. Nevertheless, at the time there were also good reasons for supposing that future technological progress would be slow (see Cardwell 1972:162). Unlike today, there was little, or no appreciation of "open-ended" technology. People had started to believe that physical sciences were nearly complete, that there were no real secrets left to find, and that "no engine or means of power more efficient than the steam engine [could] be discovered" (Cardwell 1972:162)..

After the middle of the century British progress decreased its pace. As nation after nation was industrialised, Britain lost the predominance that the nation had gained by being first in the field. Britain, which was burdened with obsolete plants that the nation had inherited from earlier stages of development and the consequences of her educational system, passed the technological initiative in Europe to Germany. Germany, in turn, was rapidly industrialised. Outside Europe, the United States seized the throne (see Singer et al. 1958b:820-822).

In parallel with the transfer of power, and the maturing of industrialisation, the 19th century in Western Europe and North America was a time of population growth and extensive migration (see Singer et al. 1958b:822-826). The remarkable increases of population, which had started back in the 18th century, forced many people to leave the countryside to earn their living. They left for the city and for other countries. The most significant of the population shifts in this period numerically and historically was the emigration to the New World. Urbanisation, however, also left its marks. By 1900, the urban population exceeded the rural population in both Britain and Germany. When the westward drive had lost its force in the United States after 1890, migration to the cities increased there too (see Singer 1958b:822).

Not very surprisingly, many new technological innovations developed together with the population growth and the migrations. Examples are an

efficient transportation network, improved farming implements and storage methods.

3.3.2. Transportation

From Ferguson (1967:284) we learn that "improved transportation was the key to the success of the Industrial Revolution". "Without adequate transportation, the Industrial Revolution could never have prospered" (Burlingame 1967:425).

In the agrarian society, where the hearth and home were the centre of production and life, and raw materials were close at hand, the requirements on the transportation network were small. In the 18th century, transportation on land was still usually carried out on stone-paved paths by caravans of packhorses. At the time, heavy, bulky or fragile goods were transported by water. This way of transporting goods was easier, safer, and less expensive than transportation on land (see Hansson 1996:281).

The requirements on the transportation system, however, grew concurrently with the growing industry (see Hansson 1996:280). "In Great Britain the division of labour and increased production which resulted from the introduction of new machines and the factory system depended on the ability to move goods and raw materials [----] freely and economically about the [---] kingdom" (Ferguson 1967:284). In the United States, adequate transportation was essential to the westward movement. Hence steps had to be taken in order to meet the new requirements. In both Britain and the United States, rivers were improved first, and canals built (Ferguson 1967:285-286). In Britain, the canal-building activity started through the efforts of James Brindley (1716-62) (see Finch 1967:209). It was carried out particularly energetically in the period between 1760 and 1830 (see Hansson 1996:209). During this period, roads were also improved. Thanks to engineers like John Metcalf (1717-1810), Thomas Telford (1757-1834) and John Loudon MacAdam (1756-1836) (see Hansson 1996:283, Singer et al. 1958a:531). "[t]he second half of the eighteenth century saw a general improvement in the highway system" (Singer et al 1958a:530). Metcalf realised that the roads ought to have convex surfaces, and that ditches were needed next to the roads, (see Hansson 1996.293), Telford, emphasised close, firm pavements (see Hansson 1996:283, Singer et al 1958a:530), and MacAdam dry surfaces (see Singer et al 1958a:532). Thanks to the improvements, "[f]ewer coaches [---] overturned, and their speed was increased in proportion to the increased safety" (Singer et al 1958a:531)

Despite these efforts, however, the transportation network on land still did not meet the requirements raised by the rapidly increasing traffic (see Singer et al 1958a:530) and the rapidly changing society (see Hansson 1996:328). There was no large and efficient counterpart on land to the large iron ships that carried out transportation over the oceans until the development of the railways.

The "Railway Era" had started by 1830 (see Burlingame 1967:426) and reached its peak towards the end of the British industrial revolution, that is, between 1846 and 1848. Together with iron ships, railway systems became the motors of the developments of the 19th century. They were both cause and effect of the increased commercial and industrial activity of the 19th century. They provided the transportation needed to complete industrialisation and to make it effective. They also stimulated the industries by their enormous demand for the very products of the process, that is, first coal and iron, and then steel (see Burlingame 1967:436).

With the railroads people became less isolated from each other and bonds between citizens easier to strengthen. Like the ports that were used for exports and imports, railway junctions became densely populated areas. Similarly, railway stations became the cathedrals of the 19th century (see Hansson 1996:334).

Like many other revolutionising innovations, the steam locomotive was first met with scepticism (see Hansson 1996:333-334). For a long time, people were afraid of its speed. They also feared that it would scare the cows grazing in the fields next to the railways, that the boilers of the engines would explode, and that the efficient means of transportation would facilitate for criminals and revolutionary mobs to ravage the countries. It was not until the mid-1830s that the superiority of steam locomotives was fully acknowledged (see Hansson 1996:330).

3.3.3. Telegraphy

According to Hansson (1996:337), there is a close connection between the success of the railways and the simultaneous development of telegraphy, which made it possible to send messages quickly between stations. The telegraph also played an important part in the distribution of news and weather forecasts (Hansson 1996:340). Before the 1830s all telegraph networks were optical. These were, however, replaced by the more efficient electrical ones as more and more findings in the field of electricity were made (see Hansson 1996:337-339, Dibner 1967b:452-460).

The first electrical telegraph seems to have been invented in 1804 by the Spaniard Fransisco Salva (1751-1828). Other telegraphs were invented by Charles Wheatstone (1802-1875), William Fothergill Cooke (1806-1879) in England, and Samuel Morse (1791-1872) in the Unites States (see Hansson 1996:338-339).

The rapid development of the electric telegraph from the 1840s onwards made people accustomed to nearly instantaneous communication across oceans and continents. When Alexander Graham Bell invented the first effective telephone in 1875 the technology was extended to include the transmission of speech (see Dibner 1967b:456).

The first wireless message across the sea came in 1899 with Guglielmo Marconi's (1874-1937) message across the English Channel. Two years later the first wireless message across the Atlantic Ocean was sent (see Hansson 1996:340).

3.3.4. The textile industry and the Jacquard loom

The textile industry, which had been one of the most important industries during the first phase of the industrial revolution (see Cardwell 1972:143 and 3.2.2.-3.2.2.3.), was still important in the 19th century. By 'chain effect', new technologies and new industries had grown up to service it (see 3.2.2.3). In addition, the concentrations of technical talent, and the pressures of innovation in this industry were interesting to those who "appreciated the application of scientific methods and new scientific knowledge in industrial processes" (Cardwell 1972:142). For example, the Mechanics' Institute movement, whose aim was "to provide working men with evening instruction, after work, on the scientific principles underlying the technical process of the industries that employed them" (Cardwell 1972:142) was concentrated to the textile areas.

One of the most significant innovations in the textile industry in the period 1790-1825 was the loom, which was invented by J. M. Jacquard in 1801 (see Cardwell 1972:119). With Jacquard's loom, it became economically possible to quickly weave a fabric with a pattern that repeats itself. Furthermore, the loom introduced a fruitful way of programming an automatic machine, which later directly inspired Charles Babbage, the founding father of the computer. Its way of coding information and then reading it by means of probes was the starting point of modern computer technology. The presence or absence of a hole, which was, and is, used to correspond to 'on' or 'off' in the loom, corresponds to what,

in today's computers, we recognise as 1 or 0 in binary notation (see Cardwell 1972:121).

The final steps towards the mechanisation of the textile industries came in 1822 with Richard Roberts's automatic self-acting mule. In less than sixty years, the textile industry, which had been a cottage-based craft, was transformed into a mechanised mass-production industry (see Cardwell 1972:143).

Thanks to the progressive improvement of the steam engine along with the refinement of textile machinery, "the steam-powered cotton mill became the characteristic production unit in the industry" (Cardwell 1972:143). None of these developments, however, would have been very successful without the development of the machine-tool industry (see Cardwell 1972:146).

3.3.5. The development of machine tools

Beside the close connection between the development of the machine-tool industry and the rapid improvement of the steam engine, machine tools were of vital importance practically everywhere where there was a diversity of industry (see Cardwell 1972:116).

During the first half of the 19th century, classical machine tools such as lathes, boring and drilling machines, shapers and planers were built of wood by craftsmen for use in factories (see Woodbury 1967:620). No two machines were exactly alike, and they were all "suited to the production of heavy, rather clumsy machines of relatively slow speeds and much noise" (Woodbury 1967:620). With the increased demand for new, lighter, finer, and better designed machines like the sewing machine in the 1850s, the bicycle in the 1880s, and the automobile by the turn of the century, the tools needed to make them had to be changed. Since the new machines were built for operation outside factories, and used by great numbers of technically unskilled people, they needed changes that required as well as permitted corresponding changes in the machine tools. Standardisation of parts, interchangeability of manufacture, and precision methods with respect to the construction of machines were needed. Skilled professional engineers rather than craftsmen were used at the head of the production. In the machines, iron and steel were used rather than wood (see Woodbury 1967:620).

The result of the changes was that machine tools were eventually improved enough to enable "such a high standard to be achieved that parts were interchangeable between machines "(Cardwell 1972:146). With the development, mass production, one of "the major technological trends of the 20th century" (Rae 1967a:37), became feasible (see Cardwell 1972:146). In turn, this created

opportunities for one of the most characteristic industries of the twentieth century, the mass production of motorcars (see 3.3.6 and 3.4.3.1.).

3.3.6. Prerequisites for mass production

Not only was the great accuracy of new machine tools essential to the technique of mass production, so were the development of the conveyor-belt and Frederick W. Taylor's (1856-1915) ideas on the organisation of work (see Hansson 1996:352-354).

Conveyor-belts were put into practice before the mid-century in both Europe and the United States. With them the work was divided into different operations, for which different workers took responsibility. They made it possible to reach higher degrees of efficiency.

Taylor's ideas on the organisation of work also made the work in the industries much more efficient. (see Pursell & Kranzberg 1967:9). In his opinion, "inter-personal, man-machine, and other relationships could be placed upon a firm scientific footing" (Pursell and Kranzberg 1967: 9). The key to success was the application of "the same principles of efficiency to the hand and muscle of man – as to the design of machines" (Guest 1967:53). Before the turn of the century, Taylor's ideas appeared in agriculture and in resource management (see Pursell and Kranzberg 1967:9). A few years later they were applied to "the planning of cities and the social development of whole regions" (Pursell and Kranzberg 1967:9).

3.3.7. Electricity

3.3.7.1. From knowledge to application

Another field in which scientific methods came to be of vital importance was the field of electricity (see Dibner 1967b:437). Electrical phenomena, like the ones caused by the power of attraction of rubbed amber, had been known as far back as antiquity (see Hansson 1996:377). The first advances in the field, however, were not made until 1600 when the book *De Magnete* by William Gilbert (1544-1603) was published. Gilbert's book was the first to describe electrical phenomena and it marked "the beginning of proper analysis of electrical behavior" (Dibner 1967a:438). It did not, however, bring about an immediate explosion of advances. The first electric machine was devised around sixty years later by Otto von Guericke (1602-86) (see Hansson 1996:377, Dibner 1967a:438). It consisted of a sulphur globe on a shaft of iron. When an electrical charge gathered on its surface, the globe attracted paper, feathers, chaff, and

other light objects. Von Guericke found that bodies became charged when brought near to an already charged sphere. He also noted small sparks and crackling sounds when the globe discharged (see Hansson 1996:377).

The sparks and cracks were explained one century later when the innovator of the lightning rod, Benjamin Franklin (1706-1790), in a series of experiments, confirmed his thesis that lightning is an electrical manifestation (see Dibner 1967a:441).

Another important breakthrough was the finding that the knowledge of electricity could be turned into practical use. The finding soon made electricity "the subject of wider experimentation and of correspondence between experimenters "(Dibner 1967a:441-442). As a result of the experiments, the Italian Alessandro Volta (1745-1827) invented an electric battery in 1800 (see Dibner 1967a:443-444). The invention, the *Voltaic pile,* "provided a continuous flow of current rather than [a] single instantaneous discharge" (Dibner 1967a:444). It was immediately put to use by experimenters both in England and on the Continent.

Soon electric batteries became indispensable in chemical laboratories and their value as scientific tools unsurpassed (see Singer et al. 1958a:227).

While demonstrating the properties of the electric battery, the Danish Professor Hans Christian Oersted discovered that an electric current influences a magnetic needle. He had found the link between electricity and magnetism (see Dibner 1967a:446-447). The results of his discovery quickly spread through Europe, and paved the way for other advances. An example is Michael Faraday's (1791-1867) discovery of electromagnetic induction, which was extremely important for further progress in the application of electricity, and made it possible to generate electric currents mechanically (see Dibner 1967a:447-449). His discovery later proved to be essential for the generation of electric voltages by mechanical rotative and motive power.

In the early years of electrical application, however, research on power sources was not concentrated on the generator, but on the battery, which could be used in the telegraphy system. Work on the generator did not increase until almost half a century later when people became interested in electric illumination (see Dibner 1967a:451).

The earliest application of a magneto generator to feed an arc light was for lighthouse illumination on the Straits of Dover in 1862. A few years later, generators were improved further with self-excitation of their magnetic poles. These *dynamo-electric machines,* or *dynamos,* soon became efficient enough to make it possible to install the motor, which was fed from a dynamo, at a

considerable distance. Electric transmission of power, which was rapidly applied to traction, machine tools, pumps and a host of other applications, was now possible. In turn, the broad application of power bred a need for more and better generators (see Dibner 1967a:451).

3.3.7.2. The electrical industry

Despite all the advances, the development of the electrical industry did not have a quick start. It took some time before its "unmatched versatility" (Sharlin 1967:578) was discovered, and it could not spring up until a large number of ancillary inventions had been made, and a manufacturing industry established.

Electricity was first used to provide telegraphy, mainly in connection with the developing railway services (see 3.3.7.1.), and to establish the metal-plating industry, but its first commercial success was illumination (see Sharlin 1967:578). Electricity was successfully used as a source of light in the small incandescent bulb, which had an agreeable light, did not produce a noise, an odour or danger of any sort, and could be used both in ordinary homes and in public buildings (see Cardwell 1972:170).

The great breakthrough of the incandescent light came with Thomas A. Edison's (1847-1931) achievements, which were both technical and commercial. Indeed, laboratory models of incandescent lamps, which would burn for a considerable length of time had been invented at the time of his achievement. Edison's lamp, however, was part of a larger technological development. So far, no other inventor had come up with the idea of connecting the lamps parallel to each other in such a way that the turning on and off of one lamp does not affect the other. Commercially, Edison's achievements consisted of a mass-distribution concept, that is, a whole system for marketing the low-cost light. With the lamp that he invented in 1879, electrical lighting could finally compete with gas lighting for a mass market (see Sharlin 1967:567-569).

Electricity was also used on a large scale in electric motors (see Sharlin 1967:571). This was "[t]he second great use of electricity, after illumination and outside of communications" (Sharlin 1967:571). First, it was used in railway motors. Electric railway motors had advantages of both economy and cleanliness over steam. In addition to being important to the history of transportation, electric railway motors were progenitors of motors in mills, and hence to the history of electric power. As Sharlin (1967:575) puts it, in the development of the electric railway system, "means for generating, distributing, and using large amounts of electric power were successfully worked out." The electrification of

the first factory, a cotton mill, was followed by the electrification of others (see Sharlin 1967:577). At the beginning of the 20th century, all new factories used electric motor drive.

3.3.8. The development of automobiles

In addition to being used to run locomotives, electricity was one of three competitive types of propulsion in the pioneering days of the automobile. Early automobiles were run either by electricity, an internal-combustion engine, or by steam (see Rae 1967b:123). It was the advent of the steam engine that made the self-propelled highway vehicle "a practical possibility" (Rae 1967b:119). As early as 1769, a steam-powered carriage was designed by Nicholas Joseph Cugnot. The carriage was made for pulling artillery pieces. Steam-powered carriages, however, like the ones run by electricity, were eventually driven out of the market by the carriages run by internal combustion engines (see 3.4.3.1.)

The first inventors to successfully put the internal-combustion engine on wheels were the Germans Karl Benz and Gottlieb Daimler in 1885. "There has been a considerable controversy over which one should be considered as *the* inventor of the automobile" (Rae 1967b:120). Daimler first saw "that a high-speed motor offered the best prospect for using an internal-combustion engine on a highway vehicle" (Rae 1967b:120), and Benz first introduced spark ignition.

In Britain, railway and stagecoach companies, which felt threatened by the development of the horseless carriage, for a long time inhibited experimentation with the horseless motor vehicle by securing legislative restrictions (see Rae 1967b:120). These culminated in the Red Flag Act in 1865, which required that "self-propelled vehicles on public highways limit their speeds to four miles an hour and be preceded by a man on foot carrying a red flag" (Rae 1967b:120). As intended, the legislative restrictions slowed down the developments. When the law was abolished in 1896, however, the internal-combustion engine had been invented. It was now possible for the great automotive engineer F.W. Lanchester to build the first all-British petrol automobile.

At the close of the 19th century, manufacture of the motor vehicle was well established in France and Germany, and it was just beginning in the United States and Great Britain (see Rae 1967b:121). At this stage, it was not particularly difficult to get into the business, and cars were assembled in a number of different small shops from parts made by a number of different companies (see Rae 1967b:122). Until the beginning of the 20th century there

were numerous technological variations, and there was uncertainty about what the future vehicle would be like (Rae 1967b:122).

3.4. The 20th Century

3.4.1. The turn of the century

Around the turn of the century, "the technological prospect could hardly have been brighter" (Pursell & Kranzberg 1967:10). Practically wherever one looked, to transportation, communications, materials, energy, agriculture, resource development, industrial research and industrial management there was historical evidence of rapid technological development. Exciting "inventions, theories, discoveries, techniques, and insights, which promised to transform the new century" had been brought forth (see Pursell & Kranzberg 1967:10). For many people living in the Western World, there had been positive political, cultural and social changes.

At the turn of the century, Western people were confident of their own destiny. The time was characterised "by political stability and a widely held belief in the idea and ideals of human progress" (Williams 1978:1). "There had been no wars between great powers for thirty years, and no general war since the fall of Napoleon" (Williams 1978:1). With little effort, colonial powers could use their colonial territories as worldwide markets, and exploit "their sources of cheap raw materials as a solid basis for their prosperity" (Williams 1978:2).

Despite the rise of the standard of living in the West at the turn of the century, however, modern technology still "played only a minor role in the lives of most people" (Drucker 1967b:23). Both in the cities and in the countryside, the facilities in the home for sanitation, lighting and heating developed slowly. Cities were growing rapidly. Since amenities within the home, like running water, flush toilets, gas or electric illumination, "were dependent upon the general availability of utilities within the municipality" (Rotsch 1967:217), "utility services almost inevitably lagged behind urban growth" (Rotsch 1967:217). In the countryside or in small towns, where still the majority of people lived, modern technology was not yet part of people's daily lives. Electric lights, telephones, street railways, and daily papers, which were dependent upon the telegraph and printed on steam-driven presses, were only to be found in a few large cities (see Drucker 1967b:23).

In the period 1909-14, what had been a period of political stability gradually turned into a period of international tension, for example, between Britain and

Germany (see Williams 1978:4-7). The British appreciated neither Germany's dominant position in matters of trade, nor the growth of the German navy, which was considered to be dangerous for the safety of the island and for its imperial communications.

As a result of a series of complex developments, the world was struck by two world wars before the middle of the century. The wars left big, devastating, marks on people's lives, but also stimulated technological development. Since different nations were pressured to be ahead of their enemies during the wars, they intensely applied valuable resources to military innovation (see Rosenbloom 1967:601). As exemplified by the advances in the control of nuclear energy that were made during the Second World (see Hewlett 1967:256, 260) and advances in the field of aviation (see 3.4.3.2.), the wars both "accelerated the rate and altered the direction of technological change"(Rosenbloom 1967:601).

3.4.2. Technology and science

In addition to stimulating new inventions and discoveries, the two World Wars changed the relationship between science and technology. With the wartime developments, the interval between a discovery in theoretical science and its practical application shrank radically (see Hewlett 1967:256).

Throughout the 19th century, technological activity had still been a craft practised by individuals who did not have much formal education (see Drucker 1967a:11). Similarly, the typical inventor was a mechanic. Generally, the few who had gone to college were liberal arts students, trained primarily in Classics and not in technology or science. Until around 1850, scientists were not particularly interested in the technological development and application of their discoveries. During the 20th century, however, as technological work became more and more complex and specialised, university degrees in technology or science became more and more important to those who were carrying out technological work. About the time of World War I, the "technically educated man with the college degree began to assume leadership" (Drucker 1967a:12) and "by the time of the Second World War the change was essentially complete" (Drucker 1967a:12). Ever since 1940, technological work has been a profession generally based on specific university training, the inventor an engineer, and the craftsman a professional.

3.4.3. Transportation

The developments in the field of transportation, which had started with the process of industrialisation in the 18th and 19th centuries and raised the standards of the transportation network considerably, did not lose pace in the 20th century. On the contrary, the technological advances of the century both satisfied the need for a broader and broader transportation network on land and by sea, and enabled people to master the sky and explore space (see Emme 1967:673-686).

In 1969, about 340 years after Galileo had first pointed his telescope at the moon, the first man was able to land on the satellite. The new transportation technology provided by spaceships made people's possibilities to travel wherever they wanted seem unlimited. We no longer seemed to be confined forever to our planetary homeland (see Emme 1967:674).

3.4.3.1. Motor vehicles, roads and ways

At the beginning of the 20th century, the technique of mass-production was finally worked out by Henry Ford. He solved the "the economic problem of how to produce the largest number of finished products with the greatest reliability of quality at the lowest possible cost" (Drucker 1967a:19). By doing so, he made it possible for the production and use of motor vehicles to expand phenomenally (Rae 1967b:125), and for industries that copied the effective technique to raise their degree of efficiency. The technique was behind "the astonishing economic recovery of the industrial societies of Europe and Japan" (Rae 1967a:51-52) after World War II. By 1910, two years after the Model T Ford was put on the market, "the builders of steam automobiles either gave up or turned to the internal-combustion engine" (Rae 1967b:124). The only exception was the Stanley brothers of Newton, Massachusetts. Their carriages stayed on the market until after World War I.

With Ford's achievements, the manufacture of motor vehicles in the United States soon became the nation's largest industry, and "the automotive output [---] the prime index of the state of the [nation's] economy" (Rae 1967b:119). The impact of the automobile was, and still is, great. It both "transformed transportation by land and changed the living habits of people throughout the world" (Rae 1967b:119). As a carrier of goods and passengers, it provided a degree of flexibility that had never been experienced before. It became both a serious competitor of the railroad and an invaluable adjunct to it (see Rae 1967b:131). It gave "economic viability to farms and communities which did not have ready access to rail transport", and "the shipper of small lots a means that

could be tailored to his needs" (Rae 1967b:131). The motor vehicle was also "quickly [---] adapted for such specialised duties as fire engines and ambulances" (Rae 1967b:131-132). In 1977 the following was true about the motorcar in the United States:

> One in seven of all workers makes cars or serves them. Up to eight million new cars are made each year; four households out of five own at least one car, and more than a quarter own two each. The minority without a car are mainly old people and inhabitants of crowded city-centres. There are over 110 million cars and fifteen million commercial vehicles [---]. In some western states there are already more than half as many cars as people. (Bromhead 1977:196):

Moreover, by its mere existence the motor vehicle created a need for innovations in a number of different fields, for example, advances in highway engineering (see Rae 1967b:133-135). As pointed out by Rae (1967b:133), "highway transport can flourish only if there are highways capable of being used with economy and efficiency".

The rapid advance of the automobile was the result of a number of different factors (see Rae 1967b:121-122). To some extent, the bicycle paved the way for the motorcar. In its capacity as immediate predecessor in road transportation it created a public demand for better roads by putting a very large number of people on the highways. It also contributed to "the automobile steel-tube framing, ball and roller bearings, differential gearing, acetylene lamps, and above all, the pneumatic tire, invented in 1888 by a British physician, John B. Dunlop" (Rae 1967b:122). Many of the early automobile firms started as bicycle firms.

The advances in highway engineering during the previous century, however, "were predicted on relatively light and slow-moving vehicles and not the automobile" (Rae 1967b:133)

The rapid increase in the number of automobile owners at the beginning of the 20th century created a strong body of opinion that agitated for more and even better roads (see Rae 1967b:133). By the mid 1920s, roads with three and four lanes were built. By the 1930s, highway engineers had realised that limit-access express highways "with traffic in opposite directions rigorously separated and cross-traffic interdirected" (Rae 1967b:134) were the most promising solution to the problem of taking the traffic from one place to another in a smooth way.

3.4.3.2. Rail and water transport

With the exception of densely populated and industrialised areas, "railroads in North America and in Western Europe had [---] reached the end of their great

period of extensive development" (Williams 1967:137) as the 20th century dawned. At the turn of the century, "the reciprocating steam engine was almost the sole motive power of railroads the world over" (Williams 1967:142). It did not take long, however, until superheating was applied extensively to new locomotives (see Williams 1967:137). It rapidly increased the capacity of the steam locomotive. As a result of the improvements, locomotives became longer and heavier, and a number of different elements of railroad technology, like tracks, bridges, turntables and engine houses, had to be improved (see Williams 1967:140).

In 1932, however, "the Pennsylvania Railroad began electrification of its New York-Washington service" (Williams 1967:142). The development was important for the development of railroad technology since electric locomotives proved to be compact, flexible, and comparatively easy to maintain. Moreover, they were able to work at substantial overload, and to deliver power continuously throughout the revolution of the driving wheel (see Williams 1967:143).

Another important development came in 1934 when "[t]he first diesel-powered, streamlined articulated passenger train was built for the Union Pacific" (Williams 1967:143). The diesel-powered train, which needed only one engine crew to control its units, irrespective of how many they were, had many advantages (see Williams 1967:144). As a result, diesel locomotives gradually replaced the steam engines. Thanks to the diesel, railroads were able to meet the growing competition from other forms of transport in the post-war period, and rescued the railroads from a major financial crisis (see Williams 1967:146).

In parallel with the developments in the railroad industry, a great deal of progress was made in the field of water transport in the period. As the 20th century dawned, vessels were still performing cargo transportation in marginal trades. The steam vessel, however, which was first run by steam engines, and later by steam turbines, had long since become competitive in most types of ocean carriage.

Cargo-shipping was changed considerably as large vessels run by marine diesel were replaced by large ocean tankers (see Williams 1967:149), and later revolutionised by the introduction of super-tankers (see Williams 1967:150-151) around 1950.

3.4.3.3. Aviation
Even though the balloon had been invented towards the end of the eighteenth century (see Cardwell 1972:113), and lighter-than-air ships, like count Ferdinand

von Zeppelin's (1838-1917) by 1900 (see Smith 1967a:165-166), the first few years after the invention of the aeroplane were characterised by distrustfulness of any reports on humans that could master the sky (see Hansson 1996:373).

The first motor driven, heavier-than-air aeroplane was invented by Orville (1871-1948) and Wilbur Wright (1867-1912) in 1903. However, it was not until 1908 that their achievement was recognised (see Smith 1967a:157). One year later, their first aeroplane was sold to the Army (see Smith 1967a:167). Before the first decade of the 20th century had passed, the aeroplane's usefulness as an instrument of war was recognised. Scientific activities financed by a military budget proved to be essential for technological progress in the field of aviation. Thanks to military research and development, a great deal of progress was made in this field in industrialized Europe and the United States in the following decades (see Smith 1967a:157). After World War I, the aeroplane had become "an increasingly complex machine that consisted of many smaller machines and systems" (Smith 1967a:160). As is typical of technological development, progress in the design of one component stimulated progress in the design of others.

In the first aircraft power plants, the only type of propulsion unit was the internal combustion engine. It could produce a relatively large amount of power by a relatively light engine (see Smith 1967a:157). In the late 1950s, the jet engine "took the aeroplane through and beyond the speed of sound" (Smith 1967a:159).

Civil aviation started to emerge in the 1910s. (Smith 1967a:171). In January 1914, the first passenger-carrying airline in the United States, the St. Petersburg-Tampa Air Boat Line, opened for business. In May 1927, when Charles A. Lindberg managed to fly non-stop from New York to Paris, enthusiasm for aeroplanes and investment in the fledgling aviation business knew no bounds. It lasted until the United States stock market crashed in 1929 and the worldwide Great Depression set in (see Smith 1967a:171-173).

Like the close connection between the railroads and the telegraph in the 19th century (see 3.3.3), and the development of the ocean-going shipping and wireless telegraphy earlier in the 20th century (see Smith 1967a:178), there was a close connection between the field of aviation and the development of communication by radio. At the end of the first fifty years of flight, "commercial, military, and private flying enjoyed elaborate and invaluable airport, radio, and radar-navigation aids" (Smith 1967a:178-179).

3.4.4. Electronic communications

In the 20th century, "[r]adio broadcasting, and then television, made communication immediate, flexible, personal, and, with the tiny transistor, ubiquitous" (Finn 1967:293).

The emergence of the radio as an applied technology and a commercial success came in the period 1912-20 (Finn 1967:299). It was also stimulated by World War I (Finn 1967:302). First, further advances in the field were greatly stimulated by the usefulness of the radio to the air force and to the navy during the war. Second, the war, which necessitated the training of a large number of signallers, made quite a few people familiar with radio engineering.

At the time, however, the use of the radio was generally restricted to the connection between one transmitter and one receiver. The breakthrough of broadcasting did not come until 1920, when the radio amateur Frank Conrad in Pittsburgh began to broadcast gramophone concerts. As these caught the public's attention the demand for receivers increased dramatically, and a rapid commercial development started.

The improvements of the radio also paved the way for the use of Radio Detection and Ranging, RADAR (see Finn 1967:305-306). By means of RADAR, it became possible to measure the distance to an object. This is done "by measuring the time it takes for radio waves to travel from a transmitter to an object and be bounced back again" (Finn 1967:305).

The first patent on television "was obtained by Paul Nipkow in Germany in 1884" (Finn 1967:303). It was based on a mechanical scanner and could only transmit still pictures. The transmission of moving pictures was facilitated by the invention of the iconoscope camera tube by the Russian Vladimir Zworykin (1889-1982) (see Finn 1967:304).

By the mid-thirties, Great Britain, Germany, France and the United States had started to telecast on a regular basis (see Finn 1967:302-303).

3.4.5. Energy sources

3.4.5.1. Lighting, heating and conventional sources

At the beginning of the 20th century, both "[l]ighting and heating were [---] quite primitive by modern standards" (Rotsch 1967:218). Coal was still the prime source of energy, and wood was still significant (see Netschert 1967:237). Crude oil was an important source of illuminating oil. It was used in the popular kerosene or "coal-oil" lamps, which replaced both candles and whale-oil lamps

in many homes about 1860. They remained the major source of illumination for several decades and were still in use in most rural homes as late as the 1930s (see Rotsch 1967:223).

Even though manufactured gas was used for lighting the streets of London as early as 1813, gas was slowly introduced in homes. During the 1890s, manufactured gas was used for lighting streets, public buildings and fine homes (see Rotsch 1967:224). Manufactured gas, however, was for a long time comparatively expensive, (see Netschert 1967:246) and natural gas, which could only be used close to the gas fields (see Rotsch 1967:223), was considered "a nuisance and waste product" (Netschert 1967:237) that did not yet offer a good alternative. Gas did not become a cheap and abundant fuel until the invention of long-distance, large-diameter, high-pressure pipelines in the mid-1930s made it possible to carry gas economically over long distances (see Netschert 1967:246). During the Second World War, the "practicability of long-distance, large-scale pipeline transmission" was unequivocally demonstrated by the American pipelines "Big Inch" and "Little Big Inch" (Netschert 1967:246). A pipeline boom followed, and in most great urban population centres in the United States, people supplemented their use of gas for cooking with the use of gas for house heating. Gas was also used to feed power stations, and found industrial applications on a large scale.

At the beginning of the 20th century, electric power was no longer a novelty. With only "two decades of commercial existence behind it" (Netschert 1967:247), it had "already exhibited the essentials of the modern power system" (Netschert 1967:247). It was available in cities and towns for use in the home, where it was mainly used for lighting, but also in appliances such as hot plates, irons, and fans. Occasionally, it was even used for heating. In industry, electricity was primarily used in small factories, which unlike the larger ones did not already have their own power plants. "One of the first electric light installations was made in a store in Philadelphia in 1878. It consisted of a system of arc-lamps developed by Charles F. Brush of Cleveland, Ohio" (Rotsch 1967:224). In 1882, the Edison Electric Company in New York constructed the first steam-powered central generating plant. It furnished direct current power to over 500 customers within one year. In the same year a hydroelectric plant was opened at Appleton, Wisconsin. Electricity, which was now a much cheaper source of power, was soon used for lighting in most urban areas in the United States (see Rotsch 1967:224-225).

3.4.5.2. Nuclear power

In the 1930s, the seeds of nuclear power were planted in laboratories in Europe (see Hewlett 1967:256) and in 1942 the first nuclear reactor in the world was built (Williams 1978:239). The developments go back to the revolutionising discoveries of the X-rays, the electron, and alpha, beta and gamma radiation, which helped scientists to establish the nature of radiation, and made them eager to find the cause of the phenomenon (see Williams 1978:223). By the end of the nineteenth century, a large number of physicists were thus "concerned with the spontaneous emissions of radiation from the atoms of certain heavy elements" (Williams 1978:223). Irène Curie, Frederick Joliot, Enrico Fermi, Lise Meitner and Otto Frisch all made important discoveries in the field. Irène Curie and Frederick Joliot discovered that some light elements could be made radioactive when bombarded with alpha particles (Williams 1978:224). Enrico Fermi realised that the neutron, which was electrically uncharged, could be used as effective missile to bombard a nucleus. He also found that uranium, the heaviest element occurring in nature, became radioactive under neutron bombardment and thereby formed even heavier elements. Early in 1939, Lise Meitner and Otto Frisch calculated that when uranium was split into two halves, vast amounts of energy would be released (Williams 1978:225). Later in the same year, the Joliot–Curie group found that when this process occurred, several secondary neutrons were emitted, and hence a chain reaction possible. The process, which seemed fit not only for generating power but also for potential use as a powerful destructive weapon, was discovered shortly before the outbreak of the Second World War. The distance between theory and practical demonstration, however, was still large. "Research began in the United States, Britain, France, the U.S.S.R. and Germany and possibly other countries" (Williams 1978:225). The nations, which all feared that their enemies would develop a nuclear bomb before them, were greatly spurred to be ahead of their enemies. The first to be convinced that a bomb was in sight that was powerful enough to have decisive effects on the results in the war were the British (see Williams 1978:227). In 1942, the Americans, which were "fully informed" by the British, set up a Project to design one (see Williams 1978:271). The project was called the Manhattan Project, but this was a cover name. The project was carried out at the Los Alamos laboratories in New Mexico and was led by Robert Oppenheimer. By June 1945, they had sufficient data to begin the production of the first nuclear weapon (see Williams 1978:276). On 6 August 1945, the first nuclear bomb, *little boy*, was dropped on Hiroshima. Four days later, the second, *fat man*, was dropped on Nagasaki. Even though four years of global warfare were brought to

an end soon afterwards, the destructive power of the two bombs devastated both places, and scientists felt that their discoveries had taken them too far this time (see Hewlett 1967:260-261). A United Nations Commission was therefore set up in order to control the use of "the dismaying new force" (Hewlett 1967:260), and to study means for ensuring that atomic energy was used for peaceful purposes (see Hewlett 1967:261).

At the end of the war, however, the Americans had become less enthusiastic about reactor development. Since they had large reserves of oil, natural gas, and coal they had no pressing need for nuclear reactors. Many piles were closed down because they were considered unsafe. Only the navy seemed interested in nuclear power (see Williams 1978:252). People in general did not again become enthusiastic about a peaceful development of atomic power until the mid-1950s when the American president Eisenhower called for a new program for power reactor development (see Hewlett 1967:266). It was not until the 1960s that the costs of nuclear power had become competitive to those of conventional fuels. Now the development of converter breeder reactors could progress at full speed.

However, despite the efforts of the United Nations Commission, nuclear power was used not only for peaceful developments. As hopes of agreement between the Americans and the Russians faded, both Russia and Britain established independent weapon development programmes, which eventually led to the development of 'H'-bombs (see Williams 1978:277).

3.4.6. Agricultural developments

In the centuries preceding the 20th century, rural technology had seen a "first cycle of progress [which] shifted the burden of farm work from the backs of people to draft animals" (Wik 1967:354). In the 20th century, there was a second cycle of progress where work was transferred from animals to machines powered by steam, petrol, or electricity. The century saw dramatic changes, many of which were stimulated by World War II (see Rasmussen 1967:337). Higher prices, a wartime demand for farm products that seemed to be unlimited, a shortage of farm labour, and appeals from the government necessitated a rise in agricultural productivity. In order to accomplish this, technological advances had to be made. A number of new devices and processes were made use of. Rasmussen (1967:337-338) mentions the following ones:

> [W]idespread progress in mechanization, greater use of lime and fertilizer, widespread use of cover crops and other conservation practices, use of improved varieties of both plants and animals, the adoption of hybrid corn, the better

balanced feeding of livestock, the more effective control of insects and disease, and the use of chemicals for such purposes as weed-killers and defoliants.

Since adequate sources of power were essential for the development of rural technology, "[e]lectrical power became one of the most versatile aids for rural Americans during the 20th century" (Wik 1967:366).

The steam engine, however, was the first source of mechanical power that farmers turned to, (see Wik 1967:356). In the United States, many steam engines were installed on southern plantations in the period from 1807 to 1812. By 1838, no less than 585 farm steam engines were in use in the United States "for driving saw mills, sugar mills, grist mills, threshing machines, and cotton gins" (Wik 1967:356). The use of steam engines on farms stimulated technological development by making farm engineers familiar with mechanical features like "slide valves, injectors, steam boilers, governors, gear ratios, and lubricants" (Wik 1967:357), and by being large and difficult to move. Since the engines were large, they became another impetus for improving roads and introducing petrol tractors, automobiles and trucks.

By 1904, farmers in the United States were beginning to buy early autos both for business and pleasure (Wik 1967:365). Henry Ford's Model T, which was introduced in October 1908, soon became popular with farmers because of its low cost, stamina, and ease of repair.

3.4.7. The Computer

Like most other 20th-century-inventions the history of the computer is complex. The first computers were not completely new machines but "a culmination and joining together of several machine traditions" (Smith 1967b:310). These "have mutually influenced each other's progress in design for centuries" (Smith 1967b:310). Examples are the tradition of producing machinery designed to transmit and multiply or reduce power and speed, and the tradition of machinery designed to transmit motion with special emphasis on the control and precision of that motion (see Smith 1967b:310).

The progenitor of modern information-processing computers, the electronic calculator, would probably not have been conceived, had it not been for the development of mathematical calculators like the digital calculator of the abacus tradition, and the analogue computer of the logarithm, slide-rule tradition (see Smith 1967b:310-313). These calculators, in turn, have developed out of the idea of using physical objects like fingers and stones "to represent abstract notions of quantity in terms of numbers" (Smith 1967b:312), and "the idea of using the

place and position of the physical objects to store and keep track of certain numbers while counting other[s]".

Thanks to the achievements of Charles Babbage (1792-1871), Herman Hollerith (1860-1929), Howard D Aiken (1900-1972), and many others, "mechanical calculators had become significant tools in commerce and science during the 19th and early 20th centuries" (Smith 1967b:315). Charles Babbage, who was inspired by the Jacquard loom (cf. 3.3.4), conceived, developed, and refined the first electronic calculator, which could "receive information in proper coded form from punched cards" (Smith 1967b:317). His machine, however, was never built. The first punched-card machine, invented by Herman Hollerith, was used for the analysis of the American 1890 census (see Smith 1967b:318-319). It was much faster than the best manual system. In 1943, Howard D Aiken (1900-1972) together with IBM constructed Mark I, the first computer that really worked (see Hansson 1996:396-397). In the same year, Alan Turing (1912-1954) invented Colossus, the first electronic machine that could decode messages (see Hansson 1996:398). The first electronic computer, the Electronic Numerical Integrator and Computer or ENIAC went into operation in 1946 and was put to work on ballistics calculations (see Smith 1967b:320). The ENIAC was the first of the next generation of computers "whose ancestry can be traced back to the complex history of electronics in radio and telephony" (Smith 1967b:321). In the next twenty years, radio tubes in the computers were replaced by transistors, and wired circuits by printed ones. As radios and radar components grew smaller, the physical size of computers was reduced. Nevertheless, their versatility and capacity to handle information increased. The trend towards smaller and smaller computers continued with Jack Kilby's (1924-) and Robert Noyce's (1927-1990) invention of the integrated circuit in 1959 (see Hansson 1996:404). The circuit made it possible to bring together a large number of components on small silicon chips. According to Hansson, it is one of the most important inventions ever.

3.5. Summary and conclusion

Throughout the history of technology, a large number of inventions and discoveries have been made which have had a decisive effect on how we live and how we view the world. The steam engine, electricity, motor vehicles, roads and ways certainly belong to these.

The steam engine is today no longer an important part of our daily lives. However, by "chang[ing] the course of world history" (Cardwell 1972:130) and

"man's consciousness of his world" both radically and irrevocably (see 3.2.5.) (Cardwell 1972:130) it is still important to us. The steam engine, which may be given the title "the symbol of the industrial revolution" (Hansson 1996:288, see 3.2.1.), was initially used for pumping water out of mines (see 3.2.5.1). Another early use was as an accessory to water mills, whereby it freed iron masters and mill owners from their dependence of water (see 3.2.5., and 3.2.5.1). It was important to the iron industry (see 3.2.4), the textile industry (see 3.2.2.1), and the emergence of the factory system (3.2.5.), and it acted as an incentive to develop the machine-tool industry (see 3.2.4). Finally, it "gave the transportation systems a power source of undisputed merit for more than a hundred years" (Ferguson 1967:262), and was important for the development of the internal combustion engine by mothering a need for a prime mover that would replace the steam engine entirely (see 3.2.5).

Unlike the steam engine, electricity, motor vehicles, roads and ways are still in daily use by people in the Western World. One of the first uses of electricity was to provide telegraphy in connection with the developing railway services (see 3.3.7.2.) Illumination was the first commercial success of electricity. The breakthrough came with Thomas A. Edison's technical and commercial achievements. Today, electricity is used as a source of lighting, heat and energy in vast number of places and artefacts.

Like electricity, motor vehicles, roads and ways are all-important to people today. The importance of the automobile to the American economy and way of life discussed in section 3.4.3.1. is an example of this. The advent of the motor vehicle both "transformed transportation by land and changed the living habits of people throughout the world" (Rae 1967b:119). As a carrier of goods and passengers, it provided "a degree of flexibility never previously experienced" (Rae 1967b:131) (see 3.4.3.1). The first steam-powered horseless carriage was designed as early as 1769 and the first internal-combustion engine was put on wheels by 1885 (see 3.3.8). In 1908 the Model T Ford was put on the market. Ford made it possible for "the production and use of motor vehicles [to] expand[ ] phenomenally" (Rae 1967b:125) (see 3.4.3.1).

The importance of roads and ways is connected with the success of motor vehicles. Without the former the latter would not exist. As pointed out by Rae (1967b:133), "highway transport can flourish only if there are highways capable of being used with economy and efficiency" (see 3.4.3.1.).

As will be shown in the following chapters, all these technological innovations have had, and still have, an enormous impact on our understanding of the world and hence on our language.

CHAPTER 4. THE STEAM ENGINE

4.1. Introductory

Even though the steam engine is today far from being a modern innovation, quite a few metaphorical expressions that seem to originate from it are still frequently used. Examples would be *pick up steam, steam away, let off steam* and *run out of steam*. The steam engine thus seems to be an excellent source domain for many metaphors even though it was invented around 250 years ago, and is generally no longer an important part of our daily lives. Considering that many people today are likely to lack detailed knowledge of how a steam engine actually works a number of questions arise. These all need to be addressed in order to supplement the ones brought up in 1.3.

1)   Is a vague knowledge of the invention enough for making the mappings or are they re-experienced through other things around us?

   a)   To what extent is the steam engine itself still important for our use and understanding of metaphorical expressions such as the ones above?

   b)   To what extent is it possible for us to re-experience mappings originating from this now rarely used invention by means of other more familiar things around us (see 1.1., 1.3. 2.1.5.5. and 2.3., see also Gibbs 1999:152-153)? Is it, for example, possible that our knowledge of steam, which unlike the steam engine is still a common element in our lives, supplements a vague knowledge of the invention and therefore prevents expressions such as *work up steam* and *blow off steam* from becoming dated and no longer used? That is, that mappings once defined by the **steam engine** may be re-experienced by means of our experiences of the way in which steam behaves?

Naturally, no matter how thoroughly an analysis is made, by simply analysing language no linguist will ever be able to say exactly what people were thinking of when uttering certain words and expressions, nor will it be possible for him or her to say exactly *how* familiar with the invention people using the expressions actually are. In this thesis no attempt will be made to do so. Accordingly, the main aim is not to answer the questions above, but to see in what ways the steam engine has helped us to structure our thoughts (see 1.3.). Nevertheless, the question whether it is **possible** to use these metaphorical expressions without a sound knowledge of the invention is intimately related to the ones concerning the cognitive role played by the invention today. The possibility of re-experiencing some aspects of the mappings by means of other external representations than the steam engine seems to indicate that the cognitive role played by the invention today is of less importance than is implied by our use of phrases like the ones above.

Like chapters 5 and 6, this chapter largely follows the guidelines laid down in 1.3. The source domains used to structure our experiences of the invention are thus discussed first, and then the target domains understood by means of the invention. However, because only one word in my material seems to have become associated with the steam engine as a result of metaphorical mapping from another domain, the former part of the study makes up a very small part of the entire chapter. The latter part of the study also differs from chapters 5 and 6 in focussing on the sense development of one single word, that is, the form *steam* (noun and verb). The primary reason why *steam* is in focus is that the existence of steam long before the steam engine was invented must be taken into consideration before establishing what metaphorical expressions originate from the steam engine. The chances are that some expressions that seem to be the result of the use of the STEAM ENGINE as a source domain are actually of a much earlier date having their origin in a mapping from the less complex domain of STEAM. In so far as mappings involving steam made prior to the invention of the engine are found, the study will reveal mappings that are independent of the invention. These early mappings may also be used as bases for later mappings of which the steam engine is a part. Furthermore, as argued in section 2.2.1, metaphor is typically based on metonymic mappings. Possibly, the attempt to follow the metaphors as far back in time as possible, in this case to the days before the invention was made, may also reveal metonymic relationships that may have paved the way for some of the metaphorical mappings. In sum, a

thorough analysis of the form *steam* is useful because it provides us with information about the historical context of mappings involving the steam engine. In addition, because the form *steam* is also a natural part of the sentences describing the workings of the steam engine, the analysis is also a first glance at the cognitive function of the invention, and a beginning of the study of metaphorical mappings based on our experiences of the invention. Sections 4.3 - 4.3.4 are thus a link between the two parts of the chapter. In particular, section 4.3.4., which highlights the relationship between the sense development of *steam* and the invention of the steam engine, makes the dividing-line between the two parts of the chapter less clear-cut than the one between the two main parts of chapters 5 and 6.

For the purpose of analysing *steam* the different entries of this form in the *OED* both as a verb and as a noun are used. All instances of *steam* in this section are from this source, the greater part of them naturally under the entry of *steam*, some under the entries of *run* (v), *shut* (v), *get* (v) and *blow* (v). Although it is not within the scope of this thesis to cover everything that is and has been signified by the form, these instances along with the different senses of *steam* accounted for under the verbal and nominal entries of the word are expected to provide as representative a picture as possible of what could and still can be signified by the form. All the senses are thoroughly investigated. Occasionally, the intrinsic relationships between the different senses are discussed as well as the mental spaces that the uses of the forms may evoke. Before this major part of the chapter, however, words and phrases that are used to describe the invention are discussed.

4.2. Concepts within the domain of the steam engine as conceptualised by means of other domains

As mentioned above, only one word in my material connected with the steam engine seems to be metaphorical. This, perhaps not very strong case of a metaphorical expression, is the use of the compound *steam jacket* to signify 'a jacket or casing filled with steam in order to preserve the heat of the vessel round which it is placed' (*OED*). In its original sense, which is still in use, a *jacket* was 'an outer garment for the upper part of the body' (1462, *OED*). The use of a term associated with an article of clothing to signify 'an outer covering, coating, or casing of any kind placed round the vessel of a steam engine' (*OED*) seems to be the result of a mapping from the ANIMATE to the INANIMATE, and from PEOPLE to MACHINES.

The non-metaphorical words of this group (presented in Table 1 below) are also compounds consisting of the form *steam* and some other term that was in use before the steam engine was invented. The uses of words such as *boiler, box, chest, brake, gauge, hammer, launch, boat, ship, tug, winch, plough, whistle, coal, heated* and *power* in order to refer to different parts of the steam engine, different implements and apparatus associated with the processes involving the steam engine, or different processes involving the steam engine, however, are not the results of mappings between domains. The applications rather seem to be the results of the use of a form associated with a member of a certain category of concepts to signify another member of this category.

Table 1. Non-metaphorical words used to refer to different parts of the steam engine, and different implements and apparatus associated with processes involving the steam engine. The dates of the first record in this sense are within brackets.

steam boiler	*boiler* 'A vessel in which water or any liquid is boiled.' (1725) (*OED*)
steambox	*box* 'A case or receptacle usually having a lid.' (a1000) (*OED*)
steam chest	*chest* 'A box, a coffer' (a700) (*OED*)
steambrake	*brake* 'A lever or handle for working a machine.' (1380) 'the handle of a pump.' (1626) (*OED*)
steam gauge	*gauge* 'A measure of the capacity or contents of a barrel.' (c1450 in English) (*OED*)
steamhammer	*hammer* 'An instrument having a hard solid head, usually of metal, set transversely to the handle, used for beating, breaking, driving nails, etc.' (a1000) (*OED*)
steamlaunch, steamboat, steamship	*launch* (1697), *boat* (891), *ship* (c725), 'Sea-going vessels or boats.' (*OED*)
steamtug,	*tug* 'A timber-wagon.' (south. and east. dial.) (1706) (*OED*)
steam winch	*winch* 'A reel, roller, or pulley.' (c1050) (*OED*)
steamplough,	*plough* 'An agricultural implement, used to prepare the soil for sowing or planting.' (c1200) (*OED*)
steam whistle	*whistle* 'A tubular wind instrument of wood, metal or other hard substance, having a more or less shrill tone.' (c950) (*OED*)
steam coal	'A piece of carbon glowing without flame.' (c825) (*OED*)
steamheated	'made hot'(1617) (*OED*)
steampower	*power* was 'the ability to do or effect something or anything' (1325) (*OED*)

4.3. The form *steam*

An analysis of what concepts, according to the *OED*, may be signified by *steam* reveals that it may be used to signify a great number of different concepts. First, as a noun the form was originally used to refer to some kind of substance that is emitted from another substance or a body. In other words, the linguistic form *steam* (A) was first used for the original concept (A) below:

FORM (A) - CONCEPT (A)
steam (n) – 'a substance emitted from a substance or body'.

Second, as a verb *steam* (A) originally signified 'to emit a substance'. It was also used of a scent in the sense of 'to be emitted':

FORM (A) – CONCEPT (A)
steam (v) – 'to emit a substance', 'to be emitted'

As will be evident from the following, the first variations of the original notion of *steam* signifying 'a substance emitted from another substance or body', 'to emit a substance', and 'to be emitted' are the ones that are brought about either by a change of the substance that is emitted, or by a change of the substances or bodies from which steam is emitted. First, variations of the notion of a change of the substance emitted will be discussed, the literal uses in 4.3.1.1. and the figurative ones in 4.3.1.2. Then, variations resulting from a change of the substances from which this substance is emitted will be looked into. On the whole the noun *steam* and the intransitive verb *steam* both display greater variation and are used much earlier than the transitive verb *steam*. The development of the transitive verb goes hand in hand with the development of the invention of the steam engine. While the first instances of the noun and of the intransitive verb are from around 1000 A.D., there are very few instances of the transitive verb from the time before the steam age. In all, there are only two instances of the transitive verb from the time before the first full-scale steam engine built for sale saw the light of day in 1699, one from 1590, and one from 1666. The number of transitive verbs increased substantially once the invention had made steam an excellent means for bringing about changes in other objects.

As to the other uses of *steam*, sections 4.3.2. - 4.3.4. discuss the ones based on conceptual metonymy often in combination with a metaphorical mapping. As can be seen here, the new concepts signified by the verb mainly correspond to the

RESULT of a more complex event where the emission of a substance is involved. An example would be the resultant event of 'becoming covered with condensed vapour'. The new concepts signified by the noun, on the other hand, are mainly entities that are the EFFECT of the emission of one kind of substance from another kind of substance, for example, 'drops forming on a surface'.

FORM (A) – CONCEPT (A) FOR CONCEPT (B)
steam (n) – 'a substance emitted from a substance or body for X'.
steam (v) – 'to emit a substance for X'.

As is also evident from sections 4.3. - 4.3.4, the new uses of the form due to conceptual metonymy all seem to have originated from a focus on new aspects of a process involving the emission of steam. The findings substantiate Langacker's view of metonymies as shifts in profile within the same conceptual base or, to use alternative terminology, Koch's claim that metonymy is the same thing as inversion of figure and ground within the same mental frame (see 2.2.1.). The new uses of the form focus on new aspects of a process involving the emission of steam. While doing so they do not necessarily exclude the concepts that were originally part of the scene evoked by it from the new mental scene evoked by the form.

4.3.1. The emission of a substance

4.3.1.1. Literal uses
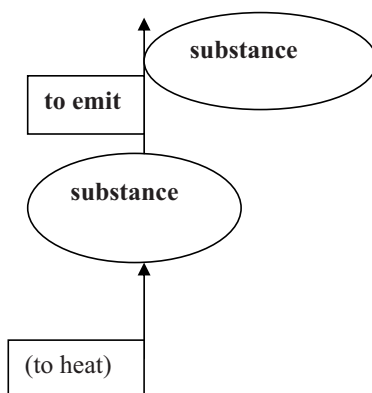
Figure 5. The structure of mental spaces evoked by forms signifying 'to emit a substance from a substance or body', or 'to be emitted'. Actions or processes are illustrated by arrows. The circles illustrate substances subjected to these actions.

Focussing on variations of the form due to a change of the substance emitted, the first uses of the intransitive verb (figure 6 below) signify 'to emit a scent or odour', whereas the noun *steam* was first used to signify 'a vapour or fume given out by a substance when heated or burned', 'an odorous exhalation or fume', 'a vapour or exhalation produced as an 'excrement' of the body; e.g. hot breath, perspiration, the infectious effluvium of a disease' or 'a noxious vapour generated from the digestive system; the 'fume' supposed to ascend to the brain as a result of drinking alcoholic liquor' (*OED*).
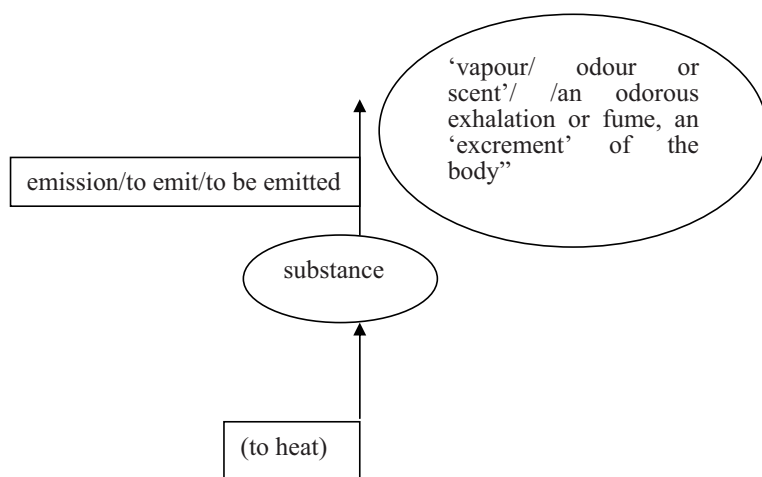
Figure 6. The first uses of the noun (in the senses of the emission of 'an odorous exhalation or fume', 'an 'excrement' of the body' or 'the ascension of a vapour inside the body') and the intransitive verb *steam* (said of a substance in the sense of 'to emit a scent or odour'). Actions or processes are illustrated by arrows. The circles illustrate substances subjected to these actions.

Interestingly enough, if the cognitive view is fully adopted that linguistic forms are used to symbolise different aspects of a conceptualisation, that is, as different entry points activating mental spaces (see 2.2.2.), the different uses of the form are closely linked to one another. More specifically, the view allows for the possibility that the form *steam* could once be used both for 'an odour or a fume' and for 'vapour' precisely because vapour coming out of heated substances is often odorous. If the form is not merely seen as having these different isolated senses but as allowing us to evoke mental spaces, not much power of imagination is required to picture a situation in which *steam* was once

used to signify a heated substance emitted from another substance, a heated substance that was *at the same time* both vaporous **and** odorous. In short, a context in which both concepts could be activated in the mental space of one and the same referent subsequently resulting in the different senses of the word [22]. Accordingly, both these concepts may easily be related to the use of *steam* for an "exhalation produced as an 'excrement' of the body, e.g. hot breath, perspiration, [and] the infectious effluvium of a disease" (*OED*). This view, however, does not rule out the possibility that, even if both concepts may be part of the same mental space, either may have attracted the main or even sole focus on different occasions. As is evident from the quotations, in odourless contexts the form has obviously been used to signify 'vapour' alone, and in contexts where odorous substances are not vaporous it has been used to signify 'an odour or a fume' alone. In (1) below the 'odour' is intended.

> (1) **1835** Willis *Pencillings* I. 61 The steams of sulphur, as we approached the summit, were all but intolerable. (*OED*)

The emphasis on only part of the mental space that may be evoked by the form is evident also in the use of the noun *steam* to signify 'a beam of light' (1300) and the intransitive verb *steam* to signify 'to emit a 'flame' (1386) and 'smoke' (1590)'. Here the focus is on the emission of something from a heated substance, whereas 'vapour' in particular is not an obligatory part of the conceptualisations. However, from the 17th century on there is only one *OED* entry of *steam* in this "ardent" sense. As we are approaching what is sometimes referred to as the steam age, *steam* generally occurs in contexts where the form evokes some kind of 'vapour'. Alternatively, in this period *steam* was used to signify concepts that either started out as 'vapour' or later turned into 'vapour'. As summarized in figure 7 below, in regard of the noun *steam* these are 'close and hot air from people', 'gas' and 'vesicles' first recorded in 1609, 1662 and 1615 respectively. The first use of the transitive verb, that is, to signify 'to emit vesicles' is of a much later date (1860) whereas the intransitive one naturally does not give rise to any other substances.

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[22] Langacker (2000:5) writes "The domains an expression invokes provide its conceptual content. Linguistic meaning does not, however, reside in content alone, for we are able to construe the same content in alternate ways, resulting in substantially different meanings."
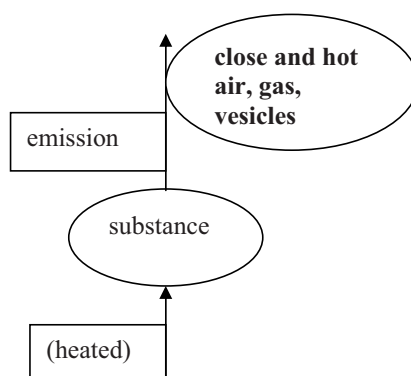
Figure 7. The structure of the mental space evoked by the nominal uses of *steam*. Actions or processes are illustrated by arrows. The circles illustrate substances subjected to these actions.

4.3.1.2. Figurative uses

As to the figurative uses of *steam*, it is generally not the quality of the substance emitted that renders the sentences figurative. In fact, most instances of *steam* in the *OED* refer to the substances accounted for in 4.3.1.1 above. The only exceptions to this are the intransitive uses of the form to refer to emit 'a dream' (1692) and 'a song' (1833), that is, concepts that do not steam in a literal sense. Of these, however, only *song* is part of a sentence where nothing but the combination of *steam* with *song* renders it figurative:

(2) **1833** TENNYSON *Lotos-Eaters* 163 They find a music centred in a doleful song Steaming up, a lamentation and an ancient tale of wrong. (*OED*)

In the case of *dream* the figurative mappings are much more complex. Here the sentence gets its figurativeness both from the dream itself and from the substance from which the dream is emitted, that is, from ill-digested thoughts that steam figuratively in (3) below:

(3) **1692** E.WALKER tr. *Epictetus' Mor.* x, A waking Dream, Such as from ill-digested Thoughts doth steam. (*OED*)

4.3.2. The substance that steams

4.3.2.1. Figurative uses before the steam engine

Having identified the quality of the different substances emitted from a substance or body recorded in the *OED,* the substances or bodies that emit steam display an even greater variety. To mention but a few "newly whited [w]alls", "manure", "apple pie", "roast and stew", "brimstone", "sulphur", "wine", "fire", "the earth", "the sea", "cencers", "clothes", "engines" and "boilers" all emit steam. In order to focus on matters relevant to metaphors and metaphorical language, however, figurative uses of *steam* and animate substances will be paid most attention to. Beginning with an analysis of the metaphorical mappings that used STEAM as a source domain before the invention of the steam engine, "reason", "ill-digested thoughts", "foming [*sic*] vengeance", "interest and party" and "inward fire" could all emit steam before the days of the invention. Being abstract concepts based on the knowledge we have of concrete entities, they are all early examples of the conventional mapping between the CONCRETE and the ABSTRACT. Not very surprisingly, they show that the metaphor ANGER IS THE HEAT OF A FLUID IN A CONTAINER by no means is a new metaphorical mapping. In one way or the other most of them are related to this metaphor. Furthermore, they clearly exemplify conventional metonymic structures. In most of the sentences discussed below the physiological effects of ANGER (e.g. Radden 2000:104, Lakoff 1987:382) are used metonymically to "stand for" the emotion in the same way as other "[ph]ysiological effects of an emotion are commonly used to stand for the emotion" (Radden 2000:104) in a great number of expressions pertaining to emotions. Most likely, it is the common location of the above entities inside people's bodies where they may bring about both bodily heat and perspiration that brings about the conceptualisation of steam coming out of them (see e.g. Lakoff 1987:380-409, Turner & Fauconnier 2000:135). One example is the earliest entry of the verb *steam* in (4) below, which signifies smoke steaming out from an inward fire. It exemplifies warmth dependent on the metaphorical mapping EMOTION IS HEAT. This instance, however, is different from the other ones in this section. As is evident from Spenser (1993:375-390, and 1993:XXIX-XXXI) *steam* is here not used to signify ANGER but rather LUST, DESIRE and the like in line with the metaphor LOVE IS FIRE (see Kövecses 2002:203).

> (4) **1590** SPENSER *F.Q.* III. i. 55 Which she misconstruing, thereby esteemd
>   That from like inward fire that outward smoke had steemd. (*OED*)

The emotions connected with (4) above are "heated" for totally different reasons than the ones in sentence (5) below. In sentence (5) the use of *steam* combined with *vengeance* seems to build on the metaphor ANGER IS HEAT or more specifically ANGER IS THE HEAT OF A FLUID IN A CONTAINER. Because ANGER (in its broadest sense related to vengeance) is conventionally conceived of as HEAT (see e.g. Kövecses 1986:13-20), there is nothing strange about steaming vengeance. The mapping even seems to be what makes the reference back to the smoke of blood in the main clause possible. There would have been no connection between the smoke of blood and the "steam of [---] vengeance", had it not been possible to conceive of vengeance as making the body boil figuratively. In the sentence below, the target domain of abstract feelings and the source domain of smoke and heat are blended in such a way that the smoke of blood metonymically signifies the vengeance. First, from what has probably started as the increased body heat of a person seeking revenge, an attack of vengeance is carried out resulting in a wound. Second, the warm blood coming from the wound is used to signify the vengeance, both because ANGER is conventionally signified by the HEAT it causes, and because the vengeance referred to in the sentence has literally resulted in "steam" from the body.

(5) **1602** MARSTON *Antonio's Rev.* III. v, Looke how I smoake in blood, reeking the steame Of foming vengeance. (*OED*)

Sentences (6) and (7) below also exemplify the processing of negative "things" giving rise to steam from the body.

(6) **1692** E.WALKER tr. *Epictetus' Mor.* x, A waking Dream, Such as from ill-digested Thoughts doth steam. (*OED*)

(7) **1672** OWEN *Disc. Evang. Love* i. 19 For the most part they [the outcries on account of schism] are nothing but the steam of Interest and Party. (*OED*)

Similarly, in sentence (8) below, *steam* may be interpreted as signifying the result of something negative. In this sentence, which describes the difficulty the speaker of the sentence has of finding a reason for the "[n]ymph" to abandon him, it is this presumably negative reason that would steam if there was one. First, by using the conventional conceptual mapping between the ABSTRACT and the CONCRETE, reason may be conceptualised in the same way as a concrete substance, that is, as a substance that may emit another substance. Second, by using the metaphor EMOTION IS THE HEAT OF A FLUID IN A CONTAINER, the emotion making the "[n]ymph" to abandon the speaker may result in the

emission of steam in the same way as other feelings are conventionally experienced as HEAT.

> (8) **1599** B.JONSON *Cynthia's Rev.* I. iii, I do neither see, nor feele, nor taste, nor savour the least steame, or fume of a reason, that should invite this foolish fastidious Nymph, so peevishly to abandon me. (*OED*)

4.3.2.2. Animate substances that steam

As is evident from Table 2 below, animate substances could steam long before the steam engine became the excellent tool that it still is for describing PEOPLE by means of MACHINES. Beginning with the noun *steam*, the first instances of steaming animate substances are of as early a date as the first inanimate ones. For instance, as early as around the year 1000, steam could come from a person's mouth.

Table 2. Animate substances emitting steam (*OED*).

a)	C1000	muðe	ÆLFRIC *Hom.* I. 86 Him stod stincende steam of ðam muðe.
b)	1300	mouth	*c*1300 *Havelok* 591 Of hise mouth it stod a stem, Als it were a sunnebem.
c)	1303	mouþ	**1303** R.BRUNNE *Handl. Synne* 2526 þe stem e stode oute of hys mouþ brennand.
d)	1400	knyghtis	*c*1400 *Song Roland* 836 Kene knyghtis cry and crossen helmes, out flow the stemes.
e)	1592	he	**1592** SHAKES. *Ven. & Ad.* 63 Panting he lies, and breatheth in her face. She feedeth on the steame, as on a pray.
f)	1602	lips	**1602** MARSTON *Antonio's Rev.* V. iii, Pieros li ps reake steame of wine.
g)	1602	I	**1602** MARSTON *Antonio's Rev.* III. v, Looke how I smoake in blood, reeking the steame Of foming vengeance.
h)	1605	hee	**1605** *Trag. End Sir J. Fites* (1860) 12 She avoy ded further perill of death, which hee in his st eame of wine, had bin likely to have offered u nto her.
i)	1608	fellow	**1608** MIDDLETON *Five Gallants* IV. viii, A fello w of several scents and steams.
j)	1609	them	**1609** HOLLAND *Amm. Marcell.* XXIX. ii. 352 When as neither the common goales, nor privat mens housescould now hold the number of them that were committed to ward, as being thronged and thrust close toget her with a hot steame among them.

k)	1670	bodyes	**1670** Covel in *Early Voy. Levant* (Hakl. Soc.) 116 These [insects] never stir out of their holes and lurking-places till the steam and perspiration of your bodyes invite them.
l)	1722	[b]odies	**1722** Defoe *Plague* (1884) 160 The Effluvia or Infectious Steams of Bodies infected.
m)	1731	body	**1731** Swift *Strephon & Chloe* 11 No humours gross, or frowzy steams, Could from her taintless body flow.
n)	1826	you (your [---] steam)	**1826** Disraeli *Viv. Grey* II. ii, Has not your Lordship treasure? There is your moral steam which can work the world.
o)	1859	flesh	**1859** Tennyson *Enid* 1451 And all the hall was dim with steam of flesh.
p)	1857	he (his)	**1857** Hughes *Tom Brown* II. ii, Now jumping the old ironbound tables, then joining in some chorus of merry voices; in fact, blowing off his steam, as we should now call it.
q)	1869	I	**1869** H.James *Let.* 16 Apr. in J. Strouse *Alice James* (1980) viii. 138, I feel an irresistible need to let off steam periodically & to confide to a sympathetic ear the impressions which the week has generated in my soul.
r)	1875	Etonians	**1875** Blake-Humfrey *Eton Boating Bk.* 60 The Etonians had not steam enough. At Ham-mer smith, Westminster was two lengths ahead.
s)	1887	he [the bull]	**1887** F.Francis Jun. *Saddle & Mocassin* 107 'And he [the bull] came for you?' 'When he'd got up steam he did.'
t)	1912	them	**1912** Conrad in *English Rev.* XI. 311 We are not allowed to bring them in under their own steam.
u)	1916	I	**1916** H.J.Laski in *Holmes-Laski Lett.* (1953) I. 25, I intend to write you a weekly letter to Washington—for I must let off steam somewhere.
v)	1949	I	**1949** J.Symons *Bland Beginnings* 142 'Would you be kind enough to see Miss Cleverly home.' 'That's not necessary. I can move under my own steam.'
x)	1976	dining club	**1976** J.I.M.Stewart *Young Pattullo* iii. 72 It's just a dining club letting off steam.

However, in sharp contrast to what may be expected considering the fact that *steam* was used figuratively quite early on, the first instances of steam coming out of animate substances do not seem to be the result of a mapping between the ANIMATE and the INANIMATE. At least, as indicated by the instances in the *OED*, before the invention of the steam engine, people do not seem to have made a distinction between steam coming from things and steam coming from people. Steam was simply what was emitted from a (heated) substance regardless of the

quality of the source of the steam. The later frequently employed mapping between the steam engine and different animate substances does not seem to have been facilitated by a conventional figurative use of other steaming inanimate substances for conceptualising steaming animate beings. Rather, it seems to have been the applicability of the term to a wide variety of substances along with the use of the INANIMATE to understand the ANIMATE in other contexts that paved the way for the mapping. More specifically, the idea of applying the experiences of a machine emitting steam also to people seems to have been close at hand, partly because steam was what came out not only from boiling kettles, the earth and the sea but also from people.

However, once the steam engine had been used for conceptualising PEOPLE the mapping quickly gained ground. As may be seen in Table 2 above, after 1826 all the instances of the noun but one are the result of the mapping PEOPLE ARE MACHINES. For this to be a clear tendency, however, it must be confirmed by more examples. The intransitive verb does not seem to follow exactly the same pattern (see Table 3 below). Even though the verb too indicates that *steam* could be used to describe the emission of steam from an animate substance or body before the steam age (see sentence b) below), sentence a) clearly shows that it was possible to use the mapping ANIMATE IS INANIMATE in connection with steam before the steam engine. Here the human fire is understood thanks to a mapping from a genuine inanimate fire. Accordingly, sentence d), which is of a later date than the first steam engines, does not exemplify this metaphor but is similar to the use of *steam* in sentences a)-m) in Table 2 above.

Table 3. To emit 'steam' from animate substances. (*OED*)

The intransitive verb *steam*			
a)	1590	inward fire	**1590** SPENSER *F.Q.* III. i. 55 Which she misconstruing, thereby esteemd That from like inward fire that outward smoke had steemd.
b)	1667	Thorax	**1667** *Phil. Trans.* II. 547 Laying open the hollow of the Thorax, there steam'd out at first a very offensivesmell.
c)	1692	[t]houghts	**1692** E.WALKER tr. *Epictetus' Mor.* x, A waking Dream, Such as from ill-digested Thoughts doth steam.
d)	1859	horses	**1859** DICKENS *T. Two Cities* I. ii, The reek of the labouring horses steamed into it.

4.3.3. Metonymic and metaphorical mappings and the development of the form *steam*

The rest of the senses of *steam* recorded in the *OED*, as opposed to those discussed in sections 4.3.1. - 4.3.2.2., are mainly of later dates than the first specimen of the steam engine and express a process dependent on an engine of some kind. In one way or the other, most of them correspond either to the EFFECTS or to the RESULTS of processes involving steam. They instantiate either the CAUSE FOR EFFECT metonymy or the lower-level case ACTION FOR RESULT metonymy (cf. Panther and Thornburg 2000:216). As is typical whenever feelings are involved, the PHYSIOLOGICAL EFFECTS OF AN EMOTION FOR THE EMOTION metonymy seems also on occasion to have played an important part in the sense development. However, in the case of a great number of the senses to be accounted for here, metonymic processes do not alone explain the development. Because of the close relationship between these senses and an engine of some kind, instances of *steam* describing PEOPLE are inevitably also structured by the PEOPLE ARE MACHINES metaphor. When *steam* refers to abstract entities, processes are involved in combination with a mapping between the ABSTRACT and the CONCRETE. Thus, in the following, senses based on conceptual metonymy will be accounted for together with senses based on metaphorical mappings. The new senses of the noun will be discussed in section 4.3.3.1., and those of the verb in section 4.3.3.2. and 4.3.3.3..

4.3.3.1 The noun *steam*

As indicated above, most of the new senses of the noun *steam* signify concepts that are EFFECTS of the emission of steam, thus instantiating the CAUSE FOR EFFECT metonymy, whereas two of them refer to entities that are related to steam through the reverse EFFECT FOR CAUSE metonymy. Beginning with the smaller group, this one is made up of *steam* used as an abbreviation for *steam coal*, and *steam* in Australian and New Zealand slang in the sense of '[c]heap wine laced with methylated spirits; methylated spirits as an intoxicant':

> (9)   **1897** *Daily News* 25 Jan. 9/3 Best qualities steam are now up to 11s 3d per ton. (*OED*)

> (10) **1941** BAKER *Dict. Austral. Slang* 71 *Steam,* cheap wine, esp. laced with methylated spirits. (*OED*)

As to the former sense it is the role played by steam coal in the production of steam that renders this sense a product of the EFFECT FOR CAUSE metonymy. As to the latter, the state of intoxication, with all that this implies, caused by the

drinking of the cheap wine, that is, the 'steam' is what lies behind the new sense of the word. First, it does not seem to be very far-fetched for anyone familiar with the property of steam to rise from various substances or bodies to conceive of the effects of intoxication as 'internal steam' rising from one part of the body to another. Second, because the EFFECT FOR CAUSE is a conventionalised cognitive structure, the use of the term to signify the cause of the 'internal steam' must have been very close at hand. This use of *steam* is both exemplified in the quotation below and in sentence (f) in Table (2) above.

> †**b.** A noxious vapour generated in the digestive system; the 'fume'
> supposed to ascend to the brain as a result of drinking alcoholic
> liquor. *Obs.*(*OED*)

In the larger group we find the following entities all instantiating the CAUSE FOR EFFECT metonymy:

1)   "visible vesicles produced by the condensation of watery vapour, as drops forming on a surface, e.g. a mirror or window-pane."

2)
a)   "mechanical power"

b)   Fig. Energy, 'go', driving power, and the like.

c)   Phr. ***by steam***, (to travel) by steamer. ***under steam***, worked by steam (as opposed to *under* sail).

d)   "In phrases descriptive of the working of the steam-engine, esp. of a locomotive; often used *fig.*; e.g. ***(at) full, (half,*** etc***.) steam; with full*** or ***all one's steam on; to have*** (all, much, etc.) ***steam on; to get up, put on steam; to blow off steam, shut off, turn off steam; under steam, with steam up, in steam***, with the engine working or ready to start working; ***under one's own steam***: ***like steam*** (Austral.), furiously; ***to let off steam***: freq. fig., to relieve one's pent-up energy by vigorous activity; to give vent to one's feelings, esp. harmlessly; to run out of steam"

3)   (short for) 'steam radio'

4)   '[a] trip by steamer'

5)   [a] dish cooked by steaming" (*OED*)

Of these, only the first entity, that is, "visible vesicles produced by the condensation of watery vapour", recorded as early as 1615, may be formed without the use of an engine. All the other concepts either describe the working of an engine or are dependent on the mechanical use of steam for their existence.

Beginning with the latter group of concepts, 'mechanical power' (2a), 'a steam radio' (3), 'a trip by steamer' (4) 'a dish cooked cooked [*sic*] by steaming' (5) are all "things" (Langacker 1995:96-97) that literally originate from the use of steam in an engine whereas 'energy', 'go', 'driving power' and the like in (2b) do so in a figurative way. Below senses 2a, 3, 4, and 5 are instantiated by sentences (11) to (14) respectively.

> (11) **1825** Hone *Every-day Bk.* I. 1535 *The Times*+of Tuesday, November the 29th, 1814, was the first newspaper printed by steam. (*OED*)

> (12) **1959**C.MacInnes *Absolute Beginners* 112, I heard one of your arias on the steam, last evening. (*OED*)

> (13) **1854** Kingsley in *Life* (1877) I. 419 Had a charming steam across the Firth of Forth. (*OED*)

> (14) **1900** *Soc. Life Brit. Army* 98 Apart from soup, the cooking arrangements will only allow of Tommy being given his choice between a bake and a steam. A steam resembles what we have been taught to call Irish stew. (*OED*)

The figurative "[e]nergy, 'go', driving power and the like" are exemplified by sentences (15-18):

> (15) **1826** Disraeli *Viv. Grey* ii. ii, Has not your Lordship treasure? There is your moral steam which can work the world. (*OED*)

> (16) **1875** Blake-Humfrey *Eton Boating Bk.* 60 The Etonians had not steam enough. At Hammersmith, Westminster was two lengths ahead. (*OED*)

> (17) **1898** *Daily News* 24 Nov. 7/3 Corbett now appeared a trifle weary and was lacking in steam. (*OED*)

> (18) **1900** *Westm. Gaz.* 23 Oct. 9/2 All the steam has gone out of American Railroad shares. (*OED*)

These senses have possibly gained ground to some extent, because the sense development is in line with conventionally used conceptual structures in the form of conceptual metonymy. According to Taylor (1995:124), metonymy is "one of the most fundamental processes of meaning extension". The role of the CAUSE FOR EFFECT metonymy in the creation and understanding of the senses discussed in this section seems to be on a par with the role of the metonymic relationships

defined by the "action ICM" in the creation and understanding of denominal verbs (see Kövecses and Radden (1998:61):

> Because [the metonymic relationships] are deeply entrenched and pervasive, they provide speakers with natural "cognitive links" that enable them to move freely from one entity (the vehicle) to another (the target) without any effort or even unconsciously. They are a part of the mutual knowledge that speakers share and rely on in creating and understanding denominal verbs with ease. (Kövecses and Radden 1998:61)

If we return to example (13), what makes it possible to use *steam* for 'some kind of trip' is presumably the fact this sense is intimately related to 'steam' in the sense of 'vapour' by being a PRODUCT or EFFECT of a process involving steam. If only we know that the movement of the boat originates from such a process, the intimate link between CAUSES and EFFECTS provided by the conventional use of the CAUSE FOR EFFECT metonymy makes the use of *steam* in this sense natural (c.f. Panther & Thornburg 2000:220).

Not only is the CAUSE FOR EFFECT metonymy a beaten track for our thoughts in the process of creating new senses, the metonymy facilitates the process of decoding the messages conveyed by sentences such as (12-14) above. Once the context has defined the function of the new senses, that is, established that in these sentences 'steam' is 'something through which we can hear arias' (sentence 12), 'some kind of trip' (sentence 13), and 'something that we can eat' (sentence 14), people who know these entities to be EFFECTS of the application of steam will have no problem understanding the new uses of the form.

The structure of sentences (15 - 18) is more complex. In addition to being structured by the CAUSE FOR EFFECT metonymy, sentences (15 - 17) are based on the PEOPLE ARE MACHINES metaphor. The sentences are the results of mappings between our experiences of the steam engine and our experiences of our own bodies. We seem to understand the "conceptual complex" (Grady et al. 1999:103) of sentences (15 - 17) by means of the following mappings, which are elaborated in different ways in the different sentences.

MORE STEAM (IN AN ENGINE) IS MORE ENERGY (IN A PERSON)
LESS STEAM (IN AN ENGINE) IS LESS ENERGY (IN A PERSON)

Sentence (18), which was created at a time when "the reciprocating steam engine was almost the sole motive power of railroads the world over" (Williams 1967:142, see also 3.4.3.2.) and when "railroads in North America had reached the end of their great period of extensive development" (Williams 1967:137, see

also 3.4.3.2.) seems to be structured by the CAUSE FOR EFFECT metonymy and by the use of the concrete to understand the abstract. In the sentence, steam seems to be used not merely to signify the driving power of the running of the trains, but a financial development that is indirectly dependent on the development of the railroads. The CAUSE FOR EFFECT metonymy provides us with connecting links between a) steam and the energy produced by means of steam, b) the energy produced by means of steam and the running of the trains and c) the running of the trains and a rise in value of railroad shares. The metonymy makes the mapping of the concrete entity steam onto the abstract entity of a rise in a value of railroad shares natural.

The senses where *steam* is used as the main word of a prepositional phrase describing the working of an engine (notably (2c) and (2d) above) are also related to the CAUSE FOR EFFECT metonymy. When these are used to describe people's feelings, the PHYSIOLOGICAL EFFECTS OF AN EMOTION FOR THE EMOTION metonymy is also involved.

The connection with the CAUSE FOR EFFECT metonymy seems to be related to the very function of *steam* of signifying processes initiated by the use of steam, that is, EFFECTS of the application of steam. In Table 4 below, *steam* is not primarily used to signify 'vapour'. Even though 'vapour' may be part of the mental space evoked by the form, the emphasis is here rather on concepts resulting from a process involving the emission of vapour, that is, 'energy', 'pressure', 'heat' and the like.

As in the senses discussed above, the use of the CAUSE FOR EFFECT metonymy and the PHYSIOLOGICAL EFFECTS OF AN EMOTION FOR THE EMOTION metonymy coincides with a metaphorical mapping between the MACHINES and PEOPLE. In sentence (c) below, the use of *steam* in the sense of 'shutting off of nervous steam' is motivated by at least three conventional conceptual structures that are consistent with one another. First, *steam* when used in a phrase describing the working of the steam engine may be interpreted as symbolising its EFFECTS, that is, 'pressure' and 'heat' through the use of the CAUSE FOR EFFECT metonymy. Second, 'nervousness' may be symbolised by the PHYSIOLOGICAL EFFECTS it causes, that is, 'internal pressure' and 'body heat' through the use of the PHYSIOLOGICAL EFFECTS OF AN EMOTION FOR THE EMOTION METONYMY, which in turn is a lower-level case of the EFFECT FOR CAUSE metonymy. Third, our use of the steam engine to understand and talk about ourselves is structured by metaphors such as PEOPLE ARE MACHINES, THE BODY IS A CONTAINER FOR EMOTIONS, EMOTION IS THE HEAT OF A FLUID IN A CONTAINER; NERVOUSNESS IS HEAT etc. (see figure 8).
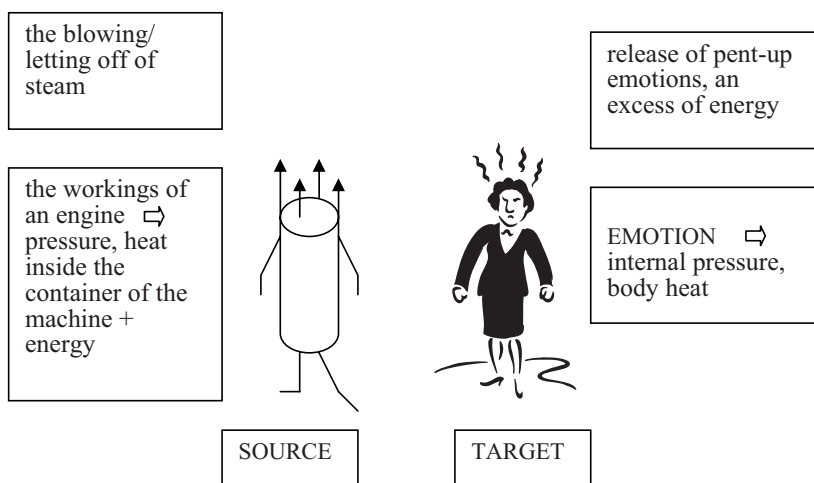
Figure. 8. The use of a steam engine that blows or lets off steam to conceptualise a person who releases energy and/or pent-up emotions.

Sentences (f), (g), (h), (i), and (j) seem to have their structure both from metonymic mappings that may be summarised by the CAUSE FOR EFFECT metonymy, the PHYSIOLOGICAL EFFECT OF AN EMOTION FOR THE EMOTION metonymy, and from various metaphorical mappings summarised in columns (C1) and (C2) below.

Table 4. Figurative uses of phrases originally signifying the working of the steam engine. In column (2) the approximate meanings of the whole phrases have been listed, in columns (3) and (4) metonymies that have motivated the development of the phrases, and in (5) instances of the phrases recorded in the *OED*.

	1	2	3	4	5
	Phrases originally signifying the working of the steam engine.	Approx. meaning of whole expression	CAUSE FOR EFFECT; STEAM/ VAPOUR FOR….	PHYSIOLOGICAL EFFECTS OF AN EMOTION FOR THE EMOTION:	Instances of the phrases recorded in the *OED*.
a)	*in steam* (1768, 1881)	'working', 'running'	..DRIVING FORCE, ENERGY		**1768 WATT** in Muirhead *Invent. Watt* (1854) I. 18, I am now getting an apparatus ready for setting it [the engine] wholly in steam as before.
b)	*shut off steam* (1824, 1899)	'to prevent the passage of [---] (steam, etc.) by the closing of a valve or tap.'	PRESSURE		**1824 R.STUART** *Hist. Steam Engine* 132 The motion of the piston was equalized by shutting off the steam sooner or later from the cylinder.
c)			.. HEAT, PRESSURE	BODY HEAT, INTERNAL PRESSURE FOR EMOTION	**1899** *Allbutt's Syst. Med.* VI II. 147 A result of some previous shutting off of nervous steam.
			METAPHOR: PEOPLE ARE MACHINES, EMOTION IS THE HEAT OF A FLUID IN A CONTAINER; NERVOUSNESS IS HEAT/ PRESSURE		
d)	*by steam* (1829, 1839, 1875)	'(travel) by means of steam/ by steamer'	..DRIVING FORCE, ENERGY		**1829 SCOTT** *Jrnl.* (1890) II. 305 Tomorrow I expect Sophia and her family by steam.
e)			(…A TRIP BY STEAMER)		**1839 CARD.WISEMAN** in W. Ward *Life* (1897) I. ix. 31 3, I shall travel by the mail direct to Marseilles, and so by steam to Città Vecchia.

f)	*let off steam* (1831, 1863, 1869, 1916, 1976)	'get an outlet for e.g. steam/pressure', 'give vent to one's feelings'	.. HEAT, PRESSURE	BODY HEAT, INTERNAL PRESSURE FOR EMOTION	**1869** H.Jᴀᴍᴇѕ *Let.* 16 Apr. in J. Strouse *Alice James* (1980) viii. 138, I feel an irresistible need to let off steam periodically & to confide to a sympathetic ear the impressions which the week has generated in my soul.
			METAPHOR: PEOPLE ARE MACHINES, EMOTION IS THE HEAT OF A FLUID IN A CONTAINER; NEGATIVE IMPRESSIONS ARE HEAT, PRESSURE		
g)	*get up steam* (1832, 1844, 1883, 1887)	'to produce sufficient steam to work the engine, often fig.'' , 'become excited, roused'	..ENERGY	ENERGY FOR EMOTION	**1832** Mᴀʀʀʏᴀᴛ *N. Forster* xl , I have a way of going ahead, by getting up the steam—and the fuel is brandy.
			METAPHOR: PEOPLE ARE MACHINES; ENERGY IS THE HEAT OF A FLUID IN A CONTAINER, CAUSE OF A SITUATION IS CAUSE OF HEAT		
h)			..ENERGY	ENERGY FOR EMOTION	**1887** F.Fʀᴀɴᴄɪѕ Jun. *Saddle & Mocassin* 107 'And he [the bull] came for you?' 'When he'd got up steam he did.'
			METAPHOR: PEOPLE ARE MACHINES, EMOTION IS THE HEAT OF A FLUID IN A CONTAINER; CAUSE OF A SITUATION IS CAUSE OF HEAT		
i)	*blow off steam* (1837, 1857)	'to allow (steam or the like) to escape forcibly with a blowing noise; also *fig.* to get rid of (superfluous energy, emotion, etc) in a noisy way; intr. (for refl.) of steam, gas, etc.: to escape forcibly'	..ENERGY, PRESSURE	PRESSURE FOR EMOTION	**1837** Mᴀʀʀʏᴀᴛ *Dog-Fiend* x i, The widow sat fuming and blowing off her steam.
			METAPHOR: PEOPLE ARE MACHINES, EMOTION IS THE HEAT OF A FLUID IN A CONTAINER		
j)			..ENERGY	ENERGY FOR EMOTION	**1857** Hᴜɢʜᴇѕ *Tom Brown* ɪɪ . ii, Now jumping the old ironbound tables, then blowing off his steam, as we should now call it.
			METAPHOR: PEOPLE ARE MACHINES, EMOTION IS THE HEAT OF A FLUID IN A CONTAINER		

k)	*put on steam* (1837, 1878)	'put on more power, energy etc.'	…ENERGY		**1837** DICKENS *Pickw.* xlviii, Get on a little faster; put a little more steam on, ma'am, pray.
l)	*under steam* (1860, 1873)	'run by steam'	..DRIVING FORCE, ENERGY		**1860** *Merc. Marine Mag.* VI I. 216 Orders were given to let the ship go under easy steam.
m)	*with steam up* (1870)	'with the engine running'	..ENERGY		**1870** *Remin. Amer.* 203 Their steam fire-engines are always kept in readiness with steam up and the horses harnessed.
n)	*turn off steam* (1878)	'turn off the pressure'	..VAPOUR, PRESSURE		**1878** KINGSTON *Ibid.* 417 The engineer having thought fully turned off the steam to prevent the boilers from exploding.
o)	*to have steam on* (1894)	*'using too much energy'*	..ENERGY		**1894** SIR J.D.ASTLEY *50 Years Life* I. 82, I naturally went to grass through having too much steam on to be able to pull up in time.
p)	*steam ahead* (1896)	'move ahead energetically'	… DRIVING FORCE		**1896** KIPLING *Seven Seas, Three Sealers* ad fin., Half-steam ahead by guess and lead, for the sun is mostly veiled.
q)	*like steam* (1905, 1979)				**1905** H.LAWSON *Coll. Verse* (1968) II. 4 We was draftin' 'em out for the homeward track and sharin' 'em round like steam.
r)	*under one's own steam* (1912, 1949)		..ENERGY METAPHOR: STEAM IN AN ENGINE IS ENERGY IN A PERSON		**1912** CONRAD in *English Rev.* XI. 311 We are not allowed to bring them in under their own steam.
s)	*run out of steam* (1961, 1968, 1973, 1977)	'of persons, to exhaust one's energy, ideas, etc.; also of things.'	..ENERGY METAPHOR: STEAM IN AN ENGINE IS ENERGY IN A PERSON.		**1973** D.FRANCIS *Slay-Ride* vii. 78 When I'd run out of steam, they would begin to nod while they listened.

4.3.3.2 The intransitive verb *steam*

Interestingly enough, the senses of the intransitive verb (*OED*) correspond directly to those of the noun discussed in 4.3.3.1.. In the same way as the noun *steam* may signify 'drops forming on a surface', the verb *steam* may signify 'the process of becoming covered with condensed vapour'. Similarly, the use of the noun *steam* to symbolise 'mechanical power' is matched by the use of the verb *steam* for 'generating or producing power'. In the *OED* the following senses of the intransitive verb are found:

1)   Of a surface: to become covered or bedewed with condensed vapour.
2)   To generate or produce power for mechanical purposes: said of an engine or boiler. **To steam up**, to turn or set it working; hence *fig*.
3)   To move or travel by the agency of steam:
a.   of a ship or its passengers. Also **to steam it**. Also with advs., as *away*.
b.   Of a railway-engine, the train or its passengers
c.   *fig. (colloq.)* (OED)

Out of the original sense 'emit steam' a number of different senses, both literal and figurative, have thus developed that focus on the result of emitting steam.

The INITIAL EVENT FOR COMPLEX EVENT metonymy (Kövecses and Radden 1998:52), seems to be behind the developments. According to Kövecses and Radden (1998:51)

[e]vents may involve several distinct subevents which are viewed as objects with parts. We can, for example, speak of the theoretical and practical "parts of a driving test. As with the thing-and-part ICMs, a whole event may metonymically stand for an "active-zone"sub-event and vice versa.

The senses discussed here and in the following section 4.3.3.3. all seem to originate from the use of *steam* in the original sense "[t]o exhale (steam or other vapour); to emit, send out in the form of vapour" to signify the complex event of something happening due to the application of steam. The focus of the new senses, however, are on the result of the application of steam rather than on the whole event. In that sense, the new senses are related to the ACTION FOR RESULT OF AN ACTION metonymy. As was the case with the nominal equivalents, the figurative senses of the verb (i.e. (2) and (3c)) are also dependent on a mapping from MACHINES to PEOPLE.

In the sentences below, the fact that the resultant movement is in focus and not the cause of the movement is frequently emphasised either by the use of a preposition indicating direction (i.e. 19-20, 25-31) or by expressions indicating that a distance has been travelled (22) or a certain speed has been reached (24).

a)

> (19) **1831** Mrs.Trollope *Dom. Manners Amer.* (1832) I. 255 Even were all the parties strangers to each other [on long river excursions], the knowledge thatthey were to eat, to drink, and **steam away** together for a week or fortnight, would induce something like a social feeling in anyother country. (*OED,* my emphasis)

> (20) **1832** R..Froude *Rem.* (1838) I. 306 We shall+see Avignon and Nismes, and then **steam** it **up** the Rhone to Lyons. (*OED,* my emphasis)

> (21) **1837** *Civil Engin. & Arch. Jrnl.* I. 28/1 She [a ship] will either **steam or sail**. (*OED,* my emphasis)

> (22) **1844** WH.Maxwell *Sports & Adv. Scot.* ii. (1855) 33 **Every mile we steamed**, the lake assumed a new character. (*OED,* my emphasis)

> (23) **1878** Kingston *Three Admirals* xix. 437 The *Bellona* accordingly **steamed on towards** the entrance of the harbour. (*OED,* my emphasis)

> (24) **1886** *Law Times Rep.* LIII. 726/1 When the tug was completed it was found that she could only **steam ten or eleven knots an hour**. (*OED,* my emphasis)

> (25) **1888** *Poor Nellie* 388 The young lady had **steamed over from** America. (*OED,* my emphasis)

b)

> (26) **1863** Mrs.H.Wood *Verner's Pride* xi, The train was **steaming into** the station.(*OED,* my emphasis)

> (27) **1899** Gratton *Memory's Harkback* 196 Now you can rail there, unconscious as to the beauties **through** which you have **steamed**. (*OED,* my emphasis)

c)

> (28) **1842** C.Fox *Jrnl.* 29 May (1882) viii. 156 **Steamed away to** London Bridge and saw the Maurices. (*OED,* my emphasis)

> (29) **1849** *Ibid.* 13 June xv. 244 **Steamed to** Chelsea, and paid Mrs. Carlyle a humane little visit. (*OED,* my emphasis)

> (30) **1857** Hughes *Tom Brown* I. vii, Young Brooke+then **steams away** for the run in, in which he's sure to be first. (*OED,* my emphasis)

> (31) **1911** *Concise Oxf. Dict.*, **Steam** *v.* (colloq.) work vigorously, make great progress, esp. *s.* **ahead, away**. (*OED,* my emphasis)

4.3.3.3. The transitive verb *steam*

Some of the senses of the transitive verb also have nominal equivalents. Sense (1a) below corresponds to sense (5) in section 4.3.3.1., and (1d) below

corresponds to sense (1) in section 4.3.3.1.. The INITIAL EVENT FOR COMPLEX EVENT metonymy (Kövecses and Radden 1998:52) once again seems to have played a part in the development of the new senses (c.f. 4.3.3.2.). Occasionally, the senses are also structured by a metaphorical mapping between PEOPLE and MACHINES (sense 3a-3b). The following senses have developed out of the original "[t]o exhale (steam or other vapour); to emit, send out in the form of vapour":

1)
a)   To apply steam to, expose to the action of steam, to treat with steam for the purpose of softening, cooking, heating, disinfecting, etc.

b)   To expose (a gummed packet) to the action of steam in order to soften the gum. *to steam open*, to open by this method. Similarly, *to steam* (a postage stamp, label, etc.) off.

c)   To fill with 'steam' or warm odour.

d)   To bedew a surface with vesicles of condensed vapour.

e)   Calico-printing. To fix (colours) by the steam-process.

2)   To convey on a steam-vessel. Colloq.

3)   Colloq. with *up*.

a)   To stir up or rouse (ardour, etc.). *rare*.
b)   To rouse or excite (a person), esp. to anger; agitate, upset.

4)   With up Agricul. To subject (an animal) to steaming up.
5)   With reference to heating, cooking, or washing by steam, and in the names of implements and apparatus used in these processes, as steam-bakery, – bath, – box, chamber, etc.

Again the focus is not on the initial event of emitting steam but on some later part of the process. Below, it is on the part of the process when a result may be on its way but is not yet at hand. In sentences (32) below, the envelope has not yet been opened but may easily be so:

(32) **1911** BEERBOHM *Zuleika Dobson* xiv. 212 She might easily steam **open** the envelope and master its contents. (*OED*)

In sentence (33), the boy or man's nerve has not yet been steamed up:

> (33) **1919** F.Hurst *Humoresque* 97 Ed says he'd never get him to **steam up** his nerve enough to call at a girl's house after her. (*OED*, my emphasis)

Similarly, the man referred to as "he" in sentence (34), has not yet managed to steam up interest but tries to do so, and the quiet girl in sentence (35) seems hard to steam up:

> (34) **1931** *Daily Express* 21 Sept. 19/2 He was trying to **steam up** interest in the contest. (*OED*, my emphasis)

> (35) **1964** Wodehouse *Frozen Assets* iii. 61 She's one of those calm, quiet girls you'd think nothing would steam **up**. (*OED*, my emphasis)

The results are here intended rather than fulfilled. Even though the process has not yet been brought to an end an outcome is clearly on its way. As is particularly evident from sentence (36), the application of 'steam' to the subject clearly brings about a change in this subject. By being subjected to steam, the wood in this sentence will become both softer and more pliable:

> (36) **1840** *Mechanics' Mag.* XXXIII. 498/1 The wood to be operated on, is first steamed, until it acquires such softness and pliancy, that it can be cut or blocked+into the different forms required. (*OED*)

The application of steam clearly initiates a process made possible through this application, that is, a process which in itself could be seen as a RESULT of the application of steam in the same way as senses (2c) and (2d) in 4.3.3.1. and senses (1) to (4) in 4.3.3.2. above are analysed as EFFECTS and RESULTS respectively. In the following sentences, resultant events of the application of steam implied by senses (1b-4) are accounted for:

(1b) Something is softened, opened or removed as in (37):

> (37) **1899** Burgin *Bread of Tears* I. ii. 35 He had steamed it over a jar of hot water, read the contents, and reclosed the letter. (*OED*)

(1c) Something is filled with warm odour as in (38):

>   (38) **1861** *Two Cosmos* v. viii. II. 191 Chops, steaks, toasted cheese, and almost all descriptions of drink steamed the whole apartment. (*OED*)

(1c) Something is bedewed with vesicles as in (39):

>   (39) **1860** *All Year Round* No. 42. 362 Glass, already opaquely steamed with youthful breath. (*OED*)

(1d) Colours are fixed as in (40):

>   (40) **1862** C.OʹNEILL *Dict. Calico Printing* s.v. *Steam colours*, The process of steaming colours. (*OED*)

(2) Something is conveyed as in (41)

>   (41) **1891** C.MacEWEN *Three Women One Boat* xv. 115 We will just+let him steam us back. (*OED*)

(3a) Someone is stirred up or roused as in (34-35) above.

(4) An animal is steamed up as in (42):

>   (42) **1969** N.W.PIRIE *Food Resources* iii. 104 The extreme case is the process known as 'steaming up' or 'flushing' ewes before mating. The extra food given+ increases the probability of conception. (*OED*)

4.3.4. The relationship between the sense development of *steam* and the invention of the steam engine

To summarise, the metonymic development of the different senses of *steam* in 4.3.3.1 - 4.3.3.3, both the CAUSE FOR EFFECT metonymy and the INITIAL EVENT FOR COMPLEX EVENT metonymy provide necessary links between *steam* and the new senses accounted for in these sections. As already argued in 4.3.3.1, the frequent use of the CAUSE FOR EFFECT metonymy is likely to facilitate both the use and the understanding of the nominal senses. However, a comparison between *steam* in its original senses and the ones accounted for here does not explain why these metonymies in particular, out of the great number of metonymic relationships that are well-entrenched in the minds of people (see

Kövecses and Radden 1998:48-61), have been used. In order to find the answer to that question we have to look outside language and turn our attention to the "real world" and the physical characteristics of the concept 'steam'. In this real world, the possibility of using steam (in the original sense of 'vapour') to create new products or as energy bred a need for new terms. Because steam was highly functional in these processes it was an apt vehicle in a metonymy involving them:

> Our basic human experiences are derived from our anthropocentric view of the world and our interaction in the world. In this world, humans take precedence over non-humans, concrete objects are more salient than abstract entities, things we interact with are selected over things we do not interact with, and functional things are more important to us than things which are non-functional. (Kövecses and Radden 1998:64)

In the same way as "[t]he parts of a car that are functional to its driving such as the wheels, the steering wheel or the motor may be used to stand for the car" (Kövecses and Radden 1998:65), people began to use the form *steam* for the processes that steam is functional of and for the things that are produced by means of steam. Original uses of the form to signify 'vapour', 'odour' or 'the emission of vapour', were complemented by the ones corresponding to the EFFECTS of processes involving steam or to complex events initiated by the application of steam, that is, senses whose relationship to the original ones is best described by the CAUSE FOR EFFECT metonymy or the INITIAL EVENT FOR COMPLEX EVENT metonymy. Hence senses such as 'visible vesicles', 'energy', 'dishes cooked by steaming', 'the application of steam to a gummed packet', 'the filling with 'steam' or warm odour' etc. were developed. Magnusson and Persson (1986:117) discuss the relationship between language and the real world in the following way:

> [T]he whole conceptual body of semantic roles may need a thorough revision aimed at bringing real world conditions in closer contact with linguistic description. For it is "out there", in the real world, that physical or abstract entities are affected by actions, processes and events. The abstractions made use of by a language in order to communicate the concepts shared by its users are in themselves a faint mirror image of real world affairs. (Magnusson & Persson 1986:117)

Similarly, the use of the PHYSIOLOGICAL EFFECTS OF AN EMOTION FOR THE EMOTION metonymy in developing the new senses of *steam* is related to the physiological characteristics of our feelings. Because feelings are mental, the only way for us to talk about them is to describe them by using the structure of

"things" that are not. That is, "things" which, according to Radden (2000:104), are generally identical with the causes and effects of our feelings:

> What people are concerned with in dealing with emotions are their causes and their effects. The causes leading to a particular emotion are manifold, but their effects are fairly consistent, in particular those that show up in people's physiological reactions. (Radden 2000:104)

In order to describe ANGER, for instance, people once started to use their experiences of physiological effects such as "increased body heat, increased internal pressure (blood pressure, muscular pressure), agitation, and interference with accurate perception" (Lakoff 1987:381). In this way, they started to conceptualise ANGER by means of HEAT (cf. Kövecses 2002:98). The use of STEAM to conceptualise ANGER is related both to the conventional mapping between ANGER and HEAT and to the PHYSIOLOGICAL EFFECTS OF AN EMOTION FOR THE EMOTION metonymy. It also seems relevant that steam was both the visible EFFECT of something heated and something that was emitted from our bodies (see 4.3.1.1.) quite early on. In being the visible EFFECT of something heated it was associated with the source domain of the metaphor ANGER IS HEAT. In being used to refer to 'excrements of the body' such as 'perspiration' (see 4.3.1.1 sentence (6)) and 'hot breath' (see 4.3.2.2 Table 2, sentence a) it was also associated with the PHYSIOLOGICAL EFFECTS OF ANGER and thereby the target domain of the metaphor ANGER IS HEAT. Above all, the usefulness of STEAM for conceptualising ANGER seems to be evident from the fact that nearly all the figurative instances of *steam* that are of an earlier date than the first steam engine instantiate, or are closely related to, the metaphor ANGER IS HEAT (see 4.3.2.1.).

In addition, these sentences, which describe abstract concepts such as *feelings*, *thoughts* and *dreams* exemplify mappings between the ABSTRACT and the CONCRETE and, in one case, between the ANIMATE and the INANIMATE (4.3.2.1).

Having thus identified the above conceptual structures as forming the basis for the figurative mappings involving 'steam' before the days of the steam engine, we clearly see that when the invention came, in many cases all that people had to do when using the invention as a source domain was to continue along already beaten conceptual tracks. First, because steam was once literally emitted also from animate beings, the mapping of the emission of steam from a machine onto the domain of people was very close at hand. Second, earlier uses of the metonymically based metaphor ANGER IS HEAT, along with the ANIMATE IS INANIMATE mapping in connection with the use of the form *steam,* paved the way for many of the metaphorical structures using the steam engine as a source domain. The mapping between the ABSTRACT and the CONCRETE, conventional

by then, also seems to have played an important part. Furthermore, the use of the STEAM ENGINE as a source domain for metaphorical mappings between PEOPLE and MACHINES was of course facilitated by the physiological characteristics of the invention and the epistemological correspondences between the two domains.

The machine could emit heated vapour as if it was a human being perspiring due to internal body heat caused by anger or other emotions. It was also perfect for describing feelings causing internal pressure in consisting of a container with an internal pressure that could be regulated by the amount of steam supplied. As illustrated by the increase or decrease of the pressure in the machine, the stronger the feelings the higher the internal pressure experienced by a person. By illustrating also the internal pressure, the steam engine made possible both the conceptualisation of some feelings not yet accounted for in connection with *steam* and the more precise description of feelings already conceptualised through the use of *steam*.

In fact, of the different metaphorical mappings building on the domain of the steam engine only the ones using the structure of the STEAM IN AN ENGINE IS ENERGY IN A PERSON metaphor (4.3.3.1) were originally structured by means of the invention. Again this is a parallel to the development of various things in the world we live in. It was not until the invention made it possible to produce power by means of steam that mappings involving steam could be used to describe the energy of working people resulting in perspiration emanating from their bodies (see 4.3.3.1 - 4.3.3.3.).

4.4. The cognitive function of the steam engine

In addition to the figurative uses of *steam* from the *OED* discussed above, my material includes figurative uses of *steam* from other dictionaries along with figurative uses of *steaming, steamy,* and a number of phrases that were originally used to describe the working of the steam engine. Roughly, these expressions fall into three main groups and one group of expressions that do not fit any of the different main groups. In 4.4.1., metaphorical expressions that are primarily used to describe ANGER and other PENT-UP EMOTIONS are accounted for; in 4.4.2., the ones that are primarily based on our experiences of steam as a source of ENERGY; in 4.4.3., the ones where the target domains are SEX and INTOXICATION; and in 4.4.4., the rest of the expressions. As may be expected, the boundaries of the different groups are by no means clear-cut. To some extent, certain phrases that are used to describe ANGER or other PENT-UP EMOTIONS also seem to make use

of our experiences of steam as a source of ENERGY. Accordingly, the use of *steamy* to signify concepts connected with sex, and the use of *steamed up* to signify 'intoxication', may be influenced by our experiences of the steam engine as a source of energy.

4.4.1. ANGER and other PENT-UP EMOTIONS

As is evident both from the study of the sense development of *steam*, and from the rest of the metaphorical expressions found in my material, the use of STEAM to conceptualise ANGER seems to be a mapping that stands the test of time. From section 4.3.2.1., we learnt that the figurative uses of *steam* were structured by the conventional metaphor ANGER IS HEAT before the steam engine was invented. Figurative instances of *steam* and *steaming* in modern dictionaries indicate that it still is a popular mapping. For example, according to *MWCD*, to *steam* is 'to be angry'. As is instantiated by the expression *steaming over the insult* (*MWCD) to steam* is to 'boil'. Similarly, *to steam up* is 'to make angry or excited: AROUSE' (*MWCD*):

> (43) **1860** *What shall I be?* (U.S.A.) 95 Not so fast, Mr. Spit~fire; You needn't steam up so fast. I'm as good company as you'll find here. (*OED*)

As in sentences (44- 47) below, to be *steamed* or *steamed up* is to be 'excited or roused, especially to anger' (*20th CW, OED*).

> (44) **1923** H.C.WITWER in *Cosmopolitan* Sept. 72/2, I was a bit steamed up about her making my popular sex ridiculous by going boy-crazy at fifty. (*OED*)

> (45) **1935** J.HARGAN *Gloss. Prison Lang.* 8 *Steamed*, envious, angry. (*OED,* their italics.)

> (46) **1936** M.H.BRADLEY *Five-Minute Girl* v. 79 If she was all steamed up like this over embroidery silks, he thought, what would she be when he told his news? (*OED*)

> (47) **1979** G.F.NEWMAN *List* ii. 22 They sounded pretty steamed with him. (*OED*)

In particular, according to *CIDE*, people who are steamed up "show their anger [---] about something that other people do not think is important":

(48) **1980** D.Bogarde *Gentle Occupation* ii. 44 The General insists it is sent to all the Brigades. He's getting very steamed up about the bloody little thing. (*OED*)

(49) She got all steamed up about the books being left on the tables instead of being put back on the shelves. (*CIDE*)

Since figurative uses of *steam* were structured by the metaphor ANGER IS HEAT before the steam engine was invented, they are dependent on people's experiences of *steam* rather than of the invention. The steam engine was neither needed in order to define the mapping nor is it needed in order to re-experience it. However, although *steam* and *steaming* may be used to describe someone who is angry without invoking our experiences of the steam engine, they allow us to conceptualise 'anger' in a much more exact way. Like other containers filled with hot fluids, the steam engine makes it possible for us to give the source domain HEAT a delineated shape. Instead of being a fairly abstract and boundless concept, HEAT becomes something that is enclosed in a container, covers a limited area and whose effects on other objects are perceptible. Once the source domain has obtained this fairly delineated shape our possibilities of describing the target domain in a much more precise way will have increased dramatically. When the heat is located inside a container, we may without difficulty observe the way in which a rise in the temperature makes the fluid in the container boil and thereby indirectly flip the lid of the container (cf. Kövecses 2002:96). By means of our experiences of hot fluids in containers, heat becomes a force whose effects on other objects are quite easy for us to perceive with several different senses. Thereby, our experiences of the way in which heat effects other objects also become structured enough for functioning as scaffoldings for working with experience. Possibly, our experiences of boiling kettles, steam engines and the like are as important as our experiences of our own bodies when it comes to paving the way for conceptualisations of ANGER not only by means of HEAT, but by means of the much more precise metaphor ANGER IS THE HEAT OF A FLUID IN A CONTAINER (cf. Kövecses 2002:95-98). Experiences of this kind make it possible for us to conceptualise in a precise way what our emotions do to our bodies, our minds and our behaviour. The relationship between the source domain a HOT FLUID IN A CONTAINER and the target domain ANGER is discussed in Kövecses (2002:95-98). In his opinion, however, our experiences of our own

bodies are all-important and the cognitive function of other external representations is played down. All that is needed when it comes to the acquisition of conceptual metaphors is our bodily experiences.

> It would be unreasonable to suggest that young children consciously learn conceptual metaphors by constructing coherent folk theories of source domains and applying the entailments of the source to the target. A more likely way for learning to take place is that we subjectively experience our bodies as containers; we have the experience of a fluid inside the body; we experience heat or lack of heat in certain parts of the body; we also feel pressure when angry; and so on. These are unconscious experiences that we have very early on in our lives. In the cognitive view of metaphor, these experiences are assumed to play a crucial role in acquiring conceptual metaphors. (Kövecses 2002:98)

Once acquired, conceptual metaphors like the ANGER IS A HOT FLUID IN A CONTAINER metaphor may "map additional knowledge from the source onto the target" (Kövecses 2002:94). Within the framework of cognitive linguistics the mapping of rich additional knowledge is called *metaphorical entailment*. However, since we may indeed come into contact with other kinds of containers quite early on in our lives too, the claim that people only use their bodily experiences when acquiring the structure ANGER IS A HOT FLUID IN A CONTAINER seems too strong. Presumably, our experiences of several different kinds of containers, inclusive of our container-like bodies, complement one another in the process of giving our thoughts this structure. On Harder and Sinha's view (Sinha 1999:249), not only "embodied grounding" but also "functional and discursive grounding" is central to language and linguistic cognition.

> [C]ognition is causally grounded in the biology of the organism in which it belongs, and functionally grounded in the interaction between organism (including brain) and environment. Grounding, in other words goes in two directions. Understanding cognitive facts requires an understanding of grounding relations both to the body that produces them and to the interactive context that constrains this process. (Harder 1999:202)

> [W]e have to understand conceptual structures not only as grounded in relation to bodily processes, but also in relation to the functional feedback cycles that they give rise to in relation to the environment. (Harder 1999:211)

Indeed, from our own bodily experiences we do not learn that "beyond a certain limit the walls [of the container] will burst as a result of too much pressure, [--] [that] the fluid will come out of the container as a result of the explosion, [--] [that] the pieces of the container will go flying all over the place, [--] or [that] this might be dangerous to people nearby" (Kövecses 2002:96).

There is also likely to be a variation between individuals as to what kinds of experiences they use to structure their thoughts in this way. Some people may indeed begin to do so almost exclusively as a result of their bodily experiences. Others, however, may structure their thoughts in this way primarily as a result of their experiences of other kinds of containers or container-like entities. The acquisition of conceptual structures is likely to be like the acquisition of language, that is, constantly on-going. Once the metaphor ANGER IS A HOT FLUID IN A CONTAINER is part of our conceptual structures, the structure will be added to by means of new experiences of containers and new experiences of our own bodies. In order to give our thoughts a coherent structure, however, we have neither to work hard nor to be clever. To quote Kövecses (2002:98), we do not have to be "naive" physicists. In the world we live in, objects of a similar kind, in this case different kinds of containers, are structured and function in similar ways. When using our experiences of real-world objects to structure our thoughts, we simply stick to the structure provided by nature and are thereby automatically provided with coherent structures.

The rest of the metaphorical expressions of this group all originate from the use of some kind of non-human container with internal pressure to conceptualise certain aspects of anger. Examples of this would be the metaphorical uses of *steam up* and *steamed up*. For steam to steam up, it needs to be inside a container of some kind. In its literal sense, *steam up* profiles a rise in the temperature of a fluid in a container and thereby an increase in the internal pressure of the container. *Steamed up* profiles the result of this process, that is, the fact that the temperature has been raised considerably and that the pressure inside the container has reached a very high level. When used to conceptualise anger, the rise in the temperature and increase of the internal pressure signified by *steam up* aptly corresponds to the fact that someone is getting more and more angry. Similarly, the high temperature and high pressure signified by *steamed up* corresponds to the fact that someone is excited or roused. Furthermore, because both these phrases seem to originate from the world of technology, their figurative uses are intimately connected with external representations from this domain. According to the *OED*, in its literal sense *steam up* is "said of an engine or boiler" in the sense 'to generate or produce steam for mechanical purposes'. Presumably, *steamed up* is of the same origin.

Similar to the way these phrases are used to describe engines or boilers, *blow off* and *let off* are descriptive of the working of the steam engine (*OED*). When used in a technological context, *blow off steam* signifies the sense 'to allow (steam or the like) to escape forcibly with a blowing noise' whereas *let off* is used

in the sense 'to discharge with an explosion'. When mapped onto human behaviour, the experiences connected with the steam engine signified by these phrases are both associated with 'the release of pent-up emotion' (*MWCD*). The following example is from *CIDE:*

> (50) He lifts weights after work to blow off steam (= to become free from worry or anger).

Because of the noisy and violent way in which steam is blown off or let off, our experiences of these actions may be used to conceptualise pent-up emotions that are released in a way that might be trying to everyone around the person doing so. According to the *OED*, to *blow off* is 'to get rid of (superfluous energy, etc.) in a noisy way' (see Table 4 sentences i and j). Similarly, *CIDE* defines *let off steam* as 'get[ing] rid of too much energy or strong feelings by behaving noisily:

> (51) The children ran around the garden shouting and letting off steam. (*CIDE*)

Furthermore, the use of the steam engine to conceptualise anger seems to capture the energy that is characteristic of strong and pent-up emotions. In the figurative uses of *blow off* and *let off* above, the person releasing his or her pent-up emotions is at the same time getting rid of an excess of energy. In sum, the steam engine provides us with a very useful source domain by means of which the target domain ANGER may be very precisely described and certain aspects highlighted. The invention defines additional meaning that may not be defined by the use of HEAT as a source domain. In addition to allowing us to conceptualise the internal pressure and the rise in the temperature that is typical of ANGER and other pent-up emotions, the steam engine makes it possible for us to conceptualise the way in which the release of the pent-up emotions sound, the intensity of the pent-up emotions, and the energy that is characteristic of them.

Despite the usefulness of the invention it also seems possible to re-experience the structures of the metaphorical expressions discussed in this section by means of other kinds of containers that function in a similar way. This seems to be possible despite the fact that some of the figurative senses discussed above even seem to originate from mappings where the steam engine is the source domain. Experiences of other kinds of containers, however, do not carry as much information as those of the steam engine.

In order to explain the success of the mapping between STEAM and ANGER, it seems relevant that it is in line with the conventional metaphorical structure

ANGER IS HEAT. However, it also seems to be relevant that the steam engine, at one point, had an enormous impact on people's lives. Because the steam engine was a successful invention, it soon became part of the common knowledge of a great number of people. The more familiar people became with it, the more metaphorical expressions based on our experiences of the invention were put into circulation. Above all, however, it seems to be the systematic correspondences between the steam engine and people that explains the success of the mappings, in other words, the fact that to some extent the steam engine is both built like a human being and functions like one.

4.4.2. The steam engine as a source of energy

This section focuses on metaphorical expressions that are the result of mappings of the function of the steam engine as a source of energy onto other domains. Of the metaphorical mappings discussed in sections 4.3.3.1. - 4.3.4. above, those that were new to the invention are all, directly or indirectly, connected with this function. Unlike other expressions of which the term *steam* is a part, the expressions to be discussed here reflect structures that have once been defined by means of the steam engine and are generally not possible to re-experience by means of other kinds of containers (cf. the structures discussed in 4.4.1. above). The primary reason why the invention is needed is that it is required in order to produce energy by means of steam. Hence it provides us with a structure for the relationship between an increase in the amount of heated vapour and the production of energy. From the figurative uses of *steam up, pick up steam* and *get up steam* below, it is also evident that our experiences of the invention are necessary in order to structure the relationship between an increase in the amount of energy inside a container and the ability of an engine to perform in a satisfactory way. Thanks to our knowledge that a steam engine that has picked up steam runs much better than one that has not, and our habit of conceptualising EFFECTS by means of CAUSES (see 4.3.3.1.), phrases like these may be used to conceptualise the fact that different kinds of entities that cannot literally pick up steam 'start working much more effectively' (*MWCD*):

> (52) After the first three months, the fundraising project really started to get up steam. (*CIDE*)

> (53) [S]ales began to pick up steam. (*MWCD*)

By contrast with the figurative uses of the phrase *get up steam* from the 19th century, which were primarily used to describe people who are 'roused 'or 'excited' (Table 4, sentences g and h), modern dictionaries seem to associate these phrases primarily with ABSTRACT, INANIMATE, FINANCIAL concepts such as the economy, fund-raising projects, and sales. In this sense, the figurative uses of the phrase seem to have developed in a way similar to those of the noun *steam* that are based on our experiences of the steam engine as a source of energy. These were also used to describe people (sentences 15-17) before they were associated with an ABSTRACT, INANIMATE, FINANCIAL concept (sentence 18). Above all, the use of mappings from the domain of the STEAM ENGINE in order to describe financial matters like these seem to build on a correlation between the two metaphors MORE IS UP and GOOD IS UP in both source and target domain and the underlying idea that the ECONOMY IS A MACHINE. As is reflected by the use of the preposition *up* in the phrases *steam up, pick up steam* and *get up steam,* more steam in an engine is conceptualised as a **rise** in the amount of steam in the engine. Because MORE in connection with the amount of steam in a steam engine IS UP, and MORE correlates with improved performance, UP is also GOOD in this domain. Within the domain of ECONOMY, this correlation corresponds to **increases** in sales, **rises** in value and similar developments that are all structured by the metaphor MORE IS UP. As is reflected by the fact that progress, when it comes to financial matters, is often visualised by means of graphs where GOOD IS UP, it also corresponds to the fact that **increases** in sales and **rises** in value are considered positive developments. It may be argued that, due to the correlation between MORE IS UP and GOOD IS UP in both domains, we are not really dependent on our experiences of the steam engine in order to understand that *the steaming up of the economy*, *the getting up of steam of a fundraising project*, and *the picking up of steam of sales* are developments of a positive kind. Admittedly, the knowledge that UP is something that is GOOD in connection with FINANCIAL MATTERS seems to suffice in order to come to that conclusion. However, in order to fully understand the sentences, familiarity with the steam engine is necessary. By means of the steam engine, steam becomes the symbol of energy, force, enthusiasm, and power, that is, the force behind the positive developments. The structure of the relationship between our experiences of a steam engine filled with steam, and the fact that someone is exploiting his or her performance to the limit, is made use of in the figurative uses of the verb *steam* in the sense 'to move or proceed with energy or force' (*MWCD*), and the figurative uses of the phrases *at full steam*, *with full steam on,* and *full steam ahead*. The instances below are from *CIDE*:

(54) If you go full steam ahead with something you do it with all your energy and enthusiasm.

(55) Now that problem is out of the way it's full steam ahead to get the job finished.

The figurative uses of phrases such as *on all cylinders, at top speed,* and *in top gear* indicate that the steam engine shares this function with a number of different technological artefacts. The figurative uses of these expressions are all dependent on our experiences of a technological artefact of some kind, be it an internal combustion engine, a bicycle, motorcycle, or a car, in order to highlight the fact that PEOPLE *with full steam on* are people who are exploiting their performance to the limit. Our experiences of the machine, however, do not have to be great. As is already signalled by the rest of the words of the phrases, that is, *at full* [---], *with full* [---] *on,* and *full* [---] *ahead,* all we need to know is that they refer to a steam engine that is running at the top of its capacity.

Similarly, a steam engine without steam is a steam engine that does not work at all. Because LESS steam is BAD, to *run out of steam* is not only used metaphorically in the sense of 'losing one's energy', but also signifies to 'lose one's energy and success' (*CIDE*).

(56) I seem to have run out of steam (=lost all my energy). (*CIDE*)

(57) The peace talks seem to have run out of steam (=lost their original energy and success). (*CIDE*)

Finally, people may also do something *under their own steam*. The mapping underlying the metaphorical use of the expression is yet another mapping pertaining to the 'power', or 'momentum' of the steam engine *(MWCD)*. The expression *to do something under one's own steam* may also be used in the sense 'to do something without help' (*CIDE*). The role played by an engine in the underlying mapping seems to be reflected by the use of the preposition *under*:

(58) When the fitness class closed, we decided to do some training under our own steam. (*CIDE*)

(59) [...] got there under his own steam. (*MWCD*)

Again the match between our experiences of our own bodies and of the steam engine is perfect. Like steam engines that are running we get warm when we

exert ourselves. When the temperature inside a steam engine is raised, steam is emitted from it. When we get warm, we perspire. Indeed, this use of the expression even seems to thin the line between the metaphorical and the literal expression. Even though the term *steam* is not primarily associated with 'perspiration' today, but with the kind of vapour that emanates from boiling kettles or from warm shower-rooms, it was initially used to signify 'vapour coming from people's bodies' or 'vapour inside people's bodies' (see 4.3.1.1.). In the sentences above, the two senses of *steam*, 'vapour' coming from a steam engine and 'perspiration', are blended into one (see Table 5 below).

4.4.3. Sex and intoxication

In my material, both instances of *steamy* in the sense of 'sexy, or erotic' and instances of *steamed up* in the sense of 'drunk, intoxicated' are found. Neither of these senses, however, seems to be dependent on our experiences of the steam engine. To begin with the former expression, it may, according to *CIDE*, be used in the sense of 'sexually exciting or including a lot of sexual activity'. This is instantiated by the sentences below.

(60) Some of the love scenes in the film are on the steamy side. (*CIDE*)

(61) The perfume commercial was so steamy that the TV company decided to ban it. (*CIDE*)

(62) His new novel is advertised as his steamiest yet. (*CIDE*)

It is true that our experiences of the steam engine may help us to associate phrases such as *steam up* (see 4.3.3.3.) and *get up steam* (see 4.3.3.1.) with people who are 'roused' or 'excited'. Indeed, the structures reflected by the expressions may be re-experienced by means of the invention. Because sexual attraction and lust are certain kinds of excitement, there seems to be a connection between the steam engine and the use of *steamy* in the sense of 'sexy, or erotic'. However, unlike the figurative uses of the phrase *under one's own steam*, there is nothing in the form of the expression indicating that a steam engine is part of the underlying mappings and was once used to structure them. Above all, this sense seems to originate from a mapping between our experiences of HEATED VAPOUR and our experiences of body heat and PERSPIRATION. Because experiences of heated vapour may be obtained from a number of different objects, it is equally true that the connection between the two domains is not dependent on our experiences of an engine.

As to the figurative use of the phrase *steamed up* in the sense of 'drunk, intoxicated', there seems to be a connection with the steam engine because steam may be seen as a force that runs our actions (see 4.3.3.1. and 4.4.2., see also Table 4. sentence g), and alcohol as a drug that influences our behaviour. The influence of 'steam' on our behaviour is particularly evident from sentences (64-65) below:

(63) **1929** M.A.GILL *Underworld Slang* 10/2 *Steamed up*, drunk. (*OED*)

(64) **1950** *Landfall* June 126 Little Spike is six foot two and has a reputation for being a hard case when he is steamed-up. (*OED*)

(65) **1971** J.TERRELL *Bunkhouse Papers* xii. 156 A cowman sat next to the houseman, and he was steamed with liquor so that he slumped a little to one side. (*OED*)

It thus seems possible to re-experience the structures underlying the figurative uses of *steamed up* in the sense of 'drunk, intoxicated' by means of the steam-engine. This sense, however, is not necessarily connected with our experiences of the invention. As already observed in 4.3.1.1, *steam* was used to refer to the occurrence of vapour inside the body long before the days of the steam engine. Earlier uses reflect the conception of the effects of alcohol as 'internal steam' (see 4.3.3.1). The structures underlying them were not originally defined by means of the steam engine.

4.4.4. Miscellaneous

In the last group of metaphorical expressions we find the figurative uses of *steaming* (adjective and noun) in the following senses:

steaming – adj. (1962) complete, utter; used for reinforcing terms of abuse. A British slang usage which enjoyed a brief vogue. (*20ᵗʰ CW*)

steaming n (1987) a form of robbery in which a gang passes rapidly through a public place, train etc. robbing bystanders or passengers by force or numbers. Steamer for such a robber is first recorded in 1987 too, and steam can also be used as a verb. British slang, possibly inspired by steam in 'to become involved in a fight or brawl'" (*20ᵗʰ CW* 1999:563)

The uses do not seem to fall into any of the groups above. As to the mappings underlying them, we can only speculate. Since very little information is provided by the dictionaries on which my material is based, I do not venture upon an

explanation. Some tentative explanations are, however, offered by Gunnar Persson (personal communication).

The adjectival use in the sense of 'complete, utter' may originate from our experiences of something that is so filled with steam that it is steaming. By analogy with these experiences, *a steaming idiot* is someone who is "so filled with idiocy that s/he is steaming from it".

The nominal sense of a 'robbery in which a gang passes rapidly through a public place, train etc. robbing bystanders or passengers by force or numbers' may originate from perceived similarities between the emission of steam from a pipe and the perpetrators. Both move and vanish quickly. The nominal use may also be related to the function of a steamroller of squashing things. In their research into the criminal sense of *steaming*, Van Welzenis and Groenen ("Steaming: A Kind of Youth Violence"
http://www.asc41.com/www/1999/absvi072.htm) found the following six criteria important for a definition of the term:

1. There are two or more offenders.
2. The location Is [*sic*] always a public place.
3. There Is [*sic*] always an Interaction [*sic*] between the offenders and the victim.
4. The offenders threaten and/or use violence.
5. The offenders extort money or something else from the victim.
6. It Isn't [*sic*] obvious If [*sic*] the use of violence Is [*sic*] only Instrumental [*sic*].

4.5. Summary and conclusion

The primary aim of the present chapter was to investigate the cognitive function of the steam engine. It was found that target domains such as HEATED EMOTIONS and the ENERGY of actions, events and emotions may be conceptualised by means of our experiences of them. Of the great number of metaphorical expressions discussed in this chapter, however, only those based on our experiences of the steam engine as a source of energy are dependent on our experiences of the invention. These were once defined by means of the steam engine, and may not be re-experienced by means of any other external object but the steam engine. Expressions were also found that reflect mappings that may either originate from the steam engine, or from any kind of container filled with

heated fluids. Examples are kettles and saucepans. The structures reflected by these expressions may today be re-experienced by means of any of these. People today are likely to use kettles and saucepans as cognitive tools more often than the steam engine. The former are used much more frequently today than the latter. The steam engine, however, generally provides us with experiences that describe the target domains in a much more precise way than other kinds of containers filled with heated fluids. It allows us to conceptualise not only the rise in the temperature that is typical of ANGER and other pent-up emotions, but also the way in which the release of the pent-up emotions sound, the intensity of the pent-up emotions, and the energy that is characteristic of them.

In part, the possibility of re-experiencing the structures underlying most of the metaphorical expressions discussed in this section by means of other external objects seems to explain why metaphorical expressions originating from the steam engine are still in use, even though the heyday of the invention has been over for a long time. Another explanation seems to be that all that is needed in order to use and understand the expressions is a fragmentary knowledge of the invention. Since metaphorical mappings are partial (see e.g. Lakoff & Johnson 1980:52-60), they tend to focus on certain aspects of our experiences associated with a given source domain. Hence we do not need to be familiar with more than certain aspects of the source domain in order to be able to use and understand expressions like the ones discussed here in an adequate way. For example, in order to use and understand the figurative sense of the phrase *at full steam,* all we need to know about the source domain is that a steam engine running at full steam is one that is running at the top of its capacity.

Even if fragmentary knowledge is of little help if we want to discuss the working of a dated invention, it may be very useful if we want to conceptualise, in a precise way, certain aspects of different target domains by means of this invention.

CHAPTER 5. ELECTRICITY

5.1. Introductory

Having investigated the cognitive function of the steam engine and the ways in which this invention has enriched language and thought, the turn has come to metaphorical mappings made possible by advances in electrical science. However, the aim of the study is not to analyse everything that, either directly or indirectly, can be related to this field.

Primarily, the cognitive function of the electric current *per se* is investigated. Very little will be said about metaphorical mappings based on the great number of inventions that are dependent on electricity as a source of light, heating and power. Merely, metaphorical words and expressions that involve the electric current will be studied. More specifically, the aim is to relate electricity to the questions brought up in (1.3.). In short, the ones below:

- What source domains are involved when people structure their experiences of electricity?

- What has the electric current helped us to define? What conceptualisations originate from this particular force? What target domains are described?

- Does the possibility of using the electric current as a tool for working with experience in any way help us to re-experience internalised structures?

In general, this chapter follows the guidelines laid down in 1.3., and aims at answering the same questions as chapters 4 and 6. However, since the metaphorical words and expressions that make use of electricity as a source domain seem to fall into four different groups, the appearance of this chapter is slightly different.

Like these chapters, the present chapter begins with a presentation of all the words and phrases compiled in my material that proved to be relevant for a study

of metaphor. These are presented in Table 5 below. Group A consists of words and phrases that have found their way to the field of electricity through conceptual mappings. The discussion of this group serves as an introduction to that of metaphorical expressions based on our experiences of electricity, that is, the words and phrases of Group B (see 5.2.).

However, unlike the rest of the chapters, the discussion of the items in Group B is divided into two parts. Sections 5.3-5.3.5. relate the metaphorical expressions of this group to four different general ideas on which the mappings seem to be based. The cognitive function of the electric current is summarised in 5.4. A summary and conclusion is provided in 5.5.

Table 5. Words and phrases in my material connected with electricity and relevant for a study of metaphor.

A	B
5.2.	**5.3.**
	electric
generate	
attraction	**5.3.2.**
fluid	*electricity*
current	*electrification*
electric	
electricity	**5.3.3.**
switch	*switch on*
circuit	*switch (n)*
grid	*switched*
	switched on
	power
	power up
	switch off
	switched off
	blow a fuse
	(safety) fuse
	short-fuse
	short-fused
	5.3.4.
	electric
	electrify
	electrifier
	electrifying
	5.3.5.
	asleep at the switches

5.2. Concepts within the domain of electricity – conceptualised by means of other domains

The number of words in my material that have found their way to the field of electricity by being mapped from other domains is not very high. Nevertheless, the words suggest the creative ways in which we proceed when we want to structure our experiences of something that is both complex and new to us, in this case, the unique properties of the discovery[23] and the unique ways in which it works. The selection of words implies that in the absence of isolated inventions or discoveries that reminded people of the electric force, they used their experiences of a number of different things. First, directly or indirectly, they used things that people, or animate beings in general, do and things that they feel. This is suggested by the history of the words *generate* and *attraction*. Similarly, the use of the term *fluid* to refer to electricity may be the result of embodiment. Second, as revealed by the terms *current, electric*, and *electricity,* people also used their experiences of things that they had observed in nature or in the sky. Third, the words *attraction, electric*, *electricity, switch, circuit* and *grid* imply that earlier inventions and artefacts were used.

The term *generate* is today used in the sense 'to cause to exist, or to produce' (*CIDE* 2001). To *generate electricity* is to 'produce electricity', and '[a] generator is 'a machine which produces something, esp. electricity' (*CIDE* 2001). However, like the rest of the terms to be discussed here, it was originally not used to refer to anything connected with electricity or with machines. According to *Barn.*, its first record is from 1509 and refers to people. More specifically, it goes back to Latin *generare* in the sense to 'bring forth, beget, procreate, create' from *genus* 'kind', 'race'. Possibly, *generate* is a backformation from *generation,* which was used to signify 'offspring, descendant' as early as 1325. Machines did not generate until 1794 (*Barn.*) and they did not generate electric energy until 1879 (*Barn.*). The term thus referred to the reproduction of human beings long before it referred to the production of anything else. Its development reflects the fact that we knew how to reproduce ourselves long before we were familiar with how electricity could be produced by means of machines.

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[23] Electricity was "discovered" long before the discovery of the theory of electricity and magnetism in the 19th century. The most remarkable ancient finds in this connection are two earthenware vessels in Iraq equipped with "metal electrodes". The most likely explanation of these finds is that they are some kind of galvanic batteries constructed about 2,000 years earlier than Galvani's and Volta's discoveries around 1800 (*Nationalencyklopedin*).

The subsequent use of a term that was initially associated with people giving birth to babies to refer to machines that produce different things and then to machines producing electricity also implies that the ones who did so drew parallels between these different kinds of experiences. The sense development seems to be yet another result of our habit of using the experiences that we have of ourselves and of our own species in order to structure our experiences of other kinds of things. Irrespective of whether people were aware of it or not, they clearly saw THE INANIMATE as THE ANIMATE, MACHINES as PEOPLE, MACHINES PRODUCING THINGS/ELECTRICITY as PARENTS GIVING BIRTH TO CHILDREN and PRODUCTS as CHILDREN. By doing so they did not only structure their own experiences of things that were new to them by making use of things that they were familiar with. They also found an efficient way of explaining to other people what the machines were doing. The source domain they used was central in their lives. Hence when hearing people talk about machines generating different things, even people who were unfamiliar with the machines are likely to have activated the adequate meaning. Today, our experiences of parents giving birth to children are also used to describe abstract concepts such as nations, political parties (*Longman*), ideas, theories, problems (*CMHP*) and the like. On (*CMHP*) we find metaphorical expressions such as *This theory fathered many others,* and *This solution actually gives birth to a lot of new problems* analysed as THEORIES ARE PEOPLE and CREATING IS BIRTHING respectively. In addition, via the PARENT directory on the site, metaphors such as THE MIND IS A PARENT, THINKING IS GIVING BIRTH, and THINKING IS HAVING IDEAS may be found. Similar to the way PRODUCTS were conceptualised as children above, the PRODUCTS OF OUR THOUGHTS like, for example, ideas and solutions and PRODUCTS OF OUR ACTIONS in general are also conceptualised as CHILDREN, which in turn also possess the capacity to generate offspring.

Similarly, the terms *attract, attractive,* and *attraction* were all connected with animate beings long before they were connected with inanimate objects. According to *Barn.*, *attract* was used in the sense 'to draw out (diseased matter) as a means of treatment' before 1425 (*Barn.*) and *attractive* in the sense 'having the ability to draw off and ingest nutriment' before 1398 (*Barn*). *Attraction* signified 'the action of drawing out diseased matter, extraction' (*Barn*) before 1400. In 1533, it was used to symbolise '[t]he drawing in or absorption of matter by any vessel of the body, the taking in of food' (*OED)* and in 1610 'the drawing in of the breath, inspiration, inhalation'. According to these two sources, it was not until the beginning of the 17th century that the term was first connected with inanimate things:

(66) **1607** SHAKES. *Timon* IV. iii. 439 The Sunnes a Theefe, and with his great attraction Robbes the vaste Sea. (*OED*)

(67) **1621** BURTON *Anat. Mel.* I. i. II. v, Attraction is a ministering faculty, which as a loadstone doth iron, draws meat into the stomach, or as a lamp does oil. (*OED*)

By then, it was also applied to people in the sense 'attracting quality' (1608). Subsequently, the use of the term to describe the action of any body or substance that, 'draws to itself another body or substance [---] to which it is not materially attached' (*OED*) paved the way for its use to describe both 'magnetic' and 'electric attraction'.

(68) **1626** BACON *Sylva* §906 The Drawing of Amber and Iet, and other Electrick Bodies, and the Attraction in Gold of the Spirit of Quick-silver. (*OED*)

(69) **1665** GLANVILL 1665 GLANVILL *Sceps. Sci.* 14 To solve the motion of the Sea, and Magnetick Attractions. (*OED*)

In turn, the application of the term to magnetic and electric attraction motivated the use of the term to signify 'the action of causing men or animals to come to one by influencing their desires' (1742) and 'personal influence, figured as magnetic' (1750) when again applied to people:

(70) **1750** JOHNSON *Rambl.* No. 160 3 [*sic*] 5 Many natures seem to start back from each other by some invincible repulsion. There are others which immediately cohere whenever they come into the reach of mutual attraction. (*OED*)

One development of the term thus seems to have led to the other. The use of it to refer to electric attraction is of course a result of us comparing our experiences of drawing different substances into our own bodies with any body or substance that possesses the property of drawing other bodies or substances to it. In that sense, the history of the noun *attraction* (and of other related forms) is yet another result of mappings between PEOPLE and MACHINES. In turn, the connection between *attraction* and our experiences of electrified or magnetised bodies drawing other substances to them seems to have made the term even more suitable for describing an action that brings about changes also in the way the

person feels who is drawn to something or someone, that is, the fact that he or she has started to feel emotions of desire for someone or something. According to the *OED*, the use of the term to signify 'personal influence' is "figured as magnetic". The sense 'the action of causing men or animals to come to one by influencing their desires' is likely to have the same origin. Alternatively, it is a result of a mapping between people's experiences of electrified bodies and the way they react together with certain other bodies. In either case, this part of the sense development originates from a mapping in the opposite direction, that is, from the INANIMATE to THE ANIMATE, from MACHINES to PEOPLE. More specifically, as is quite in line with the metaphor EMOTIONS ARE FORCES, it is a result of people's emotions conceptualised as magnetic or electric forces. Because these forces have the power to attract other bodies and because we tend to conceptualise AFFECTION as CLOSENESS and LOVE as A UNITY or A BOND (see Kövecses 2002:74), magnetic or electric forces here translate into concepts such as 'desire', 'sympathy', 'sexual attraction' and the like. In other words, DESIRES (and other related feelings) ARE MAGNETIC/ELECTRIC FORCES BETWEEN THE DESIRED AND THE DESIRER (see *CMHP*). Sometimes this FORCE is considered to be located WITHIN THE DESIRER. Sometimes it is located WITHIN THE DESIRED ENTITY or PERSON (see *CMHP*). In sentence (70) above, MAGNETIC or ELECTRIC ATTRACTION translates into (MUTUAL) ATTRACTION.

Possibly, the connection between words such as *fluid* and *current* on the one hand, and electricity on the other also originates, to some extent, from people using their experiences of their own bodies in order to understand the way things that are new to them work. At least, it does not seem unlikely that Benjamin Franklin, who was the one who put forward the theory that electricity is 'due to a subtle fluid diffused through all bodies' (*OED*) was initially inspired by his experiences of his own body and the blood in his veins. As an inheritance of his theory, the term *electrical fluid* was introduced:

> (71) **1750** FRANKLIN *Lett.* Wks. 1840 V. 246 The particles of the electrical fluid. (*OED*)

Franklin's theory made it possible for us to use our experiences of fluids that are not usually associated with a particular location inside a body to conceptualise the electric current. Having once conceived of electricity as a fluid in a body, it became possible for us to elaborate the conceptualisation by means of our experiences of, for example, different kinds of flows of water in nature such as streams, rivers, brooks and the like in order to describe what was going

on[24]. The use of the term *current* to signify 'the transmission or 'flow' of electric force through a conducting body' seems to originate precisely from this kind of elaboration. According to the *OED*, the term was introduced in connection with "the theory that electrical phenomena are due to a fluid (or fluids) which moves in actual 'streams'". By using a word previously associated with a stream of water to conceptualise what happens inside a body, people not only managed to put into words their view that electricity flows, they also found a way to emphasise the fact that electricity is a force.

> (72) **1842** Grove *Corr. Phys. Forces* 48 From the manner in which the peculiar force called electricity is seemingly transmitted through certain bodies the term current is commonly used to denote its apparent progress. (*OED*)

The terms *electric* and *electricity* were also used to signify other things that were part of people's environment long before they were associated with the 'electric force'. According to *Barn.*, *electric* originates from terms that are related to Greek *elector* designating 'the beaming sun' and are possibly cognate with Sanskrit *ulka* 'meteor'. More precisely, the term is a result of a borrowing from the New Latin term *electricus* designating 'generated from amber, as by friction', which in turn came from Latin *electrum* 'amber' and ultimately Greek *electron* related to *elector*. As implied by the origin of the terms, people seem to have found some kind of connection between 'amber' and 'the beaming sun' quite early on. In turn, they are likely to have found their experiences of the sparkling rays of the sun suitable for the conceptualisation of the electrical phenomena that they had observed around rubbed amber.

According to *Barn.*, the early use of the term *electricity*, which was formed from the root *electric* and the suffix *–ity,* referred to 'the properties of such things as amber and glass, [to] [---] attract lightweight objects when excited by friction.'. As people also began to use the term to refer to different kinds of CAUSES of this property, it acquired senses such as 'the state of excitation produced in such bodies by friction', 'different kinds of causes of the property to attract', and 'different kinds of sources of the property to attract'. It was also

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[24] See Gentner & Gentner (1983:108-110) for a discussion of the mapping. They argue that the most frequently used analogy (their terminology) to explain electricity is the water-flow analogy. Another popular mapping is the moving-crowd analogy, in which the "electric current is seen as masses of objects racing through passageways" (Gentner & Gentner 1983:111). In their study (1983:99-129) they show that the two analogies lead to different patterns of inferences.

used to refer to 'the science of the phenomenon'. In other words, broadly speaking, the sense development of the term is the result of different kinds of metonymies (see Table 6 below). The development of the figurative senses, which also involve metaphorical mappings, will be discussed in 5.3.- 5.4.

Table 6. A summary of the sense development of *electricity* (*OED*).

	Sense
	1a) '[T]he distinctive property of 'electric bodies', like amber, glass, etc., *i.e.*, their power when excited by friction to attract light bodies placed near them.'
EFFECT FOR RESULT >	'[T]he state of excitation produced in such bodies by friction.'
EFFECT FOR CAUSE >	'[T]he cause of this phenomenon'
SIMILARITY > EXTENSION >	"others [---] of common origin"
EFFECT FOR CAUSE; /CAUSATION ICM: EFFECT FOR CAUSE; PROPERTY FOR CAUSE OF PROPERTY, PROPERTY FOR SOURCE OF PROPERTY /CAUSATION ICM: STATE/EVENT FOR THE THING/PERSON/STATE THAT CAUSED IT (below)	b) 'Preceded by adjs. denoting a) the source or mode of production, as *frictional, galvanic, magnetic, thermal, vital, voltaic'*
EFFECT FOR CAUSE; PROPERTY FOR SOURCE OF PROPERTY, PRODUCT FOR PLACE /CAUSATION ICM: STATE/EVENT FOR THE THING/PERSON/STATE/EVENT THAT CAUSED IT	'Preceded by adjs. denoting b) the place of development, as *animal, atmospheric, organic.'*
	'Preceded by adjs. denoting c) the quality, as *active, constant, free, negative, positive, vitreous, resinous electricity.'*
METAPHORICAL AND METONYMIC MAPPINGS (See 5.3.2.).	2) *fig.*
STATE/EVENT FOR SCIENCE OF STATE/EVENT	3) '[T]he branch of physical science which deals with the nature and phenomena of electrical action.'
	4) Comb., as *electricity-laden* adj.

In addition to their experiences of their own bodies and of things that are part of nature, people thus used other discoveries, inventions and artefacts in order to define electricity. For example, as implied by the discussion of the term *attraction* (see e.g. sentence 69), words that were connected with electricity

caused by friction were at an early stage associated with magnetism[25]. To some extent this is true of *electricity* too. The instantiation below is from 1736:

> (73) **1736** Butler *Anal.* II. ii, Such powers in nature as magnetism and electricity. (*OED*)

The noun *switch* was associated with other inventions before it was used to refer to a mechanical device used for altering the direction of an electric current. The first instance of a railway switch in the *OED* is from 1797 and the first instance of an electrical one is from 1865. As early as 1592, however, *switch* was used in English to signify yet another artefact, that is, 'a slender tapering riding whip'. This is the very first instance of the term recorded in the *OED*. It seems to be the connection between the term and the act of urging on horses that subsequently made it possible to use it in the senses 'stimulus, incentive' and 'mechanical devices used for altering [the] direction [of something], [or] making connection/disconnection'. Primarily, these senses seem to be based on the functions that the term was associated with at the time. It seems to have developed as a result of a mapping of experiences in accordance with the metonymy OBJECT FOR FUNCTION OF OBJECT. When wanting to conceptualise a stimulus or incentive, people used their experiences of a riding whip because it could be used to urge something on. When people wanted to conceptualise mechanical devices that are used for altering the direction of something, their experiences of a riding whip were again useful because they associated it with the related function of telling horses to go in one direction or the other. The notion of functional similarity also seems to lie behind the fact that a great number of mechanical devices may be referred to by means of the term *switch* today. In my material movable rails used to "'shunt' train[s] [---] from one line to another" (*OED*), levers, plugs and other devices that are used "for making or breaking contact, or altering the connexions of a circuit" are all switches. The same is true of keys on gas burners "that regulate the amount of gas passing" or even computer programs that select paths. All these senses seem to be the result of a partial mapping from one technological domain onto another, or more specifically, the fact that people have used their experiences of one kind of mechanical device by means of which something can be steered to refer to another mechanical device by means of which something else can be directed. As people had once associated the term *switch* with a certain object they also started

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[25] People seem to have associated electricity with magnetism long before the Danish Professor Hans Christian Oersted discovered the link between electricity and magnetism in 1820 (see 3.3.7.1.).

to use the term to refer to the action that the new object signified by the term was involved in. As is evident from a comparison between the sense developments of the noun and the verb *switch*, quite a few of the verbal senses are structured by the metonymy INSTRUMENT FOR THE ACTION INVOLVING THAT INSTRUMENT. Presumably, the first instantiation of the verb (from 1611) 'to strike, hit, beat, flog, or whip with or as with a switch' when urging on horses, has originated from the nominal 'riding whip' first used in 1592. Similarly, the verbal sense 'to urge on, impel, incite' (1648) may be based on the nominal 'stimulus, incentive' (1630), and the verbal 'to turn (a railway train, car, etc.) on to another line by means of a switch; to shunt' (1853) on the nominal sense 'movable rails' (1797). Considering the closeness between the different verbal senses, however, new verbal senses may also have developed from earlier verbal ones.

Finally, by using the terms *circuit* and *grid* to refer to the thing through which electricity flows, and thereby their experiences previously associated with these terms, people managed to communicate the fact that the artefact through which electricity flows is a closed system. Initially, the term *circuit* was used in the sense 'the line, real or imaginary, described in going round any area; the distance round, the compass, circumference, containing line or limits' (*OED*). Like the term *grid* it was not associated with anything that had a beginning, an end or any other kind of interruption. Not very surprisingly, this was also true of the new application of the term to refer to 'a closed system of wires or pipes through which electricity or liquid can flow' (*CIDE*). In addition, the term *grid*, which was first used to signify 'an arrangement of parallel bars with openings between them; a grating' (*OED*) seems to have been efficient for conceptualising a network of different component parts connected to one another in a systematic way. In connection with electricity, the term is used today to refer to 'a system of wires through which electricity is connected to different power stations across a region' (*CIDE*).

5.3. Electricity – a source domain

In 1.2. it was hypothesised that technological inventions are particularly apt source domains to some extent because they are highly functional in our lives, because we interact with them quite a lot and because a great number of us are familiar with them. In brief, for reasons making them a very living and activated part of our common ground. Interestingly enough, nearly all the metaphorical uses of the words and phrases to be discussed here are the result of a mapping

between the two domains of technological innovation and humans. Even though the number of items is not very large, there is remarkable consistency among the instances. All the figurative senses of the phrases analysed here (see group B Table 5 above) but one involve a mapping where experiences of the electric current are used to describe either human action or human emotion. These will be discussed in 5.3.1. - 5.4. The only exception to the pattern is the use of *electric* to signify 'very bright' colours. This sense will be briefly discussed in the following.

According to *MWCD*, *electric* may be used to signify 'a very bright shade of blue or orange'. In *the OED* (see the samples below) it is said to signify either 'a steely-blue colour used for textile fabrics' or 'a brilliant light blue'.

> (74) **1882** *Queen* 23 Dec. (Advt.), Opera hood Black, Brown, Cream, Pale Blue, and Electric. (*OED*)

> (75) **1893** *Ladies' Home Jrnl.* Oct. 2/2 Her preference is for subdued tints, her favorite color being a soft shade of electric blue. (*OED*)

> (76) **1912** *Queen* 4 May 750/2 Lady Mary C. in electric-blue cloth with black and white hat. (*OED)*

> (77) **1955** *Times* 9 July 3/3 A huge black fish with a brilliant electric blue tail. (*OED*)

In addition, *electric green*, which according to the *OED,* is synonymous with *electric blue,* is used.

> (78) **1873** *Young Englishwoman* Feb. 77/1 One model is of bronze velvet and electric green silk. (*OED*)

Presumably, electricity is useful for describing "brightness" in connection with colours because it has the side effect of emitting extremely bright sparks when escaping from electric cables.

5.3.1. Words and phrases designating human action and human emotion – Introductory

As will be evident from the following, the senses based on a mapping between the world of technology and human beings seem to fall into four different groups, each of them based on four different general ideas. In three of them the metaphor PEOPLE ARE MACHINES RUN BY ELECTRICITY lies at the core of the mental scene that may be activated by means of the expressions. In the fourth group, the

mappings build on a mental scene made up not only of a machine but of a human being and a machine working together. Basically, the four different groups are the following ones. The first group is a state. The latter three are changes of state.

1)   The state of being electrified or electrification: As in the use of the term *electricity* in the sense of 'keen contagious excitement', the metaphorical words or phrases of this group are all based on the general idea that PEOPLE ARE MACHINES RUN BY ELECTRICITY. Like MACHINES, PEOPLE may be electrified. The words or phrases of this group either describe someone who is being electrified or someone who is subjected to electrification. In each case the one person who is electrified is the subject of conversation. (See 5.3.2.)

2)   When the current goes into the body or when it is broken: In this group too, PEOPLE ARE MACHINES RUN BY ELECTRICITY. The metaphorical words or phrases that belong to this group either describe what happens to the body as the electric current metaphorically goes into it or as it is broken. The use of the expression *to switch on the charm* in sentence (84) is an example of the former, and the use of the expression *to blow a fuse* in sentence (114) an example of the latter. In the latter case, people are conceived of as being normally electrified. Again, the person who is electrified is the subject of conversation. (See 5.3.3.)

3)   Electrifying other people: In this group we find metaphorical words and phrases based on the idea that people or their actions may electrify other people. An example would be the phrase *she electrified her audience* in sentence (129). The topic may, or may not, be conceived of as a MACHINE RUN BY ELECTRICITY. The viewer or viewers of the action signified by the sentence, however, is/are conceived of in this way. (See 5.3.4.)

4)   People operating machines: Here, people are not themselves perceived as machines. Rather it is by visualising the interaction between humans and machines that we are able to re-create the integrated scenario on which this idea is based. (5.3.5.). An example is the use of the phrase *asleep at the switch* in the sense of 'negligent of, or oblivious to [---] [his or her] responsibility' (*OED*).

When the words and phrases that belong to the first three groups are used to describe some kind of action, the metaphors below are involved.

Action metaphors

PEOPLE ARE MACHINES RUN BY ELECTRICITY
CAUSES ARE FORCES
DRIVING FORCES FOR HUMAN ACTION ARE FORCES THAT RUN MACHINES

For example, the uses of the phrases *power* and *power up* in the sense of 'preparing or being prepared to do something that involves the use of a lot of energy or effort' in sentences (96) – (100) are all structured by these metaphors.

As in the use of the term *fuse* to describe a brain that stops working rationally (sentence 115), the mappings occasionally focus on the brain rather than on the whole body. Then the following mapping is also made use of:

THE MIND IS A MACHINE RUN BY ELECTRICITY

As exemplified by the use of *electricity* in the sense of 'keen contagious excitement' (see 5.3.2.), the following metaphors are involved when human emotion is the target domain:

Emotion metaphors

PEOPLE ARE MACHINES
THE BODY IS A CONTAINER FOR EMOTIONS
EMOTIONS ARE FORCES
EMOTIONS ARE ELECTRIC FORCES INSIDE THE BODY

In section 2.2., it was argued that metaphorical words and phrases are seldom the result of isolated metaphorical mappings. Clearly, the items that will be discussed here substantiate the claim that generally a number of different mappings are used to structure one and the same mental space activated by our use of different words and phrases. In addition to being based on the mappings above, the different metaphorical words or phrases to be discussed in this chapter are structured by a number of different mappings. These will be accounted for in the following sections.

5.3.2. Group 1. The state of being electrified

In the first group we find the metaphorical uses of *electricity* and *electrification*. In addition to being the result of the PEOPLE ARE MACHINES metaphor, the different instances are based on the general idea described in (1) in 5.3.1. above. When reflecting mappings where the target domain is human emotion, they are also structured by the emotion metaphors discussed above. When reflecting mappings where the target domain is action, the action metaphors (see section 5.3.1.) are involved. Furthermore, the metaphorical uses of the terms are structured by the mappings to be accounted for below.

According to *MWCD,* the figurative uses of *electricity* may be used to signify 'keen contagious excitement'. The sense development probably originates from perceived similarities between the experiences that we have of electric excitation and the human sensation of being tensed up. Electricity with its sparks of excitation and its way of short-circuiting when the tension is too high is used here to conceptualise emotional strain. The use is both structured by the mapping between HUMAN EXCITEMENT and ELECTRIC EXCITATION and based on the idea that CONTAGIOUS EXCITEMENT is ELECTRIC EXCITATION. The quality of electricity of electrifying other objects by its mere contact explains the mapping. It may be used to conceptualise 'contagious' emotion precisely because it not only illustrates tension within bodies but may be used to electrify other objects in quite an effortless way. In addition to being structured by the emotion metaphors in 5.3.1. *electricity* in the sense of 'keen contagious excitement' is thus structured by the following quite complex metaphorical structure:

HUMAN CONTAGIOUS EXCITEMENT IS ELECTRIC EXCITATION (THAT MAY BE USED TO ELECTRIFY OTHER OBJECTS)

In sentence (79) below the power of electricity to electrify other objects is again used to conceptualise something contagious.

> (79) 1791 BURKE *Regic. Peace* i. Wks. VIII. 110 They [ambassadors] will become true conductors of contagion to every country which has had the misfortune to send them to the source of that electricity. (*OED*)

By contrast with the uses of *electricity* in the sense of 'keen contagious excitement' above and in sentences (80) and (81) below, electricity is here not conceived as something positive. Possibly, the negative view on electricity

displayed in this sentence is connected with the fact that it was uttered at a time when electricity was still an untamed force (see 3.3.7.-3.3.7.2.). However, above all it seems to originate from the mapping of our experiences of contagious diseases, with which our '"ambassadors" may be infected if we have the "misfortune to send them to" places stricken by them, onto our experiences of electricity. In the sentence, the potential of electricity to electrify other objects is highlighted by the term *conductors* and the fact that electricity is here coming from some kind of source. In this sense electricity is very similar to contagious diseases which are easily spread from one person to another. It seems to be this function in particular that has motivated the following mappings by means of which the sentence is structured:

ELECTRIC FORCES ARE CONTAGIOUS DISEASES
CONDUCTING ELECTRICITY IS SPREADING DISEASE

Unlike the positive kind of contagion discussed above, electricity is used here to refer to the bad effect that is spreading from the source, that is, in order to conceptualise some concept disapproved of by the person uttering the sentence. Naturally, the combination of something that has the quality of spreading in quite an effortless way and contagious diseases is most unfortunate. All electricity can do here is to aggravate the consequences of the contagion and the misfortune referred to in the sentence. Even though, without further context, it is not possible to say precisely what the "thing" that is spread is, the combination of our experiences of contagious diseases and electricity makes the "thing" that is spreading from the source something that is considered extremely dangerous, perhaps a dangerous force of some kind. As a result of the above metaphorical mappings the sentence is also structured by the following ones:

DANGEROUS CONTAGIOUS FORCES ARE ELECTRIC FORCES[26]
SPREADING SOMETHING DANGEROUS IS CONDUCTING ELECTRICITY

Sentences (80) and (81) below, which originate from times when people had discovered the positive value of electricity and learnt how to turn the knowledge of it into practical use above, display a more positive view of electricity. Here

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[26] Cf. the metaphors DANGEROUS BELIEFS ARE CONTAGIOUS DISEASES, CONVEYING THE BELIEF IS SPREADING THE DISEASE, and BELIEVERS ARE INFECTED on the *CMHP*.

electricity is used to symbolise 'vigour' or 'vitality' not too different from the way it was used to signify 'excitement' above.

> (80) **1864** LOWELL *Fireside Trav.* 73 The natural electricity of youth. (*OED*)

> (81) **1831** CARLYLE *Sart. Res.* (1858) 175 Wait a little, till the entire nation is in an electric state; till your whole vital Electricity is cut into two isol ated portions of Positive and Negative (of Money and of Hunger). (*OED*)

Presumably, it is its usefulness as a source of energy that motivates this use structured by the following metaphors (in addition to the action metaphors in 5.3.1.):

VITALITY IS ELECTRICITY

YOUNG, VITAL AND HEALTHY PEOPLE ARE MACHINES RUN BY ELECTRICITY

POSITIVE FORCES ARE ELECTRIC FORCES

In sentence (82), the positive view of electricity seems to be motivated by the property of electrified objects of attracting other objects. Here our experiences of electrified objects attracting one another are mapped onto the more abstract concept of 'human brotherhood'. In this context electricity symbolises 'a strong force strengthening the bonds between people' with a strong sense of 'solidarity', 'friendship' and the like.

> (82) **1858** HAWTHORNE *Fr. & It. Jrnls.* II.24 The electricity of human brotherhood. (*OED*)

The following metaphor summarises the conceptual structure behind the sentence:

STRONG BONDS BETWEEN PEOPLE IS ELECTRIC ATTRACTION BETWEEN OBJECTS

Finally, from the admittedly few instances of *electrification* we learn that this term is only similar to *electricity* in one respect. This is the use of the term to signify 'the state of being electrified' (*MWCD*) or the 'condition or state of being electrified or excited' (*OED*). In sentence (83) below, which is structured by the emotion metaphors in 5.3.1. along with the general idea of group (1) (in the same section) this 'state of being electrified or excited' is brought about by a proposal.

(83) **1892** *Leisure Hour* Aug. 657/1 Her electrification by Mr. Belport's proposal. (*OED*)

5.3.3. Group 2. When the current goes into the body or when it is broken

Of the four different groups discussed in 5.3.1. group (2) is the largest. Here too we find words and phrases whose figurative uses instantiate the mapping PEOPLE ARE MACHINES RUN BY ELECTRICITY. This, however, is only a broad generalisation. In each case of these terms, quite specific aspects have been mapped from a process involving some machine, to describe some specific emotion or action of a human being. More specifically, these correspond to four different aspects of such a process, namely the ones below:

- The moment when the current goes into the machine.
- The result of the current going into a machine.
- The moment when the current is broken.
- The result of the breaking of the current.

The use of the former two aspects will be described in connection with the discussion of *switch on*[27]*, switch* (n), *switched on, switched, power* (v) and *power up*. The discussion of *blow fuses, (safety) fuse* (v)*, short fuse, short-fused, switch off,* and *switched off* will refer to the latter two aspects. Interestingly enough, even though two different words, or two different derivations, may refer to one and the same of the different aspects above, each word, or each derivation, nevertheless corresponds to specific emotions or processes.

From the figurative uses of *switch on, switch* (n), *switched on, switched, power* (v) and *power up* we learn that our experiences of objects becoming electrified, or of objects that are electrified, are used to conceptualise the following different phenomena:

- 'People starting to behave or feel in a certain way without being sincere in what they are doing or feeling.'
- 'Something that starts to work.'
- 'Indications of exasperation, denial or surprise.'
- 'People who are aware of what is trendy.'

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[27] As is evident from this thesis, there are several important differences between the figurative uses of the two forms *switch on* and *switched on*. This is the reason why they are discussed separately.

- 'The process of getting prepared to do something that involves the use of a lot of energy or effort.'
- 'The quality of being equipped with a lot of energy.'

In the following, these uses will be discussed in detail.

According to *CIDE* and what is said about the phrase *switch on,* the image of a machine or some other artefact that is switched on may be used to activate the image of a person suddenly 'switch[ing] on a particular emotion or behaviour'. Usually, this is said in a disapproving way and the emotion or behaviour that has been switched on is generally not considered to be a sincere one. Generally, the phrase indicates that something is done in a quick way:

(84) When a customer walks in, she switches on the charm. (*CIDE*)

Similarly, according to the *OED* the verb *switch* may be used to signify '[t]o turn *on* or *off*, as if by means of a switch' in a figurative or transferred sense.

(85) **1966** *Listener* 24 Mar. 426/1, I have always found it very easy to 'switch

on' emotion. (*OED*)

In broad terms, the instances of *switch on* above are structured by the emotion metaphors in **5.3.1**. above. More specifically, the mapping PEOPLE SUDDENLY BEGINNING TO SHOW A PARTICULAR BEHAVIOUR OR AN EMOTION (NOT SINCERELY FELT) ARE SWITCHED ON ARTEFACTS /MACHINES structures the figurative uses of the phrase above. For that complex mapping to make sense to us, however, we need to consider both similarities and differences between people and machines. Perceived similarities between people and machines motivate the use of the emotion metaphors to structure the sentences. They explain why it is possible for us to use our experiences of forces in different machines to conceptualise forces that we feel inside our own bodies. Generally, machines in operation correspond to people doing or feeling things, whereas machines that do not run are people who are hurt, no longer alive, or otherwise not able to perform an expected action:

LIVING BEINGS ARE RUNNING MACHINES
PEOPLE INCAPABLE OF DOING SOMETHING ARE MACHINES OUT OF ORDER

Because electricity may be switched on very quickly, this goes for the emotion or behaviour that is figuratively switched on too. Like forces that run machines, electricity may also be used to conceptualise the energy behind our emotions and our actions. Thus, the switching on of electricity becomes the switching on of our emotions or behaviours. There is, however, a mismatch between genuine emotions or behaviours and switched on electricity. Unlike forces that run machines, genuine emotions or behaviours normally cannot be controlled in a totally conscious and deliberate way (cf. e.g. the metaphor FALLING IN LOVE IS PHYSICAL FALLING (see Kövecses 2002:57)). As implied above, the incongruity is also important for the mapping. From the point of view of the person communicating a meaning by means of the phrase *switch on*, the discrepancies between genuine emotions or behaviours and controllable forces provide him or her with a more exact mapping between forces that are switched on, and emotions or behaviours that are not sincere. For the person activating a meaning by listening to someone using the phrase in a metaphorical way, the very same mismatch is evidence of the fact that the emotions or behaviours that are switched on cannot possibly be genuine. Thereby, the incongruity substantially facilitates the kind of inference about the target domain that makes a completion of the scenario possible. That is, by concluding that the emotions or behaviours that are switched on are not sincere, we come closer to the motivation for the use of our experiences of SWITCHED ON ARTEFACTS /MACHINES to conceptualise PEOPLE SUDDENLY BEGINNING TO SHOW A PARTICULAR BEHAVIOUR OR AN EMOTION. The mapping clearly demonstrates the complexity of cognitive mappings. As a consequence, it also substantiates the claim that metaphor theories and theories of conceptual integration (blending) are complementary (see Grady et al. 1999:101).

Sometimes machines and forces within machines are used to conceptualise only the human mind. An example is the sentence below where the noun *switch* is structured by the metaphor THE MIND IS A MACHINE RUN BY ELECTRICITY.

(86) **1898** G.B.Sʜᴀᴡ *Let.* 16 Mar. (1972) II. 16, I am very cross and incommoded by having to adapt myself [to a new secretary]. For three sentences, I feel resentful and quite put out. At the fourth the switch operates and I am on to the new line as if I had never dictated to anybody else. (*OED*)

Here, the concrete image of an electrical machine beginning to function is used to symbolise the abstract image of a mind that suddenly begins to work the way it should. On this mapping we are all equipped with an electric circuit inside

our heads. Like the one we find in various machines, it may or may not work properly. When the circuit works, our brain functions properly, and when it is broken our brain cannot fulfil its purpose. The mapping thereby provides us with two useful and somewhat more specific metaphors:

A WORKING MIND IS AN OPERATING ELECTRICAL MACHINE
A MIND THAT DOES NOT WORK PROPERLY HAS A DISCONNECTED ELECTRICAL SWITCH

In contrast, the phrase *I'll be switched* does not have anything to do with 'functioning properly' at all. Here the image of an electric current flowing through someone's body symbolises a 'mild indication of exasperation, denial or surprise' (*OED*).

(87) **1838** *U.S. Mag.* I. 427, I'll be switched if I do. (*OED*)

(88) **1841** J.B.JONES *Wild Western Scenes* xiv. 178 I'll be switched if many folks lives in *higher* houses than I does. (*OED*)

(89) **1901** *Daily Colonist* (Victoria, B.C.) 4 Oct. 3/7 'Well, I'll be switched!' ejaculated the chatterer. (*OED*)

(90) **1941** L.I.WILDER *Little Town on Prairie* ix. 99 'Well, I'll be switched!' said Pa. It takes you to think up a chicken pie, a year before there's chickens to make it with. (*OED*)

Again the emotion metaphors in 5.3.1. are used and those who are figuratively electrified may remain so at least for a while. However, like the figurative 'switch on a particular emotion or behaviour' (*CIDE*), this state is more temporary than the use of an operating machine to conceptualise a brain that functions properly. Unlike this mapping the mental image activated by the phrase *I'll be switched* is based primarily on the phase when electricity goes into an object resulting in some kind of electric shock. Alternatively, our experiences of electric voltage, electric fields and the like affecting other bodies may explain the use of the expression to signify 'exasperation, denial or surprise' (*OED*), that is, our possibilities of making the following conceptual mappings.

BEING IRRITATED IS BEING SWITCHED
BEING SURPRISED IS BEING SWITCHED

In sentence (91) below, the figurative use of the adjective or participle *switched* in combination with the preposition *on* is based on this latter image of electric voltages or electric fields mapped onto human tension. In that sense this sentence is yet another example of the use of electric tension to conceptualise nerves that are in a state of high tension.

> (91) **1962** *Listener* 28 June 1131/1 His characters were understandably so permanently switched on that their moments of crisis were brought about by the small talk of others. (*OED*)

This phrase, however, is also used to conceptualise someone who is 'aware of all that is considered fashionable and up to date' (*20th CW* 1999:444, *OED*). In that sense it is different from the rest of the words and phrases discussed so far in that the metaphorical mapping behind the phrase would not work unless the function of the mechanism that is switched on was also taken into account. That is, without including some kind of medium as part of the mapping, it would not be possible to explain the use of *switched on* to describe someone who is 'aware of all that is considered fashionable and up to date'. If, however, the image of, for example, a television set or a radio run by electricity is used, the idea that those who are switched on 'know about or are involved with the most recent fashions and ideas.'(*CIDE* 2001) makes perfect sense. If the electric current is switched on, the mechanism run by electricity will work. If the mechanism run by electricity, say the television set, works properly, it will be possible for it to receive information from the rest of the world on, for example, the latest fashions and ideas. When the image of this mechanism, which by being switched on may receive information on the latest fashions and ideas, is mapped onto a human being, the information that "goes into" the machine figuratively also "goes into" the human being. As in the sentences below, "switched on people" may be understood as people 'who are aware of all that is considered fashionable and up to date'.

> (92) **1964** *House & Garden* Nov. 78/2, I want to open a department store which caters for switched-on people. (*OED*)

> (93) **1967** N.Fitzgerald *Affairs of Death* viii. 141 They must be more switched on than I gave them credit for being. (*OED*)

> (94) **1970** D.Devine *Illegal Tender* ii. 25 Her mother wasn't switched on, she

knew nothing of modern fashion. (*20ᵗʰ CW* 1999:444)

(95) **1979** 'A.HAILEY' *Overload* IV. iii. 302 She had delivered the tapes to
  that switched-on black woman who worked for a newspaper. (*OED*)

In broad terms the figurative uses of the phrase *switched on* are thus structured by the metaphor PEOPLE ARE MACHINES RUN BY ELECTRICITY. In addition, through the uses we learn that BEING AWARE OF THE LATEST NEWS is the same thing as BEING SWITCHED ON.

Finally, the uses of the verbs *power* and *power up* show that electricity (like other sources of energy) may also be used to symbolise something that 'is preparing or being prepared to do something that involves the use of a lot of energy or effort' (*CIDE* 2001) or something that is figuratively 'suppl[ied] with power'. In these senses we use our experiences of machines, which by being powered have the ability to perform some kind of energy-intensive function, in order to conceptualise people preparing themselves for action that also requires a great deal of energy. That is, in the sentences below, the structures of the action metaphors in 5.3.1. are all used.

(96) **1954** *Essays in Crit.* IV. 313 Creative activity is often powered by the
  drive to accomplish. (*OED*)

(97) **1962** *Times* 25 Apr. 16/6 The incident could have powered strong
  conflict between faith and sex.(*OED*)

(98) He really needs to power his team up for next Saturday's match. (*CIDE* 2001)

(99) The management seems to be powering up for a major confrontation with the
  unions. (*CIDE* 2001)

(100) College baseball teams across the country are powering up for the new sea-
  son. (*CIDE* 2001)

In addition, sentences (97-100) are structured by the PREPARING FOR ENCOUNTER IS POWERING UP/SUPPLYING ONESELF WITH POWER mapping in that in these sentences something or someone is powered or is powering up in order to prepare for different kinds of conflicts or encounters. The mapping seems to be particularly useful in connection with matches between different teams.

The second group of words referring either to the moment when the current within a machine is broken, or to the result of its breaking, is also based on the general idea that people are normally electrified. As implied by the figurative uses of these words too, we normally have an electric circuit inside our heads or

inside our bodies. This, however, is only indirectly implied, that is, by the fact that all these items focus on the moment when this normal state is one of inactivity. In the following, the meanings that may be activated by the figurative uses of these terms will be discussed in detail. Phrases including the term *switch*, that is, *switch off,* and *switched off* will be discussed first. Then, a discussion of phrases including the term *fuse*, that is, *blow fuses, (safety) fuse* (v)*, short-fuse,* and *short-fused* will follow.

When used literally to refer to the direction of a current in electrical apparatus, *switch on* and *switch off* are antonymous. In this context *switch on* means 'to put or turn a current on', 'to connect', and *switch off* 'to put or turn a current off', to disconnect' (*OED*). Unlike the literal senses, the figurative senses of *switch off* and *switched off* are very far from being antonymous. The only example seems to be the figurative use of *switched off* in the sense of being '[un]aware of all that is considered fashionable and up to date' (*OED*) which is antonymous to *switched-on* in the sense of being 'aware of all that is considered fashionable and up to date' (*OED*). Like the instances of *switched on*, the instances of *switched off* are all structured by the metaphor PEOPLE ARE MACHINES RUN BY ELECTRICITY. Contrary to the quality of being *switched on,* BEING UNAWARE OF THE LATEST NEWS IS BEING SWITCHED OFF. The figurative uses of *switched off* in sentences (101) and (102) below are based on these mappings:

> (101) **1966** *Punch* 29 June 946/1 But nowhere have I come across a word of guidance for the 'out' crowd—the vast, non-swinging, switched off, palateless, utterly without-it lot who dominate the community. (*OED*)

> (102) **1982** *London Rev. Bks.* IV. xxiv. 7/2 What Amis's *sprezzatura* is saying is that most of his readers are out of touch, old fogies, Prufrock retreads, switched-off. (*OED: switched-on*)

Unlike the figurative use of *switched on* in the sense of being 'aware of all that is considered fashionable and up to date' there is no antonymous figurative instantiation of *switched on* in the sense of 'very tense' in my material. In addition, the latter phrase is much less frequent than *switched on* (*OED*).

The use of *switch off* in the sense 'to turn [something] [---] off, as if by means of a switch' may seem to be the exact opposite of *switch on* in the sense 'to turn [something] *on* [---]*,* as if by means of a switch'. A comparison between the different instances of *switch on* (sentences 84-85) and *switch off* (sentences 103-104 below) reveals, however, that this is far from true. Whereas *switch on* is used to activate the image of a person suddenly 'switch[ing] on an emotion not sincerely felt or some kind of artificial behaviour', *switch off* implies that

someone or something is switched off because he/she or it is disliked by the person who switches off. *Switch on* is thus used to describe the switching on of our own feelings or our own behaviour, whereas *switch off* may both be used to describe the switching off of something that has to do with ourselves, for example, an unpleasant dream, or something that has to do with someone else:

> (103) **1929** W.J.LOCKE *Ancestor Jorico* viii. 111 Without great discourtesy one couldn't switch off Binkie. (*OED*)

> (104) **1934** *Discovery* Sept. 259/2 In this way she succeeded in switching off any unpleasant dream. (*OED*)

Furthermore, as opposed to the act of switching a particular emotion or behaviour on, the act of switching something or someone off is motivated by genuine feelings. In sentences (103) and (104) above, these are feelings of disapproval. In sentence (105) below, this manifestation of someone's will has serious consequences. Here the switching off of the couple is a euphemism for putting them to death. In sentence (106) *to switch off* means that the student has lost his or her energy and thereby made him or her less committed to his or her studies.

> (105) **1967** B.PATTEN *Little Johnny's Confession* 54 Those couples who Having been switched off per-manently, Are so very still. (*OED*)

> (106) **1980** *Nature* 27 Mar. 379/2 The prose style is guaranteed to switch off all but the most ardent student. (*OED*)

In sum, we use our experiences of someone turning something off as if by means of a switch in order to conceptualise someone or something that makes something or someone stop, or that makes someone or something lose their strength. Hence this sense is not too different from the use of the phrase to describe that we 'cease listening, [---] lose concentration, [---] become bored or [are] inattentive' (*OED*). That is, a sense exclusively pertaining to our own feelings or actions. In this sense too, the image of us metaphorically switching something off does not imply that we are not being sincere in what we are doing (see sentences 107-111). Above all, this seems to be true with respect to sentence (109) in which the phrase is used to describe someone who has probably switched off permanently.

(107) **1921** G.B.Shaw *Back to Methuselah* iii. 94 Dont [sic.] switch off. Listen. This American has invented a method of breathing under water. (*OED*)

(108) **1955** *Times* 22 June 11/5 Does he seriously maintain that in a class of 24 boys, where 23 are working keenly and well, it is invariably the master who is to blame because No. 24 always 'switches off'? (*OED*)

(109) **1976** J.I.M.Stewart *Memorial Service* vii. 108 He was heavy alike with his years and his whisky and wine, and he may simply have switched off.(*OED*)

(110) **1980** D.Bloodworth *Trapdoor* xx. 121 For some reason he could not fathom she had switched off. Her love had died. (*OED*)

(111) If he gets bored, he just switches off and looks out the window. (*CIDE*)

Thus, by contrast with the close relationship between the switching on of an emotion or a certain kind of behaviour and emotions or behaviours that are not sincere, there is nothing artificial about the act of ceasing to do or feel things by switching them off. Our problems with controlling our emotions in a totally conscious and deliberate way (see the discussion of the figurative uses of *switch on* in sentences (84) and (85) above) do not seem to affect the switching off of actions or behaviours. Probably, this is because the act of switching off pertains to our inability or unwillingness to preserve a certain behaviour or emotion rather than force ourselves onto a new one. That is, to something that is truly not wanted (any more).

To summarise, in all *switched off* and *switch off* are used to conceptualise the following different phenomena:

- 'The quality of being unaware of what is trendy.'
- 'The putting an end to something that is not wanted'
- '[…]to cease listening, to lose concentration, to become bored or inattentive'.

Like *switched off, switch off* is structured by the metaphor PEOPLE ARE MACHINES RUN BY ELECTRICITY. Since PEOPLE ARE MACHINES RUN BY ELECTRICITY and electricity may be used to run machines, DRIVING FORCES FOR HUMAN ACTION OR HUMAN EMOTION ARE ELECTRIC FORCES. These actions or

behaviours run by electricity are negative in sentences (103—104), and the result of the switching off a relief. In sentences (106-111), the case is the reverse. Here the electricity runs positive actions or emotions in the sense that a much better result would have been generated had they not been switched off. The electric current has here merely been given the role of a neutral source of energy, which may, in turn, power both negative and positive actions or emotions. On a more specific level the electric force is part of the following mappings.

- Sentences (103-104) are structured by the mapping PUTTING AN END TO SOMETHING UNWANTED IS THE SWITCHING OFF OF AN ELECTRIC CURRENT.
- Sentence (105) is structured by the mapping PUTTING AN END TO SOMETHING IS THE SWITCHING OFF OF AN ELECTRIC CURRENT.
- Sentences (106-111) are structured by the mapping TO CEASE DOING SOMETHING (BECAUSE OF LOST INTEREST) IS TO SWITCH OFF THE ELECTRICITY.

The words including the term *fuse*, that is, *(safety) fuse* (v)*, blow fuses, short-fuse* and *short-fused* may be used to activate yet other meanings. Again the meanings of the terms are intimately tied up with the match between the details of the source domain and the relationship between different component parts of the target domain. Like *switch off* and *switched off*, the phrases including the term *fuse* are based on quite complex mappings. Not only are PEOPLE conceived of as MACHINES RUN BY ELECTRICITY. Here the whole process of blowing a fuse, all the way from the moment when the current in an electric circuit is about to break because the tension is too high, until the moment when a machine has stopped working due to the blowing of a fuse, is part of the mappings. As was the case with the mappings resulting in the figurative meanings of *switch off* and *switched off*, people are conceived of as being equipped with an electric circuit inside their bodies or inside their heads in this mapping too. Again, the focus is on actual or impending inactivity as the default state of electrification. Here, however, the details of the way fuses work pave the way for activating meanings that are very different from the ones activated by the use of *switch off* or *switched off*. First, while mappings that involve our experiences of switching electricity on or off focus on the beginning or the end of a certain act or behaviour, the cause of the breaking of the current is also a substantial part of mappings that involve our experiences of fuses. The additional knowledge that the function of fuses is to prevent the current from getting too high is made use of in the latter mappings. In

these mappings, fuses that blow if the electrical tension is too high translate into a strong reaction that is due to the fact that the pressure on someone or something has been too high, for example, because of overstrain, overwork, anger and the like:

(112) **1923** W ODEHOUSE *Inimitable Jeeves* ii. 28 That scheme of yours has blown out a fuse. (*OED*)

(113) **1925** W ODEHOUSE *Carry On, Jeeves!* viii. 188 However firmly and confidently he started off, somewhere around the third bar a fuse would blow out. (*OED*)

(114) **1949** S.J.P ERELMAN *Listen to Mocking Bird* x. 120 Relax or you'll blow a fuse. (*OED*)

Second, the fact that the blowing of fuses makes electrical devices or pieces of machinery stop working further explains the differences between the meanings activated by means of *switch off* and *switched off* on the one hand, and figurative uses of words based on our experiences of fuses, on the other. While electrical devices or machines do not generally go out of order if the current flowing in them is merely switched off, this is always the case when the current is broken by the blowing of a fuse (see figure 9).

Figure 9. The figurative blowing of a fuse because of too much mental strain.

Our experiences of fuses thus seem to be very useful whenever we want to conceptualise something that stops working because of too much strain. In sentence (115), the human brain stops working because it is exposed to too much information (see *CIDE*).

(115) FIGURATIVE Your father's brain seems to fuse (=stop working) if he has to take in too many new things at once. (*CIDE* 2001)

In addition to describing something that stops working, mappings in which our experiences of fuses are used may also be taken to indicate that people stop acting rationally. In particular this seems to be the case where fuses figuratively blow because someone is charged with certain specific kinds of strong emotion, for example, extreme anger (cf. the metaphor STRONG EMOTIONS ARE MADNESS on the *CMHP*). Third, in combination, our view on EMOTIONS as FORCES, which we cannot totally control (see the discussions of *switch on* and *switch off*), our habit of using our experiences of electric tension to conceptualise nerves that are in a state of high tension (see e.g. sentence 89), and the function of fuses to blow if the tension is too high (see above), make our experiences of fuses and the way they work excellent for conceptualising the relationship between tense emotions and emotional outbursts. More specifically, as shown in Table 7 below, people who are familiar with the way fuses work are quite likely to be able to conceptualise aspects of this relationship all the way from the cause of the reaction to its consequences by means of metaphorical mappings involving fuses. If PEOPLE ARE conceived of as MACHINES RUN BY ELECTRICITY, the current that runs in the machine maps onto the strong emotion that the person experiences. The pressure and tension inside the container of the machine correspond to the internal pressure and tension in the person charged with strong emotion. The stronger the current in the machine is, the stronger the tension and the pressure inside the machine are. Similarly, the stronger the emotion the person experiences is, the stronger the tension in his or her body is. In both people and machines too much pressure results in various reactions. The machine blows a fuse while the person has an emotional outburst. Since the machine is run by electricity it will cease to function when the current is disconnected by the blowing of the fuse. Since the person who has an outburst is charged with strong emotion he or she is unable to think or function in a rational way.

Table 7. The use of fuses that blow to conceptualise emotional outbursts.

	MACHINES RUN BY ELECTRICITY	PEOPLE
1)	Strong force; electricity	Strong emotion
2)	Internal pressure, electric tension	Internal pressure, tension
3)	When the pressure is too high a fuse blows.	When the emotion is too strong the person "explodes"/bursts out with strong emotion
4)	When the fuse blows the current stops flowing and the machine stops working.	When the person bursts out (has his or her tantrum) he or she stops working rationally.

As is evident from Table 8 below, the efficient way in which fuses may be used to conceptualise this relationship is similar to the conventional way in

which strong emotions and emotional outbursts are conceptualised by means of fluids in containers that explode if the pressure is too high. (For a discussion of the metaphorical entailments described in the left-hand column below see Kövecses 2002:95-98).

Table 8. A comparison between the conceptualisation of strong emotions by means of hot fluids in containers and the conceptualisation of strong emotions by means of forces.

A STRONG EMOTION IS A HOT FLUID IN A CONTAINER	A STRONG EMOTION IS A FORCE; E.G. ELECTRICITY
STRONG EMOTIONS PRODUCE PRESSURE ON THE CONTAINER	STRONG EMOTIONS PRODUCE TENSION WITHIN PEOPLE
WHEN THE EMOTION BECOMES TOO INTENSE THE CONTAINER BOILS OVER:	WHEN THE EMOTION BECOMES TOO INTENSE A FUSE BLOWS
	(AFTER A FUSE HAS BLOWN THE PERSON STOPS FUNCTIONING/ FUNCTIONING RATIONALLY.)

Furthermore, because of the suddenness with which fuses blow, they may also be used to illustrate the suddenness that typically characterises strong outbursts of feeling (cf. phrases such as *we were swept off our feet, bursting into tears, exploding with anger, flipping our lids,* and *storming out of the room*). Along with the relations discussed above, this notion seems to be behind the figurative use of *short fuse* and *short-fused* (in sentences (116-118) below) to signify 'a quick temper' and the property of being 'quick-tempered' (US slang; *OED*).

(116) **1968** *N.Y. Times* 13 Oct. ɪᴠ. 10 Tully, a fellow notorious around Sausalito for his *short fuse. (*OED*)

(117) **1980** G.Tʜᴏᴍᴘsᴏɴ *Murder Mystery* xix. 149 Postel's first-rate but he's got a short fuse. You lie to him and he'll walk off your case. (*OED*)

(118) **1979** *Observer* 16 Dec. 9/1 He's quite *short-fused, but he knows how to control his temper. (*OED*)

In addition to being structured by the metaphor PEOPLE ARE MACHINES (RUN BY ELECTRICITY) the sentences above are thus structured by at least the following metaphors:

THE MIND IS A MACHINE (sentences 114-118)
THE BRAIN IS AN ELECTRIC CIRCUIT (sentences 114-118)

THE NERVOUS SYSTEM IS AN ELECTRIC CIRCUIT (sentences 114-118)

(CERTAIN STRONG) EMOTIONS ARE (ELECTRIC) FORCES (sentences 114, 116-118)

ANGER IS ELECTRICITY (sentences (114), 116-118)

MENTAL OVERSTRAIN IS ELECTRICAL OVERSTRAIN (sentences 114-118)

SAFEGUARDS AGAINST MENTAL OVERSTRAIN ARE SAFETY FUSES IN AN ELECTRICAL CIRCUIT (sentences 114-118)

GETTING AN OUTLET FOR ONE'S EMOTIONS IS BLOWING ONE'S FUSES (sentences (114), 116-118)

CEASING TO FUNCTION (RATIONALLY) IS BLOWING ONE'S FUSES (sentence 115)

CALMING SOMEONE/ONESELF DOWN IS ATTEMPTING TO MAINTAIN THE ELECTRIC CURRENT (sentences 114, 116-118)

5.3.4. Group 3. The electrification of other people

The general idea behind the last group of metaphorical words describing PEOPLE by making use of our experiences of MACHINES is that people, their actions or the result of their actions may electrify other people. However, as implied earlier, here the topics are not necessarily charged with electricity. They are agents rather than patients and their role is primarily to electrify the viewers of what is described in the sentences irrespective of whether they are themselves charged or not. Generally, it is the latter who experience something which, in one way or the other, reminds them of electricity. In other words, it seems to be the sensation of the observer that has motivated the mappings discussed in this section the most. By way of example, in sentence (119) below, there seem to be few similarities between electricity and the sound of a cannonade. Here *electrifier* is used to signify someone 'who or that which electrifies or (*fig.*) startles or shocks violently' (*OED*). The feelings of the person here referred to as "one", however, remind us of electricity. In this sentence he or she is the imaginary listener to the sound of the cannonade. Primarily, the mapping seems to be based on the match between the moment when his or her nerves are set in a state of high tension by the alarming sound of the cannonade and the image of an object that is shocked by electricity, that is, on a match between tense emotions and electricity.

> (119) **1860** RUSSELL *Diary India* I. 210 There is nothing to rouse one like the sound of a cannonade: it's a tremendous electrifier. (*OED*)

As was seen in for example 5.3.3., this use of electricity to conceptualise tense emotions, and thereby the use of the emotion metaphors accounted for in 5.3.1.,

and of the metaphor (TENSE) EMOTIONS ARE (ELECTRIC) FORCES (cf. 5.3.3. sentence 105) are by no means unusual mappings. They are also frequent in connection with the rest of the terms of this group, that is, *electric*, *electrify* and *electrifying*. In the following, these words, which bear a great deal of resemblance when it comes to what emotions they may describe, will be jointly discussed.

First, not only are these terms frequently used to describe the kind of 'tense emotions that are experienced by someone who is startled or roused'. As may be seen below, they are also used to conceptualise the not very relaxed feelings of 'excitement' and 'thrill'. Second, they may all be used to describe emotions or feelings that are either 'swift' or 'strong':

electric:

- 'Something might be described as electric if it is very exciting and produces strong feelings.' (*CIDE*)
- 'exciting as if by electric shock' (*MWCD*)
- 'charged with strong emotion <the room was electric with tension>' (*MWCD*)
- *'fig.* Chiefly with reference to the swiftness of electricity, or to the thrilling effect of the electric shock' (*OED*).

electrify:

- 'to excite intensely or suddenly as if by electric shock' (*MWCD*)
- 'To startle, rouse, excite, as though with the shock of electricity.' (*OED*)

- *electrifying*:

- 'That electrifies' (*OED*)

By way of example, performances and atmospheres are electric if they are 'exciting' and 'producing strong feelings'. (*CIDE*), performances and personalities are electric when 'electric as if by electric shock' (*MWCD*), and a room is 'electric with tension' if it is 'charged with strong emotion' (*MWCD*). As in sentences (120-124) below, flashes, virtues, effects, states, and pains may be

electric if they are 'swift' as electricity or 'thrilling' as the effect of an electric shock (*OED*).

> (120) **1793** COLERIDGE *Songs of Pixies* v, The electric flash, that from the melting eye Darts the fond question or the soft reply. (*OED*)

> (121) **1819** L.HUNT *Indicator* No. 6 We feel the electric virtue of his [Shakespeare's] hand. (*OED*)

> (122) **1830** SIRJ.HERSCHEL *Stud. Nat. Phil.* I. ii. (1851) 29 The effect on all on board might well be conceived to have been electric. (*OED*)

> (123) **1831** CARLYLE *Sart. Res.* (1858) 175 Wait a little, till the entire nation is in an electric state. (*OED*)

> (124) **1871** PALGRAVE *Lyr. Poems* 133 A thrill of electric pain Smote through each English breast. (*OED*)

Similarly, heights of courage (sentence 126) or people may *electrify* if they 'startle, rouse or excite as though with the shock of electricity' (*OED*).

> (125) **1752** CHESTERFIELD *Lett.* 285 III. 308 You will not be so agreeably electrified as you were at Manheim. (*OED*)

> (126) **c1794** BURKE *Addr. Brissot to Constit.* (R.), Those heights of courage which electrify an army and ensure victory. (*OED*)

> (127) **1870** EMERSON *Soc. & Solit., Eloq.* Wks. (Bohn) III. 37 An audience is electrified. (*OED*)

> (128) **1878** F.A.KEMBLE *Rec. Girlhood* I. iv. 113 The tragedy was ended, and I had electrified the audience, my companions, and, still more, myself; and so, to avert any ill effects from this general electrification, Mrs. Rowden thought it wise and well to say to me [etc.]. (*OED*; *electrification*)

> (129) She electrified (=excited) her audience with her vivid stories. [T] (*CIDE*: *electrify*)

Third, the uses of the terms to describe electrified audiences (sentences (127)-(129) above), electrifying performances (sentence (130) below), and an electrifying language (sentence (131) below) are all likely to be primarily

motivated by the fact that electricity possesses the power of attraction and is the source of electric excitation:

(130) It was an electrifying (=exciting) performance. (*CIDE*)

(131) **1820** J.Scott in *Lond. Mag.* Jan., Vivid, searching, electrifying language. (*OED*)

Accordingly, this quality seems to be behind the uses of the term to describe atmospheres (see *CIDE*), the virtue of Shakespeare's hand (in sentence 121), and an army (in sentence 126) even though sentence (126) probably makes use of our experiences of the shocking effects of electricity too (see the *OED*).

Thus, in addition to the emotion metaphors in 5.3.1. and the (TENSE) EMOTIONS ARE (ELECTRIC) FORCES, sentences (125-131) are structured at least by the following metaphors too:

HUMAN EXCITEMENT IS ELECTRIC EXCITATION (cf. 5.3.2.)
EXCITEMENT IS ELECTRICITY

TO BE IN RAPTURES IS TO BE ELECTRIFIED
RAPTURE/ENTHUSIASM IS ELECTRICITY

STRONG EMOTIONS/FEELINGS ARE STRONG FORCES
(CERTAIN) STRONG EMOTIONS/FEELINGS ARE ELECTRIC FORCES

SUDDEN EMOTIONS ARE ELECTRIC SHOCKS
STRONG EMOTIONS ARE SUDDEN EMOTIONS
(CERTAIN) STRONG EMOTIONS ARE ELECTRIC SHOCKS

STRONG BONDS BETWEEN OBJECTS/CONCEPTS/PEOPLE ARE ELECTRIC ATTRACTION BETWEEN OBJECTS (cf. 5.3.2.)

TO BE ENCHANTING IS TO BE ELECTRIFYING
TO BE EXCITING IS TO BE ELECTRIFYING

However, the combination of the terms *electric pain* in sentence (124) and the *ill effects* of the electrification in sentence (128) does not seem to build on the above conceptual mappings alone. Our experiences of electricity as the source of unpleasant electric shocks and of danger are also needed in order to activate the proper meanings of these sentences. As in sentence (132) below, the partial understanding of one domain in terms of another domain is here once again the result of a quite complex mapping. By making use of yet other details of the source domain, that is, the fact that electricity may also be dangerous, the image of something frightening may be mapped onto the target.

(132) **1834** Campbell *Mrs. Siddons* II. xiii. 393 A manner so electrifying as
to make the poor shop-man start back. (*OED*)

5.3.5. Group 4. People operating machines

Finally, in the last group of metaphors originating from the field of electrified
objects, we find the figurative use of the phrase *asleep at the switches*. Here not
only the image of a machine is mapped from source to target domain, but a
complex scene including both man, machine and the relationship between the
two. However, unlike the figurative senses involving electricity discussed so far,
the electric force is here only of subordinate importance. Primarily, it is used to
communicate the values associated with and the expectations on the person who
is the subject of conversation. By way of explanation, according to the *OED*, the
phrase is used here to describe someone who is 'negligent of, or oblivious to [---]
[his or her] responsibility' (*OED*). This is especially done with reference to
someone who operates a railway or an electrical switch. The following two
examples are given:

(133) **1906** H.Green *At Actors' Boarding House* 368 Snow awoke the startled
Williams, asleep at the switch. (*OED*)

(134) **1966** C.Achebe *Man of People* iv. 51 We must not let up. We just
must not be caught sleeping on the switch again. (*OED*)

However, from a general point of view, a scene where someone is sleeping
next to an electrical switch does not automatically make us activate this
particular meaning. Unless we know that the operation of an electrical switch is a
task that involves a great deal of responsibility, and that the person who is asleep
next to it is the one who is supposed to do the job, there is no knowing that the
sleeping person is not merely having a well-deserved rest. With this knowledge,
however, the image of a person who is asleep at the switches becomes the image
of a person who is 'negligent of, or oblivious to [---] [his or her] responsibility'.
Like any other mental scene made up of any other duty that is being neglected,
electricity is here, in an indirect way, used to conceptualise the fact that a person
is not doing what he or she is supposed to be doing. In sentence (133) above, the
term *startled* indicates that it was not the intention of the startled William to do
what he was doing. In sentence (134), the terms *must not* and *be caught* tell us
that the subjects of conversation have been caught doing something that they
should not have done. In sentences like these the reference to someone who is
asleep at a switch becomes an efficient way to emphasise the fact that something
that should have been dealt with in a careful way has been neglected.

5.4. The cognitive function of electricity

Except for the use of electricity to describe very bright colours, all the mappings in my material exemplify the use of electricity to conceptualise people's actions and emotions. The discovery seems to have provided us with the means both to re-experience conventional structures and to structure our thoughts in new ways. Primarily, it seems to be the different functions of the discovery or the effects it has on other objects that have motivated the mappings.

As a result of the similarities we perceive between electric excitation or tension in different objects on the one hand, and our own feelings on the other hand, we may use electricity to conceptualise feelings of 'emotional strain' and 'excitement'. Because of the ease with which electricity electrifies other objects, we may use it to conceptualise things, emotions or actions that are 'contagious'. There is, for example, the use of *electricity* to describe 'contagious excitement'. Quite frequently, the quality of electricity as a source of energy is what motivates the mappings the most. This is the case when the term refers to 'vigour' and 'vitality'. The combination of the qualities seems to be unique to the electric current and it does not seem possible to re-experience the structures behind the sentences motivated by it by means of other external representations. Presumably, re-experiencing by means of other representations is possible when it comes to the structures behind the use of the term as an attribute to *human brotherhood*. This sense seems to be based primarily on the ability of electrified bodies to attract one another, and it seems possible to re-experience the mappings behind it onto other kinds of attraction between bodies, for example, magnetic.

A number of words in my material describe actions or emotions that are uniquely defined by our experiences of electricity going into an object or a machine. For example, as was seen in 5.3.3., we use our experiences of someone *switching* electricity *on* in order to describe people who 'start to behave in a certain way', or people who 'show certain feelings without being sincere in what they are doing'. It is probably the clash between the act of switching something on on purpose and the fact that it is not normal for us to be able to control our feelings in that way that make the act of switching on behaviour, or emotion, one that cannot possibly have been motivated by genuine feelings. Furthermore, a machine that has *a switch that begins to operate* is used to conceptualise 'a brain that begins to function the way it should'. Similar to the reactions that we may observe in objects that are electrified, electrification becomes 'indications of

exasperation, denial or surprise' when referring to something happening to people (see 5.3.3. *I'll be switched*).

Sometimes we need to do things that involve the use of a lot of energy and effort. By way of example, we might need to 'gain strength' before a match between two teams or, before a conflict or confrontation, or simply because we need more energy in order to perform a piece of work. This is when we need to *power up*.

In a number of mappings, which are again based on the idea that PEOPLE ARE different kinds of MACHINES through which an electric current is running, people function or behave in a way that reminds us of the way the machine in question works or behaves. These are all defined by means of electricity and impossible to re-experience by means of other scaffoldings. By way of example, because electrified artefacts like radios and television sets have the ability of receiving information from the rest of the world when they are switched on, people who are *switched on* are familiar with the latest news and are aware of what is trendy. Not too different from the way electrified machines are affected by electric tension, someone who is 'irritated' or 'surprised' may also be described as someone who is *switched*. In this mapping emotional strain is once again conceptualised as electricity.

If we see PEOPLE AS MACHINES through which a current is constantly flowing, then the breaking of the current may be used to conceptualise a number of actions or emotions indicating the end of something or that something is losing its strength. In the same way machines that have been switched off cannot receive information about anything, and contrary to people who are *switched on*, people who are *switched off* are 'unaware of the latest news'. Similar to the way in which we get rid of the noisy sound of a machine by switching it off, we put an end to something that we do not like, be it an emotion or an action, by simply *switching* it *off*.

Accordingly, as if we were machines receiving information we *switch off* when we 'cease listening', 'lose concentration', 'become bored' or 'are inattentive'. Again, it seems primarily to be the ability of electricity to function as a source of energy that motivates the mapping. Because electricity is what runs the machines, switching it off means the end of the actions performed by the machines. Equally, when mapped onto what people are doing, or feeling, an individual who *switches off* becomes one who puts in less energy in what he or she is doing. In other words, one who 'ceases listening', 'loses his or her concentration', 'becomes bored' or 'is inattentive'.

In 5.3.3. it was observed that our experiences of fuses that blow are also used to indicate the end of something. According to *CIDE*, a person who *fuses* or *blows a fuse* is one who stops working rationally because of too much mental strain. Here our knowledge of the small safety devices that blow, if they are exposed to too strong an electric current, is used to describe a reaction, or possible reaction, of someone who is exposed to too much mental strain. In the examples in 5.3.3., this is what happens if we are unable to relax or if we are exposed to too much information at one and the same time. Similarly, a person who *fuses* or *blows a fuse* is someone who stops working rationally when used to conceptualise anger, fury, and the like. To some extent, the use of our experiences of fuses in mappings of which fury or other kinds of strong emotions are part is a result of the idea that people who are extremely emotional are people who have stopped working rationally. The mappings also seem to build on the match between electric tension and the kind of emotional strain that typically precedes emotional outbursts, and the match between the blowing of fuses and the strong and sudden reaction of an emotional outburst. From the figurative use of *short-fused* we learnt that someone who tends to get angry easily is someone who easily fuses.

The words *electrifier*, *electric*, *electrify*, and *electrifying* are all used about things or people that have the quality of "electrifying" other people. Again, we are dealing with mappings that are uniquely defined by means of the discovery. Above all, these mappings have been made in order to conceptualise something experienced by those "exposed to the electricity". Quite frequently, the figurative uses of these words make use of our direct or indirect experiences of electric shocks. In such cases they are used about people or things that have a 'thrilling' effect on other people, or make them 'startled', 'roused', or 'excited'. Because electric shocks are both 'swift' and 'strong', this is generally true also about the 'tense' emotions conceptualised by means of them. When making use of our experiences of electricity as the source of electric excitation and as possessing the power of attraction, the figurative uses of these words are intended to illustrate the magic atmosphere that sometimes arises between performances and audiences, the sensation of those fascinated by a language, or of readers fascinated by an author's text. Similarly, they may be used to conceptualise the joint sensation of an army encouraged by heights of courage.

In sharp contrast to the mappings described above, the figurative uses of the phrase *asleep at the switches* are not at all motivated by the effects electricity has on other objects. Unlike the figurative mappings discussed above, this mapping involves a human being, a machine, and the relationship between the two, as well

as the values and expectations associated with the scene. As is evident from this mapping, the discovery of electricity may also be of use in mappings that are predictable neither from any of its properties nor from its functions. Above all, this mapping is an instantiation of the indirect use of the discovery to define other concepts. Our experience of someone who neglects his or her duty to operate an electrical switch becomes someone who has failed to come up to expectations. Considering the versatility of the discovery, this is probably only one out of many. It seems to be one, however, that may be re-experienced by means of other mental scenes involving human beings and machines run by other means.

In the same way as we tend to conceptualise ANIMATE beings by using our experiences of other INANIMATE entities than electrified ones, the figurative uses of terms connected to electricity are the result of the following mappings:

> PEOPLE ARE MACHINES (RUN BY ELECTRICITY)
> THE MIND IS A MACHINE (RUN BY ELECTRICITY)

In particular, we tend to perceive similarities between machines and ourselves when the machines are running:

> PEOPLE ARE RUNNING MACHINES

Like many machines we are equipped with electric circuits. Our brain with its nerves and cells connected by, for example, nerve fibres and blood-veins is one, our nervous system another:

> THE BRAIN IS AN ELECTRIC CIRCUIT
> THE NERVOUS SYSTEM IS AN ELECTRIC CIRCUIT

In the same way as CAUSES are often conceptualised as FORCES, different forces may be used to conceptualise things that we feel and causes of things that we do (see 5.3.1.):

> EMOTIONS ARE FORCES
> DRIVING FORCES FOR HUMAN ACTION ARE FORCES

As a consequence, the electricity, which is normally used to run machines, may also be used to conceptualise our emotions and the causes for our actions:

EMOTIONS ARE ELECTRIC FORCES INSIDE THE BODY
DRIVING FORCES FOR HUMAN EMOTIONS ARE ELECTRIC FORCES
DRIVING FORCES FOR HUMAN ACTION ARE FORCES THAT RUN MACHINES

The mappings in which electricity is used to conceptualise our emotions rest on our experiences of electricity as a powerful force, which may shock other objects if it is suddenly switched on, and bring about electric tension in them. Here strong emotions are conceptualised by means of strong forces, tense emotions by means of electric tension, and emotions that suddenly strike us by means of electric shocks. There is also a correlation between strong emotions and emotions that occur suddenly.

STRONG EMOTIONS/FEELINGS ARE STRONG FORCES
(CERTAIN) (STRONG) EMOTIONS ARE (ELECTRIC) FORCES
TENSE EMOTIONS ARE ELECTRIC FORCES
SUDDEN EMOTIONS ARE ELECTRIC SHOCKS
STRONG EMOTIONS ARE SUDDEN EMOTIONS
STRONG EMOTIONS ARE ELECTRIC SHOCKS.

Not only are the mappings made in order to conceptualise high degrees of intensity of different emotions, electric forces are also used to conceptualise different *kinds* of tense emotions ranging from negative ones to positive ones:

ANGER IS ELECTRICITY
BEING IRRITATED IS BEING SWITCHED
BEING SURPRISED IS BEING SWITCHED
TO BE IN RAPTURES IS TO BE ELECTRIFIED
RAPTURE/ENTHUSIASM IS ELECTRICITY
HUMAN EXCITEMENT IS ELECTRIC EXCITATION
EXCITEMENT IS ELECTRICITY

In the same way as electric excitation is easily spread from one object to another, the emotions that may be conceptualised by means of electricity may be easily spread too:

CONTAGIOUS CONCEPTS ARE ELECTRIC FORCES
HUMAN CONTAGIOUS EXCITEMENT IS ELECTRIC EXCITATION

Because electricity, metaphorically speaking, has the power to enthuse us, to make us excited, someone or something that is electric or electrifying is someone or something that is enchanting. In line with these mappings, electric attraction aptly conceptualises attraction between people and ultimately strong bonds between them:

TO BE ENCHANTING IS TO BE ELECTRIFYING
TO BE EXCITING IS TO BE ELECTRIFYING
STRONG BONDS BETWEEN OBJECTS/CONCEPTS/PEOPLE IS ELECTRIC ATTRACTION BETWEEN OBJECTS (cf. 5.3.2.)

Sometimes our tense emotions bring about too much internal strain. In such cases overstrain in one system may be conceived of as overstrain in another one:

MENTAL OVERSTRAIN IS ELECTRICAL OVERSTRAIN

By breaking the current we remedy the problem of suffering from too much internal strain. Either we simply switch it off or the current is broken by safety fuses that blow.

CALMING SOMEONE/ONESELF DOWN IS BREAKING THE ELECTRIC CURRENT
SAFEGUARDS AGAINST MENTAL OVERSTRAIN ARE SAFETY FUSES IN AN ELECTRICAL CIRCUIT
GETTING AN OUTLET FOR ONE'S EMOTIONS IS BLOWING ONE'S FUSES
PUTTING AN END TO SOMETHING (UNWANTED) IS THE SWITCHING OFF OF AN ELECTRIC CURRENT

Similar to the way certain emotions may be conceptualised by means of electricity, it may also be used to conceptualise "the fuel" for our actions.

DRIVING FORCES FOR HUMAN ACTION ARE FORCES THAT RUN MACHINES
DRIVING FORCES FOR HUMAN ACTION ARE ELECTRIC FORCES

Electricity thereby translates into vitality, that is, a force towards which we have a sympathetic attitude.

VITALITY IS ELECTRICITY
POSITIVE FORCES ARE ELECTRIC FORCES

Similarly, young, vital and healthy people are described by means of machines run by electricity.

YOUNG, VITAL AND HEALTHY PEOPLE ARE MACHINES RUN BY ELECTRICITY

Accordingly, when we need to get ready for action we power up.

PREPARING FOR ENCOUNTER IS POWERING UP/SUPPLYING ONESELF WITH POWER

In reverse order, the breaking of the current may be used to conceptualise the end of an activity. In my material the phrase *switching* something *off* is used to activate the image of someone who stops doing something on purpose, whereas our experiences of fuses that blow are used in order to describe an accidental end of an activity:

TO CEASE DOING SOMETHING BECAUSE OF LOST INTEREST IS TO SWITCH OFF THE ELECTRICITY
TO CEASE FUNCTIONING (RATIONALLY) IS (UNINTENTIONALLY) BLOWING ONE'S FUSES

Similarly, a brain that does not work the way it should is a machine whose electrical switch is out of order:

A WORKING MIND IS AN OPERATING ELECTRICAL MACHINE
A MIND THAT DOES NOT WORK PROPERLY is a machine that HAS AN ELECTRICAL SWITCH OUT OF ORDER

Sometimes the discrepancies between people and machines are made use of. In contrast to the way in which electricity within machines may be switched both on and off, genuine feelings may only be switched off. Consequently, the switching on of an emotion means the switching on of an emotion not sincerely felt.

On other occasions, people and machines are conceived of as functioning in pretty much the same way. This is the case in the mapping between electrified machines, which receive information from the rest of the world when switched on, and switched on people who are well-informed and aware of what is trendy:

BEING AWARE OF THE LATEST NEWS IS BEING SWITCHED ON
BEING UNAWARE OF THE LATEST NEWS IS BEING SWITCHED OFF

To conclude, as is clear from the figurative uses of words connected to electricity in my material, the discovery has provided us with ample tools for structuring our thoughts and for conveying our thoughts to others. In addition to being the versatile discovery that it is, it has given us new opportunities to conceptualise a number of abstract concepts in a much more exact way than was possible before the days of the discovery. A number of these mappings have been accounted for in this chapter. Yet others may of course be found if metaphorical mappings in other sources are studied. In my material, mappings were found that were probably conventional before electricity was discovered as well as mappings that must have originated from the discovery. Presumably, frequent mappings such as PEOPLE ARE MACHINES, and CAUSES ARE FORCES belong to the former group and may be re-experienced by means of our experiences of electricity. Naturally, mappings based on experiences that may uniquely be learnt from the discovery are novel ones. Among these we find specialised mappings such as HUMAN EXCITEMENT IS ELECTRIC EXCITATION, TO BE EXCITING IS TO BE ELECTRIFYING, and SAFEGUARDS AGAINST MENTAL OVERSTRAIN ARE SAFETY FUSES IN AN ELECTRICAL CIRCUIT. These mappings are all structured by means of electricity.

No matter what degree of conventionality the mappings have, the figurative uses of words and phrases in my material are examples of the way in which a popular discovery, its various functions and the things we associate with it are used to conceptualise other more abstract and less clearly delineated concepts. By having this function the discovery not only substantially reduces our need to rely on pre-existing mental structures, but is also of use when we structure our thoughts in new ways. For example, the sentence *Relax or you'll blow a fuse* is structured by the mapping MENTAL OVERSTRAIN IS ELECTRICAL OVERSTRAIN. To anyone who does not yet conceptualise MENTAL OVERSTRAIN in this way, it is not possible to fully understand what is meant by the sentence, unless he or she discovers the match between MENTAL OVERSTRAIN and ELECTRICAL OVERSTRAIN. Once the person has seen the connection between the domains he

or she will not only get the message communicated by the sentence, but will probably also, from then on, store the mapping MENTAL OVERSTRAIN IS ELECTRICAL OVERSTRAIN in his or her long-term memory.

As to the details of the mechanisms underlying the mappings discussed here, they are naturally not possible to find by simply studying texts. However, the figurative uses of the words and phrases in my material favour the view that metaphorical expressions are very seldom, if ever, the result of isolated mappings. As is evident from the foregoing, each mapping is quite complex in that a number of different things are mapped from source to target simultaneously. Not only are different concepts mapped but also relations between different concepts as well as associations, values and ideas connected with the things that are mapped. By way of example, this was evident from the use of phrases such as *switched on* to conceptualise people who keep themselves up to date with the latest news and ideas, *power up* to conceptualise people who prepare themselves for battle by gaining strength, or *blow their fuses* to conceptualise people who burst out with emotion because they have been exposed to too much pressure. Even seemingly straightforward mappings as between, for example, ELECTRICITY and EXCITEMENT in sentences (125-131) are both the result of a number of different mappings and combined with other mappings (see 5.3.4.). In addition, the important role played by the discrepancies between source and target domains in the figurative use of the term *switch on* to conceptualise people who start to behave or feel in a certain way without being sincere in what they are doing or feeling favours this view.

Metaphorical expressions seem to originate from our placing of the experiences that we have of one phenomenon in a conceptual context traditionally belonging to some other phenomenon. This seems to be as true of expressions structured by conventional mappings as it is of expressions structured by novel ones. When hearing metaphorical expressions, we activate meanings that are inextricably linked to the new context in which the phenomenon is "placed". Hence, the way in which meanings previously associated with a certain word or phrase match the new context in which the word is used, is substantial for the new meaning of the word or phrase in question. Accordingly, differences between what may be profiled by the different forms of a word may lead us to use different forms of one and the same word in totally different kinds of metaphorical mappings. By way of example, far from activating metaphorical meanings that are closely related the two different forms *switch on* and *switched on*, these are used in metaphorical mappings that do not have very much in common with them. *Switch on,* which is originally used to

indicate that something is currently starting, translates into a metaphorical sense where people start doing or feeling something, that is, into meaning that people 'start to behave or feel in a certain way without being sincere in what they are doing or feeling'. *Switched on*, which refers to some time later and symbolises an ongoing process, is more useful when we wish to communicate that someone is currently being 'very tense' or 'aware of all that is considered fashionable and up to date'.

Similarly, the metaphorical expressions *switch on* and *switch off*, which are antonymous in form and literal meaning but widely differing in their metaphorical senses, demonstrate a lack of agreement between the ways the figurative senses of the phrases develop. Even though *switch on* refers to people who 'suddenly begin to behave in a certain way without being sincere in what they are doing or feeling' *switch off* does not refer to someone who stops doing so.

Clearly, words are not defined primarily by their relationship to one another but by our use of them in different contexts. Ultimately, sense development seems to originate from what happens to be required by the contexts in which words and phrases are used and from the way meanings previously associated with a certain linguistic form match the new meaning we wish to communicate. In this process, small differences play a substantial role. As is exemplified by the differences between the figurative senses of *switched* and *switched on*, differences in profile explain why the two phrases match different kinds of mappings. *Switched*, which focuses on the tension per se symbolises 'a mild indication of exasperation, denial or surprise' (*OED*) and *switched on*, which profiles the ongoing process is used to describe people who are either ' tense' or 'aware of what is trendy'.

5.5. Summary and conclusion

The aim of this chapter has been to analyse the cognitive function of the electric current and to discuss some words that have come to be associated with electricity through metaphoric and/or metonymic mappings. A number of different areas that have helped us to structure our experiences of electricity have been identified as well as a number of different ways in which electricity has in turn helped us to structure yet other experiences.

Interestingly enough, the dividing line between perceived similarities among real-world objects, metaphorical mappings and scientific truth sometimes seems

to be very thin. Occasionally, what was once a perceived similarity resulting in a metaphorical mapping later turns out to be a scientific truth. Even though Franklin considered electricity to be due to a fluid diffused through all bodies at an early stage (see 5.2.) it is evident that people used their experiences of electricity in order to conceptualise their own actions and emotions before much was known about the way electric impulses inside our bodies work. Indeed, even today familiarity with the bioelectric cerebral system does not seem to be the kind of knowledge that is common ground for a great number of speakers. It seems likely that many people today conceptualise human emotion or action by means of electricity without knowing that there is indeed electricity inside our own bodies. Presumably, the dividing line among hunches, perceived similarities among real-world objects, metaphor and science is thin precisely because many of the systematic correspondences that we observe are due to underlying real-world correspondences between entities with similar structures and behaviour. In other words, the coherent structuring of the world ultimately reflects the coherent structure of the world.

CHAPTER 6. MOTOR VEHICLES, ROADS AND WAYS

6.1. Introductory

In this chapter, words and phrases connected with motor vehicles, especially motorcars, and with roads and ways will be discussed. Like the other inventions and discoveries included in this thesis, motor vehicles have, ever since they were invented, had an enormous impact on our lives. Hence the same is true of the advances within the field of road technology. As already seen in section 3.4.3.1., motorcars and the ways in which they are driven have been particularly important in the United States, where, in Bromhead's words (1977:196), "[n]othing is so expressive of the modern [---] way of life as the motor car".

Like the other studies that are part of this thesis, the study of expressions connected with motor vehicles, and roads and ways is two-fold. On the one hand, the way in which other source domains have once helped people to structure their experiences of motor vehicles, roads, and ways along with concepts related to them, will be studied. On the other, the possibility of using these artefacts to structure and re-experience conceptual mappings will be looked into. For this purpose, a study will be made of the sense development of terms ranging from the ones signifying the motor vehicles and their different parts, to terms signifying the roads on which motor vehicles are driven.

In sections 6.2. – 6.2.4. terms that were originally not connected with motorised vehicles and roads and ways but are now used to refer to concepts connected with these fields will be discussed. In these sections, we primarily find expressions that have found their way to the world of technology as a result of metaphorical mappings. Some of the expressions, however, are the results of metonymic mappings, and in some cases of referential extension. The ones belonging to the latter two groups generally originate from earlier inventions.

In sections 6.3. – 6.3.4.2. metaphorical and metonymic expressions will be discussed whose structures either are based on, or may be re-experienced by, people's experiences of motorised vehicles and roads and ways. This part of the study will begin with an analysis of metaphorical and/or metonymic expressions that in their literal senses signify motorised vehicles, some of their different

parts, and movement by means of motorised vehicles in sections 6.3.1. - 6.3.3. In sections 6.3.4. - 6.3.4.2. metaphorical and/or metonymic expressions that in their literal senses signify roads and ways will be dealt with.

6.2. Concepts within the domain of motor vehicles – originally conceptualised by means of other domains

In the early days of the motorised vehicle, people seem to have made use of a wide variety of experiences in order to structure their experiences of the new invention and of concepts related to it (cf. 5.2.). Examples are our own bodies and earlier inventions. In particular, wheeled vehicles drawn by horses seem to have helped us in this process. As to the roads and ways on which motorised vehicles are driven, terms originally signifying roads and ways in the sense of 'beaten tracks' are still in use. In order to define different kinds of road systems, a number of different experiences have been used. Examples are experiences of the circulatory system, trees with branches, circular objects, belts around people's waists and aeroplanes.

6.2.1. The vehicles

To begin with the way people structured their experiences of motor vehicles, they seem to have found horse-drawn vehicles very useful. Five terms out of twelve in my material (see Table 9), that is, *station wagon, buggy, motor carriage, bus* and *coach* were used to signify horse-drawn vehicles before they were applied to motorised ones.

Table 9. Terms signifying different 'motorised vehicles'.

station wagon	*saloon car*
buggy	*limousine*
motor carriage	*bubble*
(omni)bus	*caterpillar*
coach	*bulldozer*
auto(mobile)	*motor*

The new applications of the terms, however, are neither of metaphorical nor **of** metonymic origin, but the results of referential extension primarily based on functional similarity. A *station wagon*, in the sense of 'a [motorised] car with a

rear door or doors, capable of carrying goods as well as passengers', for instance, is similar to the original horse-drawn station wagons used for 'conveying passengers to and from a railway station' (*20th CW)* with respect to the function of transporting people and goods. Similarity in appearance also seems to have motivated the new applications of the terms. In the case of the motorised *station wagon*, for example, it is similar to the horse-drawn one with respect to the rear door or doors at the back of the vehicle through which goods can be loaded onto the vehicle, or unloaded from the vehicle.

As to the term *buggy*, it is used today in the sense of 'a small car usually with no roof which is designed for driving on rough ground' (*CIDE*). Originally it was used to refer to another lightweight vehicle, that is, '[a] light one-horse (sometimes two-horse) vehicle, for one or two persons'.

The term *motor carriage* was introduced in 1901 to signify a car and is "[a] stately but long vanished usage harking back to the days of the horse-drawn carriage"(*20th CW*). In turn, the noun *carriage* is related to the verb *carry* and thereby to Middle English *carien*, Old North French *carier* signifying 'to transport in a vehicle', and ultimately Latin *carrus* (*MWCD*)", which was used about various horse-drawn vehicles, including war-chariots. Today, the term *carriage* may be used to refer to 'a vehicle with four wheels which is usually pulled by horses and was used esp. in the past', 'a vehicle for moving a baby around which consists of a small enclosed bed supported by a frame on four wheels', or in British English, 'any of the separate wheeled parts of a train in which the passengers sit' (*CIDE*). Like *buggies, station wagons* and *carriages*, both *buses* and *coaches* were also originally horse-drawn vehicles. The term *coach* ultimately originates from Hungarian 'a wagon from Kocs'. Of the senses below, 1a was used first:

> 1a) '[A] large usually closed four-wheeled horse-drawn carriage having
> doors in the sides and an elevated seat in front for the driver.'
> b) '[A] railroad passenger car intended primarily for day travel.'
> c) '[A] bus.' (*MWCD*)

In English the Latin term *omnibus* meaning 'for all', or *bus* for short, was initially used to refer to '[a] four-wheeled [horse-drawn] public vehicle for carrying passengers, with the inside seats extending along the sides, and the entrance at the rear, and with or without seats on the roof; usually plying along a fixed route' (*OED*). From 1901 on, buses were also motor-driven. This was the year when the term *motor-bus* was introduced (*MWCD*).

However, words that were previously applied to horse-drawn vehicles are not the only indicators of the tendency in the early days of the motorised vehicle to think about it as a horse-drawn one. Even the new coinage *auto, or automobile* in full, seems to be defined in relation to horse-drawn vehicles. As implied by the name, an automobile was first something 'that moves by means of mechanism and power within itself; [this was] esp. [said] of a vehicle, self-propelling as distinguished from horse-drawn' (*OED,* my emphasis).

From the terms *saloon car, limousine, bubble, caterpillar,* and *bulldozer* we learn that in the process of defining motorised vehicles, people have also made use of their experiences of rooms, clothes, bubbles, and insects. A number of different reasons seem to have motivated the uses. In the case of *limousine, bubble,* and *caterpillar,* the applications of the terms to motor vehicles seem to be based on a focus on a certain part of the whole vehicle, that is, they all seem to be the result of metonymic PART OF WHOLE FOR WHOLE mappings.

Beginning with the use of the term *saloon* to refer to a motorcar, however, it seems initially to have been made with the aim of making the car more attractive. According to the *OED,* the term was used in the following senses before it was used to refer to '[a] type of motorcar with a closed body for four or more passengers' in 1908, or the full form *saloon car* was used in the same sense in 1915 (*20th CW*):

> 'A large apartment or hall, esp. in a hotel or other place of public resort, adapted for assemblies, entertainments, exhibitions, etc.' (1747).

> '[A] large cabin in a passenger-boat for the common use of passengers in general or for those paying first-class fares' (1835).

> '[A] railway carriage without compartments, furnished more or less luxuriously as a drawing-room or for a specific purpose, as dining, sleeping saloon' (1842).

By applying a term associated with large, often luxurious, rooms used for entertainment to a motor vehicle, the manufacturers of the car seem to have aimed at making us associate the car too with a roomy space, luxury, entertainment and travelling in a very comfortable way. When mapping our experiences of a saloon in either one of the senses above onto the small cramped space of a motorcar, we highlight the positive properties of the source domain while at the same time downplaying the negative properties of the target. As a result of doing so, we may come to the conclusion that saloon cars must be really different from other less spacious and comfortable ones.

Another motor vehicle associated with luxury is the limousine. According to the *OED*, a *limousine* is today 'a (luxury) car with a compartment for the passengers and a separate compartment for the driver'. "[R]ecently it has been used, esp. in the U.S., for conveying passengers to and from large airports". Unlike the application of *saloon*, however, *limousine* was not initially associated with luxury and comfort but with "Limosin, a former province of France" (*20th CW*). However, contrary to what one might think, Limosin is not the PLACE where the car was first produced. People did not begin to use this term to refer to the vehicle as a result of structuring their experiences in line with the metonymy PLACE FOR PRODUCT (MADE THERE) (cf. terms used for products such as "*mokka* [sic]*, java, china*" (see Kövecses 2002:155) *champagne*, *cognac* and *eau de cologne*). The reason why they did so is related to the appearance of the first limousine. Originally, a limousine was a vehicle whose "driver's seat was outside though covered with a roof". Since it resembled "a type of cloak worn in Limosin" (*20th CW*) people mapped their experiences of the cloak onto the vehicle[28]. Hence the use of the term to refer to the vehicle goes back to the use of the province *limousine* to stand for a cloak worn in that province. The metonymic mapping PROVINCE FOR CLOAK structures the use. When mapping their experiences of the cloak onto the vehicle, people started to use the term *limousine* metonymically representing the cloak to refer to the vehicle. This application is structured by the metonymic mapping CLOAK FOR VEHICLE.

The applications of the terms *bubble* and *caterpillar* to different vehicles are also related to the appearance of the vehicles. A *bubble* is 'a miniature car with a transparent domed top', which was in fashion in Britain in the late 1950s (*20th CW*). The rounded top of the vehicle reminded people of a bubble. The similarity in appearance made people map their experiences of a bubble onto the top of the car in line with the metaphor TOP OF VEHICLE IS A BUBBLE and hence begin to use the BUBBLE to stand FOR the TOP OF the VEHICLE. Since the rounded top of the car is a prominent feature, they started to use it to stand for the whole vehicle in line with the metonymy "bubble" TOP FOR VEHICLE. The term *caterpillar* was initially used to signify 'the larva of insects'. Because of the close points of similarities between the feet of a larva and the threads of a specific kind of tractor, people mapped their experiences of the feet of larva onto the threads of

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[28] Cf. the sentence *My wife… whose waist is an hourglass* (Lakoff 1993:229), which originates from the mapping of "the image of an hourglass onto the image of a woman's waist". Image metaphors, or "one-shot" metaphors, are here considered to "work in the same way as all other metaphorical mappings: by mapping the structure of one domain onto the structure of another" (Lakoff 1993:229). Like other metaphorical mappings, they are conceptual. The metaphors are "not in the words themselves, but in the mental images" (Lakoff 1993:22).

the vehicle. The metaphor TREADS OF TRACTOR ARE FEET OF LARVA is behind the use of the expression *Caterpillar Tractor* in 1908 (*OED*):

> (135) **1908** *Sci. Amer*. 16 May 348/1 The Caterpillar Tractor. For some months past the British military have been experimenting with a new type of tractor for the haulage of heavy vehicles over rough and unstable ground… The soldiers at the Aldershot military center, where it is in operation, promptly christened it the 'caterpillar' (*OED*).

The use of the clipped form *caterpillar* in the sense of '(a vehicle with) an endless belt of metal plates around the sets of wheels on each side of the vehicle allowing movement over very rough ground' is the result of the conceptual mappings TREADS OF TRACTOR ARE FEET OF LARVA, and TREADS OF TRACTOR FOR TRACTOR. Interestingly enough, in modern use, *caterpillar* is not used mainly to refer to the whole vehicle but again connected with 'the belt of metal plates', that is, the 'steel bands' or the caterpillar tracks' (*20ᵗʰ CW*). The vehicle signified by the term *caterpillar tractor*, can also be referred to as a *bulldozer*. According to *20ᵗʰ CW*, a *bulldozer* is 'a heavy caterpillar tractor fitted with a broad steel blade in front, used for removing obstacles, levelling uneven surfaces, etc.' This use, in turn is, "a transferred use of a 19th-century US slang term which meant 'a strong-arm man who coerces people with threats of violence'" and thereby a mapping from PEOPLE to MACHINES[29]. Here our experiences of a person threatening someone with violence are mapped onto our experiences of the brute force of a caterpillar tractor. The act of threatening someone with violence is mapped onto our experiences of a machine removing obstacles with a steel blade.

Finally, the use of the term *motor* to refer to a motor vehicle is also the result of clipping, that is, of the phrase *motorcar* to *motor*, and structured by the PART OF THE VEHICLE FOR THE WHOLE VEHICLE metonymy. The reason why this particular part of the vehicle has been chosen seems to be that it is essential for its running. Because motor vehicles are made for forward movement, the motor is essential for the most important function of a car (cf. 4.3.4. and the discussion of the verb *motor* below. See also Kövecses and Radden 1998:65).

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[29] According to Barn., the origin of the term *bulldozer* (like the term *bulldoze*) is of uncertain origin. However, "the etymology usually suggested is that the word is a compound of *bull* (the animal) and an altered form of *dose*, i.e. that a whipping given to coerce voters was a dose suitable for a bull. The reference was to a supposed practice carried out during the Tilden campaign, especially among Blacks in the South." The first time the term appeared was in 1876.

6.2.2. Movement by means of a motor vehicle

From the use of the verbs *go, drive, ride, auto, charioteer, motor, pilot, tool*, and *wheel* to refer to the act of driving, we may learn in what directions people turned in order to conceptualise movement by means of a motor vehicle. Other clues are given by the verbs *operate, run, work, guide, steer, roll,* and *chauffeur,* which are also associated with the act of manoeuvring a motorised vehicle (*MWCD*). Of these, the verbs *motor, tool, wheel*, *charioteer, auto, pilot,* and *chauffeur* are denominal and seem to have become connected with the act of driving a vehicle as a result of metonymic mappings (Kövecses 1998:60). The use of the terms *go, run, operate, work, guide, steer*, *drive* and *ride* to refer to this act seems to originate from the mapping of our experiences from a number of different sources.

   The uses of the verbs *motor, tool, wheel*, *charioteer,* and *auto* to refer to the act of driving a motor vehicle all originate from the INSTRUMENT FOR THE ACTION INVOLVING THAT INSTRUMENT metonymy (cf. Kövecses and Radden 1998:61). In their original senses the terms *motor, tool* and *wheel* all signify different parts of a vehicle that are "functional to its driving" (Kövecses and Radden 1998:65, cf. 4.3.4. and the discussion of the noun *motor* above). The terms came to be used in the following senses when people started to use these functional parts to refer to the action of which they are a part:

> *motor* – 'To convey in a motor car; to traverse (a distance) in a motor vehicle'. 'To travel or drive in a motor car.' (*OED*)
>
> *tool* – 'To drive (a team of horses, a vehicle, or a person) in a vehicle; of a horse, to draw a person in a vehicle.' (*OED*)
>
> *wheel* - 'To travel in or drive a wheeled vehicle; to go along on wheels, as a vehicle. *mod. colloq*. to ride a bicycle or tricycle, to cycle.' (*OED*)

   While the verb *motor*, naturally, was introduced in connection with motorised vehicles, both *tool* and *wheel* were used to refer to the driving of horse-drawn vehicles before they were associated with the driving of motorised ones. *Wheel* was also used in the sense of 'to ride a bicycle or tricycle, to cycle', before it was used in the sense of 'to drive a car slowly, as when manoeuvring into or out of a car park'. Hence, the connection between the latter two terms and motor vehicles is both the result of the metonymic mapping INSTRUMENT FOR THE ACTION INVOLVING THAT INSTRUMENT and referential extension of terms applied to one kind of vehicle to refer to another kind of vehicle (cf. the discussion of *station wagon, buggy, motor carriage, bus* and *coach* in 6.2.1.). Not only the noun *wheel* but also the verb existed long before motorised vehicles were invented. As the

latter were invented the term was applied also to the driving of these and referential extension took place.

The verbal senses of *charioteer* and *auto* originate from the nominal *chariot* and *auto* signifying the entire vehicle involved in the action signified by the verbal senses. Like the verbs *wheel* and *tool*, the verb *charioteer* was applied to the driving of horse-drawn vehicles before it was used to signify the act of driving motorised ones. Like the verb *motor*, the verb *auto*, however, or, in full, *automobile*, was first used in connection with motor vehicles (see the discussion of the noun above).

The verbal uses of the terms *pilot* and *chauffeur,* seem to derive from the metonymy AGENT FOR A CHARACTERISTIC ACTIVITY OF THAT AGENT (Kövecses and Radden 1998:60) and ultimately a shift in profile from AGENT to A CHARACTERISTIC ACTIVITY OF THAT AGENT. Originally, *pilot* was used in the sense of 'one who steers or directs the course of a ship; a steersman, helmsman; *spec.* a person duly qualified to steer ships into and out of a harbour, or wherever the navigation requires local knowledge'. Because the metonymic mapping AGENT FOR A CHARACTERISTIC ACTIVITY OF THAT AGENT is "deeply entrenched in the conceptual system of speakers of English" (Kövecses 1998:61) it was probably very natural for people to begin to use the term not only to profile the pilot himself[30] but also, on other occasions, the action that the pilot was engaged in. In this way, the verbal sense of 'to conduct as a pilot, to direct the course of (a vessel) through difficult or dangerous waters; to steer [and to] guide' seems to have developed. Subsequently, the term was used to refer to the persons driving many other kinds of vehicles along with the acts of driving these other vehicles. Examples of these applications are the nominal uses of the term to refer to the driver of a motor car, or a person who 'controls an aircraft, balloon, spacecraft, or the like during flight' and the verbal use of the term to refer to the driving of a motor car, or the process of 'act[ing] as a pilot on (an aeroplane or other aircraft) in the air'. Similarly, a shift in profile seems to be behind the development of the verb *chauffeur* in the sense of '[t]o drive (a vehicle) as a chauffeur; to convey (a person) by car' out of the nominal '[a]n automobilist'. That is, it seems to be a result of us using the activity that the chauffeur is engaged in as "the referent within the conceptualisation" (Langacker 1995:96, see also 2.2.1.), rather than the chauffeur himself.

Of the terms *go, run, operate, work, guide, steer*, *drive* and *ride* the first two were originally used to refer to human action. The primitive sense of *go* is likely

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[30] The use of the pronoun *himself* is intentional. The first instance of the verb in the *OED* is from the end of the 17th Century. At the time, pilots were usually men.

to have been 'to walk; to move or travel on one's feet ([as] opposed to *creep, fly, ride, swim* etc.)' (*OED*). Quite early on (c888), *run* was used in the sense of '[t]o move the legs quickly (the one foot being lifted before the other is set down) so as to go at a faster pace than walking; to cover the ground, make one's way, rapidly in this manner' (*OED*). Nevertheless, the use of the terms to refer to vehicles does not necessarily seem to be the result of mappings between our experiences of moving on our own feet onto motorised vehicles, that is, between PEOPLE and MACHINES. As a result of a number of different uses of the term *go* to refer to a number of different movements, it became "the most general expression [said of both persons and things] (I) for a movement viewed without regard to its point of departure or destination; (II) for a movement *away from* the speaker, or from the point at which he [31] mentally places himself; and (III) for a movement to or towards a place which is neither in fact nor in thought that occupied by the speaker" (*OED*) long before motorised vehicles were invented. It is thus impossible to establish what mapping is behind the use of the term to refer to the movement of a motor vehicle. The verb *run* also came to be used to signify a number of different senses such as '(hurried) travelling or going about, esp. to distant places' (a1300) or 'to hasten *to* some end or object, or *to* do something, to make haste, be active' (c897) (*OED*) early on. Because both verbs had acquired a vast number of related senses long before the first motorised vehicle saw the light of day, it seems legitimate to argue that the sense development of the terms *go* and *run* to signify movement by means of motor vehicles is not the result of mappings between domains, but of the use of very general expressions associated with movement, to refer to movement by means of a motorised vehicle. *Run,* for example, was used to refer to wheeled vehicles that move rapidly or easily as early as 1375 (*OED*) and to refer to vessels that sail swiftly or easily around 1000. Considering the impact of our own bodily experiences when it comes to conceptual organisation (see e.g. Lakoff & Johnson 1980:25, 29), however, it seems likely that for individual speakers of English, their experiences of moving forward by means of running on their own feet are of substantial help when they first hear someone using the term *run* to refer to an act associated with motor vehicles. In such individual cases mappings from PEOPLE to MACHINES are involved in the activation of conceptual content prompted by the use of the term. The fact that they associate the term with moving their own bodies forward with speed helps them to associate the term with the quick movement of inanimate entities too.

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[31] In this case, *he or she* would have been more correct than *he*. The passage, however, is a quotation from the *OED*.

Like *go* and *run,* the verbs *operate, work, guide* and *steer* were all used to refer to the act of manoeuvring a number of different animate and inanimate entities before they were used to refer to the manoeuvring of motor vehicles. For example, in the case of *steer,* sea-going vessels, chariots, bicycles, balloons and ploughs, animals and people were all steered before the days of the motor vehicle (*OED*). As in the case of *go* and *run,* the sense developments of *operate, work, guide* and *steer* do not tell us exactly what kinds of previous experiences once made us begin to use the terms to refer to the manoeuvring of motor vehicles. All that can be concluded from the wide range of applications of the terms is that in the early days of the motor vehicle, a great number of experiences of manoeuvring different things had been made. Any of these may be behind the first applications of the terms to the manoeuvring of motor vehicles and the extension of the meaning of the terms *operate, work, guide* and *steer*.

Similarly, *ride* and *drive* had acquired a number of related senses before people started to use them to refer to movement by means of motor vehicles, and it is difficult to establish exactly what experiences once made us begin to use the terms to refer to motorised vehicles. According to the *OED*, *drive* was initially used in the sense of 'to force (men or animals) to move on before one, or flee away from one, by blows or intimidation; to urge on or impel with violence' (*OED*). *Ride* was initially used in the sense of '[t]o sit upon, and be carried by, a horse or other animal; to move about, make one's way or journey upon horseback'. Subsequently, *drive* also signified 'to urge onward and direct the course of (an animal drawing a vehicle or plough), or [as a result of profiling another entity within the scope of the expression] the vehicle itself', and *ride* 'to be conveyed, to travel or journey, *in* a wheeled or other vehicle'. Once the two terms had been associated with other kinds of vehicles, the road was paved for the use of the terms to refer to motorised ones. In the *OED*, the difference between *ride* and *drive* is described in the following way:

> One drives a vehicle of which the course is under one's control, as one's own or a friend's private carriage, or a hired carriage or cab; one rides in a vehicle the course of which one does not control, as a public stage-coach, omnibus, or tram-car, or the cart of a friendly farmer who gives one a lift on the way. (*OED*)

The distinction, however, does only apply to vehicles that one rides **in**, that is, to four-wheeled ones, and not to the ones that one **rides**, that is, to two-wheeled ones. People who ride motorbikes and the like tend to be in control of them. The makers of the dictionary seem to have overlooked the use of *ride* to refer to the riding of the latter kind of vehicles.

6.2.3. The different parts of a motor car

As is evident from Table 10, the terms in my material that are used to refer to the different parts of a motorcar fall into four different groups:

Table 10. Terms signifying the different parts of a motorcar.

1.	2.	3.	4.
tail	*juice*	*sump*	*dashboard*
wing	*car bra*	*trunk*	*glove compartment*
horn	*bonnet*		
	hood		
	boot		

In the first group of words we find the terms *tail, wing* and *horn*, which were all originally used to refer to different parts of animals. The first instance of *tail* in the *OED* is in the sense of 'the rear end or a process or prolongation of the rear end of the body of an animal'. A *wing* was first used to refer to 'each of the organs of flight of any flying animal, as a bird, bat or insect' (*OED*). Possibly, the use of *tail* in American English to refer to 'the back part of a motor vehicle' (that is, the part of the car which in British English is called the *rear*), and the use of *wing* to refer to 'one of the four parts at the side of a car which go over the wheels' (*CIDE*), are the results of mappings from ANIMALS to VEHICLES. However, like so many other terms in this section both *tail* and *wing* were used in number of different senses before they were applied to motor vehicles. Before the days of the motor vehicle a *tail* was the 'the back, or back part of anything' (*OED*). The term *wing* could be used of many different 'appliance[s] or appendage[s] resembling or analogous to a wing in form or function' (*OED*). The application of the terms to different parts of motor vehicles may thus also be the result of the fact that people had learnt to associate the terms with anything that is located at the back or on the sides of something else. This knowledge could have been learnt from any of the many applications of the terms used before the days of the motor vehicle.

Like *tail* and *wing*, *horn* was also first used in connection with animals. According to the *OED*, a *horn* was initially 'an animal organ or appendage' in the shape of '[a] non-deciduous excrescence, [that is] often curved or pointed, consisting of an epidermal sheath growing about a bony core, on the head of certain mammals, as cattle, sheep, goats, antelopes, etc. serving as a weapon or defence'. Among many other things, the term is today used to refer to 'a device

on a vehicle that is used to make a loud noise as a warning or signal to other people' (*CIDE*). The conceptual content associated with the term *horn* seems to have started to change when horns were found on other locations than on the heads of certain mammals. At this point, people started to use them for a number of different functions. Because a *horn* did not cease to be a horn when it was no longer an appendage of an animal, the term was still applied to horns when they were hollow, without the core, and 'used as a vessel or a musical instrument' (*OED*). Accordingly, a horn was still a horn when used as 'an instrument attached to motor vehicles', which could be sounded as a warning signal. Because of the functional and acoustic similarity between real horns used as instruments on motor vehicles, and the ones that we find in motor vehicles today, people started to use the term to refer to these too even though they are very far from being real animal horns.

In the second group, we find the terms *juice, car bra, bonnet, hood*, and *boot*. *Juice* was used to refer to '[t]he watery or liquid part of vegetables and fruits, which can be expressed or extracted' (*OED*) long before it was used in the humorous sense of 'fuel for an engine' (*20th CW*). Again the underlying mapping and thereby the sense development of the term seem to originate from a functional similarity between source and target domain. That is, the best way to explain the sense development of *juice* from signifying 'juice from vegetables and fruits' to signifying 'petrol' seems to be that both liquids may be used for supplying power. When people have juice they are supplied with energy and able to function. When a motorcar is filled with petrol it is supplied with power. By means of the energy the vehicle will run. As is analogous with the contemporary use of *juice* to refer to electric current (*OED*), the application of the term to petrol seems to originate from a mapping between PEOPLE and MACHINES, and between an ENERGISING DRINK and FUEL.

The terms *car bra, bonnet* and *boot* were all originally used to signify different articles of clothing but are now also applied to motor vehicles. In the same way as different articles of clothing function as covering for different parts of the body, *car bras, bonnets, hoods* and *boots* are now also coverings for different parts of a car. A *bra*, or *brassiere* in full (*OED*), was first used in the sense of 'a woman's undergarment to cover and support the breasts' (*MWCD*). When applied to vehicles, the term came to be used in the senses of 'a protective cover that fits over the front end of a car, guarding it against wear and tear' and 'a similarly placed carbon-based cover that absorbs the microwaves used in radar equipment, minimizing the chance of getting caught by a radar speed trap' (*20th CW*). The applications of the term are thus the result of a mapping between

PEOPLE AND MACHINES. More specifically, they originate from a comparison between a woman's breasts and the front end of a car, and, since THE EXTERIORS OF A CAR ARE ARTICLES OF CLOTHING, between the kind of clothing that is used to cover and support the breasts, and the cover of the front end of a car. Primarily, the application of *bra* also to vehicles seems to be based on the functional similarity between car bras and the kind of bras used by women. The function of both is to cover and protect. In addition, the location of the thing protected also seems relevant. Like bras worn by women, car bras protect something that protrudes from the front.

While bras were originally used to protect women's breasts, bonnets and hoods were originally used as coverings for people's heads. Originally, a *bonnet* was 'a head-dress of men and boys; usually soft, and distinguished from the hat by want of a brim', 'a kind of helmet'. It was also used to signify other kinds of head-dresses like 'a night-cap' and 'a head-dress of women out of doors; distinguished from a hat (at present) mainly by the want of a brim, and by its covering no part of the forehead' (*OED*) before it was applied to other artefacts resembling head-dresses like these in function and form. The first instance of the term in the sense of '[a] hinged cover over the engine (in some makes over the luggage compartment) at the front of a motor vehicle' is from 1904 (*OED*). Similarly, a *hood* was '[a] covering for the head and neck (sometimes extending to the shoulders) of soft or flexible material, either forming part of a larger garment (as the hood of a cowl or cloak) or separate [from it]' (*OED*) long before it was used in the sense of 'a cover for parts of mechanisms; specifically: the movable metal covering over the engine of an automobile' and the chiefly British 'a top cover over the passenger section of a vehicle usually designed to be folded back'. Ultimately, the applications of the terms seem to originate from a tendency to compare a part of a car that is essential for its running, that is, the engine, with a bodily part that is in charge of our actions, that is, the head.

Like *bonnet* and *hood*, *boot* was also initially used to signify an article of clothing. Around 1325 the term was used in the sense of 'a covering for the foot and lower part of the leg [of a rider]' (*OED*). Usually, the covering was made of leather. By contrast with a shoe, it extended above the ankle of the person wearing it (*OED*). As in the case of *bonnet* and *hood*, the application of *boot* to refer to a motorcar may be the result of mappings from PEOPLE to MACHINES, and from different ARTICLES OF CLOTHING to THE EXTERIORS OF A CAR. However, like *bonnet* and *hood*, *boot* was used in a number of different senses other than the one signifying an article of clothing before it was used to refer to a part of the car. For this reason, the British use of the term to refer to 'the luggage

compartment' of a motor vehicle may be the result of mappings from other source domains than the ones above. Most likely, the development of the term in this direction originates from the use of *boot* in the sense of 'the receptacle for luggage or parcels under the seats of the guard and coachman' and ultimately the sense of '[t]he fixed external step of a coach' or 'uncovered space on or by the steps on each side, where attendants sat, facing sideways, [and] later, a low outside compartment' (*OED*). Presumably, people started to use the term to refer to 'the fixed external step of a coach because this part of the vehicle protruding from the lower part of the vehicle was where a person could place her/his boot in line with the metonymy BOOT FOR PLACE OF BOOT. In order to use the space under the external step of the coach in a sensible way, people then started to use it as a compartment for their luggage. Once a *boot* was a luggage compartment in one kind of vehicle, it was a natural thing to use the term to refer to the luggage compartment in another kind of vehicle.

The third group of words in my material is made up of *sump* and *trunk*. The latter term is American. Both *sump* and *trunk* were originally applied to natural objects, but are today used to signify different parts of the car. *Trunk* was first used in the sense of '[t]he main stem of a tree, as distinct from the roots and branches, the bole or stock', and then in the sense of '[a] chest, box, case, etc. (supposed to have been orig. made out of a tree-trunk' (*OED*). In 1609 it was used in the sense of '[a] box, usually lined with paper or linen, and with a rounded top, for carrying clothes and other personal necessaries when travelling' and in 1929 '[t]he luggage compartment of a motor vehicle' (*OED*). The suggestion that the first trunks in the sense of a 'chest, box, or case' were made out of tree-trunks indicates that people once started to use *trunk* in this sense as a result of the metonymic mapping MATERIAL CONSTITUTING AN OBJECT FOR THE OBJECT (see Kövecses and Radden 1998:51). Subsequently, trunks in the sense of 'chest[s], box[es], or case[s]' were fastened at the rear of vehicles in order to carry the personal necessaries of travelling people. The term was still used when luggage compartments were eventually designed into the rear of the car.

In 1907 *sump* was for the first time used in the sense of 'a depression in the bottom of the crankcase of an internal-combustion engine, which serves as a reservoir of lubricating oil' (*OED*). Around 1425, the very same word was used in the sense of '[a] marsh, swamp, morass, [---] a dirty pool or puddle' (*OED*). In 1653, it was used in connection with mining in the sense of '[a] pit or well sunk at the bottom of an engine shaft to collect the water of the mine' (*OED*). It seems primarily to have been the dirty and muddy quality of the water at the

bottom of the engine shaft that reminded people of the cloudy water in a marsh, swamp, morass, dirty pool or puddle and made them use the term to refer to the pit or well at the bottom of an engine shaft too. Then they mapped their experiences of a pit or well used as a reservoir of one kind of dirty liquid in one kind of engine, onto their experiences of a reservoir of another kind of cloudy liquid in another kind of engine. Hence they started to use the term to signify 'a depression in the bottom of the crankcase of an internal combustion engine'. Again the mapping and thereby the sense development seems primarily to be based on a functional similarity. However, similarity in appearance between two different artefacts used for collecting a dirty liquid from an engine also seems to have motivated the mappings.

The terms in the fourth group of words, that is, *dashboard* and *glove compartment*, were not applied to motor vehicles as a result of metaphorical or metonymic mappings. When people started to use *dashboard* to refer to 'a board in front of a vehicle' (*20th CW*) they did so because the function of the board was initially 'to stop mud [from] being splashed or (dashed) up from the [hoofs of the horse drawing the vehicle]'. When they started to use the term *glove compartment* to refer to a 'a small cupboard or shelf in the front of a car' (*CIDE*), they did so because the cupboard or shelf was used for storing gloves. Unlike the majority of the terms in this section, the reason for discussing *dashboard* and *glove compartment* is thus not that they were mapped from other domains onto our experiences of vehicles. What is interesting about these terms is that they are still in use even though the functions from which they got their names are today, if at all, only peripherally connected with the artefacts that the terms signify. They are thus two terms out of many that survive their original senses, as real world knowledge and conditions change[32]. According to *MWCD*, a glove compartment is today 'a small storage cabinet in the dashboard of an automobile' and in *CIDE* a glove compartment, or a glove box is 'a small cupboard or shelf in the front of a car that is used for storing small items such as maps'. As is reflected by these definitions, glove compartments may today be used to store a wide range of small items. *CIDE* mentions maps, and not gloves. Of the many different kinds of small items that may be stored in glove compartments today, gloves are no longer even the most likely to be found there. Nevertheless, the term has survived. People seem to have been able to handle it by focussing on the fact that glove compartments are used for storing small items, no matter what the small things are.

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[32] For example, an *atom*, is something quite different now from the original conception in ancient Greece.

In the case of the term *dashboard*, the modern use signifying 'the panel beneath a motor vehicle's windscreen on which electrical instruments and controls are mounted' (*OED*) has developed even further away from the initial sense of a dashboard used for protecting the vehicle from mud that is dashed up. Here the location of the dashboard in the front of the car is all that the different kinds of dashboards have in common. This sense development also involves demotivation of the original sense of *dash*.

6.2.4. Different traffic systems and the ways on which motorised vehicles are driven

Quite a few of the terms used to refer to the roads on which motorised vehicles are driven signify ways which existed long before the days of the motorised vehicle. A case in point is the term *road*, which, as implied by the name, was first used in the senses of '[t]he act of riding on horseback', 'a spell of riding', or a 'journey on horseback' (*OED*). "The meaning of an open way for traveling between two places is first recorded late in English, in Shakespeare's 1 Henry IV" (*Barn*.1988:932). This use seems to be the result of the metonymic mapping ACTION FOR LOCATION OF ACTION. Among many different senses, the term *road* is today used to refer to 'an open way for vehicles, persons, and animals; especially: one lying outside of an urban district' (*MWCD*).

Like the first roads, the first carriageways are also likely to have been used by horse-drawn carriages before motorised ones used them. As mentioned above, the first time the term *carriage* was used was not in connection with motor vehicles, but with vehicles drawn by other means. Today, *carriageway* is used in the senses of 'a road used by vehicular traffic (*MWCD*), or, in British English in the sense of 'one of the two halves of a motorway or other wide road which has two or more parallel divisions for keeping apart faster and slower cars travelling in the same direction' (*CIDE*).

Today the terms *highroad*, *highway*, and *superhighway*, are used to refer to roads that are used by motorised vehicles. *Highway* and *highroad* were, however, both in use before the 12th century (*MWCD*), that is, long before motor vehicles were invented. As early as 859, a *highway* was 'a public road open to all passengers, a high road; esp. a main or principal road forming the direct or ordinary route between one town or city and another, as distinguished from a local branch, or cross road, leading to smaller places off the main road or connecting two main roads' (*OED*). In *MWCD*, *highway* is defined as 'a public way; especially: a main direct road' and in *CIDE*, *highway* is said to be the

American and Australian term for 'a public road, esp. an important road that joins cities or towns together'. Similarly, a *high-road* is 'a chief or main road' (*OED*). The use of the term *high* to refer to important main roads is quite in line with the conventional conceptual metaphorical structures MORE (BIGGER) IS UP and BETTER/ MORE IMPORTANT IS UP.

Unlike highways and highroads, roads referred to as *superhighways* have been built as a direct result of the motorised age. Interestingly enough, in one of its senses the originally Latin prefix *super-* means 'over, above'. The use of the terms *super* and *high* to refer to 'a multi-lane road for high-speed traffic' (*20th CW*) is coherent with the above mappings. That is, if important roads are *highways*, then even bigger and more important roads, such as the ones with 'with two or more lanes parallel divisions in each direction' (*CIDE*), are higher than highways, that is, they are *superhighways*. The connection between *super* and 'over, above', however, seems to be indirect rather than originating from the mappings EVEN (BIGGER) IS FURTHER UP and EVEN BETTER/MORE IMPORTANT IS FURTHER UP. According to the *OED*, *superhighway* is formed after *superman*. As in quite a few other fairly recent formations, the prefix *super-* is here "used to designate a person, animal, or thing which markedly surpass all others, or the generality, of its class"[33].

In order to refer to the access road of a main road, *feeder road* was introduced in 1938 (*MWCD*). The application of this term to roads seems to be yet another result of mappings based on a functional similarity between source and target domain. In the same way as a *feeder* is 'a person who feeds or supplies food to (a person or animal)' (*OED*) or a 'stream which flows into another body of water', that is, a stream which feeds or supplies another body of water with water, a *feeder* is also a road feeding or supplying a major road with more traffic. For instance, in the *OED*, a *feeder* is 'a branch road, railway line, air service, etc., linking outlying districts with the main lines of communication' (*OED*). In the words of *MWCD*, it is 'a road that provides access to a major artery'. Directly or indirectly, the application of the term *feeder* to roads seems to be the result of mappings from the ANIMATE to the INANIMATE. In the mappings, PEOPLE correspond to BODIES OF WATER or LINES OF COMMUNICATION, and FOOD to BODIES OF WATER and VEHICLES. Interestingly enough, in the *OED* a *feeder road* is described as a **branch** road and in *MWCD* a main road to which a feeder road provides access is described as a major **artery**. Because feeder roads and

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[33] The first use of *superman* in English was in 1903 in George Bernard Shaw's *Man and Superman*. The term was borrowed into English "as a loan translation of German *Über-mensch*, literally, 'overman', coined by the German philosopher Nietzsche, in *Thus Spake Zarathustra*" (*Barn.*)

main roads are both parts of a whole system of roads, they seem to be best described by means of concepts that are part of other kinds of systems. As is evident from the use of the term *artery* to refer to a road, our circulatory system is one such system. The use of the term *branch* above indicates that a tree with its trunk and branches is another (see figure 10 below). As may be expected, as opposed to a *branch road*, a *trunk road* is 'an important road for travelling long distances at high speed, [---] suitable for large vehicles and a lot of traffic' (*CIDE*):

(136) Plans to upgrade the trunk road into a motorway have met considerable opposition. (*CIDE*)

In part, the use of *major artery* to refer to a main road seems to be based on the correspondences that we may find between the flow of blood from smaller arteries to major arteries, and the flow of traffic from smaller roads to major ones. In part, the structure of the entire circulatory system in all its complexity seems to explain why people have found it useful for the conceptualisation of a complex system of roads. As to the use of the terms *trunk* and *branch* to refer to different kinds of roads, it is probably based both on the familiar appearance, and thereby structure, of the whole tree and of the appearance of its different parts. By means of our experiences of trees, not only the size of different kinds of roads may be conceptualised in a very efficient way, but also the intrinsic relationship between the roads. As illustrated by figure 10 below, branch roads are smaller than trunk roads and they lead to and from the trunk road, which is located in between the branch roads.
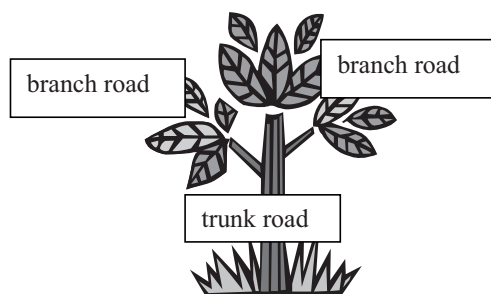
Figure 10. The use of a tree with its trunk and branches to conceptualise a system of roads.

Similarly, the uses of the terms *spaghetti*, or *spaghetti junction, clover-leaf, orbital road, ring road, beltway, traffic island* and *hard shoulder* to refer to concepts that are part of the domain of road technology seem to originate from mappings based on similarities in appearance between source and target domains. The term *spaghetti* was used in the sense of 'complex roadways forming a multi-level junction, especially on a motorway' (*20th CW*) in the 1960s. By contrast with the fairly orderly relationship between the different parts of a tree, boiled spaghetti on a plate or dish provide us with a pattern that is complex and messy enough to be used for structuring our experiences of the complex pattern of roads at different levels. In 1971, *spaghetti junction* was first used. This first application of the phrase was to "the Gravely Hill interchange near Birmingham" (*20th CW*). Today, a *spaghetti junction* is "any place where many roads cross in a complicated way" (*MWCD*). Another kind of 'system of intersecting roads from different levels' (*20th CW*) is the one referred to as a *clover-leaf*. According to *MWCD*, a *clover-leaf* is 'an interchange between two major highways that allows traffic to change from one to the other without requiring any left turns or crossings'. As implied by the name and illustrated by figure 11, a clover-leaf is a system of roads that from above resembles a four-leaf clover in shape (*MWCD, 20th CW*). Initially clover-leaves were built in the US and they "quickly became a signature of the new road systems being built in the US and Germany" (*20th CW*).
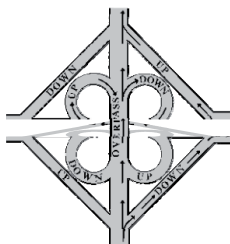
Figure 11. *Clover-leaf* in the sense of 'a system of roads that from above resembles a four-leaf clover in shape' (*MWCD; 20th CW*).

In order to refer to roads taking the traffic around towns or other urban areas, *orbital road, ring road,* and *beltway* are used[34]. In British English, an *orbital road* is '[a road] which takes traffic around a city rather than through it' (*CIDE*). In both British and Australian English, such a road, which 'goes around the edge of a town, allowing traffic to avoid the town centre', is also referred to as a *ring road* (*CIDE*). In both British and Australian English, there thus seems to be a

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[34] If not in my material, the expression *circular road* is also used in Britain. An example would be the *North* and *South Circular* around London.

tendency to conceptualise CIRCULAR ROADS SKIRTING URBAN AREAS by means of other CIRCULAR OBJECTS. In American English, 'a highway skirting an urban area' is a *beltway* (*MWCD*). Like the term *spaghetti junction*, *beltway* is particularly associated with a certain geographical area. According to *MWCD*, it is "often used to refer specifically to the beltway around Washington D.C. [---] delimiting what is seen as an insular political and social world".

> (137) **1973** *Times* 13 Aug. 10/7 The beltway built round Washington to relieve traffic jams was jammed with traffic. (*OED*)

> (138) **1986** *Observer* 14 Dec. 12/11 Two weeks ago Reagan was complaining that the whole affair was a 'Beltway' scandal, of interest only to people who live in the self-obsessed world inside Washington's ring road. (*OED*)

Here our experiences of 'a strip of flexible material worn especially around the waist' (*MWCD*) have been mapped onto our experiences of roads around urban areas. Primarily, it seems to be the function of the strip of flexible material going around the waist of a person located in the middle of our bodies that made it apt for conceptualising roads going around the centre of areas populated by people. However, the long and thin shape of a belt, which is reminiscent of the appearance of roads, may also have motivated the mapping.

In a way that is not too different from the use of *insular* to refer to the political and social world inside the beltway around Washington D.C. above, the term *traffic island*, or *island* for short, is used both in British and American English to signify 'a raised or marked area in a road to direct traffic and provide refuge for pedestrians crossing the road' (*OED*). As implied by *MWCD*, it seems to have been the isolated or surrounded position of 'a tract of land surrounded by water' that made people begin to use the term to signify an equally isolated and surrounded raised or marked area in a road. In English today, 'a superstructure on the deck of a ship (as an aircraft carrier)' and 'a kitchen counter that is approachable from all sides' are other kinds of ISOLATED AREAS, referred to as ISLANDS (*MWCD*). Similarly, ISOLATED GROUPS such as isolated ethnical groups ARE also ISLANDS (*MWCD*).

In order to refer to 'the hard area beside a main road, esp. a motorway, where a driver can stop if there is a serious problem' (*CIDE*), speakers of British English, except for the Irish[35], started to use the term *hard shoulder*. In American and Australian English the short form *shoulder* is used (*CIDE*). Thus they seem to have structured their experiences of roads by means of their experiences of

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[35] The Irish usually call a hard area beside a main road a *hard margin* (*CIDE*).

their own bodies. In the mapping underlying the use of the term to refer to the 'reinforced verge at the side of a motorway' (*20th CW*), the head of a human individual, which is considered one of the most important parts of our bodies, maps onto the main road. Below this "higher, more prominent, or more important part" (*CIDE*) of our bodies, our shoulders protrude. In the mapping, the shoulders correspond to 'the edge of [the] roadway'. In the same way as our shoulders are not exactly considered the centre of activity inside our bodies, a hard shoulder is specifically, 'the part of a roadway [that is] outside of the traveled way' (*CIDE*).

From the use of the terms *zebra* and *panda crossing* to signify different kinds of pedestrian crossings, it is evident that our experiences of animals have also helped us to structure our experiences of concepts connected with roads. According to *20th CW*, a *zebra crossing* is 'a pedestrian crossing marked by broad black and white stripes on the road and Belisha beacons on the kerb', and a *panda crossing* is 'a pedestrian road crossing in the UK with chevron-shaped road-markings, operated by traffic lights'. Here, however, the only feature that seems to have been mapped from the source domains of these animals onto the target domain of "various road-crossing configurations" (*20th CW*) is the fact that zebras and pandas are black-and-white.

Finally, the British use of the terms *fly-over* and *fly-under* to refer to 'a bridge that carries a road or railway over another road' (*CIDE*) and a 'line or road under another' (*OED*) respectively, is also metaphorical. Literally, roads cannot fly, neither over, nor under, anything else. However, by mapping experiences of things that can, for example birds or aeroplanes, onto experiences of roads and bridges, a road passing over another one may be conceptualised as a road flying over another one, and a road passing under another one as a road flying under another one. The applications of the terms may also originate from the idea that the traffic using the roads and bridges is as fast as things that fly, that is, the mapping of one kind of act onto another in combination with the LOCATION OF ACTION FOR ACTION metonymy. Most likely, the applications of the terms are the results of the mapping of experiences of aeroplanes that fly onto the traffic using the fly-overs and fly-unders. Aeroplanes were topics of much interest at the time when the terms were first used (see 3.4.3.3.). Considering that quite a few terms in this thesis are connected with a time when the technological domains from which they originate were considered particularly interesting (cf. 1.2.), the first uses of *fly-over* and *fly-under* are more likely to be connected with aeroplanes than with birds. Since at the beginning of the 20th century aeroplanes were modern, this connection also makes the roads and bridges referred to as *fly-overs* and *fly-unders* modern. A connection between the terms and high-speed

traffic also makes the artefacts more attractive. If the traffic using the roads and bridges is as fast as things that fly, *fly-overs* and *fly-unders* must be roads and bridges of very high quality.

6.3. The cognitive function of (motor) vehicles, parts of vehicles, movement by means of vehicles and roads and ways.

In the following sections, the use of motor vehicles, roads and ways as source domains or scaffoldings for conceptual structure is discussed. More specifically, the sections deal with figurative uses of terms originally signifying vehicles, the different parts of vehicles, movement by means of vehicles, and the roads and ways on which vehicles are driven to conceptualise different entities, characteristics and acts outside the world of technology. Mappings that are new to the inventions are discussed as well as mappings that may be re-experienced by means of the artefacts discussed here. Of the different groups of words investigated here, the largest one is the group originally signifying *roads* and *ways*.

6.3.1. (Motor) vehicles

Of the different terms originally signifying vehicles, *(omni)bus, bulldozer* and *limousine* are all used figuratively. *Omnibus* was used figuratively very early on. In fact, the first figurative instances of the term are from the times when omnibuses were still drawn by horses. In the *OED*, the very first instance of *omnibus* is from 1829. As accounted for in section 6.2.1., *omnibus* was then used to refer to '[a] four-wheeled horse-drawn public vehicle for carrying passengers [---] usually plying along a fixed route'. Two years later, it was used figuratively to refer to a reformation bill:

> (139) **1831** W.Irving in *Life & Lett.* (1864) II. 455 The great reform omnibus [the Reform Bill] moves but slowly. (*OED*)

Considering the date of this possibly first figurative instance of the term, it seems to originate from a period when omnibuses are likely to have been topics of much interest despite their being still drawn by horses. To some extent, this seems to explain the use of the term *omnibus* to refer to a reformation bill. More importantly, however, the use is in line with the conventional metaphorical mapping CHANGE IS MOTION, which is quite likely to be supported by various other scaffoldings. As is quite in line with the metaphor CHANGE IS MOTION, the

omnibus, which is a public vehicle built for motion from one place to another, is used to conceptualise a reformation bill written in order to bring about changes 'for all'. When the concept of 'omnibus' is mapped onto that of a reformation bill, the movement of the vehicle maps onto the changes that originate from the bill. As in the sentence above, changes of a reformation bill that are slowly enforced are conceived as an omnibus moving slowly. The various stops along the fixed route map onto the different items of the bill.

Buses are also involved in the figurative uses of the phrase *to miss the bus* in sentences (140) and (141) below. From the dates of the instances we learn that sentence (140) is connected with the experiences that people had of horse-drawn vehicles and sentence (141) with their experiences of motorised ones (see section 6.2.1.). Whether it is a horse that draws the vehicle or an engine is, however, not relevant for the mapping. In the sentences, *to miss the bus* is used in the sense 'to lose an opportunity; to fail in an undertaking'.

> (140) [**1886** J.MORLEY *Miscell.* III. 147 Though he [*sc.* Mark Pattison] appeared+ as much a Catholic at heart as Newman+it was probably his constitutional incapacity for heroic and decisive courses that made him, according to the Oxford legend, miss the omnibus.] (*OED*)

> (141) **1922** *Daily Mail* 28 Oct. 8/3 The Prime Minister has 'missed the 'bus' .+He has thrown away the greatest opportunity ever offered+to any statesman. (*OED*)

What is relevant here is that buses may take us to different places, and that they ply along fixed routes and pass different bus stops at different times. Since buses have the function of taking us to different places, and "achieving a goal often requires going to a destination" (Kövecses 2002:70), buses may be seen as a means for achieving what we want to achieve in line with the conventional conceptual metaphors PURPOSES ARE DESTINATIONS, and A PURPOSEFUL ACTIVITY IS A JOURNEY. Since the means for reaching our goals may be conceived as being on the bus, the missing of an opportunity to reach our goals may be conceived as missing the bus. From the sentences above, we may infer that those who have missed the bus are people who have had certain purposes to what they were doing. In both cases, the opportunities that the people once had were on the bus that they have just missed. For them, missing the bus means missing the chances that they once had of accomplishing what they had initially intended to do.

From the use of the term *bus*, or *bus-bar*, in sentence (142) below, we learn buses may be used to conceptualise different parts of a computer system. Here

the term *bus* is used to refer to 'a major path along which signals are transferred from one part of a computer system to another.'

>   (142) **1946** *Ann. Computation Lab. Harvard Univ.* I. 12 All units in the machine are connected to the central distribution buss over which numbers are transferred from one unit to another with the aid of timed electrical impulses. (*OED*)

More specifically, it seems to be the function of buses of taking people from one bus stop to another that is used to describe the function of a path in the computer system of transferring signals from one unit to another in an accurate way. The mapping is thus yet another example of a very pedagogical way of describing the function of an entity in a new invention by means of the function of an invention known to a very large number of people.

In section 6.2.1. above, we saw that the term *bulldozer* was initially said of a 'a strong-arm man who coerces people with threats of violence' (*20th CW*). As a result of a metaphorical mapping between PEOPLE and MACHINES it was then applied to caterpillar tractors. In sentences (143) - (146) below, the uses of the term are likely to be the result of mappings in the other direction, that is, from PEOPLE to MACHINES, and more specifically, from our experiences of bulldozers to our experiences of human beings:

>   (143) **1945** R.J.OAKES in *Coast to Coast 1944* 100 The fourth man was a gunner, a bulldozer of a man. (*OED*)

>   (144) **1952** *Sat. Rev.* 9 Aug. 12 The bulldozer determination with which he plowed through confused happenings. (*OED*)

>   (145) **1955** *Times* 21 June 9/4 Such spotters can+obtain 'bulldozer' rights for a patrol on a hot scent to pass through the areas of other units without being shot in error. (*OED*)

>   (146) **1959** *Times Lit. Suppl.* 20 Feb. 102/1 The bulldozer detective tactics of Inspector Evans. (*OED*)

Admittedly, without further context it is impossible to say exactly what kinds of experiences are behind the uses of the expressions *bulldozer of a man*, *bulldozer determination, bulldozer rights*, and *bulldozer detective tactics* in the sentences above. Indeed, the uses of *bulldozer* in these sentences may either be

due to the connection between the term and a 'strong-arm man who coerces people with threats of violence', or the use of the term in the sense of a 'caterpillar tractor'. However, according to the *OED*, the uses of *bulldozer* in the above sentences are figurative instances of the term in the sense of 'a caterpillar tractor'. Furthermore, the dates of the instances seem to imply that they are connected with the technological sense of the word. In the *OED*, the instances of *bulldozer* in the sense of a 'strong-arm man' are all from the latter part of the 19th century, and the instances of the term in the sense of a 'caterpillar tractor' from the period between 1930 and 1942. The figurative instances of the term in sentences (143) - (146) are from the period between 1945 and 1959. The view that the uses are connected with the world of technology is further substantiated by the precise way in which a vehicle, whose primary function is to level uneven surfaces and remove obstacles, may help us to describe the man, the determination, the rights and the detective tactics in the sentences above.

Finally, in the U.S. the phrase *limousine liberal* is used in the sense of 'a wealthy liberal' (*OED*).

> (147) **1969** *Times* 4 Nov. 10/5 The little man truly representing the ordinary people, hitting out strongly at Mr. Lindsay's 'limousine liberal' appeal. (*OED*)

> (148) **1970** *N.Y. Times* 26 Oct. 36 Canada is most fortunate to have a Premier who is willing to tell the bleeding hearts and limousine liberals what he thinks of them. (*OED*)

No doubt, the use of the phrase is based on our experiences of the vehicle referred to as *limousine*, or more precisely, the fact that a limousine is a luxurious vehicle. That being the case, only wealthy people can afford it. The use of the phrase in the sentences above thus seems to be structured by the metonymy VEHICLE FOR CHARACTERISTIC QUALITY OF THE OWNER OF THAT VEHICLE.

6.3.2 Parts of vehicles

From my material we also learn that motors and spare tyres are among the different parts of vehicles that are used as source domains in metaphorical mappings. Both *motor* and *spare tyre* are used figuratively.

From the figurative uses of the verb *motor*, and the noun *motormouth* we learn that our experiences of motors are used in order to conceptualise that someone is

doing something in a quick way. In sentence (149) the painters are painting the house in a quick way, and in sentences (150) and (151), people are talking quickly.

(149) It took a while for the painters to get started on our house, but now they're really motoring. (*CIDE*)

(150) She's a real motormouth. (*CIDE*)

(151) He's known as a motormouth disc jockey - he plays very little music and talks a lot. (*CIDE*)

However, our experiences of motors are of help not only when we want to conceptualise speedy acts. In the sentences above, there is a difference between what is communicated by means of the use of machines to describe the way in which people work, and the use of them to describe the way in which people talk. When used to describe people who are working, our experiences of machines help us to create a much more positive mental scene than when they are used to describe people who talk. In sentence (149) above, they indicate that in addition to being quick, the painters are efficient and have staying power. Here, not only the fact that the work is done in a quick way, but several other features associated with the capacity of running machines are part of the mapping. When used to describe people who are talking, the facts that motors have not got any feelings and are insensitive to people are highlighted. When an act that is normally characterised by interplay between different people is conceived as being run by a motor, this has serious consequences for the way in which the act is carried out. Not only will the person referred to talk in a quick way. Because motors are incapable of taking turns, and of being sensitive to people, the person will also be one who talks without considering what he or she is saying. In *MWCD*, the term *motormouth* is used in the sense of 'a person who talks excessively' and in *CIDE*, a *motormouth* is 'a person who talks quickly and continuously, often without considering what they are saying'.

By means of our experiences of spare tyres we both manage to describe the appearance of rolls of fat around our bodies and the fact that extra weight in the form of rolls of fat is superfluous. In *CIDE*, the term *spare tyre* (or American *spare tire*), is described in the following way: "If you've got a spare tyre (Am. spare tire), you have extra unwanted fat around your waist". The use of tyres to conceptualise rolls of fat is structured by the mappings PEOPLE ARE MACHINES, and BODY PARTS ARE AUTO PARTS. In a vehicle as well as on a body, spare tyres are soft, rounded parts that are for the most part superfluous. However, even

though the mapping seems to some extent to have been made in order to conceptualise the rolls of fat around our bodies as something superfluous, the fact that in a vehicle, but rarely on a body, spare tyres may at times be very useful, has not prevented us from making the mapping. Evidently, the highlighting of a certain feature does not necessarily imply that everything connected with this feature is mapped from source to target domain. In addition to having the cognitive ability to activate information, we seem to be equally skilled at suppressing it (see Harder 1999:217a, cf. Lakoff & Johnson 1980:10-13).

6.3.3. An act connected with the movement of a vehicle

Like the expressions discussed above, the phrase to *take someone for a ride* is also used figuratively. This phrase, which was initially used to refer to the act of riding horses (see section 6.2.2.) and then also to the act of riding a vehicle, and to the act of riding **in** a vehicle, is used in the figurative sense of 'to tease; to mislead deliberately, to hoax, to cheat' (*OED*):

> (152) **1929** J.P.McEvoy *Hollywood Girl* vii. 109 What was the name of that girl he was crazy about?+ Dugan. But Jack isn't bragging about it. She certainly took him for a ride. (*OED*)

> (153) **1973** 'D.Jordan' *Nile Green* ix. 43 She said, quickly, '+Are you an expert?'+I said, 'Not at all.+ You could take me for a ride any day you chose.' (*OED*)

As in sentences (154) and (155) below, the phrase is also used in the extended sense of 'to take a car journey with the intention of murdering or kidnapping' (*OED*):

> (154) **1929** *Sun* (Baltimore) 15 Mar. 2/6 Possibility that Joseph Drell, wealthy cigar store owner, may have been 'taken for a ride' by under world enemies, tonight was engaging the attention of detectives investigating his kidnapping.(*OED*)

> (155) **1931** F.L.Allen *Only Yesterday* x. 261 Another favourite method was to take the victim 'for a ride': in other words, to lure him into a supposedly friendly car, shoot him at leisure, [etc.]. (*OED*)

The distinction between *driving* a vehicle and *riding* in a vehicle accounted for in section 6.2.2. seems to be relevant for the mapping, that is, that the act of driving a vehicle is associated with control, and the act of riding in a vehicle, with lack of control. The driver of the vehicle has the power to decide where to go next and hence what to do next. All the person who merely takes a ride in the vehicle can do is to move along. The sense development may also be connected with conventional conceptual structures. Since ACTION IS MOTION (see e.g.

Kövecses 2002:159) and CHANGES ARE MOVEMENT (see e.g. Kövecses 2002:123), the driver of the vehicle controls not only MOTION, but also ACTION and CHANGES. Accordingly, the metaphor LACK OF CONTROL (OVER CHANGE) IS LACK OF CONTROL OVER MOVEMENT (see Kövecses 2002:136) explains why the person who merely takes a ride in the vehicle lacks control not only of the vehicle, but also of the coming course of events.

6.3.4. Roads and ways

In my material, the group of metaphorical and metonymic expressions including either one of the terms *road* and *way* is extremely large. Although not statistically tested, the significant number of expressions seems to point to the usefulness of roads and ways when it comes to defining and re-experiencing conceptual structures. The fact that the terms *road* and *way* are included in the expressions implies that roads and ways were somehow involved in the first figurative uses of the expressions. That being the case, it also seems to be possible for people to use experiences of roads and ways when making sense of the expressions.

According to Aitchison (1994:215), studies of how people cope with words with multiple meanings show that "when the same sequence of sounds has two meanings which fit equally well, people activate both and then select one, even if they are not aware of this process going on." What is more, experiments also suggest that "subjects briefly activate both meanings of a homonym, even in cases where one of them is inappropriate" (Aitchison 1994:215). The experiments substantiate the claim that people tend to connect figurative uses of *road* and *way* expressions with roads and ways in the sense of material courses[36],[37]. Since the difference between linguistic and extralinguistic

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[36] This is **not** to say that literal meaning is prior to figurative meaning. What I am claiming is that from the study of metaphorical expressions, we learn more not only about the way in which our conceptual system is structured, but also about what experiences may be used to help us structure our thoughts. The literal senses of terms that are included in figurative expressions give us clues as to what scaffoldings may be used in order to make sense of the expression.

[37] Interestingly enough, the dialectal uses of phrases such as *no road, some road or other* and *any road* in sentences like *They couldna get shet on 'em no road; They couldna get shet on 'em no road, I don't say Johnny would steal a horse.+ But he'd have one for me, some road or other, Anyroad, sir, to cut a long story brief, I gets down to the mill-'ouse.*(*OED*) further substantiate the claim that roads and ways may be connected with the figurative uses of expressions analysed here. The phrases are analogous with *no way, one way or other*, and *anyway* and indicate that even these so-called "dead" metaphorical expressions may occasionally be connected with roads and ways.

knowledge is "illusory" (Langacker 2002:35), the activation of the different senses of a word may, however, also include the activation of experiences connected with the different senses[38]. The use of roads and ways to re-experience the structure codified in a figurative expression including either one of these terms is thus also likely to include experiences associated with 'material courses'.

In the following, the relationship between roads and ways and figurative uses of road and way expressions will be studied. Roads and ways, however, have existed long before they could rightly be called technological artefacts. Since this is a study of the way in which experiences connected with the world of technology are used to structure our thoughts, it begins with an attempt to distinguish between figurative uses that are recent enough to originate from experiences from the world of technology, and the ones that originate from the times when roads and ways were nothing but beaten tracks. This distinction is necessary to make before establishing to what extent roads and ways that are the results of technological endeavour have helped us to structure our thoughts in new ways, and to what extent they help us to deal with mappings made a very long time ago.

For the purpose of distinguishing between the expressions, an attempt to date them has been made by consulting the *OED*. More specifically, the first figurative instances of the expressions analysed here have been found by means of searches through the entries of the main words of the expressions, and through searches of entries that are equal to whole phrases. Finally, the dates resulting from these searches have been compared with the ones resulting from searches through all the quotations in the dictionary. Occasionally, full text searches have been made. The first figurative instances of the expressions in the *OED* are collected in Tables 11-12 (Appendix 1).

From the earliest figurative instances of the expressions we learn what expressions were used figuratively before the days when the British had started to build roads and ways. The dates of these instances also give us an indication of what metaphorical and/or metonymic expressions were coined after the days when they had started to do so. However, since it is always possible for expressions to exist for some time in the language before they are recorded in the *OED*, this indication will be nothing but an approximate one. There is always the possibility that some of the expressions that seem to originate from the times when roads and ways had become technological artefacts are actually of an

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[38] In this thesis, Langacker's (1987:154-158) encyclopaedic view of meaning is adhered to.

earlier date. It must also be taken into consideration that even today, there are ways, like tracks and paths beaten by people and animals that exist independently of technological advances. Even if we can establish what expressions have been coined fairly recently, there may indeed be certain isolated expressions of more modern times that have been based on experiences of a rudimentary road or way.

Beginning with the sense developments of *road* and *way* accounted for in the *OED*, we see that despite the comparatively late dates of the first instances of *road* in the senses of 'an ordinary line of communication' and 'any way, path, or (material) course', both *way* and *road* were used to refer to lines of communication long before people in Britain had started to build roads and ways. In section 3.3.2., we saw that roads and ways in Britain could not rightly be called technological artefacts until the 18th century. It is true that before this century, people in Britain did occasionally clear roads and ways of brushwood and other kinds of obstacles. However, it was not until the 18th century that they actually started to build roads. From the *OED*, we learn that the first instance of *road* in the senses of 'an ordinary line of communication', and 'any way, path, or (material) course' are from 1596 and 1602 respectively. From the same source, we also learn that w*ay* was used to signify 'a main road connecting different parts of a country' and '[a] track prepared or available for travelling' even earlier. The first instance of *way* in the former sense is from the beginning of the 10th century. The first instance of the latter is from around 950. The first record of *way* in the sense of 'a path in a wood or through the fields' is from the 14th century. From the *OED,* it is also evident that in addition to these literal senses of the terms, a great number of figurative expressions including *way* had been used before the days when roads and ways were actually technological artefacts. In Table 11 (Appendix 1), the figurative expressions in my material that were in use before the turn of the 17th century are shown. For the sake of comparison, Table 11 also contains the first literal instances of a large number of the expressions. These are within brackets.

From the early dates of the figurative uses of *way, go out of your/the way, byway, two-way, pave the way, highway, out of harm's way, know which way to turn and give way* in Table 11, Appendix 1, it is evident that these were not based on experiences connected with technological artefacts. The phrase *pave the way*, however, seems to be an exception. Despite the fact that it was used before the days when 'road[s] connecting different parts of a country' were technological artefacts, the verb *pave* in itself signifies a technological action. According to the *OED*, to pave is '[t]o lay or cover with a pavement', that is, with 'a piece of paved work, a paved surface; the superficial covering or layer of a floor, yard,

street, road, or area, formed of stones, bricks, tiles, or, in later times, blocks of wood, fitted closely together, so as to give a compact and more or less uniform and smooth surface; also an undivided hard surface of cement, concrete, asphalt, or other material, used for the same purpose'. Presumably, the first metaphorical uses of the phrase were not based on experiences of ways in the sense of 'main road[s] connecting different parts of a country' but of paved ways within populated areas, that is, of paved streets, which were paved much earlier than the ones outside more densely populated areas. Sentence (156) below, seems to be the first instance of a paved street in the *OED*.

> (156) **1539** CROMWELL *Let.* 18 Oct. in Merriman *Life & Lett.* (1902) II. 237
> That you shuld cause the stretes and Lanes there to be vieued for the pavementes. (*OED*)

The very early date of the first figurative use of *way* also strikes one as odd. Strangely enough, it is of an even earlier date than any of the literal instances of the term. Since metaphorical mappings involve understanding abstract, or less delineated concepts, by means of concrete, or more delineated ones (see e.g. 2.1.4.), this figurative instance from 825 seems to imply that *way* in the sense of a 'road or other material course' was in use much earlier than around the beginning of the 10th century. Alternatively, considering the biblical context of the figurative use, it may be the result of a translation from Latin and thereby experiences made abroad of ways in the sense of 'a road or other material course'.

From Tables 12 and 14 (Appendix 1), it is evident that the only phrase including the term *road* that was used figuratively before the 18th century is *on the road*. It was used metonymically in the sense of 'travelling, journeying, upon or during a journey etc.' as early as 1642. None of the expressions *middle-of-the road, reach the end of the road, on the right road, get the/this show on the road, road trip,* and *down the road* seem to have been used figuratively before the turn of the 17th century. Since that date is used here as a rough dividing line between the times when British roads and ways were still nothing but beaten tracks, and the times when roads and ways were built by means of technological methods, these are expressions whose figurative uses are considered likely to be based on experiences from the world of technology. In that sense they are like the metaphorical and/or metonymic expressions including the term *way* in Table 13 (Appendix 1). From the dates of the first figurative instances of the phrases *lead the way, pay their way, give way to/make way for, one-way, go a long way (towards), go one's own (sweet) way, show the way, see your way clear to, point*

the way, to go all the way, the whole way, come a long way, along the way, superhighway, the Third Way, way-out, all the way, down our way we learn that they may have been based on experiences gained by means of travel on more modern roads.

Expressions with no figurative instances in the *OED* are shown in Table 15 (Appendix 1).

Interestingly enough, the analysis of the metaphorical and/or metonymic expressions in the material shows that all the expressions in Tables 11-15 are structured by mappings that are coherent with one another. No matter if they have been coined at different times, even in different centuries, they are all structured by the metaphor ACTION IS MOTION and ultimately by our habit of using spatial relationships to structure our thoughts. That is, in being structured by the ACTION IS MOTION metaphor, all the expressions in Tables 11-15 (Appendix 1) are ultimately structured by the spatial relationship of a path, line or course going from one place to another. On this line, course or path, ACTION IS FORWARD MOVEMENT from one point to another. Consequently, the majority of the expressions in the tables are also structured by one or more of the conventional and frequently used metaphorical mappings LIFE IS A JOURNEY, A (PURPOSEFUL) ACTIVITY IS A JOURNEY and A RELATIONSHIP IS A JOURNEY. In addition, quite a few of them are structured by the metaphor PURPOSES ARE DESTINATIONS.

Naturally, not only roads and ways may be used to structure and re-experience conventional mappings like these. Various scaffoldings based on our experiences of ourselves and the things around us are used to support the mappings. Hence paths (see sentence 158), courses, and lines may also be used, along with artefacts such as bridges and ladders (see sentences (158) and (159) below):

(157) It's an arduous **path**, but he'll make it. (*CMHP*, my emphasis)

(158) She'll **cross that bridge** when she **comes to it**. (*CMHP*, my emphasis)

(159) He's **half-way up the** corporate **ladder**. (*CMHP*, my emphasis)

From the following sentences from the *CMHP*, it is evident that our experiences of actions such as flying in the air, drifting or sailing through the water, or of bees flying from one place to another, are also used for this purpose.

(160) He **flew** through his work. (*CMHP*, my emphasis)

(161) He is a **drifter with no direction**. (*CMHP*, my emphasis)

(162) It is smooth **sailing from here** on in in [*sic*] the application process. (*CMHP*, my emphasis)

(163) She made a **beeline** for the presidency. (*CMHP*, my emphasis)

Roads and ways are thus only one kind of artefact out of many that may help us to structure our thoughts in line with the above conceptual structures. However, since roads and ways are built for movement, they are extremely useful in such processes.

Sections 6.3.4.1. - 6.3.4.2. below deal with the way in which the structure provided by road systems, and people and vehicles travelling on them, may be used to structure and re-experience conceptual mappings. It should be noted that the overall aim in these sections is to see what possibilities to do so these scaffoldings offer and not to find out whether our experiences of roads and ways are actually used. In order to be able to say whether experiences of roads and ways are used or not, some kind of sophisticated psychological test is needed. Such a test is not within the scope of this thesis. All that is evident from language data is that the large number of figurative *road* and *way* expressions are structured in a coherent way. This in turn seems to indicate that the expressions are of the same origin, that is, initially based on our experiences of roads and ways, and may be re-experienced by means of them. The finding that the sentences are structured in a coherent way is important, because it substantiates the view that it is possible to use experiences connected with today's highly technological roads and ways to handle expressions coined at a time when roads and ways were nothing but beaten tracks. Hence it provides us with a reason why a large number of *road*- and *way* expressions coined very early on still survive in the language.

Having claimed that all the expressions in Tables 11-15 are structured by mappings that are coherent with one another, I go on to deal with the coherence between the mappings and their relationship to the experiential bases provided by roads and ways in section 6.3.4.1. Since figurative expressions coined very early on and figurative expressions of more modern times are structured in a coherent way, there is no need to discuss them separately. Unlike the steam engine and electricity, today's roads and ways are not important cognitive tools because they provide us with new ways of structuring our thoughts, but because they allow us to continue along already beaten tracks. In other words, their importance as scaffoldings for conceptual structure is primarily related to the fact that they allow us to make sense of and re-experience mappings codified in expressions coined at a time when roads and ways were nothing but rudimentary material

courses. To some extent it is also related to the fact that roads and ways allow us to elaborate mappings made a very long time ago. In section 6.3.4.2. the way in which modern road technology has helped us to elaborate the mappings discussed in section 6.3.4.1. will be dealt with. Section 6.3.4.1. may thus also be seen as a background to section 6.3.4.2.

Since the focus in section 6.3.4.1. is on the similarities between metaphorical and/or metonymic expressions coined at very different times, it discusses structures that may be re-experienced by means of roads and ways in general, that is, by means of roads and ways ranging from rudimentary ones to highly technological ones. If people today structure their thoughts by means of their experiences of roads and ways, however, we would have to assume that modern roads are involved rather than beaten tracks. The way in which we structure our thoughts is based on our experiences of ourselves and of the world around us (see e.g. 2.1.5.5.). In the Western World today, roads and ways that are the results of technological endeavour are found practically everywhere around populated areas and hence a well-established part of our common ground knowledge. No matter if the expressions analysed here originate from experiences of rudimentary roads and ways, or of technological ones, today's uses of the expressions are likely to be connected with technological roads and ways rather than with rudimentary ones.

6.3.4.1. Roads and ways in general

As may be expected, considering that roads and ways are built in order to serve a certain function, the choice of roads and ways as scaffoldings for conceptual structure is yet another example of our tendency to "see […] things from a functional point of view" (Kövecses & Radden 1998:65, cf. sections 4.3.4, 5.4. and 6.2.2.). It is primarily their function that explains their aptitude as scaffoldings for conceptual structures. Since the use of roads and ways as scaffoldings for conceptual structure is intimately connected with their function, it is also intimately connected with the movement of people and vehicles that takes place on them. Of all the experiences that we may have of roads and ways, our experiences of them as artefacts that may take us from one place to another (figure 12 below) are behind the figurative uses of the expressions analysed here[39]. When we see a road or way we see a line, course or path that goes from

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[39] It should be noted that in this thesis the expression *experiences of roads* refers to these kinds of experiences and not the ones connected with the physical characteristics of roads and ways.

one place to another, from A to B. Roads and ways are also connected with the fact that they are built for movement from A to B. Movement from A to B, however, necessitates action. Since action is a prerequisite for motion, taking to the road means beginning to do something, forward motions means action, and coming to the end of the road means coming to the end of an action. If our movement from A to B, and hence our actions on the road, are purposeful, forward motion along the road means progress towards a goal, and coming to the end of the road means reaching our goal.
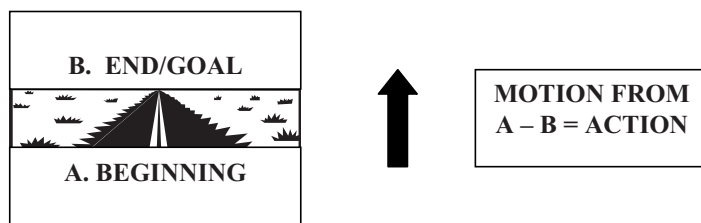
Figure 12. The function of roads and ways.

In addition to making roads and ways apt scaffoldings for conceptual structures like the ones discussed in 6.3.4. above, the close connection between the figurative uses of the expressions and the function of roads and ways, also seems to explain why all the expressions are structured in a coherent way. The connection may also be part of the reason why people surrounded by today's roads and ways have no problems using expressions coined by people who were only familiar with roads and ways in the sense of beaten tracks. As is evident from table 11 and 12 (Appendix 1), a number of expressions coined very early on still survive in the language. Since they are still in use, it seems to be fairly easy for people today to use and understand them. One way to explain why they still survive is that they are structured by conventional, conceptual mappings. Another is that it is possible for people today to use their experiences of modern roads and ways to make sense of, and re-experience mappings codified in the expressions. Unlike the physical characteristics of the 'material courses' referred to as *roads* or *ways*, their function has stayed the same ever since *road* and *way* were first used in this sense. Hence so has the way in which we structure our thoughts by means of roads and ways.

As implied by the fact that our experiences of roads and ways along with people and vehicles travelling on them are used to re-experience the conceptual structures discussed in 6.3.4, we tend to use our experiences of travelling on

roads and ways to conceptualise our lives, the things we do in our lives, and the relationships we have with other people.

In sentence (164) below, the act of taking to the road conceptualises the beginning of an activity in line with the mapping TO START DOING SOMETHING IS TO TAKE TO THE ROAD[40].

> (164) Come on, let's get the/this show on the road (=begin what we have planned) or we'll be late. (*CIDE*)

The expression seems to originate from a mapping that may be seen as a special case of the conventional metaphorical mapping AN ACTIVITY IS A JOURNEY. To some extent, it seems to be motivated by the fact that taking to the road, as opposed to staying where we are, may be seen as an activity that necessitates ACTION. While staying where we are gives us the possibility of doing nothing, taking to the road is normally not possible unless the person doing so engages in a host of activities. Typically, people who travel on the road will have to act in order to move from one spot to another. They will have to orientate themselves, pay attention to fellow road-users, and plan where they will be going, or what they will be doing next. Moreover, because there is a close relationship between travelling and adventure, there is also a close relationship between travelling and experiencing more, and activating one's senses more. Journeys, which are symbolised here by a road, thus also tend to imply that we are more mentally active than if we had been staying still. The mappings above, however, also seem to be motivated by the fact that taking to the road, as opposed to staying where we are, is an act that involves movement from one place to another, that is, progress along a line or path from A to B. Since roads and ways have been built for taking us from one place to another, they may be used to represent 'movement from one place to another', or 'direction of movement' in line with the metonymy LOCATION OF ACTION FOR ACTION, or more specifically, LOCATION OF MOVEMENT FROM ONE PLACE TO ANOTHER, FOR MOVEMENT FROM ONE PLACE TO ANOTHER. Since ACTION IS MOTION (see Kövecses 2002:159), and roads and ways represent 'motion' metonymically, they

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[40] The use of the now "dead" metaphorical expression *under way* in sentences like *The film festival gets under way (=begins) on 11th July* (*CIDE*, my italics) may seem to originate from experiences of roads and ways too. *Under way*, however, was originally a nautical phrase used of a vessel that had begun to move through the water (*OED*). Even though it is structured by the analogous mapping TO START DOING SOMETHING IS TO GET UNDER WAY, which may also be seen as a special case of the metaphor AN ACTIVITY IS A JOURNEY, the way in question here is not a material artefact but a way through the water.

may be used to symbolise action. In the following, the connection between roads/ways and action structured by the above mappings will simply be referred to as the connection between roads and ways and action.

The close connection between roads and ways and both MOVEMENT and ACTION explains why roads and ways are extremely useful whenever we want to re-experience the conventional metaphor ACTION IS MOTION. In fact, since they are not only associated with ACTION, but prototypically, ACTION ON ROADS OR WAYS IS FORWARD MOTION, they may be used as scaffoldings for the entire mapping ACTION IS MOTION.

Possibly, the large number of figurative expressions including either one of the terms *road* and *way* is due to the fact that they are scaffoldings for the entire metaphor. The mapping ACTION IS MOTION seems to be extremely important to the way in which we structure our thoughts. All the expressions that are structured by the metaphor LIFE IS A JOURNEY also seem to be structured by this more general mapping. Presumably, our tendency to structure LIFE, THE THINGS WE DO IN OUR LIVES, or OUR RELATIONSHIPS as JOURNEYS comes precisely from this mapping. In turn, this very general metaphor seems to originate from our even more general tendency to use spatial relationships to structure our thoughts (Lakoff & Johnson 1980:14-21, Lakoff 1993:228, and Pütz & Dirven 1996)[41], in this case a spatial relationship going from one point to another, from A to B.

Naturally, in addition to experiences that may be gained by means of roads and ways, a great number of other experiences may help us to structure our lives in this way. At an early phase in our lives we learn to associate ACTION with MOTION and BEING AT REST with REMAINING WHERE WE ARE. As soon as a small child has learnt to crawl, ACTION for him or her tends to include MOVEMENT FROM ONE LOCATION TO ANOTHER. For adults too, ACTION is prototypically associated with MOTION. No matter if there are exceptions to the rule in the form of activities that may be carried out on one and the same spot, people lying in bed, or sitting on a chair are typically less physically active than people who are moving from one location to another, for example, out walking, running or cycling. However, as mentioned above, roads and ways are extremely useful because they may be used as scaffoldings for the entire structure. Their usefulness does not diminish because they are often used by motor vehicles whose function of taking us from one place to another coincides with that of roads and ways. When motor vehicles are part of the mapping, the connection between STANDING STILL and INACTIVITY, and MOVEMENT FROM ONE

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[41] Cf. Lyons 1979:111-141.

LOCATION TO ANOTHER and ACTION, is particularly evident. If people who are inactive tend to be still, this is even truer of motor vehicles. Since motorcars have also been built for taking people and things from one location to another, action for a motorcar typically means movement. Accordingly, inactivity means standing still. In sentence (165) below, the former location of the car in the garage, where motion is not possible, is definitely connected with inactivity. In this sentence, *in the garage* implies 'out of order', and hence 'immobility'.

> (165) My car was in the garage for a week, but it's now back on the road (=working again). (*CIDE*)

Accordingly, the fact that the car in is now once again located on a road that is built for movement from one place to another conceptualises that the car is running again. From our experiences of vehicles and the roads and ways on which they are driven, we thus learn that TO FUNCTION IS TO (BE ABLE TO) MOVE FORWARD. Since this can be done on the road, the ROAD may be used FOR the ACTION that takes place on it, or for the action that may take place on it. In other words, like the rest of the sentences discussed here, sentence (165) is also structured by the LOCATION OF ACTION FOR ACTION metonymy, or the LOCATION THAT ALLOWS ACTION FOR ACTION metonymy. Sentences (164), and (165) above thus substantiate the claim that roads are both intimately connected with action and, as a result of different conceptual mappings, used to symbolise it. From these expressions we learn that TO BEGIN TO DO SOMETHING IS TO TAKE TO THE ROAD, and TO BE DOING SOMETHING IS TO BE ON THE ROAD.

In sentence (166) below, the road is intimately connected with the kind of action that is normally carried out on a road.

> (166) After two days on the road (=driving for two days), they reached the coast. (*CIDE*)

Here, being on the road means 'driving'. Again, the relationship between the road and the action it symbolises is metonymic. Both the more general metonymic mapping LOCATION OF ACTION FOR ACTION and the more specific ROAD FOR ACTION metonymy structure the use of the phrase. Again, the function of the object involved is important for the mapping. Since roads are built for being driven on, they become apt symbols for this kind of action, and are used to represent it metonymically. However, roads are connected not only with the kinds of acts that normally take place on them, they may also be connected with the kinds of acts, or the kinds of events, that people travelling on the road are

involved in at different destinations along the road. We can infer that the term *road* in sentence (167) below is both connected with an act that normally takes place on a road, or for which roads are built, and with the acts that travelling rock groups carry out when they come to the locations of their performances.

> (167) Most rock groups spend two or three months a year on the road (=travelling to different places to perform). (*CIDE*)

Similarly, according to *CIDE*, the term *road,* in one of its senses, signifies "a series of scheduled visits or appearances (such as games or performances) in several locations or [it signifies] the travel necessary to make these visits. The term *road trip* is described in the following way:

> If someone, esp. a sports team, takes a road trip, they travel to other places to play games against other teams or for business reasons. (*CIDE*)

The following examples are given:

> (168) Baltimore won seven of the nine games they played on this three-city road trip. (*CIDE*)
>
> (169) George is on an extensive road trip for his company, covering eight cities in three states. (*CIDE*)

In sentence (168), the *Baltimore* team does not play games when they are on the road, but when they come to different destinations along the road. In sentence (169), the person named *George* is not merely travelling on the road for his company, he is travelling on the road to get to different destinations where he can work for his company. Like sentence (166) above, sentences (167), (168) and (169) are metonymic. In these sentences, the ROAD LEADING TO DIFFERENT DESTINATIONS is used FOR the DESTINATIONS (along the road), and in turn, the DESTINATIONS along the road, FOR the ACTION that is carried out on these locations.

Returning to sentence (165) above, however, the action that the people referred to as *we* intend to begin will not necessarily take place on a road or in connection with road-trips. The same is true of the actions in sentences (170) - (172) below.

> (170) If you want to take it up with the boss, I'll support you all the way. (*CIDE*)
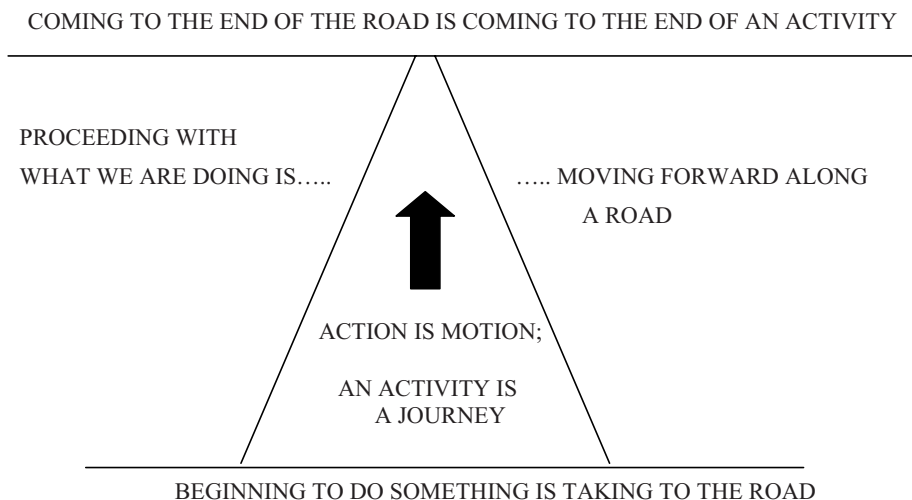
(171) I agree with you all the way, but I still don't think you'll change anything by protesting. (*CIDE*)

(172) My friends said they would be behind me (all the way) if I applied for the course. (*CIDE*)

From *CIDE* we learn that "[i]f you are behind someone (all the way) you support them (completely) in what they intend to do". Even though the actions referred to in sentences (170) - (172) are not really connected with trips on roads, and the people uttering them do not necessarily think of ways in the sense of 'material courses' when doing so, the use of the phrase *all the way* in this sense is likely to originate from the close connection between roads and ways and action. Presumably, the close connection between roads, ways, and the like, and the kind of action that normally either takes place on roads, or in connection with road-trips, has paved the way for the use of different kinds of roads to symbolise practically any kind of ongoing action. In sentences (170) - (172), the phrase *all the way* is used to indicate that someone will support a person completely in his or her act of taking something up with a boss, that someone completely agrees with someone who is protesting, and that some friends will support a person completely in his or her act of applying for a course. Again we are dealing with sentences structured by the metaphorical mappings AN ACTIVITY IS A JOURNEY and ACTION IS MOTION. However, from the ideas that ACTION IS ON THE ROAD and BEGINNING TO DO SOMETHING IS TAKING TO THE ROAD, it also naturally follows that MOVING FORWARD ALONG A ROAD means PROCEEDING WITH WHAT WE ARE DOING. Hence THE END OF AN ACTION IS THE END OF A ROAD and COMING TO THE END OF AN ACTIVITY IS COMING TO THE END OF THE ROAD (see figure 13 below)[42]. This entailment seems to explain why the phrase also implies 'completeness' in what we are doing. That is, if COMING TO THE END OF THE ROAD means COMING TO THE END OF AN ACTIVITY then *supporting someone all the way* means 'supporting someone's actions as long as they are doing something'. Hence the phrase may be used in the sense of 'supporting someone completely in what they are doing'.

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[42] The connection between the end of an action and the end of an extended locative landmark can also be found in Ungerer & Schmid (1996:169) and their analysis of the sentence *The match is over*. They argue that the sentence is based on a mapping from SPACE onto TIME and that the event category MATCH is understood as an extended locative landmark. "The more specific underlying metaphor therefore is +AN EVENT IS AN AREA+ and the general picture is that we travel along a path through a game just as we may travel over a field or over bridge. In terms of the schema of – OVER–, the persons travelling are the trajectory (which is not expressed on the linguistic surface of this expression) and the game functions as a metaphorical landmark. When the travellers reach the boundaries of the landmark, the field and the event are over".

COMING TO THE END OF THE ROAD IS COMING TO THE END OF AN ACTIVITY

PROCEEDING WITH
WHAT WE ARE DOING IS…..   ….. MOVING FORWARD ALONG
                                                            A ROAD

ACTION IS MOTION;

AN ACTIVITY IS
A JOURNEY

BEGINNING TO DO SOMETHING IS TAKING TO THE ROAD

Figure 13. The structure of metaphorical expressions involving either of the terms *road* and *way*.

In sentences (173) and (174) below, the connection between THE END OF THE ROAD and THE END OF AN ACTION displays itself in the use of *the end of the road* to symbolise 'the end of someone's negotiations' and 'the end of a relationship' respectively.

(173) There is no point continuing with these negotiations as they have clearly reached the end of the road (=cannot continue). (*CIDE*)

(174) My relationship with Jeannie has come to the end of the road (= 'finished'). (*CIDE*)

THE END OF THE ROAD, however, does not only symbolise THE END OF AN ACTIVITY. Because activities are often carried out for some purpose, or in order to achieve something, THE END OF THE ROAD, which we are moving towards when we are acting, is also frequently used to symbolise the GOAL of our actions. In sentence (175) below, where the phrase *on the road to* indicates that a woman's health is improving, the goal at the end of the road is the woman's recovery.

(175) The doctors say she's on the road to (=likely to achieve) recovery. (*CIDE*)[43]

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[43] Cf. the sentence *Economic recovery is already under way*. (*CIDE*, my italics) indicating progress.

It is evident that artefacts like roads, ways and the like are apt scaffoldings for a large number of conceptual metaphorical and metonymic structures. The study of the way in which, along with the people and things travelling on them, they are used to structure action, seems to illustrate a close relationship between a great number of coherent conventional conceptual structures. Above, it was argued that expressions originally signifying roads and ways are all structured by the conventional and frequently used metaphorical mapping LIFE IS A JOURNEY, or by any of the special cases of the mapping. Thereby, they are also structured by the more general mapping ACTION IS MOTION. It was also argued that expressions that are structured by the ROAD FOR ACTION metonymy are also structured by the more general LOCATION OF AN ACTION FOR ACTION metonymy. In addition, complex systems consisting of roads, ways, and people and goods travelling on them illustrate spatial relationships that are useful when it comes to structuring conceptual mappings such as PURPOSES ARE DESTINATIONS and REACHING A GOAL IS COMING TO THE END OF THE ROAD. The use of roads, ways and the like to symbolise action, and the act of taking to the road to symbolise the beginning of an activity, also imply that MOVING FORWARD ALONG A ROAD means PROCEEDING WITH WHAT WE ARE DOING. If an act is carried out in order to achieve something, and proceeding with this act, at least in ideal cases, means making progress. Thereby, MOVING FORWARD ALONG A ROAD also means MAKING PROGRESS. The idea discussed above that COMING TO THE END OF THE ROAD means REACHING A GOAL seems to be a result of the same kind of conclusions. Since ACTION IS FORWARD MOTION on roads and ways, the distance covered along a way, or the distance that will be covered, may be used as an indicator of how much people or things have advanced, or will advance (see sentences (176) – (179) below). The further we move along the way, the more successful and the closer to our goal we will be.

> (176) Information technology has come a long way (=developed or improved a lot) in the last twenty years. (*CIDE*)
>
> (177) She is very intelligent and works hard, she'll go a long way (=be successful). (*CIDE*)
>
> (178) The money the charity has received will go a long way towards (=be very helpful) providing essential food and medicine. (*CIDE*)
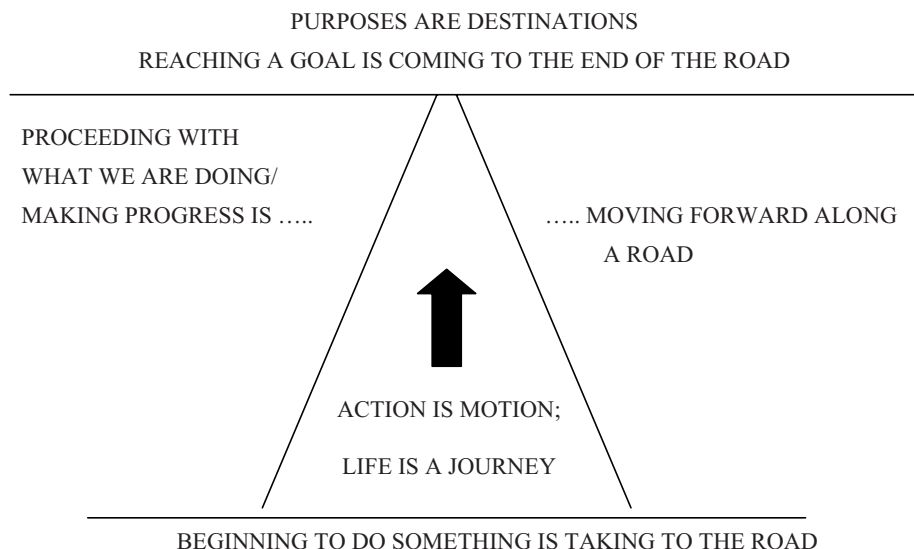>
> (179) He has got a long way to go (=a lot of work to do or improvements to make) before he can present the scheme to the public. (*CIDE*)

As in sentence (180) below, those who have been most successful are those who have covered the longest distance along the way.

(180) The company has been leading the way in (=been the first to produce) net-
work applications for several years. (*CIDE*)

Similarly, as in the use of the phrase *go all the way* in the sense of "having
sex, esp. after a period in which there has only been kissing and touching"
(*CIDE*), the ones who have gone the whole way have finally reached their goal:

PURPOSES ARE DESTINATIONS

REACHING A GOAL IS COMING TO THE END OF THE ROAD

PROCEEDING WITH
WHAT WE ARE DOING/
MAKING PROGRESS IS ….. ….. MOVING FORWARD ALONG
A ROAD

ACTION IS MOTION;

LIFE IS A JOURNEY

BEGINNING TO DO SOMETHING IS TAKING TO THE ROAD

Figure 14. Purposeful activities conceptualised by means of *roads* and *ways*.

As is evident from the above uses of our experiences of movement on roads
and ways to re-experience conventional conceptual structures, the conceptual
metaphorical mapping COMING TO THE END OF THE ROAD IS REACHING A
GOAL, and thereby the more general metaphors LIFE/AN ACTIVITY IS A JOURNEY
and ACTION IS MOTION, are thus also related to the conceptual metaphorical
structure PURPOSES ARE DESTINATIONS. If activities are carried out for some
purpose, and moving forward along a road means proceeding with what we are
doing, then the end of the road is not only the goal of our actions but also the
destination of our purposes. In Kövecses' view, "the class of events that we call
"reaching destinations" (which is grounded in correlations in human experience
like the ones below), is much broader than, and thus includes more, than just
journeys" (Kövecses 2002:70-71).

> [The PURPOSES ARE DESTINATIONS metaphor is [---] grounded in correlations
> in human experience. If we want to do something, we often have to go to a
> particular place to do that thing. For example, if we want to drink beer, we either

have to go to the store to buy beer or to a bar to have one there. That is, achieving a goal often requires going to a destination. This recurrent experience (of achieving goals by going to destinations) provides a strong experiential basis for the PURPOSES ARE DESTINATIONS metaphor. (Kövecses 2002:70)

Because of the broadness of the class of events called "reaching destinations" and because "we typically have certain goals in life" and a life with a goal and or a purposeful life is a special case of having purposes in general", Kövecses (2002:71) claims, "we can take the specific LIFE IS A JOURNEY metaphor to be a special case of the more general PURPOSES ARE DESTINATIONS metaphor." The present study seems to substantiate his claim. Not only are the expressions discussed in this section all structured by the metaphorical mapping LIFE or AN ACTIVITY IS A JOURNEY, but whenever we use our experiences of roads, ways, and the like to conceptualise goal-directed action, we also structure our experiences in line with the conventional metaphorical mapping PURPOSES ARE DESTINATIONS. Indeed, when conceptualising goal-directed action "the experiential basis that applies to the general case will also apply to the specific one" (Kövecses 2002:71). However, since there is not always a purpose to our lives and to the things that we do, the metaphor PURPOSES ARE DESTINATIONS does not always interact with the LIFE IS A JOURNEY metaphor. In the light of the relationship between the metaphors LIFE IS A JOURNEY and ACTION IS MOTION discussed above, it is more likely that both the metaphors LIFE IS A JOURNEY and PURPOSES ARE DESTINATIONS originate from this even more general mapping. In turn, this very general mapping seems to originate from our tendency to use spatial relationships to structure our language and our thoughts (cf. 6.3.4.).

Returning to the way in which roads and ways, or more specifically the function that they have, may be used to structure mappings like these, they are useful scaffoldings for a very large system of conceptual metaphors which are all based on the connection between ROADS AND WAYS and ACTION. They are all coherent with the ACTION IS MOTION metaphor.

In addition to the conceptualisations and relationships discussed above, our experiences of movement on roads and ways, represented metonymically by roads and ways, are also useful for conceptualising 'possibilities of doing something'. An example of the connection between roads, ways and the like and 'possibilities' would be the use of the phrase *Where there's a will there's a way* to communicate that "if you are determined enough, you can find a way to achieve what you want, even if it is very difficult"(*CIDE*). Again, it is the function of roads and ways of taking us from one place to another that makes them useful scaffoldings for conceptual structure. That being the case, they may be associated with a direction of movement, and hence provide us with new

referents for this concept. The connection is structured by mappings such as REACHING A GOAL IS COMING TO THE END OF THE ROAD and PURPOSES ARE DESTINATIONS. The use of roads and ways to symbolise not only 'action' but also 'possibilities of doing something' is connected with the metaphorical mappings REACHING A GOAL IS COMING TO THE END OF THE ROAD and PURPOSES ARE DESTINATIONS. In sentence (182) below, roads, ways and the like are connected with the specific kind of goal-directed ACTION that is structured by these mappings, that is, ACTION THAT HAS THE PROPENSITY OF TAKING PEOPLE OUT OF DIFFICULTIES. In this sentence, a girl or woman is in a state owing to the death of her parents and needs to do something in order to change matters.

(181) When both her parents died, she didn't know which way to turn. (*CIDE*)

For her, finding a way means learning what to do in order to get out of a difficult situation. Like sentences such as *We're **in** this thing together*, *We're **in** a mess*, and *We're **in** a lot of trouble now* (*CMHP,* my emphasis*)* the sentence is based on the idea that DIFFICULTIES ARE CONTAINERS, which is also intimately connected with the ACTION IS MOTION metaphor. Because ACTION IS MOTION, and action is generally needed in order to change matters, motion from one place to another is needed in order to get the ones who are **in** difficulties **out of** their trouble. Roads and ways, which are built for movement from one place to another are excellent means for taking people **out of** the state they are **in**.:
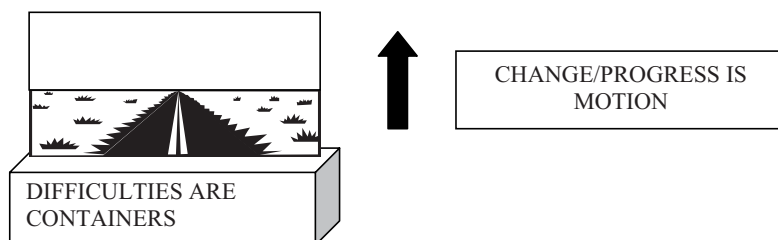
Figure 15. The use of roads and ways to symbolise possibilities.

In that sense, sentence (181) is structured by mappings coherent with the metaphor PROGRESS IS FORWARD MOVEMENT structuring sentences (175 - (180) above (see also *CMHP*). While being trapped inside a container makes it impossible to fulfil a PURPOSE by REACHING A DESTINATION, to REACH A GOAL by COMING TO THE END OF THE ROAD, or to MAKE PROGRESS by MOVING

FORWARD etc., FINDING A WAY (out of the container) means being able to take oneself out of trouble by BEING ABLE TO MOVE.

Similarly, PROBLEMS may be conceptualised as OBSTACLES IN A PERSON'S WAY. In standing in a person's way (see sentence (182) below), OBSTACLES ON THE ROAD may block our chances of moving forward along it. Hence they conceptualise 'problems that prevent us from acting and from reaching the destination of our purposes'.

(182) There's no way round (=solution to) this problem. (*CIDE*)

The use of the phrase *in one's road* below in the sense of 'in one's way, so as to cause obstruction or inconvenience' seems to be structured in the same way:

(183) **1854** A.E.BAKER *Northampt. Gloss.* s.v., 'You're quite in one's road' is a phrase often addressed to a person who, by over-officiousness, retards instead of assists. (*OED*)

One way to see to it that we will reach our goals, or that other people will reach theirs, is to make sure that the way is free from obstacles by for example, *paving* it.

(184) Scientists hope that data from the probe will pave the way for a more de tailed exploration of Mars. [44] (*CIDE*)

Not all actions, however, have the good result we initially aimed at. As implied by the saying *The road to hell is paved with good intentions*, meaning 'that you must not simply intend to behave well but you must act according to your intentions, because you will have problems or be punished if you do not' (*CIDE*), they are sometimes not even carried out for some good reason or in order to achieve something good. As is understood from sentences (185) - (186) below, we seem to have solved the problem of conceptualising actions with

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[44] The use of *pave the way* in this sentence is very similar to the use of *clear the way* in the sentences *Could you see your way (clear) to letting us* (=consider agreeing to allow us to) *borrow the machine on Wednesday*? (*CIDE,* my italics) and *We've got a loan from the bank and that's cleared the way (=made it possible) for us to buy a house* (*CIDE,* my italics). From the first instance of c*lear the way* in the *OED,* however, we learn that this was originally a nautical term (cf. phrases such as *to **clear** the cost, **clear** a way,* and **clear** *the decks*). Even though people who use the phrase *clear the way* today may indeed be making use of their experiences of roads and way on land when doing so, roads and ways were not involved in the first figurative instances of the phrase. The phrase has been excluded from my material for that reason.

various kinds of results, by letting different kinds of actions correspond to different kinds of roads (see figure 16 below). At the end of them very different kinds of results are waiting. As in sentence (185) below, there are good roads, ways and the like, and (as in sentence 186) there are bad ones:

(185) These results show that we are on the right Br road/AM track (=going to be successful). (*CIDE*)

(186) Rejection of the peace deal would be a one-way ticket to disaster. (*CIDE*)

The good roads (Br.) or tracks (Am.) will make us successful, whereas the bad roads, ways, or the like, will take us to disaster. The connection between certain roads and actions that will lead to disaster also explains why we started to use the expression *out of harm's way* in the sense of "in a position which is safe from harm or from which harm cannot be done" (*CIDE*).

(187) The children will be here soon – you'd better put that plate out of harm's way. (*CIDE*)

As is quite in line with the connection between various roads and ways and various courses of action with various kinds of results, the term *two-way* originally referring to something that is 'connected with two ways, roads or channels' was used very early to describe a point in people's lives when they are hesitating between different courses of action and do not know what to do (Table 11, Appendix 1).

This use is also in line with the use of roadmaps or people showing the way to conceptualise people or plans guiding our actions. According to *MWCD*, a *roadmap* is not only 'a map showing roads especially for automobile travel' (*MWCD*), but also 'a detailed plan to guide progress toward a goal'. In sentence (188) below, *to point the way* "is to show how something can be done better in the future" (*CIDE*). "If you *show the way* [(sentence 189) my italics], you do something original which others are likely to copy":

(188) Recent medical discoveries are already pointing the way to more efficient vaccines. (*CIDE*)

(189) Sweden has shown the way forward on energy efficiency. (*CIDE*)

As implied by the use of the phrase *to point the way* "above, in the sense of 'show[ing] how something can be done better in the future', the DISTANCE COVERED ALONG A ROAD OR WAY is not only an INDICATOR OF SOMEONE'S SUCCESS, it also conceptualises TIME in line with the metaphor TIME IS

DISTANCE. Since ACTION IS MOTION and MOVING FORWARD ALONG A ROAD means PROCEEDING WITH WHAT WE ARE DOING, ACTIONS THAT ARE CARRIED OUT AT AN EARLY PHASE will be LOCATED CLOSER TO THE BEGINNING OF THE ROAD THAN ACTIONS THAT ARE CARRIED OUT AT A LATER PHASE. As in the use of the phrase *down the road* in the sense of 'in or into the future' (*MWCD*), the FUTURE is located FURTHER DOWN THE ROAD. In order to come to it, we have to move on along the road:

(190) We have an idea to develop a talking book, but a marketable product is a long way down the road/line/track (=in the future). (*CIDE*)

Accordingly, THE PAST is THE PART OF THE ROAD THAT WE HAVE ALREADY PASSED. Hence *to go back a long way* means 'to have known each other for a long time' (*CIDE*):

(191) We go back a long way (=have known each other for a long time) - we were at school together. (*CIDE*)

Roads, ways and the like may thus help us to structure ACTION as MOTION, PURPOSES as DESTINATIONS, LIFE /A PURPOSEFUL ACTIVITY /A RELATIONSHIP as a JOURNEY, THE END OF AN ACTION as THE END OF THE ROAD, and REACHING A GOAL as COMING TO THE END OF THE ROAD. In addition, they may help us to structure TIME as A MOVING OBJECT[45]/ MOTION[46] in line with the following mappings:

Times are things.
The passing of time is motion.
Future times are in front of the observer; past times are behind the observer.
One thing is moving, the other is stationary; the stationary thing is the deictic center. (Kövecses 2002:33)

Considering the connection between ACTION, FORWARD MOVEMENT and DIFFERENT POSITIONS ALONG A ROAD, WAY OR THE LIKE (discussed above), the relationship between TIME and MOTION seems both to be connected with and coherent with the one between ACTION and MOTION. Concrete artefacts like roads, ways and the like, which go from one place to another and are built for movement from A to B, illustrate the relationship in a very precise way. In our capacity as living, thinking and acting human beings we experience time in

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[45] For a discussion of the TIME IS A MOVING OBJECT metaphor, see e.g. Lakoff and Johnson (1980:41-45)
[46] For a discussion of the TIME IS A MOTION metaphor, see e.g. Kövecses (2002:33f).

relation to the things we do in our lives. If ACTION is conceptualised as FORWARD MOTION ALONG A ROAD, actions that are carried out at an early phase will be located closer to the beginning of the road than actions that are carried out some time later. Accordingly, the time periods in which the different acts are carried out will also be connected with different locations along the road. If roads and ways are used as scaffoldings for conceptual structure, it also becomes evident that TIME PASSED IS DISTANCE PASSED. This in turn, explains WHY the FUTURE is conceived as being located further down the road, and THE PAST as something that we have left behind us while moving forward along the road (see figure 16 below. As illustrated here, different courses of action, metonymically represented by different kinds of roads, have different kinds of results).

the future

disaster   success

ACTION IS FORWARD MOTION; TIME PASSED IS DISTANCE PASSED

Acts that are carried out some time later.

Acts that are carried out at an early phase.

the past
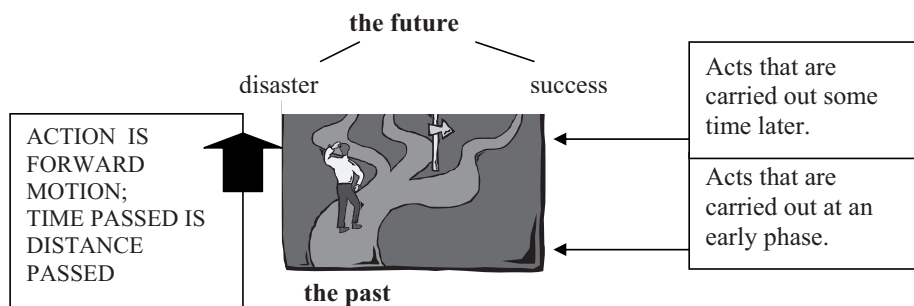
Figure 16. Since ACTION IS MOTION and MOVING FORWARD ALONG A ROAD means PROCEEDING WITH WHAT WE ARE DOING, TO ACT IS TO MOVE CLOSER TO THE FUTURE, which is located further down the road.

In addition to being connected with certain actions or processes, roads and ways, on a more specific level, conceptualise the lives or acts of specific individuals. In sentence (192) below, *the same way* refers to the future of the *he* in the sentence:

(192) The family history is a sad one, and I'm afraid that he will go the same way as his parents (*CIDE*)

In sentence (194), the term *way* is connected with the job of an individual.

(193) I've been in this job for thirty years, and I've picked up a good deal of expertise along the way (=during this time). (*CIDE*)

In sentence (194) the way leads to a man's heart:

(194) The way to a man's heart is through his stomach. (*CIDE*)

In this saying, the man's heart conceptualises his love and affection in line with the metonymy LOCATION OF AN EMOTION FOR EMOTION. The way (to his heart) symbolises the actions that will make him affectionate with the person that is figuratively following it. Since it goes through his stomach, however, the actions that will conquer his love are connected with the quality of the food he has. From the sentence, we thus learn that the way to win the man's affection is to serve him the kind of food that he loves.

Like the figurative uses of the term *way* in sentences (192) - (193) above, the connection between the lives of individuals and different ways is also evident from the use of the phrase *pay their way*:

> If someone pays their way, they pay for the things which they use or have rather than letting someone else pay. (*CIDE*)

If the lives we lead and the things we do correspond to different roads or ways, "people or groups of people [who] choose to go their own ways" (*CIDE*) conceptualise people who "agree or decide to live or work without continuing their previous personal or business relationship":

> (195) After a couple of years together, we realized that we were not suited to one another and decided to go our own ways. (*CIDE*)

From this line of argument it also follows that a person who goes his or her *own (sweet) way* also conceptualises 'someone who does "what [he] or [she] want[s] to do without considering other people" (*CIDE*):

> (196) He always goes his own way, without taking any notice of what his family wants. (*CIDE*)

The connection between roads, ways and the like and the actions of particular groups of people discussed above, also displays itself in the use of the phrase *the Third Way* in the sense of "politics which tries to balance the development of business with the needs of society" (*CIDE*):

> (197) Tony Blair claims that New Labour is the Third Way between capitalism and socialism. (*CIDE*)

In calling New Labour a "Third Way", Tony Blair, in sentence (197) above, conceptualises the policy of his party as one way, and the actions of capitalists and socialists as other ways. In locating the way that his party has taken in between those of the capitalists and the socialists, he also states that the policy of his party is more moderate than those of the other two ideologies. The sentence

thus seems to be based on a combination of our habit of using movement on roads, ways and the like to conceptualise 'action' and our habit of defining different attitudes, opinions, ideologies, political parties etc. by locating them along a continuum. As is conventional when it comes to different attitudes, opinions, ideologies, political parties etc., extremes are conceptualised as being located at the farthest ends of the continuum and more moderate standpoints, ideologies etc. in the middle.

Similarly, the figurative uses of the phrase *middle-of-the-road* are based on a combination of these two habits. According to *MWCD,* the phrase *middle-of-the-road* may be used in the sense of "standing for or following a course of action midway between extremes; especially: being neither liberal nor conservative in politics", and in *CIDE's* wording "[a] person, organization, opinion or type of entertainment that is middle-of-the-road is not extreme". Being so, the person, organization, opinion or type of entertainment that follows a course of action that is *middle-of-the-road* may, according to *CIDE*, either be "acceptable to or liked by most people" (sentence 200) or "disapprov[ed of]" (sentence 199):

> (198) They adopted a sensible, middle-of-the-road policy on defence spending. (*CIDE*)

> (199) They criticised boring, predictable middle-of-the-road TV broadcasts that are screened because they are safe and unlikely to offend. (*CIDE*)

As mentioned above, the conventional use of locating attitudes, opinions, ideologies, political parties etc. along a continuum partly explains the mapping. In part, it may be explained by our experiences of roads. Again, the latter kind of experience helps us associate the phrase with action. However, not all roads may be used for this purpose. The connection between the location referred to, that is, the road on which we travel, and the way in which we act, probably originates from experiences of rather small roads. Being in the middle of a major road, say a modern highway, is not associated with being moderate. On rather small roads, however, travelling in the middle is the normal case, unless someone else is coming in the other direction, and being in the middle means being in less danger of ending up in a ditch or falling down a slope than being on either side does. Hence, only on rather small roads does being in the middle mean being 'moderate'. The connection between the road, and the way in which we act, is thus likely to originate precisely from these conditions.

Like the phrase *middle-of-the-road*, *pass by on the other side (of the road), give way* or, *give way to/make way for* also reflect mappings where different

positions on the road are used to structure action in line with the metaphor AN ACTIVITY/LIFE IS A JOURNEY. In sentence (200) below, the phrase *pass by on the other side (of the road)* is used in the sense of 'fail[ing] to give help' (*CIDE*).

> (200) No one seeing the plight of these refugees could pass by on the other side (=fail to give help). (*CIDE*)

In the sentence, the refugees and the lives they live are conceived as people standing on the side of the road in need of help[47]. Because their plight is too hopeless to be ignored, it is impossible for people travelling along the road to pass them. It is not even possible to pass them on the other side of the road.

The figurative use of the phrase *pass by on the other side (of the road)* seems to be coherent with the figurative uses of the phrases *give way* and *give way to/ make way for*. Beginning with the former phrase, it reflects the use of our experiences of vehicles on roads 'permit[ting] other traffic to move first' (*CIDE*) to conceptualise people who 'stop arguing or fighting and accept that they have been beaten by the other person or people involved'. In sentence (201) below, the people discussed have not yet accepted themselves beaten. In sentence (202), the person spoken to is urged not to let his or her fears prevail.

> (201) Neither of them will give way, so they could be arguing for a very long time. (*CIDE*)

> (202) Don't give way to your fears. (*CIDE*)

In both sentences, ACTION IS MOTION and LIFE/THE THINGS WE DO IN OUR LIVES IS A JOURNEY. As the people referred to live or act, they move forward along a road, way or the like. Doing so, however, they meet with OBSTACLES travelling in the opposite direction. In sentence (201) the obstacle is another person arguing with the person referred to. In sentence (202) the obstacles come in the form of fears blocking the person's way. In both cases, winning means continuing to move forward despite the obstacles. In reverse order, giving way to the obstacles and permitting them to pass in one's place, means acknowledging oneself beaten. Similarly, in sentences (203) - (204), entities that no longer belong to the most successful ones are beaten by, and have to *give way to,* or *make way for,* the ones that do.

> (203) In some areas, modern intensive farming is giving way to the re-introduction of traditional methods. (*CIDE*)

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[47] There may be an implicit allusion here to the Good Samaritan in the Bible (Luke 10.25-37).

(204) She believes that older institutions should make way for improved replacements. (*CIDE*)

Here the act of permitting other traffic to move first conceptualises the stage when something ''become[s] replaced by something, esp. because it is better, cheaper, easier, etc.' (*CIDE*). If MOVING FORWARD ALONG A ROAD IS MAKING PROGRESS, then successful entities will move forward more quickly than unsuccessful ones. When moving forward along the same road, entities that are not very successful are likely to reach a point where they have to permit other more successful, that is, more fast-moving entities to pass. As in the sentences above, this stage conceptualises a situation when entities that are not very successful are replaced by the ones that are.

Unlike the phrase *middle-of-the-road*, the phrases *pass by on the other side (of the road), give way* or, *give way to/make way for* are not restricted to small roads. On the contrary, since the acts that these phrases signify are extremely usual on main roads and ways with dense traffic, experiences of roads and ways like these seem to be very useful to people who use the expressions. However, from the *OED,* we learn that *give way to* was used figuratively as early as 1713, and *make way* in 1820 (see Tables 11 and 13). Even though experiences of roads and ways, along with the vehicles on them illustrate, in a very accurate way, the literal meaning of the expressions, it is evident that the first figurative uses of the phrases do not originate from these. They may be compared with the figurative use of *to take the road of* in the sense of 'to take precedence of' from 1670:

(205) **1670** EACHARD *Cont. Clergy* 99 Most certainly, without quarrelling, he takes the road of all mankind.) (*OED*)

From the figurative uses of the phrases *go out of your/the way and way-out* below, it is evident that the conventional use of roads and ways to symbolise action also helps us to conceptualise actions that are considered normal in one way, and actions that are considered unusual in another way. If action is normally conceptualised as located on the road, actions that take place off the road correspond to unusual actions. In sentence (206) below, the phrase *go out of your/the way* signifies that someone tries 'especially hard' (*CIDE*). Here the image of someone leaving a road on which travelling is easy is used to conceptualise someone's unusually persistent attempt to please someone else.

(206) They really went out of their way to make us feel welcome. (*CIDE*)

If giving way to other people by moving to the side of the road conceptualises giving other people precedence, then actually leaving the road means taking pains to do so.

In sentence (207) below, the phrase *way-out* is used to refer to something unusual:

(207) A lot of experimental theatre is too way-out for me. (*CIDE*)

Interestingly enough, the connections between travelling on a road and doing something that is considered normal, and travelling off the road and doing something unusual, are also coherent with the general tendency for us to locate usual things inside and unusual things outside a container, reflected by a host of expressions, among them *far out, out of the ordinary, in ordinary life,* etc.

Another way to conceptualise acts that are usual is to describe them by means of roads or ways with a high volume of traffic. This mapping is naturally related to the fact that roads and ways with a high volume of traffic are considered 'ordinary ways'. For this reason, our experiences of them may be used to conceptualise acts that are considered 'ordinary'. Examples are highways on which we tend to travel much more often than on smaller ways. According to the *OED*, the term *highway* was used in the sense of 'a public road open to all passengers, a highroad; esp. a main or principal road forming the direct or ordinary route between one town or city and another' (my emphasis) as early as the 9th century. Around 1637 we started to use the term in the figurative sense of 'the ordinary or direct course (of conduct, thought, speech, etc.)' (*OED*):

(208) *a*1637 B.Jonson *Discov., Otium Studiorum* Wks. (Rtldg.) 748/2 He never forced his language, nor went out of the highway of speaking, but for some great necessity or apparent profit. (*OED*)

(209) 1871 E.F.Burr *Ad Fidem* vi. 90 To march+in an orderly way, along the highways of thought. (*OED*)

In addition to being used comparatively often, main routes like highways also serve the function of taking us to different destinations comparatively quickly and without unnecessary detours. Hence our experiences of highways may be used to help us conceptualise 'a course of conduct leading directly to some end or result' (*OED*). The first instance of the phrase in the *OED* in this sense is from 1598.

(210) **1598** F.Meres tr. *Lewes' Sinner's Guide* Title-p., Brought into the
Highway of Euerlasting Happinesse. (*OED)*

(211) **1690** Child *Disc. Trade* Pref. (1694) 25 Trades that we have lost, and
are in the highway to lose. (*OED*)

(212) **1875** Jowett *Plato* (ed. 2) V. 288 That state+I perceive to be on the
highway to ruin.(*OED*)

6.3.4.2. Today's roads and ways

In the previous section we discussed a great number of expressions, including
either of the terms *road* and *way* that were coined long before roads and ways
could rightly be called technological artefacts. Nevertheless, they remain
frequently used expressions in our language. Today's roads and ways, which are
the results of highly advanced technological methods, seem to be useful
scaffoldings for the mappings codified in these expressions, even though the
physical characteristics of today's roads and ways are very different from the
ones of earlier days. As argued above (see sections 6.3.4. and 6.3.4.1.), the
explanation is that the usefulness of roads and ways when it comes to structuring
our thoughts is primarily related to their function, and that the function that roads
and ways have has remained through times. From the great number of
expressions of more modern times (see sections 6.3.4. - 6.3.4.1.) it is also evident
that today's roads and ways have given rise to a large number of metaphorical
and/or metonymic expressions. Since the function of roads and ways has not
changed through times, figurative *road* and *way* expressions of more recent dates
seem to be structured in a way that is coherent with those of earlier days. In
addition, since today's roads and ways are much better at quickly taking us from
A to B, technological developments have made some of the conceptualisations
based on earlier roads and ways more precise. An example is the use of highways
to conceptualise 'a course of conduct leading directly to some end or result'.
Above, we saw that the first instance of the phrase in the *OED* in this sense is
from 1598. Since developments in road technology and improvements of motor
vehicles have made it possible to move even faster on highways, the aptitude of
highways for conceptualising this kind of conduct has increased concurrently
with the developments. We use our experiences of highroads to conceptualise the
relationship between our actions and their outcome when we are quite sure that

our actions will be a success or disaster. The use is in line with the metaphor SPEED OF ACTION IS SPEED OF MOTION. [48]

Developments in road technology and of motor vehicles also seem to have made the use of the term *highway* in connection with computers more precise. In the sentences below, one technological artefact that makes it possible for people and vehicles to travel quickly from one place to another conceptualises another technological artefact that makes it possible for information to be sent quickly from one place to another.

> (213) **1949** D.R.HARTREE *Calculating Instruments & Machines* (1950) viii. 107 A number of source-gates+on the right, and a number of destination-gates on the left, are connected by a single bus labelled 'Highway'. In this bus there is a further gate, labelled 'transfer gate', which exercises the main control over transfer of words between the various sources and destinations. (*OED*)

> (214) **1962** *Gloss. Automatic Data Processing Terms* (*B.S.I.*) 87 *Highway*, a major path along which signals travel from one of several sources to one of several destinations. (*OED*)

> (215) **1964** F.L.WESTWATER *Electronic Computers* i. 7 The number+can either be allowed to pass on to one of the so-called 'highways' in the computer or it can be obliterated. *Ibid.* 9 Numbers are driven out on to the highways serially by admitting electronic pulses to the registers. (*OED*)

As is quite in line with metaphors such as ACTION IS MOTION, AN ACTIVITY IS A JOURNEY, SPEED OF ACTION IS SPEED OF MOTION, to use the computer is to travel on the information highway. When highways are not fast enough to conceptualise this kind of action, we make use of our experiences of even faster ways. We thus use the term *superhighway* in order to signify '[o]ne of a number of projected national high-speed, high-capacity telecommunications networks linking homes and offices and permitting the transmission of a variety of electronic media including video, audio, multimedia and text" (*20ᵗʰ CW*). When

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[48] Cf. the sentences *Cooper moved quickly **into the fast lane** of Hollywood society*, *He was still adapting to life **in the fast lane***, and *[…]seven days of good food, fine wine, and living **in the slow lane*** in (Kövecses 2002:137, my italics). Not only are these too structured by the metaphor SPEED OF ACTION IS SPEED OF MOTION they are also connected with people's experiences of motorways.

referring to ways (primarily in the US), the term signifies 'a multilane highway (such as an expressway or turnpike) designed for high-speed traffic' (*MWCD*).

> (216) 1993 New York Times: One of the technologies Vice President Al Gore is pushing is the information superhighway, which will link everyone at home or office to everything else – movies and television shows, shopping services, electronic mail and huge collections of data. (*20th CW*)

Since highly technological roads have been built in order to make it possible for us to travel to different destinations at speed, they seem to conceptualise successful goal-directed actions even better than their forerunners did, that is, roads and ways in the sense of beaten tracks.

Since technological roads and ways are generally more crowded with traffic than the ones of earlier days, the former also seem to provide the user of figurative *road* or *way* expressions connected with the flow of traffic with more accurate experiences than the latter. Examples of such expressions are *give way (to), make way for, no way round,* and *pass by on the other side (of the road)*. They also seem to be part of the reason why the phrase *two-way* is used today to refer to 'situations that involve two people or two groups of people working together to achieve a shared aim' (*CIDE*). It is true that *two-way* was used figuratively to refer to something which is 'connected with two ways, roads or channels', as early as 1571 (*OED*, see Appendix 1, Table 11). Obviously, the first figurative uses of the phrase do not originate from experiences of modern ways. However, it is also true that the figurative sense of 'occurring or existing in two directions; reciprocal' from 1950, is very different from the first figurative sense of the phrase. Like the figurative use of *one-way,* in the sense of 'leading, tending, pointing, thinking or developing in one direction only' from 1596, it is connected with the direction in which something located on one and the same road moves, rather than with two different roads, ways or the like. In part, it seems likely that the figurative use of *one-way* in the sense of 'leading, tending, pointing, thinking or developing in one direction only' from 1596 has paved the way for the use of *two-way* to refer to something going in two different directions, that is, that *two-way* is an analogical expression. In part, however, the late date of the first instance of the phrase in the sense of 'occurring or existing in two directions; reciprocal' seems to indicate that the use originates from experiences that people had of ways of a more modern kind. In (217) it seems to be the requirements on drivers on modern roads with dense traffic that are mapped onto the requirements on the different parts in a negotiation. In the same way as driving on a way with traffic flowing in two directions necessitates co-

operation with other drivers, so does action referred to as a two-way "thing". From the very accurate mapping, we also learn in what way the negotiators have to act in order to succeed.

> (217) Negotiations are a two-way thing – both sides have to come to a compromise. (*CIDE*)

In (218), where the statement that there is "no one-way traffic" communicates that not only one party will suffer from the consequences discussed, there is a close connection between the figurative use of the phrase *one-way* and traffic on modern roads, ways or the like.

> (218) **1961** L.van der PostHeart of Hunter III. xv. 202 The European+tends to believe that the consequences are only for the primitive and that he+is immune from them. But actually there is no one-way traffic on these eventful occasions.(*OED*)

6.4. Summary and conclusion

In this chapter, the primary aim was to investigate the cognitive function of motor vehicles, roads and ways. Motor vehicles, their different parts and movement by means of motor vehicles are used to conceptualise a number of different "things". Examples are concepts as diverse as 'extra weight', the acts of 'missing an opportunity', or 'misleading someone deliberately', and the qualities of 'being extremely determined', 'wealthy', 'efficient', or 'insensitive to other people'. By contrast, the figurative expressions including either one of the terms *road* and *way* in my material are all structured in a coherent way. The cognitive function of roads and ways is related to the function that they have of taking us from one place to another, and hence to the fact that they provide us with new referents for the concept of 'direction of movement'. That being the case, they do not help us to define something new, but provide us with new referents for conceptual structures previously structured by means of for example courses, lines or paths. Above all, roads and ways are useful when it comes to re-experiencing conceptual structures coherent with the ACTION IS MOTION metaphor. Unlike paths, however, roads and ways are highly functional in the lives of people in the Western World today. Even though paths are still important cognitive tools and may still help us to structure our thoughts, roads and ways seem to some extent to have taken over their role as scaffoldings for conceptual structure. Not only are roads and ways frequently occurring artefacts in our lives

and important to us because we often use them, they are also concrete artefacts that literally lead from one place to another. Consequently, they not only take us from one place to another but also provide us with referents that are both visible to the eye and possible to touch.

CHAPTER 7. SUMMARY AND CONCLUSION

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In this study I set out to explore the relationship between technological innovation and the development of language and thought. For this purpose, three different fields of technology were investigated: 1) the steam engine, 2) electricity, and 3) motor vehicles, roads and ways. They have all either played an extremely important part in people's lives, or they are still essential to us.

The steam engine is sometimes called the symbol of the industrial revolution. During this period the steam engine interacted with a number of different industries and decisively changed the course of world history. Today, however, steam engines are no longer frequently used. The first practical application of electricity was to provide telegraphy in connection with the developing railway services at the beginning of the 19th century, while means for using large amounts of electric power were worked out in the development of the electric railway system. Illumination, its first commercial success, had its breakthrough in the 1890s. Today the versatility of electricity is unmatched and most people in the Western World are dependent on it in their daily lives. Like electricity, motor vehicles, roads and ways are an essential part of people's lives today. With the process of industrialisation, the requirements on the transportation network increased. In order to meet the requirements, canals, railroads and roads had to be built and already existing roads and ways improved. Concurrently, vehicles were improved and their numbers increased. The first internal-combustion engine was put on wheels in 1885. At the close of the 19th century, manufacture of the motor vehicle was established in France and Germany, and just beginning in the United States and Great Britain.

The overall aim of the study was to investigate the cognitive role of the steam engine, electricity, motor vehicles, roads and ways. In addition, studies of words and phrases connected with these fields were made in order to find out what source domains are involved when people structure their experiences of the inventions and discoveries that are part of this thesis. The study illustrates what a valuable source of information language can be as a reflection of the way in which we structure our thoughts. In this closing chapter, a summary of the results is provided. In addition, some general conclusions are suggested on the basis of

what has been presented in the previous chapters. These suggestions concern the relationship between world, thought and language. Some possible future studies are also mentioned where the results obtained here could be refined and complemented by other methods.

My material shows that when conceptualising the steam engine, electricity, motor vehicles, roads and ways people made use of a wide variety of experiences. The study suggests the creative ways in which we proceed when striving towards understanding the unfamiliar by means of the familiar.

When structuring their experiences of the steam engine, people may have had some help from the fact that the invention consists of a number of different parts that people had previously come into contact with in other contexts. Before the invention was made, not only **steam**, **engines** and heated fluids in containers existed, but also **jackets**, **boilers, boxes, chests, brakes, hammers, launches, whistles** and **coal**. When used in the machine, these isolated but familiar parts probably made it easier for people to make sense of the whole new machine. Like the isolated parts of the machine, the terms used to refer to them were familiar.

In order to understand electricity and concepts related to it, people had to be somewhat more creative. The terms *electric* and *electricity* are related to Greek *elector* signifying 'the beaming sun', Latin *electrum* 'amber', and new Latin 'generated from amber'. People seem to have found some kind of connection between 'amber' and 'the beaming sun' quite early on. Subsequently, they found their experiences of the sparkling rays of the sun suitable for the conceptualisation of the electrical phenomena they had observed around rubbed amber and for the property of such things as amber and glass to attract lightweight objects when excited by friction. As people began to use the term to refer to different kinds of causes of this property, it acquired senses such as 'the state of excitation produced in such bodies by friction', 'different kinds of causes of the property to attract', and 'different kinds of sources of the property to attract'. It was also used to refer to 'the science of the phenomenon'.

From my material it is evident that people also used their experiences of human action, earlier inventions, artefacts and other things that they had observed in nature in order to conceptualise electricity and concepts related to it. Machines causing electric energy to exist were like people **generating** their offspring. Electrified artefacts drawing other substances to them were like other bodies **attracting** different kinds of substances. Presumably Benjamin Franklin, who put forward the theory that electricity is 'due to a subtle fluid diffused through all bodies' (*OED*), was initially inspired by his own body and the blood in his veins. Once conceived as a fluid, electricity could be conceptualised by

means of the experiences that people had of different kinds of flows of water, for example streams, rivers, brooks and the like. The use of *current* to signify 'the transmission or 'flow' of electric force through a conducting body' reflects the view that electricity is a powerful flowing force. Like horses and several different artefacts, electricity, which flows in closed systems such as **grids** and **circuits**, can be directed by means of **switches**.

Similarly, bodily experiences seem to have helped people when structuring their experiences of motor vehicles. In the same way as different articles of clothing function as coverings for different parts of the body, **car bras**, **bonnets**, **hoods** and **boots** are coverings for different parts of a car. Like bras worn by women, car bras protect something that protrudes from the front. The applications of the terms *bonnet* and *hood* seem to originate from a tendency to compare the engine, which is essential for the running of the car, with the head, which is in charge of our actions. Not only are the exteriors of a car compared with articles of clothing, the use of *juice* in the sense of 'fuel' reflects a comparison between people who have energising drinks and vehicles that are filled with fuel.

In addition to using bodily experiences when conceptualising motor vehicles, people used entities as diverse as rooms, clothes, bubbles, insects, animal parts, natural objects and forerunners to motorised vehicles in the form of horse-drawn carriages. The latter seem to have been particularly close at hand in this process. From the use of the verbs *motor, tool, wheel*, and *charioteer* we also learn that instruments involved in the act of running a vehicle were used to refer to the act of running the vehicle. The verbal use of *pilot* and *chauffeur* reflects the use of people who drive vehicles to refer to the act of driving them. My material also shows that people compared the act of steering motor vehicles with the act of steering other kinds of vehicles. Examples would be sea-going vessels, chariots, and bicycles. They also compared this act with that of steering other artefacts such as balloons and ploughs. In addition, movement of motorised vehicles was like the movement of animals and people.

In order to refer to the roads and ways on which motorised vehicles are driven, they continued to use terms originally signifying roads and ways in the sense of 'beaten tracks'. When defining different kinds of road systems, however, a number of different experiences were used. Examples are circular objects, belts around people's waists and aeroplanes. Cleverly enough, they used systems of things to understand systems of things. Examples are the use of a tree with its trunk and branches, or the use of the circulatory system, to understand road systems. The former mapping is reflected by the use of *branch road* in the sense

of 'a feeder road', and *trunk road* in the sense of 'an important road for travelling long distances at high speed'. The latter is reflected by the use of *major artery* to refer to a main road, which seems to be based on the correspondences that we may find between the flow of blood from smaller arteries to major arteries and the flow of traffic from smaller roads to major ones. In addition, it seems to be based on the correspondences between the complexity of the entire circulatory system and the complexity of a system of roads.

It can be concluded that when understanding one kind of thing by means of another kind of thing, we seem to be very creative. A wide variety of experiences have been used in order to understand isolated inventions, and they have been combined with one another in imaginative ways. In effect, it seems to be possible for us to use any kind of experience as a source domain as long as it reminds us of the target domain in one way or the other. Furthermore, it is possible to combine the use of one kind of experience to conceptualise one part of an invention with the use of another totally different kind of experience to conceptualise another part of the same invention. The results obtained here also show that generally the mappings made in order to conceptualise the inventions and discoveries that are part of this thesis have been triggered by the perception of functional similarity between source and target.

Through the study of words and phrases connected with the steam engine, electricity, motor vehicles, roads and ways, it has also become evident what target domains are understood by means of the inventions and discoveries that are part of this thesis as well as what conceptual structures may be re-experienced by means of them. Throughout my thesis, the working hypothesis has been that, in being successful, these inventions and discoveries are all good reference points, and hence apt source domains and scaffoldings for conceptual structure. Indeed, in my material, a number of different expressions reflecting the use of them as cognitive tools are found. The expressions show that advanced technological know-how is not a prerequisite for understanding the mappings behind them. As accounted for in the following, the metaphorical or metonymic expressions analysed here seem to be based on rather fragmentary knowledge of the inventions and discoveries.

When we see a steam engine we see a machine that consists of a container filled with hot water and steam. The engine is associated with heat and the machine is smoking with steam. We also know that the container has an internal pressure that can be regulated by the amount of steam supplied and that the machine has the function of producing energy. The greater the amount of heated vapour inside the container is, the higher the internal pressure and the production

of energy are. The heated steam coming out of the engine is a visible trace of the pressure inside the container, and hence the production of energy, the blowing noise of the machine is an audible one. The invention provides us with a structure both for the relationship between an increase in the amount of heated vapour and the production of energy, and for the relationship between an increase in the amount of energy inside a container and the ability of an engine to perform in a satisfactory way. The structure is useful when we want to conceptualise a number of different relationships. As is evident from sentences such as *Steam up the economy* and *Sales began to pick up steam* it may, for example, be used to describe a recovery in the economy and a rise in sales. Sentences such as *Now that problem is out of the way it's full steam ahead to get the job finished* and *The peace talks seem to have run out of steam* reflect the use of our experiences of the steam engine to describe people, or even processes, that 'move or proceed with energy or force'. In the sentences *We decided to do some training under our own steam* and […] *got there under his own steam*, the perfect match between our experiences of our own bodies and the steam engine is reflected. Like steam engines that are running we get warm when we exert ourselves. When the temperature inside a steam engine rises, steam is emitted from it. When we get warm, we perspire. In addition to helping us to structure our experiences of energy, the steam engine provides us with a very useful source domain by means of which the target domain ANGER may be very precisely described and certain aspects highlighted. Even though the mapping between ANGER and STEAM, which had been made long before the steam engine was invented, does not originate from people's experiences of the steam engine, the steam engine may help us to re-experience it. In addition, the steam engine allows us to conceptualise 'anger' in a much more exact way than our experiences of steam in other contexts. It also defines additional meaning that may not be conceptualised by the use of HEAT as a source domain. In addition to allowing us to conceptualise the internal pressure and the rise in the temperature that is typical of ANGER and other pent-up emotions, the steam engine makes it possible for us to conceptualise the way in which the release of the pent-up emotions sound, the intensity of the pent-up emotions, and the energy that is characteristic of them. In the sentence *The children ran around the garden shouting and letting off steam* for instance, there is a connection between steam and noise. Besides making steam the symbol of energy, force, enthusiasm, and power, the steam engine may be used to re-experience the structures underlying the figurative uses of phrases like *steamy* in the sense of 'sexy', or 'erotic' and *steamed up* in the sense of 'drunk', 'intoxicated'. Neither of these senses, however, seems to be dependent

on our experiences of the invention. Although there may be a connection between the steam engine, which may be used to conceptualise people who are 'roused' or 'excited', and sexual attraction and lust, which may be categorised as certain kinds of excitement, there is nothing in the form of the expression indicating that a steam engine is part of the underlying mappings and was once used to structure them. The use is more likely to originate from a mapping between our experiences of heated vapour and our experiences of body heat and perspiration. Because experiences of heated vapour may be obtained from a number of different objects, the use of the expression is not dependent on our experiences of an engine. Similarly, uses of *steamed up* in the sense of 'drunk', 'intoxicated' may be connected with the fact that steam in a steam engine may be seen as a force that runs our actions, and alcohol as a drug that influences our behaviour. The use of *steamed up* in this sense, however, is not necessarily connected with the invention. The phrase was used in this sense before the days of the invention and was not originally structured by means of it.

Through my analysis, a view on electricity as a powerful force that provides us with energy and is used to run a number of different electrical appliances and machines appears. The force is associated with electric tension and excitation, it has the property to attract other objects, it may be switched on or off, it affects objects in different ways, and it runs through closed circuits. If running through a body, it brings about electric tension in the electrified body. If suddenly switched on, it may shock. The stronger the power of the current is, the more sudden the shocks are, and vice versa.

All the mappings in my material but one exemplify the use of electricity to conceptualise people's actions, feelings, and emotions. The only exception is the use of electricity to describe very bright colours. Primarily, it seems to be the different functions of the discovery and the effects it has on other objects that have motivated the mappings. As a result of the similarities we perceive between electric excitation or tension in different objects and our own feelings, we may use the electric current to define feelings of 'emotional strain' and 'excitement'. As in the use of *electricity* to describe 'contagious excitement', the ease with which electricity electrifies other objects allows us to use it to define things, emotions or actions that are 'contagious'. Thanks to its function to provide us with energy, it may be used to conceptualise 'vigour' and 'vitality'. Unlike mappings involving the quality of electrified objects to attract other objects, the combination of these qualities seems to be unique to the electric current, and the mappings in which they are involved may not be re-experienced by means of other external representations. The results of my analysis also demonstrate that

our experiences of electricity going into an object or a machine may be used to describe people who 'start to behave in a certain way', or people who 'show certain feelings without being sincere in what they are doing'. The clash between the act of switching something on on purpose, and the fact that it is not normal for us to be in total control of our feelings makes the act of switching on behaviour, or emotion, one that cannot possibly have been motivated by genuine feelings. Furthermore, in my material, we also find the use of a machine that has *a switch that begins to operate* to conceptualise 'a brain that begins to function the way it should', and the use of electricity going into an object to describe people who show 'indications of exasperation, denial or surprise'. The process of 'gaining strength' before a match between two teams or, before a conflict or confrontation, or in order to perform a piece of work is conceived as a machine that is *powering up*.

The idea that PEOPLE ARE MACHINES and behave like machines also structures the use of electrified artefacts like radios and television sets, which have the ability to receive information from the rest of the world when they are switched on, to conceptualise people who are familiar with the latest news and are aware of what is trendy. Similar to the way in which electrified machines are affected by electric tension, someone who is 'irritated' or 'surprised' may also be described as someone who is *switched*. By seeing PEOPLE AS MACHINES through which a current is constantly flowing, it becomes possible for us to use the breaking of the current to conceptualise a number of actions or emotions indicating the end of something or that something is losing its strength. Like machines that cannot receive information because they have been switched off, people who are *switched off* are 'unaware of the latest news'. In the same way as we switch off machines that we do not want to listen to any longer, we put an end to something that we do not like, be it an emotion or an action, by simply *switching* it *off*. Accordingly, as if we were machines receiving information we *switch off* when we 'cease listening', 'lose concentration', 'become bored' or 'are inattentive'.

As is evident from the use of *short-fused* to describe someone who tends to get angry easily, and the use of *fuses* or *blows a fuse* to describe someone who stops working rationally, it is also evident that fuses that blow conceptualise the end of something. These mappings primarily seem to build on the matches between electric tension and the kind of emotional strain that typically precedes emotional outbursts, and the blowing of fuses and the strong and sudden reaction of an emotional outburst. In my material, *electrifier*, *electric*, and *electrify* describe people or things that have a 'thrilling' effect on other people, or make them

'startled', 'roused', or 'excited'. They also refer to the magic atmosphere that sometimes arises between performers and audiences, the sensation of those fascinated by a language, or of readers fascinated by an author's text. The former uses are connected with our experiences of electric shocks. Because electric shocks are both 'swift' and 'strong', this is generally true also about the 'tense' emotions conceptualised by means of them. The latter use is based on our experiences of electricity as the source of electric excitation and as possessing the power of attraction. Again, we are dealing with mappings that are uniquely defined by means of the discovery.

Like the steam engine and electricity, the use of motor vehicles, roads and ways as source domains are intimately connected with their real-world function. A very large number of mappings in my material involving these artefacts are connected with the fact that they are built for taking us from one place to another.

When seeing a road or a way people see a line, course or path going from one place to another, from a beginning to an end. When taking to the road, we not only embark upon a journey, we begin to do something. When coming to the end of the road we come to the end of the journey, and to the end of the action we were engaged in while travelling. If our journey and hence our actions on the road were purposeful, coming to the end of the road also means reaching our goal.

Since roads and ways provide us with coherent structures, the majority of the metaphorical expressions involving either of the terms *road* and *way* in my material are structured in a coherent way. Like the uses of the expression *the end of the road* to refer to 'the end of someone's negotiations' and 'the end of a relationship', the majority of them are structured by the metaphors ACTION IS MOTION, LIFE IS A JOURNEY, PURPOSES ARE DESTINATIONS and a number of mappings coherent with these structures. Ultimately, the mappings are structured by the spatial relationship of a path, line or course going from one place to another. In that sense, today's roads and ways do not primarily help us to structure our thoughts in new ways but to re-experience mappings that were made long before most roads and ways became technological artefacts. When thinking of motor vehicles people also seem to have their function of taking us from one place to another in mind.

Metaphorical mappings involving motor vehicles, their different parts and movement by means of motor vehicles, however, are not as coherent as those involving the roads and ways on which they are driven. They structure our experiences of concepts as diverse as 'extra weight', the acts of 'missing an

opportunity', or 'misleading someone deliberately', and the qualities of 'being extremely determined', 'wealthy', 'efficient', or 'insensitive to other people'.

To sum up, the figurative uses of words and phrases in my material reflect the use of popular inventions or discoveries, their various functions and the things we associate with them to conceptualise other more abstract and less clearly delineated concepts. By having this function they not only substantially reduce our need to rely on pre-existing mental structures, but are also useful when we structure our thoughts in new ways. Electricity, motor vehicles, roads and ways are still important parts in our daily lives. People today may thus re-experience the mappings involving them as source domains whenever they need to. The steam engine, however, is no longer frequently used and people today are likely to lack detailed knowledge of how a steam engine actually works. To some extent the mappings connected with the steam engine may be re-experienced by other kinds of containers with an internal pressure.

On a more general level, it has also been shown that the structure of our thoughts and our language reflects the structure of the world and the way in which entities in it function and relate to other entities. Even though conceptual mappings are the results of creative processes, this process is not characterised by unconstrained creativity. The impressively systematic way in which we structure our thoughts seems to be nothing but a reflection of the structure of the world as we perceive it. It does not seem possible to structure our thoughts in a way that is in conflict with this structure. Moreover, since metaphorical mappings are often motivated by the fact that source and target domains function in similar ways, the line between metaphorical mappings and real-world correspondences is sometimes very thin. Frequently, what was initially a hunch, a perceived similarity, later turns out to be a scientific truth. It has for example, been shown that electricity was used to conceptualise a force that runs our actions long before scientists were familiar with the bioelectric cerebral system and the way in which it works. We may conclude that analyses focussing on the functions of various source domains are important because they focus on the structure that is used as scaffoldings for our thoughts and our language. In the analyses of figurative language, the cognitive functions of various source domains deserve more attention than they have previously attracted.

Prospects for further research

- Since the scope of the thesis had to be limited, the results of the study have not been complemented by a corpus study. There are, however, numerous opportunities for further research by means of a corpus-based method. By using electronic corpora as an additional source of data, it would be possible to test frequencies and patterns of usage. By way of example, it would be interesting to see how frequent the expressions in my material are today. Are the expressions originating from the steam engine still frequently used even though the invention is no longer an important part of our lives? Are the expressions originating from the steam engine less frequently used than those of inventions and discoveries of more recent dates? Having claimed that the inventions and discoveries analysed here are apt source domains because they are popular and part of the common ground of people, it would be interesting to see whether a diachronic corpus-based study of the frequency of the expressions reveals that their popularity as source domains has changed though time. Furthermore, in cases where it is difficult to know whether a metaphorical expression reflects the use of the invention or discovery as a source domain, or some other artefact with a similar function, it would be interesting to see whether more context provides clues as to what source domains have been used.

- In addition to the studies mentioned above, an in-depth study of figurative uses of spatial expressions would be very fruitful. The study of expressions involving roads and ways as source domains demonstrated how important spatial relationships are when we structure our thoughts. It would be interesting to compare the findings of this study with the structure of mappings involving other kinds of lines, courses and paths as source domains and mappings evident from metaphorical uses of verbs of motion. What are the similarities between the mappings? What are the differences?

- Figurative uses of terms signifying material courses built for transportation and terms signifying different vehicles could be further investigated. A comparison between the two groups would be particularly rewarding. What patterns of usage and differences in frequency are

evident from a larger material? Are metaphorical expressions involving roads and ways as source domains, as implied by my material, larger in number than the ones involving vehicles as source domains? If so, how can the differences in frequency be explained? That is, if vehicles, roads and ways have the same function, that is, the function of taking us from A to B, and the metaphorical mappings behind the expressions are connected with the function of the artefacts, why are the vehicles that actually transport us from A to B less popular source domains? Can the differences be connected with the fact that roads and ways, in their capacity as extended locative reference points, provide us with much more delineated experiences of the spatial relationship of a line from A to B than the vehicles that travel the same distance?

- It may also be potentially rewarding to compare the use of the steam engine and electricity as source domains with the use of other sources of energy. Again, it may be interesting to pay attention both to similarities and differences between the uses of various sources of energy as source domains.

- Finally, it has been argued here that by using our experiences of the steam engine we may structure ANGER in a much more precise way than by means of our experiences of other kinds of containers with an internal pressure. A comparison between the use of different kinds of containers for example, steam engines, kettles, boilers and saucepans would be an interesting field for further research.

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Appendix 1. Metaphorical and/or metonymic expressions including either of the terms *road* and *way*

Table 11. Metaphorical and/or expressions including the term *way* that were in use before the 18th century.

Expressions that are included in the material	*OED* First figurative sense(s). (Literal senses within brackets.		First figurative instances. (Literal instances within brackets.)
way	**b.** In figurative context, with reference to a metaphorical walking or travelling.	A	*c*825 *Vesp. Psalter* xxvi. 12 Fot min stod in weᵹe ðæm rehtan. (*OED*)
go out of your/the way	**37. out of the way.** (See also OUT-OF-THE-WAY *adj. phr.*) **a.** Away from the road by which one is travelling; off the track or proper route. Also in fig. context.	B1	**1530** PALSGR. 769/1, I voyde a thyng **out of the way**, or out of syght, *je oste*. **1**
		B2	(FIRST LIT[49]: *turn, v.* **13+** *Sir Beues* (A.) 3669 **Out of þe way** ᵹhe gan terne Ase ᵹhe wolde do hire dedes derne.)
byway	(**1.** A way other than the high-way; a side road; a secluded, private, obscure, or unfrequented way.)	C1	(**1330** R.BRUNNE *Chron.* 10145 (Rolls Ser.) By a bywey [*v.r.* bigate] to Totenes lay, Cador & hyse toke þat way.)
	2. *transf.* or *fig.*; often depreciatively.	C2	**1488** CAXTON *Chast. Goddes Chyldr.* 23 Suche a man cometh lightly in to a byewaye and for many errours he slideth ful folyly.
	3. *attrib.*	C3	**1661** HICKERINGILL *Jamaica* 84 Undisputed Titles need not + by-way stratagems to ensure their Negotiations.
two-way	**1. a.** Having, or connected with, two ways, roads, or channels; situated where two ways meet. ***two-way cock***, one with two outlets, which may act together or alternatively.	D1	**1571** GOLDING *Calvin on Ps.* xxv. 12 We stand as it were in a twowayleete, in every of our dooings, we hang in doubt, and are at our wittes end.
	b. Occurring or existing in two directions; reciprocal;	D2	**1950** J.JENKS *From Ground Up* ii. 17 The agri-cultural relationship is, like all vital relationships, two-way.

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[49] Occasionally, the first literal instance or sense of an expression is provided. This is merely for the sake of comparison. The first literal instances and senses are all found within brackets.

pave the way	3. Phrase. **to pave the way**: to prepare the way (*for*, *to* something to come); to facilitate or lead on to a result or an object in view.	E1	*a*1585 Cartwright in R. Browne *Answ. Cartwright* 86 The way will bee paued and plained for mutuall entercourse. (*smoothen*, v.)
		E2	1648 Howell *Twelve Treat.* (1661) 375 To smoothen and facilate things, thereby to open a passage, and **pave the way** to a happy peace.
highway	(A public road open to all passengers, a high road; esp. a main or principal road forming the direct or ordinary route between one town or city and another, as distinguished from a local, branch, or cross road, leading to smaller places off the main road, or connecting two main roads. **the king's highway**: see quot. 1895.)	F1	(**859** in Earle *Land Chart.* 130 Circumcincta ab oriente cyniges heiweȝ a meritie stret to scufeling forde.)
	3. *fig.* **a.** A course of conduct leading directly to some end or result.	F2	1598 F.Meres tr. *Lewes' Sinner's Guide* Title-p., Brought into the Highway of Euerlasting Happinesse.
	b. The ordinary or direct course (of conduct, thought, speech, etc.).	F3	*a*1637 B.Jonson *Discov.*, *Otium Studiorum* Wks. (Rtldg.) 748/2 He never forced his language, nor went out of the highway of speaking, but for some great necessity or apparent profit.
(cf. *highroad*)[50]	(A chief or main road; a highway.)	G1	(**1709** Steele *Tatler* No. 144 2 [We] do not share alike in the Division of Her Majesty's High-Road.)
	(**b.** *fig.*)	G2	1793 Holcroft *Lavater's Physiog.* III. xii. 64, I+will travel in the high-road of certainty, and confine myself to what is visible.
out of harm's way	**c. out of harm's way**: Out oft he way of doing or of sustaining injury.	H	*a*1661 Fuller *Worthies* (1840) I. xviii. 61 Some great persons+have been made sheriffs, to keep them out of harm's way.
know which way to turn		I	(*stick*, v.[51]:) **1677** Locke in P. King *Life* (1830) II. 164 But

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[50] Expressions within brackets, like *highroad* above, were not originally part of my material, and will not be further discussed in the following sections. They have been included in the tables, however, since it might be interesting to compare them with the ones that are part of my material and will be discussed further on. In this case, *highroad* has been included because it might be interesting to compare the development of this term with that of the term *highway*.

			when we begin to think of the beginning of either, our understanding sticks and boggles, and knows not which way to turn.
give way	**6. a.** In generalized use: Opportunity for passage or advance; absence of obstruction to forward movement; hence *fig.* freedom of action, scope, opportunity. In various phrases, as **give way** :)		
	(**a.** Of fighting men: = *give ground*. To retreat before an advancing force; to break rank. Also *transf.* and *fig.* Const. *to*.)	J1	(**1413** *Pilgr. Sowle* (Caxton 14 83) IV. xxx. 78 The chyuetayns haue at the moost nede of socour yeuen weye to their enemyes and made the peple proye to them.)
	(†**b.** To make way; leave the way clear. In early use often *to give the way*. Const. *to*. *Obs.*)	J2	(*a***1533** Lᴅ.Bᴇʀɴᴇʀs *Huon* xxxviii. 122 They gaue hym way, nor durst aproche nere hym.)
	c. To make room for; be super seded by. Const. *to*.	J3	**1713** Sᴛᴇᴇʟᴇ *Englishm*. No. 12 Sophistry must give way to Learning.
	†**d.** To allow free scope, opportunity, or liberty of action *to*. Also in indirect passive, and **to give way (to** a person*) to do*, *that*, etc. *Obs.*; passing into f. and g.	J4	*a***1586** Sɪᴅɴᴇʏ *Arcadia* I. (1633) 5 And knowing that the violence of sorrow is not at the first to be striven withall+ they gave way unto it for that day and the next.
	f. Of persons: To yield under solicitation or insistence; to make concessions; to defer to the will of another. Const. *to*.	J5	**1758** Lᴅ.Kᴀᴍᴇs in *Life W. Cull en* (1832) I. 601 If you give way to every patient+you will never stir from Edinburgh.

Table 12. Metaphorical and/or metonymic expressions including *road* that were in use before the 18th century.

Expressions that are included in the material	*OED*	
	Sense	First instance
on the road 'driving'	'travelling, journeying, upon or during a journey etc.' (1642)	A	**1642** H.Mᴏʀᴇ *Song of Soul* II. xx xv. Wks. (Grosart) 22 In this same Land as I was on the rode, A nimble traveller me overtook.

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[51] In the Tables, terms within brackets preceding a quotation like (*stick*, v.) above, are used to indicate that the quotation is not found under the entry of any (or all) of the terms that are part of the expression in question. In this case, under the entries of any (or all) of the terms of the expression *know which way to turn*. These have instead been found by means of a search through all the quotations in the *OED,* and can be found under the entry of the term within brackets, that is, in this case, the entry of *stick*, v.

Table 13. Metaphorical expressions including the term *way* supposedly coined after the turn of the 17th century.

Expressions that are included in the material	*OED*		
	First figurative sense(s). (Literal senses within brackets).	First figurative instances. (Literal instances within brackets.)	
lead the way	**e. *to lead the way*:** †(*a*) with personal obj., to guide, show the way to (*obs.*); (*b*) in later use (influenced by sense 13), to go in advance of others, take the lead in an expedition or course of action.	A1	**1770** GOLDSM. *Des. Vill.* 170 He +allured to brighter worlds, and led the way.
		A2	(*shore*, v.1:) (**1607** MIDDLETON *Fam. Love* III. iii, Shore up your eyes, and **lead the way** to the goodliest people that ever turned up the white o' th' eye.)
		A3	(FIRST LIT.: *c*1200 ORMIN 34 65 Ant teȝȝre steorrne wass wiþþ hemm To ledenn hemm þe weȝȝe.)
pay their way	(**27. pay one's way.** †**a.** To defray one's expenses on a journey. *Obs.)*	B1	(*a*1825 *Willie Wallace* vi. in Child *Ballads* III. 271/2 Take ye that, ye belted knight, 'T will pay your way till ye come down.)
	b. To succeed in paying one's expenses as they arise, without incurring debts. Of a business undertaking, ***to pay its way*:** To be carried on at least without loss, to be self-supporting.	B2	**1803** G.COLMAN *John Bull* II. iii. 22, I earned my fair profits; I paid my fair way.
give way (to)/ make way for	(**25. make way. a.** To open a passage, remove obstacles to progress, to facilitate passage or entrance. (See 6 above.) Const. *for*, †*to*, or †dative.)	C1	(*c*1200 *Trin. Coll. Hom.* 91 Ðo þe þe weie makeden biforen him bien folkes lorþeawes.)
	(†**b.** Of ground: To allow of passage. *Obs.)*	C2	(*c*1300 *K. Horn* 1489 (Laud MS.) þe sond by gan to drye And hyt hym makede weye.)
	(**c.** To move from one's place so as to allow a person to pass.)	C3	(*c*1400 MANDEVILLE (Roxb.) xxv. 120 He commaundez þe lordes þat rydez nere him to make way þat þe men of religioun may comme to him.)
	(**d.** To leave a place vacant *for* a successor or substitute.)	C4	(**1760–72** H.BROOKE *Fool of Qual.* (1809) III. 122 When my family+were thus turned out of doors, an old follower made way for them in his own cottage, and retired+to a cow-house hard by.)
	(**e.** To make progress on a jour	C5	(**1490** CAXTON *Eneydos* xxvii, 97

	ney or voyage. Often with qualifying word, as **to make good, much, little way**. (Cf. 7 above.) (*a*) *Naut.* (see 7i).)		Castyng her sight ferder towarde the see, she sawe the saylles, wyth the flote of the shippes that made good waye.)
	(*b*) *gen.* Also *fig.*	C6	(**1588** SHAKES. *Tit. A.* II. ii. 24 And I haue horse will follow where the game Makes way.)
		C7	**1820** SCOTT *Monast.* Introd. Ep., So great is the difference betwixt reading a thing one's self, making toilsome way through all the difficulties of manuscript, and, as the man says in the play, 'having the same read to you'.
one-way	**3. a.** Leading, tending, pointing, thinking, or developing in one direction only.	D1	**1824** M.WILMOT *Let.* 5 Feb. (1935) 206 Our one way life, dearest Alicia, gives me so little to say.
		D2	(FIRST FIG. in the adj. sense of 'one direction only') **1596** BACON *Max. Com. Law* iii. (1636) 10 This rule doth give them a sway to take the law more certainly **one way**.
highway and byway	-	E	**1839** CARLYLE *Chartism* iv. 28 The wild Milesian features+ salute you on all highways and byways. *Ibid.*, The English coachman+lashes the Milesian with his whip.
(*one-way ticket*)	**b.** *spec.* Of a ticket: entitling the holder to a journey in one direction only; 'single'. Also *fig.*	F1	**1976** J.LEE *Ninth Man* 258 You've bought yourself a one-way ticket to obscurity.
		F2	(FIRST LIT.: **1906** *Dialect Notes* III. 148 Over three hundred negroes left Springfield, purchasing oneway tickets to many different towns.)
	c. Of a thoroughfare: along which traffic is permitted in only one direction; of traffic: passing only in one direction; also, of or pertaining to such traffic. Also *fig.*	G1	**1961** L.VAN DER POST *Heart of Hunter* III. xv. 202 The European+tends to believe that the consequences are only for the primitive and that he+is immune from them. But actually there is no one-way traffic on these eventful occasions.

		G2	(FIRST LIT.: **1914** *World's Work* Aug. 302/1 Some little has already been done in the small streets off Piccadilly to *request* drivers to avoid some streets when going north and others when going south, thereby aiming at 'one-way' traffic, but there is no power to enforce the requests. *Ibid.* 304/1 Where streets are too narrow to permit of the rotary system the difficulty can be overcome by on e-way streets.)
go a long way	**c. *to go a good, great, long, short way (to* or *towards)*:** to have a great, little effect; also, to have great influence *with* (a person).	H1	(*impression*, n.) **1843** DICKENS *Mart. Chuz.* (1944) v. 57 First impressions, you know, often **go a long way**, and last a long time.
	(cf. *go a great way*)	H2	cf. **1697** COLLIER *Immor. Stage* i. (1730) 18 A very indifferent Religion well Believed, will go a great way.
go a long way towards		H3	(*west*, adv., n. and a.) **1967** *Times* 3 Aug. 16/7 Making the Israeli pound legal tender side by side with the Jordanian dinar on the Israeli-occupied West bank should **go a long way towards** increasing imports of goods from Britain.
	(cf. *go a great way towards*)	H4	**1749** CHESTERFIELD *Lett.* (1792) II. ccxi. 308 Your stay at Rome will go a great way towards answering all my views.
go one's own way		I1	**(*individual*, a. and n.:)** **1856** FROUDE *Hist. Eng.* (1858) II. viii. 244 A determination in each individual man to **go his own way**.
		I2	(*escapement*) **1856** FROUDE *Hist. Eng.* (1858) I. iv. 327 He allowed her to **go her own way**, as the best escapement of a frenzy. (*F.T*)[52]
go one's own sweet way		J	(*sweet*, a. and adv.:) **1970** 'D. HALLIDAY' *Dolly & Cookie Bird* vii. 105 You **go your own sweet way**, or so the evidence tells me.
	(*cf. hold one's own way*)	K	**1848** DICKENS *Dombey* x,

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[52] In cases when instances of an expression could not be found by means of searches of the main words of an expression, or searches of entries equal to the whole expression, full text searches were made. Sentences found by means of full text searches are followed by the abbreviation (F.T) within brackets.

			People who have enough to do to hold their own way+had better be content with their own obligations and difficulties.
show the way	**15. a. *to show* (one) *the way*:** to guide a person in a required direction, by leading or accompanying him, or by giving him instructions; also *fig.* In *Racing* and *Hunting*, to lead; *to show the way from*, to draw away from, get before (in a race).	L1	**1869** M.Arnold *Culture & Anarchy* 192 So, too, one who wants to be a painter or a poet cannot help loving and admiring the great painters or poets who have gone before him and shown him the way.
		L2	(FIRST LIT: **1530** Palsgr. 703/ 1, I shewe him the way.)
see your way clear to		M	**1885** *Law Times* LXXIX. 342/1 He did not **see his way clear to** allow their names to remain upo n the register.
point the way		N1	(*finger*, n.:) **1612** Bacon *Ess., Judicature* (Arb.) 458 An ancient Clearke+is an excellent finger of a Court, and doth many times **point the way** to the Iudge himselfe.
		N2	(**singularism:**) **1911** J.Ward *Realm of Ends* 24 If the difficulties of Pluralism **point the way** to Singularism they will at least serve to make the character of the One clearer than any 'cheap and easy monism'+can ever do.
to go all the way, the whole way	a) to continue a course of action to its conclusion; *spec.* (*slang*), to engage in sexual intercourse (*with* someone), as opposed just to fondling;	O1	**1915** J.C.Powys *Visions & Revisions* 12 If you lack the courage, or the variability, to *go all the way* with very different masters,and to let your constructive consistency take care of itself, you may become, perhaps, an admirable moralist; you will never by a clairvoyant critic.
		O2	**1924** P.Marks *Plastic Age* xiv. 151 'Wonder if Janet would have gone the whole way,' flitted across his mind. (F.T.)
	(*b*) to agree completely *with* someone.	O3	**1922** H.J.Laski in *Holmes-Laski Lett.* (1953) I. 412, I can't go all the way with it, for if it was as a business man that the tyrant found the path to power I should have thought there would have been mention of it in Aristotle. (*absent*, a. and n.)

come a long way	**f. *to come*** or ***go a long way*** (with personal subj.: for impersonal subj. see <u>GO v.</u> 43c, d): to achieve much, to make much progress	P1	**1922** W.S.MAUGHAM in *Pearson's Mag.* Oct. 320/2 He had come a long way since then.
		P2	(FIRST LIT:) **1579** BURGHLEY in Nicolas *Sir C. Hatton* (1847) 126 Approaching to the house, being led by a large, long, straight fair way, I found [etc.].
along the way		R1	(*politickig*, vbl. n.:) **1934** *Sun* (Baltimore) 10 July 1/3 Mr. Farley+confided to 'the boys' that he expects to do considerable 'politicking' **along the way**.
		R2	(*dream* n:) **1937** L.BROMFIELD *Rains Came* Dedication, For all my Indian friends+but for whom I should never have+ understood the Indian Dream. *Ibid.* I. xxxiii. 144 A ruler who would cherish the dream and carry it a little way farther **along the way** to fulfilment.
superhighway	**super-"highway** *N. Amer.*, a road designed for high-speed traffic, a motorway; also *fig.*;	S1	**1949** *Word Study* May 1/2 A superhighway toward+success.
		S2	(**1925** *Amer. City Mag.* Apr. 373/1 The *Super-Highway is unique.+ It will furnish an express motor traffic highway.)
the Third Way	**third way**, **Third Way**, used in a variety of contexts to designate a third possible ideology or solution to a problem (see quots.);	T1	**1949** H.F.MINS tr. G. Lukács in R. W. Sellars et al. *Philos. for Future* 572 Modern phenomenology is one of the+ philosophical methods which seek to rise above both idealism and materialism by discovering a philosophical 'third way', by making intuition the true source of knowledge.
		T2	(*free-will*:) **1654** HOBBES *Liberty, Necess., etc.* (1841) 1 The **third way** of bringing things to pass, distinct from necessity and chance, namely, freewill.
way-out	**1.** Far removed from reality or from convention; extreme; progressive, avant-garde, advanced. *slang.*	U1	**1958** G.LEA *Somewhere there's Music* xix. 164, I turn on [*sc.* smoke marijuana] a little and I get way out.
		U2	(*kinda*) **1935** 'R.WEST' *Harsh Voice* ii. 132, I kinda like being **way out** beyond everywhere.
all the way 'support someone	'completely'	V	**1973** 'N.CARTER' *Spanish Connection* x. 112 I'm saying I can't buy your story all the way, Corelli.

completely in what they intend to do'			
down our way		X	(*Pestalozzi*) **1974** *Radio Times* 14 Mar. 25/4 **Down Your Way**. Brian Johnston recently visited Pestalozzi Children's Village, Sedlescombe, Sussex.

Table 14. Metaphorical and/or metonymic expressions including the term *road* supposedly coined after the turn of the 17th century.

Expressions that are included in the material.	*OED*		
	First figurative senses. (Literal senses within brackets.)		First figurative instances. (First literal instances within brackets.)
on the road 'travelling to perform', *road* 'a series of scheduled visits or appearances (as games or performances) in several locations'	'on tour'	A1	**1870** O. LOGAN *Before Footlights* xxviii. 367 The organ of the circus people+gives many curious details of circus-life Behind the Scenes, and 'on the road'.
on the road to 'likely to achieve' recovery, 'working again'		A2	**1878** in *St. George's Hosp. Rep.* (1879) IX. 779, I think it may be some time before she is quite right; but when the os and cervix are sound,+she will be on the road.
		A3	(*consummate*, a.:) **1868** M. PATTISON *Academ. Org.* v. 191 In Oxford+degrees in arts were not final or consummate degrees, but steps **on the road+ to** the doctor's degree.
middle-of-the-road	**1.** Phr., often used *attrib.* or quasi-*adj.*, pertaining to or designating a person who, or a course of action, etc., which, is moderate or unadventurous, tending to avoid extremes; orig. *spec.* in *U.S.* with reference to the views of the Populist party.	B1	**1896** *Congress. Rec.* 10 Dec. 80/2 The only honest Populist is the 'middle-of-the-road' Populist. **1927** *Amer. Speech* II. 443/1 The 'middle of the road' is the sacred path followed by compromising politicians who desire to promote their own or their party's fortunes. (FIRST LIT.:) **1777** P.THICKNESSE *Year's Journey* I. vi. 43 It is necessary+to keep in the *middle* of the road, so as not to be too suddenly surprised.)

	(**2.** Of (usu. popular) music: avoiding extremes of volume, beat, etc., so as to appeal to the widest possible audience; deliberately unadventurous and inoffensive; mediocre. Abbrev. *MOR* s.v. <u>M</u> 6.)	B2	[**1958** L.A.G.STRONG *Treason in Egg* ii. 35 A steady middle-of-the-road musician whom they felt they could trust to lead them throughthe morasses of contemporary music.]
	(Hence **middle-of-the-roader**.)	C	**1896** *N.Y. Tribune* 21 July 2/2 If the Bryan faction predominates, the Middle-of-the-Roaders will bolt and nominate another candidate.
reach the end of the road 'cannot continue' *has come to the end of the road* 'finished'	**h.** Phr. **the end of the road** (*transf.* and *fig.*).	D	**1924** DILLON & LAUDER *End of Road* 4 Keep right on to the end of the road. Keep right on to the end. (FIRST LIT. taxi, n.:) **1922** M.A.vonArnim *Enchanted April* ix. 135 A taxi stand was at **the end of the road**.
on the right road	*right*: **d.** Leading in the proper direction or towards the place one wishes to reach. Also *transf.*	E1	(*about-turn*:) **1942** C.S.Lewis *Broadcast Talks* 1. v. 29 If you're on the wrong road, progress means doing an about-turn and walking back to the **right road**
		E2	(FIRST LIT. *right*, adv.) **1814** D.H.O'BRIEN *Captiv. & Escape* 95 Happening to hit the right road, I resolved to follow it for some time.)
get the/this show on the road	'to get started (*colloq.*)'	F	**1957** J.BLISH *Fallen Star* II. vii. 88 They came trooping into the thawing shack.+ 'That's enough,' Jayne said at last. 'Let's get this show on the road.' (F.T)
road trip 'to travel to other places to play games against other teams or for business reasons'	'with reference to sporting fixtures played away from home'	G	**1961** *Newsweek* 14 Aug. 44/3 He broadened teammates' minds by reading sensitive passages aloud during road trips. (F.T)
down the road	in the future. *U.S. colloq.*	H1	**1964** MRS.L.B.JOHNSON *White House Diary* 17 Nov. (1970) 204 It was a sad good-by for all of us. But one good thing, we know we'll always be seeing each other **down the road**. (FIRST LIT. *lark*, v.2: **1813** P.HAWKER *Diary* (1893) I. 68 Having larked all the way **down the road**.)
		H2	(*squanderlust:*) **1960** *Wall St. Jrnl.* 5 May 8/2 Politicians+, moved +by an any-year philosophy of squanderlust, lead the country **down the road** to economic

			trouble.

Table 15. Expressions of which no figurative instances/no instances at all were found in the *OED*.

Expression in my material	*OED*		
	Sense		*First instance*
no way round	-	A	(*opaque*, a. n.:) (**1667** MILTON *P. L.* III. 619 Whence **no way round** Shadow from body opaque can fall.)
pass by on the other side (of the road)	-	B	(NO FIG.) (**FIRST LIT.: 1968** *Listener* 9 May 601/2, I was occasionally loused-up myself, and people, rather than pass me, used to go **on the other side of the road**.)