Classification from Antiquity to Modern Times

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Classification from Antiquity to Modern Times

Sources, Methods, and Theories from an Interdisciplinary Perspective

Edited by
Tanja Pommerening and Walter Bisang

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Einbandabbildung: Relief mit Kranichen und anderen Vögeln, Replikat der Darstellung aus dem Grab des Ptahhotep, Saqqara (um 2400 v. Chr.) (Foto: ADD der Universitätsbibliothek Mainz)
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Dietrich Busse

Frames as a Model for the Analysis and Description of Concepts, Conceptual Structures, Conceptual Change and Concept Hierarchies

Summary: Frame models are generally understood to be instruments for explaining, analyzing and describing concepts or terms and conceptual structures. They are also suitable, however, for describing conceptual change, or for describing changes in entire conceptual systems and concept hierarchies or systems of classification. The concept of *frame inheritance* as used by some frame researchers particularly emphasizes the classificatory aspect of conceptual knowledge. Although current frame research has yet to provide complete approaches to analysis and description of conceptual systems, the author of this chapter would like to show how an analysis of conceptual knowledge and concept hierarchies can gain in clarity and provide structuring options from the perspective of frame theory.

1 Introduction

Human knowledge, especially abstract knowledge, is generally understood to be conceptual in nature and seen as structured by concepts. This is a truism as long as one accepts that the term *concept* or its derivation *conceptual* refer not only (or at least not primarily) to words, that is linguistic signs, but principally to the mental content or knowledge components behind them. Even though serious philosophical and linguistic doubts are often raised about the concept of *concept*, and have in particular been raised about many current theoretical and philosophical conceptions connected with this term, yet this term and the idea of an analysis of knowledge in the form of a conceptual analysis are still (again?) enjoying a certain popularity and currency. This is true especially in recent and very recent tendencies, in the cognitively based research on cognition, knowledge, and significance, concentrating on the terms *term* or *concept* as the core of the theoretical models.

More recent cognitive science (which combines cognitive psychology approaches, philosophical and thought theory approaches, linguistic and language-theoretical approaches, and artificial intelligence models) makes prominent use of concepts and conceptual structures (or ontologies) in its central theoretical considerations. More advanced models from this area actually attempt to theoretically throw light on the precarious relation, always present to some extent when using the term *concept*, between individuality and society, i.e. the individual-psychological disposition and

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the supra-individual conventional, social character of the knowledge structures which constitute concepts, as well as between concrete situative realizations referring to individual cases (*tokens*) and the general knowledge structure transcending the individual case (*type*). One theory in particular, that of *frames*, offers a model with which the structure of conceptual (or, if preferred, concept-related) knowledge can not only be explained, but practically described, too. While in conventional research on concepts as practised in all disciplines (mostly, but not always, carried out empirically for, and within the area of the history of concepts) a more hermeneutic – often quite strongly intuitive – form of description of conceptual structures or significance dominates, we need to demand of a systematic conceptual analysis that it be able to serve both to explore and to describe conceptual knowledge with maximal reflection and methodological systematicity (as far as this is possible at all in the fields of knowledge analysis and semantics).

This paper presents some thoughts on what such a systematic analysis might look like if *frame semantics* are applied to it. It is assumed that the approach suggested (or other, similar approaches) is valid as a universal theory and method for various conceptual domains (disciplines), and that it is suited especially (and more so than other, older models of semantic and conceptual analysis) to lay open and describe the structures of very complex abstract concepts and conceptual systems. After a short reflection on some basic theoretical and methodological issues and the discussion of some aspects concerning concepts, concept theory, and conceptual analysis, the conceptual model of frame analysis will be briefly sketched. Against this background, it will be possible to discuss why exactly this model was chosen for the descriptive approach to conceptual analysis. After that, specific aspects of conceptual relationships and systems will be dealt with, so as then to reflect on the possibilities and limits of frame-semantic conceptual analyzes, especially in view of the aims of a history of concepts.

2 The concept of *concept*

The use of the terms *concept* and *meaning* is often quite unreflected in many publications dealing with linguistic problems, , both within and outside of the language sciences, and even in language philosophy. It is mainly based on everyday language, or at best on terminology within specialist disciplines, but it lacks linguistic reflection. The fact that the term *concept* is chosen as a reference point of semantic analysis shows in itself a certain understanding of the function and value of *concepts*, which ascribes a central role to these in the process of linguistically delimited acquisition (or constitution) of reality (or knowledge of the same). In everyday use, the expressions *word* and *concept* are not clearly distinguished. Definitions, such as those often met with in

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dictionaries, which explain *concept* with 'meaning of a word, ideal content',[1] do not by any means cover the everyday use of this expression. In many, if not most, non-specialist uses, *concept* is a synonym of *word*, although not an exact one. This everyday understanding thus reflects the fact that it is not as simple to separate the ideal content from the word(s) carrying it as it might seem. Yet *word* and *concept* are not used in an identical way in everyday speech. The main meaning of *word* clearly has to do with specifically linguistic characteristics, the language sign (Saussure's *signifiant*, the external side of the linguistic sign), whereas the main meaning of *concept* places the aspect of the sign, the external side of the linguistic sign, more in the background, emphasizing the meaning (Saussure's *signifié*, the internal side of the linguistic sign, the mental momentum of 'comprehending'). But in the use of *concept* in everyday language, the intellectual side of the sign is not completely separated from the specifically linguistic side, the character of the word possessed by the linguistic sign, in contrast to such separation in scientific texts. Daily language, as a rudimentary reservoir of centuries-long theoreticization processes, thus reflects the variance in the definition of *concept* that has been an integral part of thinking about language since Plato.

Two determinants still dictate today what is generally understood by *concept*: on the one hand, *concept* as an abstractive synopsis of object characteristics, on the other, *concept* as a higher-ranking word (in relation to its abstractive function). The aspect of linguistic signs being used in communicative acts of expression, and that this use can be not only meaningful, but also forms the power of language to constitute reality, has, by contrast, been overlooked in the definitions of *concept* and *word* and the difference between these notions. It has been overlooked by a perception and conception of language which wanted to see thinking (and thus the mental side of concepts) as independent of language, which was wrongly seen as a purely mediating instrument.

The problem for every analysis of concept is how to deal with the subsumption (in a traditional understanding of language) of the concept, perceived as purely mental and therefore individual, in the form of a linguistic sign by the medium of language, which transcends the individual. The perception of concepts as purely cognitive entities leads to any conceptual idea being private, if its constitution (or, put in a more modern way, its cognitive representation) cannot be shown to be a genuinely linguistic process. The thought of a completely private nature of conceptual ideas is a wrong assumption when the analysis of concepts is to be used to represent the analysis of trans-individual (and only in this sense objective) knowledge. Concepts must be intersubjective, *objectifiable*, by means of language as a process of communication and understanding. According to Wittgenstein, we acquire concepts with the meanings of the words in their usage; they

1 This remark refers to the German term *Begriff* as defined in a popular dictionary (Wahrig 1979: col. 614 f.). The English term *concept* seems not to reflect the double meaning of *word* (of a certain kind) and 'meaning/content of a word' as the German *Begriff*. (For more details cf. Busse 2011, and Haller and Mittelstrass 1971).

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are not delimitable or finite (Wittgenstein 1971: §§ 67–71). A single word has a meaning for us only when it is used in a concrete context, and only against the background of the systems of significance constituted by a language, called 'language games' by Wittgenstein. 'Wenn sich die Sprachspiele ändern, ändern sich die Begriffe, und mit den Begriffen die Bedeutungen der Wörter (Wittgenstein 1970: § 65).' ('When the language games change, the concepts change, and with the concepts the meanings of words.') And with these, the things we have referred to with the words change for us, too; our image of reality changes.[2]

What is commonly referred to as *conceptuality* appears to be a conglomerate of attributions of characteristics, abstractions, cross-references and situational references, all of which are the result of a multitude of communicative acts in which individual linguistic signs can be the trigger or the point of reference, of aspects of meaning (themselves constituted by the context of application), but which can never represent the *object* (or the *concept*) as a unit in its totality. Concept words thus induce the synopsis of communicative experiences, which can never be exactly the same for all speaking individuals of a language community. What could be designated a *concept* is not constituted by individual uses of signs, but by the totality (or by a multitude) of sign uses in a continuum of acts of utterance, texts, and discourses. If one wants to reconstruct *concepts* analytically, one must look for them at their place of constitution, the acts of sign use within the framework of communicative acts (regardless of whether these occur orally or in the form of texts and text constituents).

Since the *cognitive turn* at the latest, models that regard *concepts* as purely mental phenomena are en *vogue* in linguistics and linguistic philosophy. Cognitive scientists, in particular, mostly talk of a *level of concepts*, which is often wrongly seen as being separable from the *level of language*. According to the interpretation accepted here, the question of a possibly language-independent or pre-linguistic level of concepts does not arise, the problem of describing the relation of cognition and language with regard to the language and the cognition of the people using language does not pose itself.[3]

2 Wittgenstein often uses *concept* and *word* nearly synonymously, thus making clear that whatever embodies a concept is, for him, explicable and *comprehensible* only with reference to lexical use (and that means to lexical meaning). The lexical use serves as an *example*, a *paradigm* for what is to be grasped as *thing*, and can have meaning in turn only in the context of the language game belonging to it.

3 From what I can see, cognitive evidence in animals makes it not unlikely that we should assume the possibility and existence of a pre-linguistic level of cognitive category-formation. Whether one should call this a *conceptual level* is extremely questionable. But one should never forget that there are areas or levels of cognition in the language-cognizant human being which cannot be categorized, and thus conceptualized. Their *content*, if one can and should use this concept here at all, are thus not linguistically accessible and not directly communicable. See the pertinent discussion by Wittgenstein on expressions of pain.

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As far as people have a language and use it, as Wilhelm von Humboldt said so unforgettably, it may be assumed that

> the word, … adds a good part of itself to the concept. (The word which first makes the concept an individual in the mental world also adds a considerable part of itself, and, as the idea receives by means of the same determination, it is simultaneously held within certain limits.)[4]

If one takes *concept* here to be chiffre for thought, the episteme, the knowledge structures, then the relation between linguistic elements and elements of knowledge (cognition) is as follows, according to Humboldt: Even when the thesis of a complete identity between language (e.g. the semantics inherent to language in their sum) and knowledge (or thought) is not being supported here, yet the fact that epistemic content can only (or mostly) be expressed and thus communicated in linguistic form does considerably influence the structure and content of knowledge itself. ('The word […] also adds a considerable part of itself.') Knowledge elements can only be identified in as much as we have the linguistic means to isolate them and to evoke them. ('The word […] makes […] the concept an individual in the mental world […]') Without words (linguistic means of expression) there are no identifiable thoughts (epistemic elements); only through them does what is thought first receive an identity, the ability to be (re)called and repeated; but this also means that only by means of words does thought become changeable and able to acquire a history. ('The idea attains definiteness through the word.')
At the same time, the linguistic means give structure to the epistemic content and limit it, tying it into the corset of linguistically constituted structures, as it were. ('The idea is held captive by the word in certain limits.')

By way of a preliminary conclusion, then, the unit *concept* cannot be considered in complete dissolution from units of the type *word* (or more exactly: 'linguistic sign'). Quite apart from what one may think of their relation as a theoretical consideration, it is irrefutably the case that a practical, analytical approach to concepts can only be made through words, texts and text corpora. Words (texts, linguistic-communicative acts) are thus the decisive key to access to the concepts, to the content behind the words, to the knowledge communicated or alluded to in language. The relation between word and concept becomes accessible primarily through the momentum of knowledge, the episteme. Cognitive processes in the language-using human being operate to a greater (and in our context more interesting) extent on and with knowledge which has been constituted and structured in the use of language. The connecting factor is the schematization of knowledge and the architecture resulting from this.[5] The concept of *frame* has been suggested for these formations of schemata. In

4 'Ueber das vergleichende Sprachstudium' (1820), cited after Humboldt 1985: 20.
5 On the aspect of the architecture of knowledge, cf. the considerations in Busse 2005.

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linguistics this is known as the concept of the *semantic frame* in the sense of the 'interpretive semantics' of Charles Fillmore.[6] In the field of general cognitive science, it was Marvin Minsky (1974) who exemplified the frame character of the knowledge required for certain optical perceptions.[7] I personally prefer the term *knowledge frame*, so as to emphasize the general, basic nature of this concept.

The formation processes of schemata (or the formation of knowledge frames) are linguistic insofar as only (or, if you want to be more cautious, especially) the active use of the schemata (frames) in acts of linguistic communication stabilizes (gives them continuity) these schemata, enriches them with knowledge, and renders them changeable. 'The word adds a part of itself to the concept' (Humboldt), in that the epistemic schemata which form concepts, but also those that go beyond this, are only laden with epistemic material (elements of knowledge) through their use in the context of linguistic utterances/texts. (With an eye to the theory of signification or meaning, it makes some sense in this context to recall Husserl's distinction – referring to the interpretation of signs and symbols – between 'sense-giving [mental] acts' or 'meaning-conferring [mental] acts' and 'meaning-fulfilling [mental] acts' (Husserl 1913: 38). One may assume that this distinction can also be established in the case of schemata/frames. One could then speak of *fully specified* frames and distinguish these from frames that are not epistemically/with regard to content fully specified, which however would not permit complete comprehension.) As both the linguistic signs and the frames/schemata forming the basis of their comprehensibility can fulfill their (complete) epistemic function only within a context, one can speak of a process of *contextualization* with regard to a reasonable comprehension of linguistic signs (sentences, texts).[8]

Language is, so to speak, the *medium* in which not only articulation and communication of social knowledge takes place, but in which this knowledge is, at the same time, constituted and structured as such (i.e. as social knowledge). Language (and language events such as texts) is thus by no means the *archive* of this knowledge. If an *archival* metaphor is to be applied in any way at all to language, then one could perhaps best characterize language as the *index* or *register* of the archive of social knowledge. This *index* or *register* contains only references; these references are something that every speaker of the language must first of all epistemically realize and substantiate for him/herself in the course of the process of understanding (more precisely: in the course of the processes of concluding and inference that lead to com-

6 For an overview, cf. Fillmore 1977 and 1982; he speaks there, too, of the 'semantics of understanding'.

7 Here with a clear reference to the schema theory of Bartlett 1932; on the central role of Bartlett's schema theory in frame theory, see Busse 2012: 311–331.

8 The concept of contextualization used here is an epistemic *contextualization*, thus it means something like 'situated in a structured (in respect of content, and thus not accidental, but always contingent) arrangement of frames/schemata'. Cf. on this in more detail Busse 2007.

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prehension). One can call this in Husserl's sense the 'fulfillment of sense'. Language as the register of knowledge fulfills its task in that the individual signs and their specific combinations *evoke* (Fillmore)[9] knowledge (frames, schemata and frame or schema complexes) in each case. Frame theory, with its foundation in and on cognitive and linguistic-semantic science, is an effective means of making accessible, and describing, the epistemic content of concepts more precisely than was possible with the old models of semantic or conceptual *feature-lists* or *lists of semantic markers* (so-called 'checklist semantics', as Fillmore called it in his severe criticism of 1975). How this is possible, and how it is done in practice, will be explained in more detail in the following.

3 The conceptual model of frame theory (what is frame semantics?)

Generally, frame theories (theories of knowledge frames) understand frames (or knowledge frames) as 'structures consisting of concepts or ideas'.[10] Frame semantics, or – more generally – frame theory as it is presented today (particularly in linguistics) is, nevertheless, not a monolithic block, not a closed model, but rather a heterogeneous set of concepts with the most varying ancestries in different branches of science, each of which shows, to some extent at least, very different goals of knowledge, objects of research, and basic assumptions. The frame semantics of the linguist Charles J. Fillmore (and of the research association founded by him, FrameNet, with its centre in Berkeley) – the only genuinely linguistic frame concept – is rooted in thoughts and theorems, some of which are quite different from those of the frame models in the cognitive sciences, such as the models of Marvin Minsky (1974 and 1986), Schank & Abelson (1977) and Lawrence Barsalou (1992).

While Fillmore's linguistic frame model had and still has roots and theoretical points of reference to a much greater extent in valency grammar and the syntactic theory of 'case frames' derived from this in Fillmore (1968), the cognitive frame concepts of Minsky and Barsalou or the closely related script model of Schank & Abelson, have borrowed heavily from the schema concept of the memory psychologist Frederick Bartlett (1932). While Fillmore focuses on 'frame evoking' types of words, primarily verbs in their function as semantic and syntactic structural centres of the sentence frame (and evaluates the other types of words, such as nouns, adjectives, adverbs etc.

9 For reasons of space, I will not discuss the difference between *evoke* and *invoke* introduced by Fillmore 1982. However, cf. on this Ziem 2008: 231–237 for a wider-ranging, affirmative discussion, and (critically) Busse 2012: 122–131, 203–209, and 644–670.

10 Thus i.a. Fillmore 1992: 40 and 2006: 613, as well as Barsalou 1992: 31.

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primarily with regard to their function in a semantic or knowledge structure dominated by the verb), Barsalou's (1992) frame idea – as Minsky's (1974) – aims primarily at nouns (nominal concepts/ideas).

If a frame (knowledge frame) is defined as a *structure consisting of concepts*, then this means something else for Fillmore than it does for Barsalou or Minsky. A frame according to Fillmore would be a structure consisting in concepts/ideas forming, for example, the basis for the semantics of a sentence (meaning concepts for the verb content, for the subject noun, for the object noun[s], and so forth). In contrast, a frame according to, say, Barsalou would be an epistemically or cognitively viewed (nominal) concept, complex and structured of and for itself, which in turn consists of (sub- or part-) concepts; every frame is itself, in turn, a structure consisting of frames, or, in Barsalou's terminology, every concept (every idea) must be comprehended as a structure of concepts (ideas). (The idea of the recursivity of all frame structures or conceptual structures or knowledge structures which underlies this thought was, incidentally, borrowed from linguistic syntactic theory by the cognitive scientist Barsalou.)[11]

What Fillmore's sentence- or verb-oriented conception has in common with the general cognitive frame model founded by Minsky (1974) is his talking of slots (or, terminals in Minsky 1974), here understood as blank positions for arguments and their fillers. It is this notion of slots that makes up the charm, the distinctiveness, and the essential core of frame theories and that has rendered them so attractive to so many scientists in a multitude of disciplines. Valency theory in linguistics, which deals more with sentence structure, borrowed this basic idea metaphorically from chemistry, or, more exactly, from the conceptual difference between the bonding ability of atoms and the concrete bonds met with in given molecular structures. By the circuitous road of linguistic valency grammar, primarily focused on sentences and the binding ability of central sentence predicates in the form of verbs, and its semantic extension to case frame theory in Fillmore (1968), this model was then transferred to the content structures of concepts. Here a few points should be mentioned which act as the centre of the frame idea being discussed and further developed in many disciplines (such as linguistics, cognitive science, psychology).[12]

A frame or knowledge frame is a structure of knowledge in which a certain constellation of knowledge elements is grouped, with reference to a structural frame

11 Recursivity in the syntactic sense means the embedding of a sub-structure with a certain construction in the (super-)structure of the same type. Thus, for example, a nominal group such as *the friend's father's brother's house* itself contains an attributive nominal group *the friend's father's brother's*, which in turn contains an attributive nominal group *the friend's father's*. According to Barsalou 1992, such recursions are in principle endless when the principle is described within frames, i.e. endlessly divisible or refinable.

12 The following description is based on the thesis-like summary of the core ideas of frame theory/-ies in Busse 2012: 819–827.

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core which can be understood as an *object* or *theme* of the frame; the constellation of knowledge elements functions in this perspective as a frame-constituting element. These knowledge or frame elements are not epistemic quantities *filled out* with concrete data; rather, they act as slots, to which, in an epistemic contextualization (embedding, *filling*), concrete (*filling out*) knowledge elements (so-called *fillers*, *values*, or attributions) are allotted.[13]

Thus, frames represent knowledge structures (to put it in somewhat simple terms) that attach to a category certain attributes, which in turn can be filled out with certain concrete values. (In other frame theories, the attributes are called 'blank positions' or *slots* and the values are called *fillers*.) The type and number of attributes of a frame is not laid down once for all, but varies. Thus, new attributes may be added.

Frames are then generally understood to be *structures made of concepts* (*concepts* understood here as purely epistemic quantities or entities), which, since all concepts in turn are structured in the form of frames, reveal themselves to be structures made of frames. As far as frames essentially specify (epistemic) possibilities and constraints of expansion (of further detailed frame elements), their structure can be described as an *arrangement consisting of epistemic relations* (to the attached elements and among them).

Since frames, in this view, are basic structures (elements) of cognition/knowledge, and thus are to be assumed on all levels of their description, it follows compellingly that different *levels* and *types* of frames (and frame analysis) must be assumed. Within the framework of an application of frame theory to semantic or conceptual analysis, the following dichotomies approximately designate level differences that must be taken into consideration in frame theory and frame analysis: *individual* versus *social*; *short-term memory* versus *long-term memory*; *token* versus *type*; *actual (meaning)* versus *occasional (meaning)*; *concrete* versus *general*; *exemplar* versus *category*.

In the description of frames (as conceptual structures), then, the description of the slots or attributes or terminals and their relation among each other and to the frame core, has a central function. This can be defined as follows: the slots (terminals, frame elements, *attributes*) of a frame are the knowledge elements that are connected to a firm set of such elements in a particular frame, and that constitute this frame, and that define the *object of reference* (the *theme*) of the frame. These knowledge elements are not fully specified in their epistemic content; rather, they simply establish the conditions that must be fulfilled by concrete and specifying knowledge elements

13 With such structures, linguists immediately think of the valency framework in dependency grammar according to Lucien Tesnière 1959, which are discussed in modern research under the concept of 'argument structures', but also of the concept of *subcategorization* from the linguistics of the 1970s. A valency framework is opened by a verb. Thus, the verb *give* (as in *donate*) opens a three-place valency framework (one then says that the valency of *give* is three-valued) which provides for places for an agent of the verbal action (subject), the object being given (direct object), and the recipient of the gift (indirect object).

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when they, as constitutive characteristics or components of a frame, are to render said frame an epistemically completely specified (*instantiated*) arrangement of knowledge. As the slots establish concretising conditions for the epistemic characteristics of the fillers, they can also be characterized as a *set of conditions of attributes* (or *set of conditions for attributability*, *set of subcategorization conditions*).[14]

In so doing, the following must be taken into consideration: the characteristic of being a slot (a terminal, an attribute) is not attached in an absolute sense to a knowledge element, but only in relation to a higher-ranking frame. In isolation, such knowledge elements form their own frames, with their own slots/attributes in turn subordinated. The *slots* or *attributes* that are important for an epistemological analysis are those ascriptions of concepts (functioning in this relation as *aspects*) for which there exists, in the linguistic/cultural community in which this attribution occurs, an established convention of attribution. Slots determine the relations (and thus also types of relations) which subsist between the frame core and the specified knowledge elements (*fillers*, *fillings*, *values*) which are attached by means of these relations. But the knowledge elements themselves can be characterized as relations between the set of attributive conditions defining them and the frame of reference. In other words, between the *slot*/*attribute* and the frame core that is thus specified there exists a relation of allocation, a correlation.

A working definition of the fillers or values could be as follows: ascriptions/fillers/values are those knowledge elements which are attached via slots or terminals to a (general, abstract) frame, so as to make this an epistemically fully specified frame of knowledge (an instantiated frame, an instantiated concept). *Ascriptions* or *fillers* or *values* important for an epistemic analysis are those attributions of concepts (that function in this relation as *fillers*) to other concepts (that function in this relation as *slots*) which form expected or possible concretisations/instantiations of the general type conditions of the slot, according to the conditions that define the slot (terminal, attribute) of this frame.[15]

Here, too, it is important to note that the characteristic of being an attribute (a filler, a value) in such a conceptual structure does not attach absolutely to a knowledge element, but only in relation to a superordinated slot (attribute). In isolation, such knowledge elements form their own frames, with their own slots/attributes, in turn subordinated, and ascriptions/fillers/values. In token frames all ascriptions/

14 In linguistics, the concept of subcategorization designates e.g. that a verb such as *bark* (of dogs) not only requires an agent as subject (that results already from the valency requirement lexicalized with this verb), but that this agent must belong to a category that is more closely specified by a characteristic such as doggish, canine.

15 (Important terminological notice: Barsalou 1992 uses *attribute* for *slot* and *value* for *filler*; so the term *attribution* in this paper has to be understood in the sense of *process*, i.e. *ascription*, and not to be confounded with Barsalou's term *attribute*.)

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fillers/values must be specified (as far as the conditions of filling determined by the slots or attributes require this).

As long as slots are not taken up (depending on the situation and context) by concrete, specific ascriptions/fillers/values, they are occupied by standard fillings (default values) added from conventionalized (prototypical) knowledge. Instantiated slots (slots in a substantiated and instantiated frame) can, as a rule, only be taken up by a single ascription/filler (a single value).

To illustrate this, and to make things clearer, the figures 1–3 below show a schematic representation of two (albeit relatively simple) concept frames according to Barsalou (1992) and then the representation of a predicative frame according to Fillmore et al. (2002) and FrameNet:

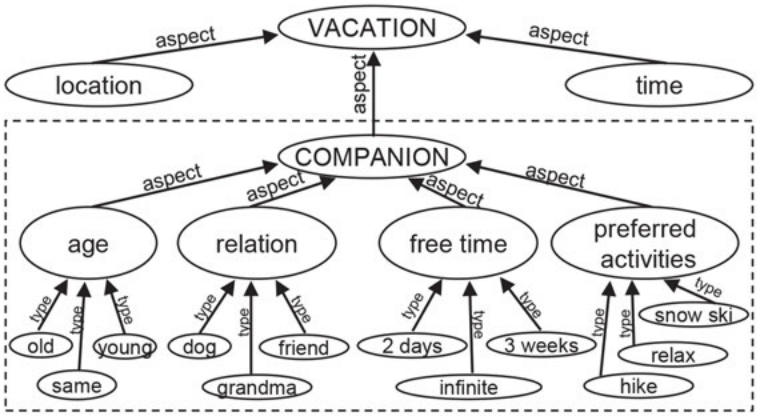

Fig. 1: Attribute frame for companion according to Barsalou 1992: 33; 62

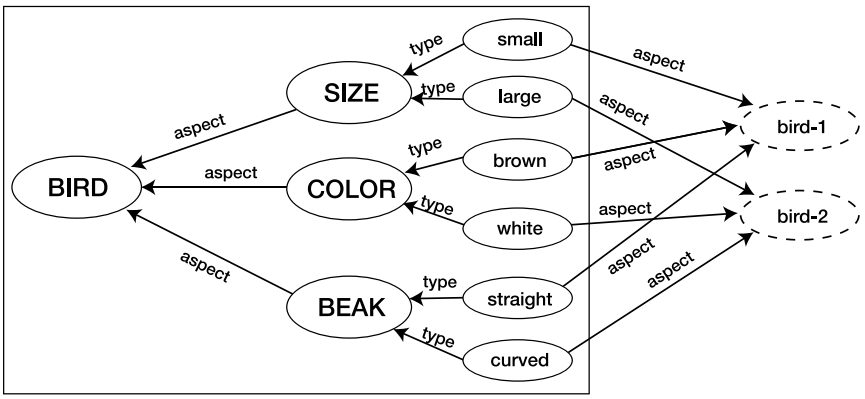

Fig. 2: Representation of tokens/exemplars for bird according to Barsalou 1992: 45

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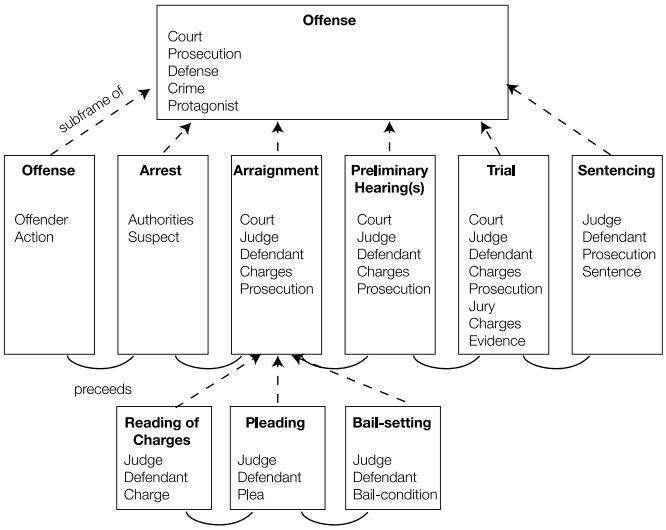

Fig. 3: Criminal process frame from Fillmore et al. 2002: 5

A linguistic (semantic) frame analysis, but also a conceptual one, thus registers, with the assumption of *frames*, structures in knowledge (relevant to comprehension). It is generally agreed by nearly all researchers active in frame research that there is no way to distinguish strictly between *linguistic knowledge* and so-called *encyclopaedic knowledge* (or *knowledge of the world*). An important interaction between the *linguistic* and the generally epistemic levels is to be seen in the fact that linguistic signs focus knowledge of the world in a specific manner. (See, for instance, *perspective* according to Fillmore 1977, which he sees realized through the verbs *buy*, *sell*, *pay*, *cost* in the example of the Commercial Event frame.) But it should be noted here that this interaction between *linguistic* and generally epistemic levels is strongly influenced by *recursivity*, *undelimitability*, *flexibility* and *vagueness* (Barsalou 1993 has emphasized this particularly).

Using the frame model for the purposes of a conceptual analysis (as is the central focus of this examination), frame elements show up as conceptual elements (attachment positions, *slots*, *attributes* of a category). Barsalou's frame elements, which he calls *attributes*, are, with reference to the lexeme class of nomina, typically classes of characteristics that can be specified in the reference objects of a category (size, colour, material, etc.). Within the group of characteristical frame elements, one can and should distinguish between so-called *structural* frame elements and *functional* frame elements/attributes. *Structural frame elements* refer typically to attributes such as COLOUR, FORM, MASS in the case of physical entities (things, living things, people); PLACE, TIME, GOAL etc. in actions, events, etc. *Functional frame elements/attributes* have most recently also been subsumed under the name *affordances*. Affordances are typically assumed in the case of objects and things (usually artefacts). A possible

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working definition of *affordance* would perhaps be: *functional characteristics, in relation to people, uses, purposes, of things* (e.g. *nail*, *hammer*, *screwdriver*, etc.).

Frames can also be regarded as subdivided, organized, in different structural levels. An important type of the internal structure of frames is centred on the pair of concepts *type-token*. A distinction referring to these might be the distinction between *abstract pattern frames* and *concrete exemplar frames*. Strictly speaking, this is not a distinction within a single frame, but a distinction referring to different types or levels of frames. The relationship between the two levels is not only a difference between a structure consisting of empty slots (or slots filled simply with standard values) and a structure consisting of filled (with concrete values) slots. Rather, exemplar frames can augment a pattern frame by adding slots, when these occur more frequently (via a larger number of exemplars, or in especially salient exemplars).

Frames (on the level of general social knowledge structures, i.e. patterns or types) are not simple and closed structures. On the contrary, one must reckon with considerable social variance in the degree of 'granulation' and differentiation of the frames. Owing to the general principle of recursivity, frames are, in principle, knowledge structures that can be infinitely refined. This shows in that, in social domains with different needs of knowledge, the differentiation of frames varies, too (typically known as the so-called expert/layman divergence).

The key words *frame systems* or *frame nets* have been used in the literature hitherto mainly for discussions of conceptual taxonomies (so-called *ontologies*). Beyond the interconnectedness that results in such taxonomic orderings of knowledge, the associative relations between frames and frame elements, based frequently on analogous formation, perception of contiguity, and metaphorical transfer, should not be underestimated with regard to their constitutive and structuring effect on knowledge.

Thus far the general outlines of frame theories as the basis for a semantic frame description, or one aiming at conceptual analysis. It has become clear that some representatives (in cognitive disciplines) of frame theory, at least, conceive of frames primarily as conceptual structures (in a double sense: internal structures of concepts and structures consisting of several concepts, conceptual systems). In this way, frame theory has become an important contribution to a theory of concept. Frames or concepts are seen here as knowledge structures, i.e. as complexes consisting of knowledge elements which are arranged internally in a regulated, structured relationship to each other. The advantage of frame theories as opposed to previous concept theories is to be seen primarily in the ability to allow a structural description of the internal semantic, conceptual or epistemic structure of concepts, based on uniform criteria and a unified model of structure.

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4 Frames, conceptual orders, hierarchies and frame systems

In work on frame theory, too, it is often overlooked that an important impulse in developing the frame conception was formed by the hope of being able to better and more systematically explain and describe relations between concepts, up to and including complex conceptual systems (concept hierarchies and so-called *ontologies*), with this model. It is not well known that the founder of the cognitive variant of frame theory, Marvin Minsky, in his later monograph for the basis of a theory of cognition (*Society of Mind*, 1986), complained clearly about, and was surprised at the total lack of attention to what he held to be the core and the actual goal of his 1974 text (especially to what was really new and went beyond previous schema theories, for example, that of Bartlett). This core aspect, which he also used as the title of a partial printing of his paper at that time, was *Frame system theory*. This aspect still plays hardly any role in research even today, although pursuing it further would be of great use in exploiting the frame model as the instrument of a general analysis of knowledge and epistemology (one could say 'the architecture of knowledge', cf. Busse 2005). Yet the explanation and description of the relations between frames and the structures within frame systems must remain an important point in any frame analysis, also – and especially – in linguistic semantics, as systematic aspects implicitly result from it again and again, whether in connection with ontologies and taxonomies or in connection with phenomena such as *frame inheritance*, *frame proximity* or *frame analogy*.[16]

4.1 Frames as structures consisting of frames and relations

While Fillmore first conceives of frames in a rather real-world encyclopaedic way, as representations of holistic *scenes*, Minsky builds the idea into his model from the start that frames themselves are in turn structures made of frames. This becomes clear when he defines the so-called *slots*[17] as *terminals* (*connective positions*), and adds that we use these to add frames to frames. In Barsalou, too, it becomes clear that frames, being constellations of concepts and concepts themselves in turn represent frames, are always structures consisting of frames. As is well-known, Barsalou narrows the whole thing down to this: Frames are basically recursive (all components of frames are themselves frames). Since *attributes* (slots) of a frame, according to Barsalou, are frequently highly complex embedded frames, one could also define a frame as a kind

16 The following description is based strongly on chapter 7.6 in Busse 2012.

17 The frequently used German term for the English term *slot*, i.e. *Leerstelle* ('empty or blank position') is far less adequate than Minsky's 1974 original term *terminal*, that could be translated to German as *Anschlusstelle* (*connective position*).

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of *mini-system* consisting of frames. But not only slots or attributes are organized like frames; naturally values, including the standard values themselves, invoke frames, as Ziem (2008) emphasizes. That is, every frame is, per se, an integral component of an extensive conceptual network (which, according to Ziem, is organized hierarchically by means of superordinate relations). It would be wrong to understand frames as mere formations of *elements*; they are this, too, but that is not all. By means of the concept of *slot*, in particular, the aspect of *relationality* is highlighted. In other words, frames are *structures consisting of elements and the relations* obtaining between them. More precisely, a good part of what goes to make up frames refers more to relations, types of relations, general conditions for relational attachment and so forth, than to information in the sense of static *elements*.

Bartlett had already underlined this thought when he pointed out that any knowledge is always knowledge of relations (interconnectedness). Relationality is already inherent in the concept of schema (as a predecessor of the frame idea) in the form of a basic characteristic. Barsalou, too, understands frames as 'dynamic relational structures' whose form is flexible and dependent on context. An important aspect in frame analysis is formed not only by the frame-constituting relations between the frame core and the sub-frames or value frames (or default value frames) attached by attributes (slots). Equally important are the relations, as Minsky was the first to emphasize, that exist between the elements (concepts, frames) attached to a frame. These relations, too, are not random, but specified, or at least they can be.

While Minsky and Barsalou focus on relations *within* frames and between frame elements (core, attributes, values) in the same frame (one could call these *intra-frame relations*, except that there is a risk of absolute misunderstanding, unless one constantly keeps in mind the basic recursivity and non-rigidity of frames), Fillmore is more concerned with the relations *between* frames (one could then call these *inter-frame relations*), as they exist in hierarchical, taxonomic circumstances (as super- and sub-frames) – he calls this *frame inheritance*. Besides this, Fillmore also mentions *frame blending* and *complex frames* as types of inter-frame relations. *Frame inheritance and taxonomic levels*, *epistemic frame connectedness and frame systems*, *types of relation between frames and frame elements* and *types of frame systems* are thus topics within the context of complex frame structures which need to be further investigated. At this point, however, I can only discuss them very briefly.

4.2 Frame inheritance and taxonomic levels

In the development of the frame model by Fillmore and FrameNet, the idea of *frame inheritance* plays an increasingly important role. This fact is mainly due to experiences from trying to describe the frames for lexematic meanings in linguistic semantics, since this soon raised the question of whether certain slots or attributes that can be determined for a frame-constituting concept should be descriptively registered on

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a more general or a more concrete level. Let us take, by way of example, the frame for a lexeme such as *to bark*. For the description of the slot AGENT, apparently, one has something of a dilemma as to whether this is to be classified as *dog* (or having one or more characteristics of a dog), or as *animal* (with the specification sub-category *dog*), or as *living thing* (with the specification sub-category *animal*, and then the sub-specification sub-sub-category *dog*), and so forth. In other words, the same problems occur as the ones that always occur in conceptual hierarchies or taxonomies. In frame research, Konerding (1993) in particular has drawn the most radical conclusion from this circumstance, in that he has developed a graded scale of categories in conceptual hierarchies for the description of frames (he calls this approach 'hyperonym type reduction'), which, in the end, leads to extremely abstract so-called *matrix frames*, of which the concrete frames are always the sets of derivations or concretisations, attained by reducing the number of slots. The closeness to conceptual systems (a speciality of science in the Enlightenment of the 18th century, thus at the apex of encyclopaedism) is quite remarkable.

Fillmore started by introducing and explaining the idea of frame inheritance with the example of frames for verbs. *Frame inheritance* is the *elaboration* of a more general (and more abstract) *parent frame* by one or more *child frames*. In so doing, the child frame *inherits* all the frame elements and characteristics of the parent frame, but can *add* its own additional elements and characteristics to these. Examples named include: a general MOVEMENT frame and TRAVEL as its realization. The parent frame and child frame(s) thus behave towards each other like superordinate concepts and subordinate concepts in conceptual hierarchies (taxonomies) and ontologies (in whose image these frames are clearly conceived of, although this similarity is not more closely examined).

In contrast to such conceptual and hierarchical frame-to-frame relations, designated *frame inheritance*, the frame relations designated by Fillmore and FrameNet *sub-frame relations* (or *frame compositions*) represent a kind of *part-whole relation*. A typical example of this are partial actions (or partial course of events) as more comprehensive complex chains of action (or courses of events). Thus, to come back to the example of TRAVEL, partial or sub-frames such as DEPART and ARRIVE show this. Sub-frames share only some frame elements with the superordinated frame (thus, the PERFORMER frame element in the superordinated frame TRAVEL and in the sub-frames DEPART and ARRIVE is identical). It then depends on the specific character of the sub-frame (or the type of embedding of the sub-frame in a superordinate frame) as to what kind of frame elements, and how many, agree in each case. For example, in a complete PICNIC EXCURSION frame, the PERFORMER frame elements are identical in the superordinate frame TRAVEL and in the sub-frames DEPART, ARRIVE, CONSUME FOOD, but need not be so in the sub-frame PREPARATION OF FOOD.

Larger courses of events or action complexes are, in the FrameNet project, divided into partial actions or events, each of which is then described as a frame (a sub-frame). The analysis does not just touch upon what is recognisable in everyday

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life as a partial action or partial aspect (as is the case in a TRAVEL frame with the partial aspects DEPART, DRIVE [vel sim.] and ARRIVE), but upon very subtle part elements, which can only be tapped intellectually by means of an epistemologically/cognitively oriented breaking down. The example ARRIVE in *Jack entered the room* can be described as a transition between two conditions (A = Jack is not in the room, B = Jack is in the room), each of which shall represent sub-frames of the superordinate frame. The application of the frame relation *sub-frame* in FrameNet extends from such very subtle partial aspects of events to such *large-scale* frame compositions as the CRIMINAL TRIAL with all its partial events, partial actions, courses of events, etc.

In contrast to inheritance relations, sub-frame relations reflect the relations between constitutive elements of a whole and the whole itself. A sub-frame therefore represents a *constitutional relation*, while inheritance is an *abstractive* (or *specifying*) *relation*. Each is thus on a different theoretical level. They are, however, connected, insofar as the identification of sub-frames may require steps of abstraction which do not always reveal themselves in everyday consciousness from the start. Thus far, at least, the registration of this type of frame relation does demand a decidedly abstractive look at frames of the semantically relevant knowledge.

The most important aspect of frame relations according to Fillmore concerns the recurrence of frame elements (in this case: actant frame elements in predicative frames) in several frames, either as identical frame elements or as relations between more general and more substantive versions of frame elements. One could, with the same justification, speak of *frame-element relations* instead of *frame relations*. The aim of describing frame relations is primarily to enable semantic generalizations across more than one frame. Referring to the definition of frames, typical for FrameNet, as 'systems of concepts', the frame relations are then designated 'semantic relations between collections of concepts'. With this, the connection between Fillmore's frame inheritance and conceptual taxonomies becomes clear. But with this, the concept of frame inheritance also *inherits* all the problems entailed by 'conceptual hierarchies'. Here, too, we are dealing with a relation between levels of higher abstraction and levels of lower abstraction.

Taxonomic *inheritance* relations (in the sense of superordinate/subordinate concept) are what Minsky, too, has in mind, when he emphasizes that every frame is embedded in superordinated (higher-ranking) frames. Barsalou concisely sums up this aspect with his recursivity axiom. He particularly underlines the special power of the frame model in analyzing taxonomies, *conceptual combinations*, and *conceptual fields*. The aspect of attributes and values (slots and fillers) being connected to each other in frames through inheritance relations (i.e. superordinate and subordinate concept relations) leads, then, by the principle of recursivity, to taxonomically graduated inheritance chains. In this sense, Barsalou speaks of recursively graduated attribute taxonomies. He ascribes an important heuristic value to these for the construction of knowledge systems by the single individual. According to him, frames and frame systems help individuals to develop and build taxonomies from existing

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epistemic material. He then speaks of *conceptual fields*. Frames and frame inheritance relations can then structure complex conceptual fields in their entirety. Barsalou pleads the case for the strong thesis that 'Every frame defines an implicit conceptual field'. These conceptual fields are understood in a purely cognitive way and are not to be equated with the *lexical fields* of older schools. On the basis of the recursivity of frames, conceptual fields, according to Barsalou, can grow in exponential fashion, but most positions of a conceptual field are not lexicalized (only a minority is).

The taxonomic conception of (or perspective on) frame inheritance and frame systems leads to frame systems sharing the problems of all taxonomic hierarchies, for instance, when one understands them as systems consisting of inheritance relations. These problems are particularly pertinent in the practical description of meaning in linguistic semantics. The deeper one enters into a frame hierarchy, the more subslots can be established. (This corresponds to the increase in semantic characteristics on the lower levels of a conceptual hierarchy). In contrast, there is the problem that top-level categories in taxonomies are very abstract and can often no longer be expressed by a corresponding lexical term—a fact that sometimes gives rise to serious problems of naming descriptive categories. From a view that understands taxonomies as descriptive methods (cf. Konerding in particular) rather than as theoretical models (as does Barsalou, perhaps), the main problem with taxonomic approaches is, however, that they pretend to reflect a totality which, in fact, cannot actually be attained with encyclopaedically aligned descriptive models, in contradiction to the emphatic claims generally made by these very models.[18]

Another problem with frame taxonomies comes from the area of *type-token*. While on the level of the current frame instantiation (a level that Barsalou, for one, primarily, although not exclusively, has in mind) probably *inheritance* relations can be comparatively precisely determined (and the relation between slots and fillers can also be understood as an inheritance relation), this may turn out to be considerably more difficult on the level of abstract patterns, particularly if the function of signs as either *types* or *tokens* is involved as well. One reason for this is that epistemic relations (knowledge relations) can grow rampant in actual everyday knowledge because of *analogy*, a problem that is known in semantics since the 19th century. As is well-known, human beings are masters at seeing (sensing, feeling) analogies. These do not simply stop where supposedly systematical conceptual hierarchies and inheritance relations would tell them to do so, and they would not even permit themselves to be limited by these factors (apart from the fact that every conceptual system is always the result of a certain, historically perhaps only accidental, view, idea, ideology, or

18 For example, the practical test to which Lönneker 2003 (according to Konerding 1993) subjected the taxonomic model of hyperonym type reduction is very sobering. Konerding's top level frames (which he names 'matrix frames') covered only 38% of lexemes in one of Lönneker's corpora in a first step. Only after they were complemented by new, ad-hoc matrix frames did they manage to cover 89%!

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everyday theory, which may confront other views with other criteria of classification and inheritance relations). The aspect of frame inheritance and taxonomic relations must, then, in any adequate frame theory and analysis, always be complemented by the view of other, less systematic, epistemic frame connections and systems resulting from *unsystematic* (or systematically/taxonomically not strictly explicable) cross-references/analogies.

In summary, the aspects of frame inheritance and taxonomic orders can be described as follows: Frames are recursive hierarchical structures consisting of knowledge elements that can, in turn, be described as frames. In this sense, frames are always structures made of sub-frames and supra-frames. A central aspect of frame structures is that, as we have seen, attachment positions (slots, terminals, attributes) can determine categorial characteristics of what is attached (fillers, values). In the taxonomic view, this implies that the fillers 'inherit' categorial aspects from their slots. This aspect can be called *frame inheritance*. Inheritance, seen this way, is a typical characteristic in hierarchically graduated conceptual systems i.e. in conceptual taxonomies. Besides the inheritance relation between slots and fillers (attributes and values), there are also inheritance relations between frames and superordinated (more abstract) frames, in regard to which the given frames represent specializations. It is important now to realize that such inheritance relations do not only refer to individual, isolated conceptual characteristics (knowledge elements). An essential effect of the recursivity of frames and frame structures is that certain *constellations of frame elements* (together with the typified relations existing between them) can also be inherited. This mainly unburdens cognition, since certain constellations of frame elements then only need to be stored once for an entire system of hierarchically graduated frame elements (or only the differences, additions or reductions). This can be observed in actant constellations in actant frame systems. For example, numerous frame elements are typologically identical in the specialized individual frames of a TRANSPORT frame system (PLACE OF DEPARTURE, DESTINATION, ROUTE, DIRECTION, ENERGY EXPENSE, etc.).[19] But it can be observed in other categorial frames and their frame elements of characterization as well. Thus, in frames for PHYSICAL OBJECTS, frame elements such as FORM, COLOUR, SIZE, MATERIAL are always present (if not always relevant to the same extent).

Sub-domains of such inheritance relations can be organized (or described as such) in taxonomic, hierarchically constructed conceptual systems, as far as the material or the subject matter permits. I regard the construction of such hierarchical taxonomies

19 And the specific thing of a 'Beam me up, Scotty!' frame is roughly that the frame element PATH, provided by the system, is more or less null instantiated, at any rate dissolved from its normal characteristics, irrelevant.

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(or rather: partial taxonomies)[20] as an *instrument* of human cognition or epistemes, which is better adapted to certain subjects and areas of life, and less so to others. To put this in a different way: one may not misunderstand the taxonomic character of conceptual systems or frame systems as a value in itself (and one most definitely may not hold this to be ubiquitous); rather, one must always keep the instrumental character (sometimes productive, but sometimes misleading, too) in mind. Looked at it this way, the approach set forth by Fillmore and FrameNet is right in saying that taxonomic inheritance relations should only be assumed in the description/analysis where they are unavoidable and have a recognisable additional benefit.[21]

4.3 Epistemic frame connectedness and frame systems

Frame research was drawn early on to the relations between frames and frame connectedness in knowledge which cannot simply be reduced to taxonomic structures. Various kinds of frame connectedness were identified. Fillmore pointed out, comparatively early, that not only the activation of a single frame/schema was needed for lexeme-related knowledge, but also knowledge of the schemata (scenes, frames) with which the word/lexeme itself (or the frames it activates) is connected. Fillmore mentioned structures similar to lexical/semantic fields by way of example, although he regarded the actual theory of semantic fields as inadequate. From a perspective that goes beyond Fillmore, one can also understand verb frames (such as BUY, SELL, PAY, COST) as partial frames of an interconnected frame system which realizes different perspectives of a common total scene called 'commercial event'—a term they mentioned by him as the starting point for the development of a frame theory. Minsky extended this aspect of perspectivization to perspective in the literal sense in visual perception, and described the different perspective frames of a visually perceived object (e.g. a table whose legs are completely covered and two other ones with partially covered legs), two others with partially covered legs) as elements of a *frame system* of the *total object*. This *total object* cannot be a purely 'visual' system. It is rather a cognitive or epistemic system integrated into the memory system, since there can be no *total perspective* on a visually perceived object.[22] *Frame systems* are not

20 These are called, terribly misleadingly, *ontologies* in computer linguistic (and to some extent in cognitive) literature.

21 It is in any case known from cognitive lexicology that a median level of taxonomy (not too abstract, not too concrete) is evidently preferred in the mental lexicon.

22 For these *frame systems*, too, the following is valid: the different frames of a system share the same slots. One can see quite well that this is not just a characteristic in inheritance relations. I would assume rather that such relations, as they are described here by Minsky, enjoy priority to the inheritance relations in taxonomic conceptual systems. Hence, the latter prove to be a special case of a more general phenomenon, for which Minsky's examples represent something like the original form.

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limited to visual perspectives as introduced by Minsky, they can be extended to any epistemic system. Fillmore's perspective frames on action complexes or events are an example of this. Frame systems as combinations of several perspectives or single aspects are therefore a more general phenomenon of knowledge and its structures.

The above remarks show that knowledge as it is relevant to comprehension is characterized by a high degree of complexity and structuredness. Frames are the format for reflecting the organization of such structures, including frame systems and networks. Beyond the interconnectedness which is the result of taxonomic orders of knowledge, the *associative* relations between frames and frame elements, often based on the *formation of analogies*, the *perception of contiguities*, and *metaphorical transfers*, should not be underestimated with regard to their constitutive, structuring effect on social and individual knowledge. Frame systems can constitute themselves, in that the various individual frames of a system share common basic constituents (slots, attributes) or even groups of constituents as in the case of sets of frames that look at the same thing from various perspectives. In this case, they can be compared to inheritence relations, for which the same holds true as well. Frame networks can also be created by slots in other frames which are filled by more complex frames which get entangled with the epistemic structure of these frame networks through this fact. That is the case, for instance, if the complex legal frame *property* has a constitutive role in the meaning of the term *theft*. The description of such structures and networks of frames is a matter for applied epistemology and is of a clearly encyclopaedic character. This circumstance is best recognised in the Fillmore/FrameNet project association, where taxonomic considerations have been minimized in favour of a more descriptive, *thesaurian* approach to analysis, which is believed by linguists to be the most adequate approach to the objects of linguistic semantics.

Frames or frame elements (or groups of frame elements) do not only belong to one and the same frame (e.g. as slot frames and filler frames that are assigned to a category concept as the elements constituting such a frame), they also form connections with different degrees of epistemic solidity. If such connections are of a certain duration and stability, one can speak of frame systems or frame networks. Depending on the types of connections, one can distinguish the following *types of frame system* (without any claim to systematicity and independence of criteria):

4.3.1 Frames as a frame system

Every frame is first of all a frame system in itself (owing to the principle of recursivity), because it consists of subordinate frames (sub-frames, e.g. in the case of an instantiated frame consisting of attribute frames and value frames). Object frames for physical objects are one of the prototypes of such a *frame system* which is most frequently discussed in the literature. Minsky himself called these frames 'frame systems', arguing that completely formed frame systems exist only for the most important objects (not

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for all objects!). In this case, one may speak of *micro-frame systems*. The pertinent type of relation for such frame systems is the *slot-filler relation*.

4.3.2 Taxonomies

Taxonomies are complex macro-frame systems that divide into numerous levels and groups of subordinate frame systems. The well-known conceptual hierarchies are a typical case in point. Taxonomies are characterized by hierarchical relations (superordinate or supra-frame, subordinate or sub-frame). Superordinate frames in taxonomies determine the frame elements (slots, default values) of the subordinate frames (either individually, as an inheritance of frame elements, typically however as the inheritance of groups of frame elements).

4.3.3 Congruency networks

In contrast to the hierarchical relations in taxonomies, frame systems in the sense of congruency networks are based on matches of individual elements of knowledge. The pertinent type of relation for congruency networks is the relation of *parallelity* (or more precisely: *congruency in the absence of hierarchical relations*). Here, neighbouring frames share single frame elements or groups of them. A connection to taxonomy exists in that co-hyponyms in a hierarchy are always also congruency networks in the sense defined. Perhaps congruency networks are a prerequisite for the creation of taxonomies. A special case of such a congruency network is the well-known *lexical/semantic field*.[23]

4.3.4 Seriality networks

The individual frames in *seriality frame networks* may share single frame elements or groups of frame elements. If so, they share this property with congruency networks, even though this is not a necessary condition. What characterizes this type of networks are consequential relations (results) in the broadest sense. *Seriality networks* occur in the form of event frame systems and action frame systems (or as mixtures of the two). One can (and should) distinguish at least the following sub-types of seriality:

23 Congruence networks in the sense thus defined correspond to what Minsky called 'similarity networks'.

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a. Temporal seriality
These are chronological sequences (*series* in the most narrow sense), with no implication of any logical causal relation. Most forms of such temporally constituted frame networks will be culturally conditioned (if they are not causal) and for that reason they cannot always be clearly distinguished from sub-type (b). An example could be WORK-OUT IN THE GYM and then right after that VISITING THE SAUNA THERE.

b. Culturally conditioned seriality
This type of seriality consists of sequences of action frames, event frames, or both of them. They are based on socially anchored knowledge concerning the seriality of results in terms of conventions or prototypes. Examples are SKIING and APRÈS-SKI, or, more particularly, institutionalized systems of consequences with result relations, such as SERMON and BLESSING, or Fillmore's CRIMINAL TRIAL etc. As far as they are not based on causal relations, the *scripts* in the sense of Schank and Abelson (1977) (at least to some extent) belong to this sub-type.

c. Causally conditioned seriality
What is meant here are frame systems that connect frames on the basis of causal relations. Causal relations are a type of such result relations about which there exists solid individual or social knowledge, or both, on the foundation of reliable supra-individual sources of knowledge. At the core of causality, reliable coherence naturally exists; but there is also socially (or culturally) conditioned causality (of the type of results that require no further verbalization: 'They caught John with a BAC of .15 …'). Causal seriality always presupposes temporal seriality (a result cannot exist in the world before its cause), and is therefore, in the end, a special case of temporal seriality. The descriptive or backward-directed perspective of causality corresponds to the forward-directed or hypothetical perspective of conditionality. The frame relation types causality and conditionality play an important role in the so-called scripts. Prior to systematization of the script analysis, the script concept should not be determined for causality and conditionality too quickly (as it is the case in Schank and Abelson). Between causal, cultural and temporal seriality relations there are mutual overlaps, so that frame systems (such as, for example, scripts or script systems) are likely to be mixtures of different seriality types. The *plans*, *goals* and *themes* postulated by Schank and Abelson are sub-types of frame systems closely associated with causal and conditional relations.

d. Linguistic seriality
Linguistic seriality may constitute a further sub-type of frame networks. It occurs, for instance, in all syntagmatic relations, which one might also describe by syntagmatic contiguity. What Barsalou calls 'sentences' and 'texts' in the context of frame networks qualify as good examples of linguistic seriality. But simple sentences, at any rate, belong to type 1 in the sense of Fillmore's predication frame model: frames as frame systems. Complex texts (e.g. tales, novels, scientific monographs) are very

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special and strongly convoluted frame systems requiring special treatment and can hardly be comprehensively accounted for in terms of a pure frame analysis. They would at least strain frame semantics to the point of breakdown.

4.3.5 Associative networks

The type of frame systems or networks with the *weakest* form of relations are the *associative networks*. The relations pertinent to associative networks occur in different forms. Relevant types of relation are at least the relations of *contiguity*, *similarity*, *partial congruence* (e.g. semantic isotopies in the sense of Greimas 1969), and *(procedural) correlations/co-occurrences*.

a. Contiguity
This type of relation is constitutive of frame systems of type (5) only if we are not dealing with contexts already created by another type (for instance, by type (1) *frames as frame systems*). Thus, for example, the part-whole contiguity is to be counted – as a rule – as type (1). Contiguity always occurs when certain frame connections do not belong to the knowledge constituting concepts, yet are frequently to be expected.[24] Contiguity can but does not have to create frame systems or networks, but does not necessarily have to. That is true particularly of the following sub-type.

b. Similarity
The relation of *similarity* (in its constitutive form for frame networks) is always strongly dependent on subjective evaluation and perceptions; similarity must be *seen*.[25] There may be numerous words in natural language that, in the end, are based on something very much like similarity networks. Take some fashionable expression, such as *chav*[26], as a label for a class of object frames whose close relation is not strictly defined by element congruence, but rather via associative relations. In such a case, there is no *concept* in the strict sense of the word but there is an expression which can be taken as a label for an associative network – here in a pejorative sense as a social stereotype.

24 Thus, there were times, for example, when the frames Automobile and Gloves entered a solid connection in the sense of contiguity (occur in common, but without necessity).

25 When Minsky, then, designates the congruence networks, in the sense defined above, 'similarity networks', this is misleading, for he means factual agreement in clearly determinable frame elements, which does not apply to the usual understanding of similarity.

26 The original German example was *Warmduscher* that cannot be well tranlated in English. (Meaning a person who prefers to have a warm shower – contrary to hot or cold, used in a non-literal, pejorative sense for certain traits of personality or behaviour.).

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c. Partial congruence
In contrast to congruence networks as described under frame systems of type (3) above, the connectedness of this sub-type of (5c) is created by only a few frame elements. A rather well-known case is represented by certain types of the so-called isotopic relation (defined on the basis of individual semantic characteristics, thus not of entire meanings or concepts), as Greimas postulated them within the framework of the structural semantics of the 1960s. Isotopic relations create associative chains and can thus constitute entire networks out of the frames involved. Possibly, affordances are particularly well-suited to creating such associative frame networks , since they go back to only a single element (e.g. the associative frame network, tried and proven a thousand times in party games: 'what I would take with me to a desert island').

d. (Procedural) correlations/co-occurrences
Finally, there may possibly exist a type of *associative frame networks* that are created by something that one might call *procedural contiguity*, and that cognitive psychologists might describe like this: whatever is frequently processed together cognitively, can enter into associative concatenations in the memory. Every language system knows such forms of concatenation based on procedural co-occurrences.[27] In particular, however, there are probably mixed forms of connection, created by frequent or salient co-processing between the data of various channels of perception (seeing, hearing, smelling, tasting, feeling).[28]

5 Performance and limits of frame-semantic analyzes

The empirical research on frame analysis is still too new and too rarely applied – in the sense of systematic research comprising the entire spectrum of theoretical models and possibilities – as yet to have attained a conclusive evaluation of its potential and its limits. Linguists such as Fillmore and cognitive scientists such as Minsky and Barsalou have made impressive lists of what might be investigated with the help of their rather different types of frame models in the field of concepts and language in the broadest sense. Beginning with verbs, nouns and sentences, through cognitive concepts, texts, morphemes, metaphors, anaphors, presuppositions, to prepositions and conjunctions – nearly everything in the field of linguistics has been named as a pos-

27 Much of what is called 'constructions' by Fillmore may belong to this category.
28 This is certainly where the phenomena of so-called synaesthesia belong; these can grow to be genuine illnesses. In particular, certain types of traumatic disturbances are a part of this too. (This sub-type 5d may not be easily separable from sub-type 5a of associative contiguity.).

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sible field for the application of some kind of frame research. The programmatic part, then, is certainly ambitious.

However, there are good reasons to asume that this is not going to happen. It will not be possible to analyze all the phenomena described above equally well. Taking the example of Fillmore's *background frames*, it is even unclear to what extent they can be integrated into Barsalou's model of frames. It is true of many of Fillmore's prime examples (*orphan*, *widow*, *bachelor*, *vegetarian*, *on land*, *on the ground*) that the knowledge associated with these concepts is so complex and demanding that a suitable paraphrase may require a greater number of additional frame elements (structures, relations), which in turn need to be analyzed and defined with all their elements in a frame-semantic way. In this way, one would rapidly arrive at a rather complex description. This is true too, as we have seen, of analytically complex concepts such as those typical of the world of law,[29] but certainly also of other kinds of complex concepts, such as those in philosophy, or maybe the basic historical and social concepts as Koselleck (1972) and others saw them.[30] Such complex structures probably will not permit descriptions within a single frame (and certainly not, if this is a graphic), but must be divided into numerous sub-structures, each of which is first investigated for its own sake, before they can be integrated into superordinate structures.

Thus, it would surely be mistaken to see a magic genie in frame theory that can solve all theoretical problems concerning concepts and semantics and just about any possible research question. The frame theory is strong where it fills in the gaps left by older theoretical conceptions of meaning (such as feature semantics, logical semantics, word-isolating lexical semantics, logic-based compositional sentence semantics, word- and concept-isolating historical semantics). More precisely, frame theory comes in wherever the scope, the complexity, the subtlety, the power to distinguish, and the epistemic connectedness of the knowledge relevant to comprehension or to concepts has been (sometimes severely) underestimated in older models. In the field of analyzing complex conceptual structures, concept competition, and conceptual change, frame analysis can unfold its special ability to perform, and is, as far as I can see, superior to other approaches. The limits of its possibilities become (and can become) visible only when these possibilities are tested in empirical analyzes of the most various kinds in the most various fields of semantics or concept analysis. The history of concepts and the investigation of conceptual systems could be one of these fields.

29 For more details and examples of frame analyzes of legal terms, cf. Busse 1992; 2008a; 2008b.
30 For more details on 'Begriffsgeschichte', i.e. conceptual history as founded by Koselleck 1972, cf. Busse 1987; 2003; Busse and Teubert 1994; and, with relation to frame theory, Busse 2007; 2008c.

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Figures

Fig.1: After Barsalou 1992: 45.
Fig 2: After Barsalou 1992: 45.
Fig 3: Fillmore et al. 2002: 5.

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