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Hypertext and (Grammar) Learning¹

1 Introduction

For about ten years now, the internet and, particularly, the world-wide web (www) and its key feature "hypertext" have presented challenges to all university disciplines. Perhaps, linguistics is particularly challenged, because the new medium with its new text-types creates new (English) language styles (cf. Crystal) and because hypertext is not only a new opportunity to present material on the www, but forces us to reconsider traditional key notions in applied linguistics, like text, reading, learning, etc. (cf. Jucker 2000).

For our purposes we define hypertext pragmatically as non-linear text units with hyperlinks in HTML, especially on or for the world-wide web or internet. This corresponds for instance with Storrer (2000, 227-28), who defines internet and the www as non-sequential, non-linear and interactive through nodes and links (similarly from Kuhlen as early as to Jakobs). Generally this means an (electronic) interactive information system with data stored in a network of nodes which trigger links to connected text units. This simple concept has been criticised for good reasons: some have argued that non-linear should be called multi-linear, others point out that hypertext also occurs in multimedia combinations of text, graphics, audio and video, it thus should be called hypermedia (e.g. Jucker 2002 and this volume). This illustrates that "hypertext" has become part of an intricate taxonomy (cf. Esser and Bublitz this volume). However, the following concrete discussion of problems should be relevant to the "common core".

In our discussion of (language) learning materials on the www, we have to distinguish different types of hypertext: from linear hypertext, which is basically HTML-encoded normal text on the world-wide web where you can only go forward and backward (thus it is hyper-

¹ In this title "Grammar" is in brackets because I think that the following considerations are also relevant for other types of language learning like vocabulary learning, where new elements have to be integrated into word-webs (cf. Aitchison chap. 4 or Lemberg).

Of course, e-learning also has a socio-political context, because recently e-universities and e-learning in Germany have been debated in the university globalisation context, since this is a major issue in "knowledge societies" generally (cf. Rüschoff/Wolff). In linguistics, for instance, new concepts like the virtual linguistics campus or the virtual centre for teacher training in Marburg are pioneering projects in practice, although some of the central general challenges in applied linguistics have not yet been met.

For numerous discussions on the topic I wish to thank all my collaborators in the "InternetGrammar" project (1999-2003), particularly Katrin Voigt and Christoph Haase. The project was supported by the German Research Foundation (DFG) as part of our "New Media" research group. It is accessible free on <<http://www.tu-chemnitz.de/phil/InternetGrammar/>>.

text only technically, not structurally), to hierarchical hypertext, where you can also go up and down, e.g. from the table of contents to chapters. Of course, the most advanced, most complex and most prototypical type of hypertext is a semantic net, which illustrates all the associations, connotations etc. that can be detected related to a specific node. Figure 1 tries to visualise such a network. My argumentation here concerns mainly the structure not the content, although I included grammar terms in the slots to illustrate basically a network of knowledge representation for English learners. Later (in 2.3) I will distinguish between a conceptual network (in human cognition) and a virtual network (in a computer).

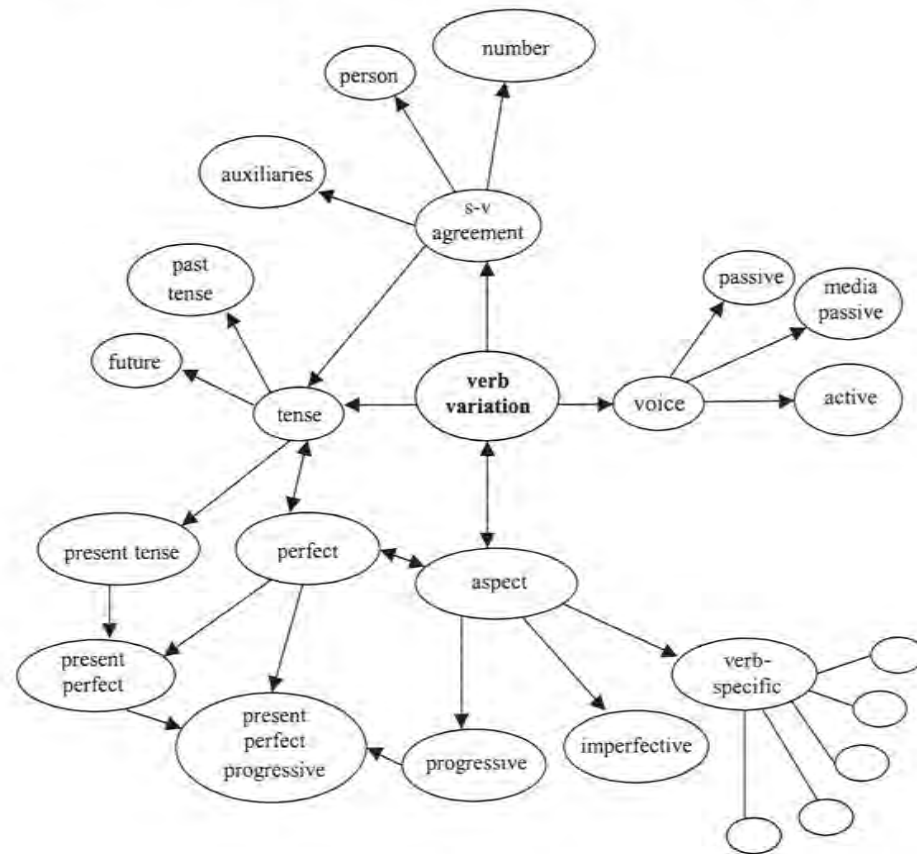


Figure 1: A simplified semantic network of English verb variation.

The following discussion of hypertext learning is particularly important for complex systems of the network type, since this contribution derives from the practical experience gained from our own complex hypertext system, the Chemnitz Internet Grammar (CING). It seems suitable as an example, not only because of its complexity, but also because of the 'cognitive plausibility' hypothesis (cf. 3.1) and because it offers a special example of active, user-specific reading. It thus provides a bottom-up approach to hypertext (similar to

Busse/Plummer this volume) from a writer and reader perspective, when we see "hypertext as an interactionally organized event, which is produced and interpreted in and through the process of communication" (Fetzer this volume).

In this project we see grammar as a complex web of form – function relationships. If cognition is organised in a network and E-language (as encoded in a grammar book) is only a weak reflection of I-language (the grammar in our head), then grammar can be seen as a flexible hypertext system, like in the CING (cf. 3.2).

The central idea of the CING is that it offers readers choices to construct their own (dynamic) texts, partly through options for integrating sample material from suitable databases and partly through hypertext choices (cf. Pittas/Sommerville/Saunders). It is thus an extreme example of "self-created hypertext", because readers can expand the reading material autonomously (the corpus examples) and create their individual text unit sequences – and "self-selected paths are the real *raison d'être* for hypertext as an interactive medium" (Fritz 223). This offers particular challenges to text-, cognitive and psycholinguistics.

However, we can only discuss details of the CING system when we limit ourselves to specific examples. My standard example within the complex CING system is English aspect (cf. Table 1). Aspect relates the verbal action to the general external temporal situation (thus verb semantics and situational context are variables of the classification below) or, as Comrie (3) puts it: "aspects are different ways of viewing the internal temporal constituency of a situation". The contrast is for instance *she goes* vs. *she is going to school*. From a formal perspective it is often called continuous, from a functional perspective progressive, because that is the most prominent of its meanings. But beyond the simplest school grammar, continuous forms have obviously several, and sometimes contradictory, meanings. We can summarise them in a hierarchical order starting from the most prototypical progressive and imperfective down to other meanings related to the particular verb-semantics. If we want to illustrate and thus explain these aspect usages on one hypertext page, we can devise an abstract classification system in four columns (Table 1): major and minor (sub)concepts, prototypical "best examples"² verb-semantics and contextual parameters. Standard examples are usually best to illustrate the concepts and the remaining two categories in this Table.

2 An immediate response test to provide examples of English progressive typically includes sentences with a time conjunct like *while*, a durative verb like *read* and two simultaneous actions, which obviously signal the core of progressive function.

Table 1: English aspect meanings depending on verb semantics and context meaning (based on Huddleston/Pullum 162-68)

aspect concept	"proto example"	verb semantics	context meaning
progressive:	<i>he was reading</i>	<i>durative</i>	long reference time
imperfective:	<i>she was phoning</i>	<i>durative</i>	simultaneous reference time
waxing/waning:	<i>you are making more and more/fewer and fewer mistakes</i>	<i>devel.-telic</i>	linear development up/down
<u>aktionsart-contrast/emphasis:</u>			
non-accompl.:	<i>she has been learning</i>	<i>durative-telic</i>	mid-interval implicature
time-expansion:	<i>they were nodding</i>	<i>punctual</i>	iterative
dynamizing:	<i>he is being silly</i>	<i>stative</i>	temporary
temporary:	<i>she is studying at Hull</i>	<i>durative</i>	limited duration
non-habitual:	<i>she is mowing the lawn</i>	<i>'serial'</i>	single event

In this discussion, however, we are more concerned with the convincing presentation of a complex content than with the content itself. In a modern hypermedia system, reader-friendly support systems can be introduced by:

- step-by-step presentation, i.e. information can be provided gradually or sections or columns added successively in a logical order (and complex parts only for advanced users),
- colour-coding, i.e. in the four different columns above, concepts could be in dark red (or bold black), examples in brown (or italics), verb-semantics in green (or in bold italics) and context meaning in blue (or normal font) (and the colour codes reoccur in the following more detailed sections) and, of course,
- explanatory pop-up windows, i.e. all the technical terms ought to be clickable so that the students who need them can help themselves to more detailed explanations.

Apart from these technical support systems, the complexity of the system can be illustrated in "related text units" that bring in other hierarchies between (sub-)concepts of English aspect. In a "footnote" it can be made clear that we should not forget other meanings of continuous forms, so our hypertext system contains at least brief explanations of time meanings (for instance "near future plan": *I'm phoning her tonight*) or idiomatic meanings in discourse (like *How are you doing ... Nice talking to you*). Sometimes these meanings are combined with special collocates, for instance with modal auxiliaries, where you have a non-epistemic *I must be going* meaning 'immediate action is required' and an epistemic *he must be studying hard* as a deduction or even conviction.

This brief example shows clearly that a complex grammar chapter can be illustrated in a complex hypertext network, although because of its conceptual complexity it is not easy, despite modern technical structuring devices. However, this structuring violates the assumed open-choice ideology of a hypertext system, since not all links are equal and sometimes the web author finds it advisable to use a hierarchical colour-coded system and other devices to

guide the reader even in a supposedly non-linear, non-hierarchical, non-sequential hypertext web.

2 Hypertext, context, and concept-formation in reading

If we are interested in hypertext learning or in how knowledge is acquired from the internet, the difference to traditional reading should not be overestimated. Thus it is easy to show that even a traditional academic text has hypertext structures. In Figure 2 below a section from the *Cambridge Grammar* (Huddleston/Pullum) is presented in the original book form as well as in a modified hypertext format, using a paragraph on aspect as an example. The real issue is how hypertext reading leads to contextualisation and conceptualisation. This can be demonstrated using the English present perfect as an example, again from the *Cambridge Grammar*. We can contrast two examples of categorisation hinted at by Huddleston/Pullum and a related alternative concept as well as the different concept of categorisation of present perfect from the *Comprehensive Grammar of English* to show that presentation determines conceptualisation.

2.1 "Traditional hypertext" and new technology options

Of course, every table of contents in a traditional book is the beginning of a hypertext system as well as other texts on a text (metatexts), like footnotes and endnotes, which are at the end of the traditional book (page). Other types of reference that constitute a metatext link system in book format can be intratextual (e.g. 'cf. above') or intertextual (e.g. 'cf. chapter 4') or extratextual when there is a reference to secondary literature (e.g. 'cf. Schmied 1999'). Finally, in the index we find page references and in the glossary we find explanations and often further reading. Like in a "modern" hypertext structure, the readers can choose to what extent they want to include these metatexts, but the degrees of freedom seem smaller in traditional hypertext since it is always clear what the main text is and where the supplements can be added.

A good example of "traditional hypertext" (in structure, not in technology) is the introduction to the subsection "5.3.2. The experiential perfect" as it is presented in the *Cambridge Grammar* (2002) – including two major weaknesses.

The original, scanned version can be seen in Figure 2a: The headline as such is actually linked to the second paragraph where the experiential/essential perfect is illustrated in three examples. Before that, the four types of present perfect are mentioned and the continuative type is only mentioned briefly, since it "has been dealt with", a reference back to three pages before – a weakness, since this is not immediately clear and would be much clearer and more immediate with a "real" hyperlink.

The same text material is presented in hypertext form in Figure 2b. Here hyperlinks can, of course, be used to link the four types, which are mentioned in the first paragraph to their actual explanation on the pages "further down". In addition, other hyperlinks could be intro-

duced in a hypertext format, such as the link to present tense form or present time meaning or continuative adjuncts.

5.3.2 The experiential perfect

Grammars commonly distinguish four major uses of the present perfect: the **continuative**, the **experiential** (or 'existential') perfect, the **resultative** perfect, and the perfect of **recent past**. These can be thought of as a classification of the main ways in which the concept of a time-span up to now can be involved in the use and interpretation of the present perfect – or as different ways in which the past situation may have 'current relevance'. The continuative has been dealt with already, and can be distinguished reasonably sharply from the non-continuative: compatibility with such expressions as *ever since* provides a criterion. The three categories within the non-continuative are not mutually exclusive, but they are useful nevertheless.

The experiential/existential perfect is seen in:

- [11] i *I've finally finished. We've now walked ten miles.*
- ii *This is/That was the best meal I've had all week.*
- iii *His sister has been up Mont Blanc twice.*

This use of the present perfect is concerned with the occurrence of situations within the time-span up to now. The connection with now is clearest and most direct when the completion of an accomplishment takes place at (or virtually at) T_d , as in [i]. The possibility of having present time adjuncts like *now* or *at present* shows clearly that we have present time meaning as well as present tense form. These bear some resemblance to continuatives – the walking ten miles, for example, has occupied a period up to now. However, they cannot take continuative adjuncts like *ever since* ..

Figure 2a: The experiential perfect in the *Cambridge Grammar* (143)

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Figure 2b: The experiential perfect in the *Cambridge Grammar* (143) as hypertext (the additionally underlined expressions indicate links)

The last paragraph actually offers an obscured "hyperlink", in the formula " T_d " and the reference "as in [i]"; this refers back to an illustration two and a half pages before (141, reproduced in Figure 2c) – again a weakness since it requires a special reader effort.

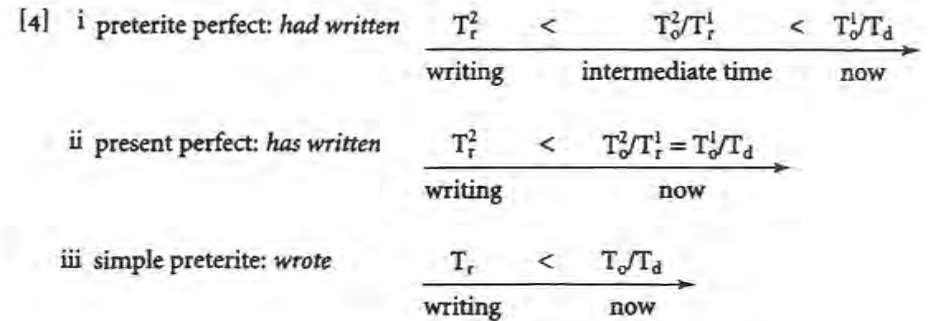


Figure 2c: Figure showing time relationships from the *Cambridge Grammar* (141)

In the CING we also use hyperlinks to diagrams and figures, e.g. to illustrate the time relationships between two verbal actions (Figure 2d).

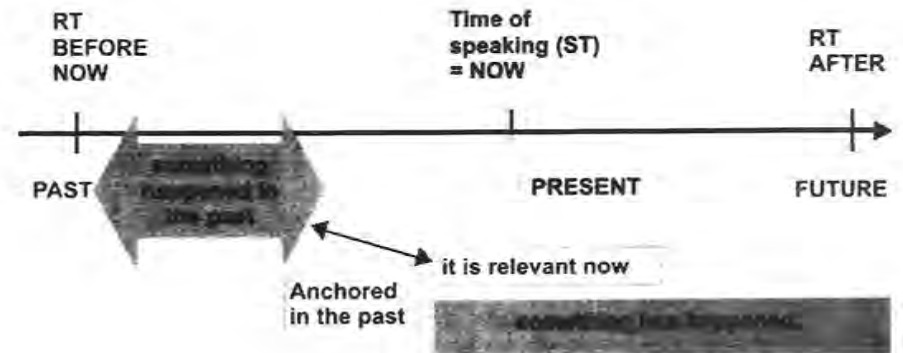


Figure 2d: CING figure illustrating time relationships of two verb actions

The issue is the time gap between "speech time" and "reference time" (on the basis of Reichenbach) and Figure 2e below visualises how it can be bridged: the circle O in the graph for type 1 suggests 'including the present'. The exception is the resultative, where not the event but the result bridges the time gap. If the legend is not given, learners could of course also be asked which diagram corresponds to which text.

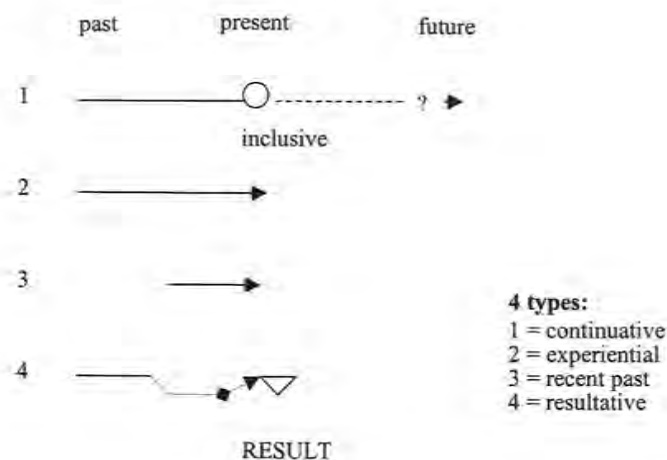


Figure 2e: The present perfect bridging the past-present-time gap

These examples illustrate that intuitively appealing web diagrams can be produced (and later changed) relatively easily. The combination of text, image and audio is certainly one of the great advantages of web-based learning.

2.2 Hypertext and contextualisation

This leads us to a more general view of learning, again using grammar learning as our key example. New learning can be described as the constructive integration of information in an existing context or knowledge frame through individual learning paths or strategies, partly through questions and hypotheses towards incorporation, which is often called learning by inquiry, explorative or data-driven learning (cf. ELT, for instance, Johns/King). Although this "new learning" started before the internet-hypertext, it has become much more obvious and testable now. The continuous constructive refinement of their own coherent ideas on the topic (often in the form of "grammar rules") puts the main work stress on the learners and makes the teacher only a facilitator, wherever necessary. The readers constantly add new meaning elements to their concept system. Thus the most general rule 'continuous forms signal progressive function' is refined: imperfective functions are separated from progressive functions, when non-accomplishment functions are added, until more and more verb-semantic subsystems make the picture more complex and even partly contradictory (cf. Figure 1 and Table 1). Thus German learners of English have to verify their basic notion 'continuative forms are always set in a long reference time', which admittedly is typical of progressive usage, but this "rule" clearly contradicts the idea of "limited duration", which is the characteristic frame for temporary meanings as in *She is studying at Lancaster this term, usually she studies at Marburg*. Studying is not usually considered a short period in the life of academic people, so that continuous forms suggest a wrong situational context. This is a clear case where "subrules" have to be placed into the conceptual context and this makes an

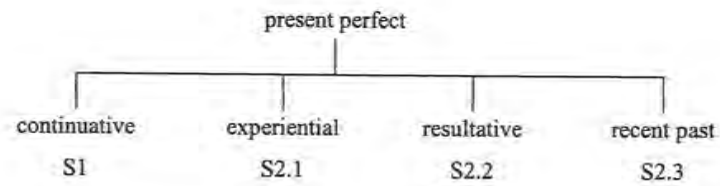
adjustment of the complete conceptual network necessary. In this sense, dynamic reading means accommodating new usage cases into the wider knowledge context, and constant adaptation affects the entire system (cf. 3.2).

2.3 Hypertext and conceptualisation

If coherence leads to context building, it also leads to concept building or conceptualisation. Thus hypertext can not only be seen as a formal system, it can also suggest a meaningful categorisation of grammatical phenomena. This exemplifies the much discussed coherence in hypertexts (cf. Storrer 1999), which are characterized as dynamically created texts³ where the readers have to create their own conceptual coherence network. This is not identical with the virtual hypertext network on the computer screen,⁴ which again is not identical with that in the computer. Of course, the hypertext authors will try to anticipate the reactions of hypertext users, but they may also include certain manipulation devices to guide readers in directions that are considered suitable for specific learners. One way of finding an empirical basis for such hypotheses is of course recording user behaviour, another one is discussions with users and integrating web users as authors, which can be done easily with university students (Bromme/Stahl).⁵

The differences can again be illustrated in the *Cambridge Grammar*, since it first seems to suggest four types of present perfect (visualised in Figure 3a), whereas later on it actually suggests two types continuative vs. non-continuative with three subsections and illustrates all possibilities by examples (Figure 3b). However, a different system seems to be possible if one distinguishes between resultative and continuative categories because the recent past and experiential could be seen as marked continuatives in contrast to the unmarked forms (Figure 3c).

- 3 In this case 'dynamically created texts' refers to the cognitive process (in the mind) not to the technical process when www pages are created dynamically (on the computer screen) from a database.
- 4 For advanced learners certain basic notions and links may be omitted, for intermediate learners complex subsystems may be omitted and other "didactic" presentation requirements may override certain network aspects.
- 5 Hypertext production can also be used: "Ideally, the author would inspect each node content and try to imagine which kind of further information a reader might desire or should be able to receive, and then set the links accordingly It can be assumed that authors who think about their hypertext product in this way would gain a deeper understanding of the subject matter at hand" (Bromme/Stahl 41).



Sample sentences *Cambridge Grammar* (141-45)

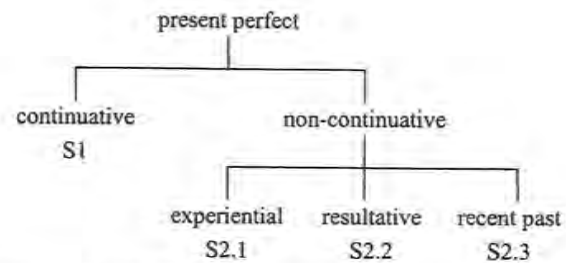
S1 She has lived in Berlin ever since she married.

S2.1 We've now walked ten miles.

S2.2 He has closed the door.

S2.3 I've discovered how to mend the fuse.

Figure 3a: Categories of present perfect in the *Cambridge Grammar* (141-45)



Sample sentences *Cambridge Grammar* (141-45)

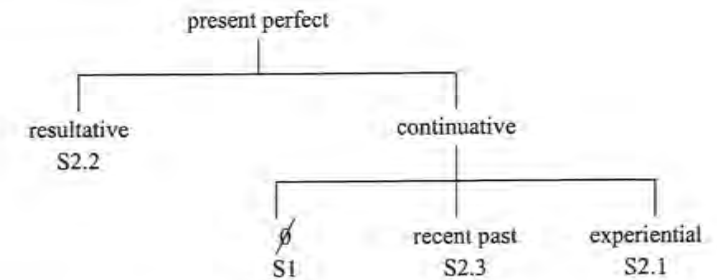
S1 She has lived in Berlin ever since she married.

S2.1 We've now walked ten miles.

S2.2 He has closed the door.

S2.3 I've discovered how to mend the fuse.

Figure 3b: Categories of present perfect using the *Cambridge Grammar* (141-45)



Sample sentences *Cambridge Grammar* (141-45)

S1 She has lived in Berlin ever since she married.

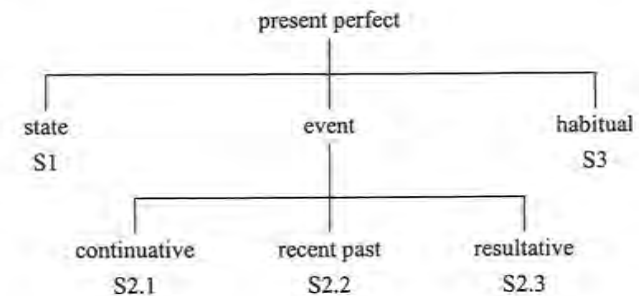
S2.1 We've now walked ten miles.

S2.2 He has closed the door.

S2.3 I've discovered how to mend the fuse.

Figure 3c: Categories of present perfect using the *Cambridge Grammar* categories and examples

In contrast to this categorisation the *Comprehensive Grammar* (Quirk et al.) first subdivides the present perfect usage according to state, event or habitual and points out that only event verbs are subdivided into continuative, recent past and resultative through specific examples (cf. Figure 3d).



Sample sentences *Comprehensive Grammar* (192-94)

S1 That house has been empty for ages

S2.1 Have you seen the Javanese Art Exhibition? [yet]

S2.2 Have you heard the news? The president has resigned.

S2.3 The apples have all been eaten.

S3 Mr Terry has sung in this choir ever since he was a boy.

Figure 3d: Categories of present perfect using the *Comprehensive Grammar* categories and examples

All four types must be visualised in a diagram (Figure 2e) which clarifies that there is usually no time gap between past and present for the present perfect.

Interesting categorisation and conceptualisation issues are also implied in the verb variation network in Figure 1 above: the English perfect is classified between tense and aspect, progressive and imperfective are portrayed in a non-hierarchical structure as two general sub-concepts of aspect vs. a verb-specific bundle of other meanings, and future seems to have the status of a tense like past tense, all of these are of course debatable.

3 Learning in the InternetGrammar system

These general considerations of (grammar) hypertext reading have to be applied to the concrete learning tool the CING. A more detailed description of the added value of a complex hypertext system in this area will be followed by a description of the main distinction of deductive vs. inductive learning before the specific problems and their solutions will be discussed in detail.

3.1 The added value of hypertext learning (systems)

In this setup the question has to be asked whether a hypertext learning system like the CING provides some added value compared to a traditional text system.

The CING can be described as a hypertext system (illustrated in Figure 4 below), which has an integrated English – German Translation Corpus and a tracking system on the worldwide web so that it is not only a service, but also a research tool.

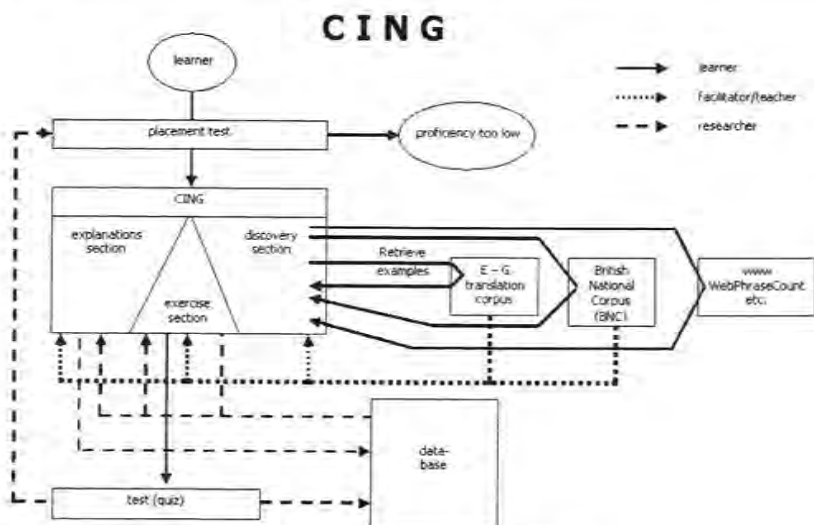


Figure 4: A modular flow-chart visualisation of the CING

More specifically, we could say that the CING is a hypertext network, which has multiple tasks and allows user-specific strategies. These allow an individual learning pace and in particular the two major options, the explanation (= deductive) or the discovery (= inductive) section. However, it is also used as a flexible retrieval system, which can be used as a test bed partly through corpus examples that are integrated in particular in the discovery section and partly through corpus searches that the learner can execute all the time according to his or her own requirements. All the exercises have partly an automated feedback and finally all the learner input is tracked and stored in a MySQL database.

The added value of the hypertext system lies in its variable non-linear complexity. Hypertext seems to be cognitively plausible under the assumption that knowledge, whose acquisition is the general objective of learning, is organised in the human brain in networked topological non-linear structures. This is the so-called cognitive plausibility hypothesis, which has not been proven but is related to the general academic ideals of pluralistic, relativistic and critical reasoning:

Hypertext links simulate and represent analogies in the mind; linkage is the electronic counterpart to analogy. Thus, hypertext permits student writers (and others, of course) to engage in the formation of concepts, and to explore the basis of their thought. (Slatin 56)

From a language point of view, it is plausible in three perspectives: The author does not have to concentrate on linearisation when encoding a text, a mental representation of text is stored in a network and the reader does not have to do the delinearisation when decoding a message (although the actual reading process is still sequential). In this simplified metaphor imagery, the nodes become ideas, the links become associations, and the distance and seize become closeness of relation and importance. Learning here means adding new network elements in this context.

3.2 Deductive and inductive learning

The distinction between learning by rules and learning by examples has been discussed for a long time. In grammar learning both paths have been tried, but it has been difficult to compare the value of both approaches for the same grammar content systematically. The CING gives us an opportunity to record the chosen learning behaviour and learning success of learners for the same grammar area because they can choose in each subsection whether they want to work in the discovery section, the explanations section (inductive and deductive respectively) or the exercise section.

In the discovery section, learners are presented with prototypical sample sentences from authentic language material (Figure 5, where for instance 2 out of 6 are ticked for a common feature). Students are to draw inferences from this and test their hypotheses on the next set of prototypical sentences, where automatic feedback (green ticks and red crosses) leads them towards "correct" concepts. Then they can also choose between different "hypotheses" and get automatic feedback – until they feel that they have been able to form a concept that is clear and coherent enough to try it out on the corresponding exercises, which are also only a click away (in the top right-hand corner).

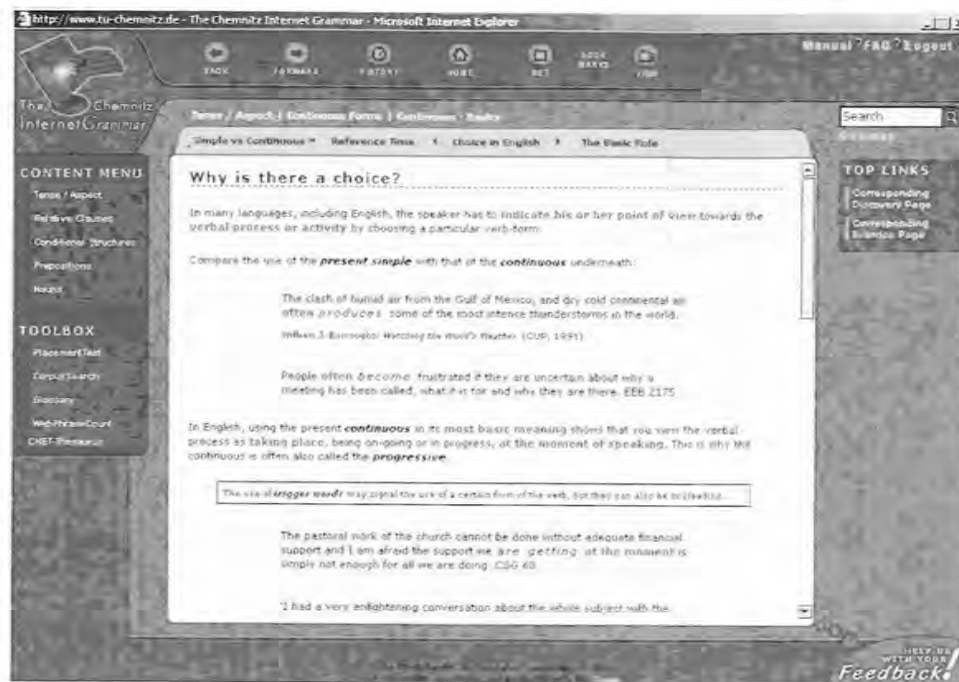


Figure 7: A sample page from the CING2 (2004)

Thus what was thought to be the great advantage of a hypertext system, that it leaves open a vast number of choices, suddenly became a disadvantage, at least for the beginner. But we still have not gone so far as providing a guided tour for what the CING authors consider the best learning strategies for certain learner types depending on their computer, grammar and language skills.

In general,⁶ the orientation has been improved by colour codes, by orientation bars at the top and on the left hand margin and by a "floating" sitemap, which can be called up in a pop-up window any time by clicking the 'sitemap' button in the right frame (Figure 8). The standard reading support system that users know from internet browser software with forward/backward, history and set/view bookmarks buttons has been added. These orientation/navigation functions are at the top of the frame, clearly separated from the content functions, with chapters on the left margin and sections and subsections colour-coded above the inner frame. In terms of hypertext coherence this means that much more context is provided than envisaged previously. Like in other bottom-up user-involved projects (Busse/Plummer this

6 In terms of content, the page corresponds to that in Figure 6, the main difference is, however, that the contrastive material was reduced to make the CING usable for learners that do not know enough German to appreciate the comparison.

volume) it is the readers who demand more guidance than the internet authors had considered necessary.⁷

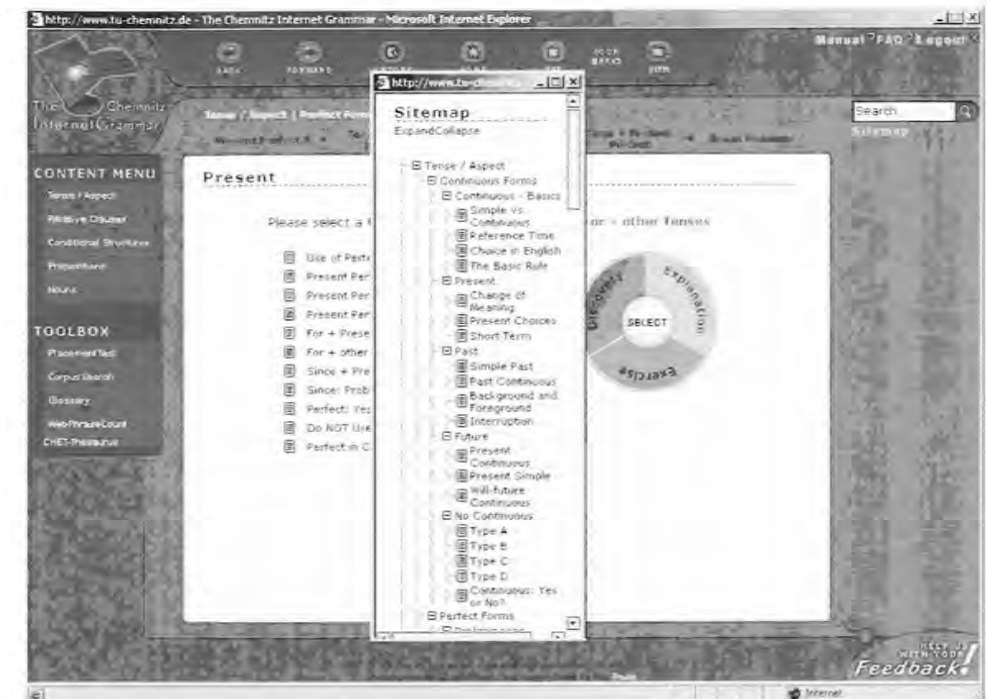


Figure 8: Orientation support in the CING, incl. sitemap

3.3.2 Cognitive overload

The second major problem that has been discussed extensively in internet learning is the so-called cognitive overload.

In studying user behavior data and the usefulness of hypermedia glosses, one striking result has been that not all modes of information presentation are helpful to all learners...

The beauty of multimedia and hypermedia is that different learning styles can be accommodated, but all learners do not need to access all of the different modes of information presentation in order to learn. In addition, the combination of modes can be critical, as other research has shown. Certain combinations can cause cognitive overload for certain kinds of learners whereas other combinations prove beneficial.

7 In other pages more hypertext links were removed, since they were considered interesting for the grammar expert but the functional differences and hierarchy made the virtual network on the computer screen too complex for the student user. Technically, the CING2 is also quite different from the CING1 since it is implemented in PHP and a related MySQL database, which makes the inclusion of new materials through an author-friendly content management system (or backend) much easier. Finally, the design was adapted to the current style conventions.

The crucial questions to be asked are thus: when is hypermedia useful for language learning and for whom is hypermedia useful? How can hypermedia support different learning styles and how do we avoid cognitive overload. (Dorothy M. Chun, n.pag.)

Basically, (short-term) memory capacity constraints make the processing of the entire information impossible. Of course, in a hypertext system with multimedia elements, like CING, even simple charts take the reader some time to decipher. Again, that is not very different from the traditional grammar book, but we can prove this easily with the recorded time users spend on such pages.⁸

3.3.3 Guided learning and other effects

For the researcher the opportunity of recording learner movements on the web presents an interesting way to compare two approaches to reading and grammar learning: Is it better to browse through the grammar or to search specifically for the relevant facts? Such learner-group-specific assignments may be set as useful tasks that are based on previous learner-problems. In an experiment some students were given specific tasks like "Which adverbs occur particularly often/never with continuous forms?", so that they might have an advantage over the more general browsers without any specific task. However, the result was not conclusive in so far as the searchers' test results were not better than the browsers', which suggests a considerable "serendipity" effect of associative browsing.⁹ Furthermore, both groups had a similar problem of abstraction, such as when the solution to "continuous forms" was 'hidden' under the heading "progressive function" it became not immediately clear to the CING users, although it had been clear at several points that continuous form and progressive function are corresponding concepts (in the form – function categories) and overlap to a large extent.

4 Hypertext and text, grammar and grammar learning

In conclusion, the discussion and analysis of hypertext and grammar learning has raised specific issues in key concepts of text, reading and learning:

⁸ In more detail, this can be analysed using a tracking system that records eye focus and eye movement, which can be a very good way of measuring for instance whether specific semiotic manipulation devices "work".

⁹ Kuhlen (22, transl. Schmied) distinguishes four types of browsing according to the author – reader interaction:

- Hypertext systems or bases with simple units and associative links and associative 'browsing';
- Hypertext systems or bases with structured units and typed links; navigation in the hypertext base is mostly based on the principle of direct manipulation;
- Hypertext systems or bases with structured units and typed links; navigation in the hypertext base can be mostly based on the principle of direct manipulation, but can also rely on author-set paths;
- Hypertext systems or bases on the basis of units structured by knowledge-based techniques and typed links; navigation in the hypertext base is organized on dialogic, cooperative principles.

1. From a text-linguistic perspective, it seems plausible that for the average reader of complex academic texts the difference between a traditional linear system with traditional hypertext references and the more modern immediate hypertext system is negligible; hypertext is a gradual phenomenon (Jucker 2002 and Lobin 1999).

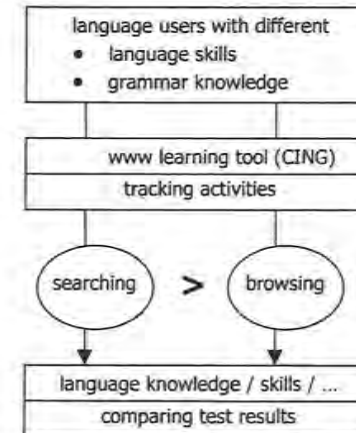


Figure 9: Searching and browsing in the CING system

2. Although the reading process of the same text units in hypertext form may not be fundamentally different, it becomes more obvious that reading is a dynamic interactive process between texts and their coherence-creating structures, and readers and their knowledge of texts.
3. If readers are to construct their own (cognitive) texts from a hypertext system, they need to be not only experienced users who are familiar with this structure and the technology behind it, they also need, even after an initial guided tour, a sophisticated orientation and navigation system. Too many degrees of freedom can only be enjoyed and mastered by the absolute expert.
4. In text type studies, a hypertext system like the CING offers the challenge that it is a potentially more open system than a traditional text, since new materials can be generated and incorporated all the time through corpus queries. This makes it a particularly valuable resource for advanced learners of English.
5. Hypertext learning requires an even more diligently determined autonomous learner, since the opportunities of intelligent learning also provide many distractions.
6. For the grammar experts, the hypertext presentation of grammatical networks presents an interesting challenge to present and analyse the complex form-function relationships that can be condensed and abstracted in any text, however, possibly more appropriately in a hypertext than in a linear text.

As with new dictionaries the usability of new grammars can be tested on various levels. It has often been emphasised that the coherence of hypertext structures has to be tested for usability, if readers are to profit from the new presentation systems. This includes new media effects like visualisation, which can be much more impressive and multidimensional on a computer than in a book. This also includes the learner-specific adaptations of more or less complex hypertext systems, i.e. different degrees of cognitive and terminological, stylistic and conceptual complexity could be presented to different types of learners. Lastly the role of salience in the presentation and the didactic component of intelligibility has to be considered if we want to decide whether the new media really require a new methodology of language (learning and) teaching. This discussion has hardly started.

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