And *And*: Conjunctive Hypertext and the Structure Acteme Juncture (Draft)

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A rhizome has no beginning or end; it is always in the middle, between things, interbeing, intermezzo. The tree is a filiation, but the rhizome is alliance, uniquely alliance. The tree imposes the verb "to be," but the fabric of the rhizome is the conjunction, "and . . . and . . . and . . ."'This conjunction carries enough force to shake and uproot the verb "to be."

Deleuze and Guattari [11, p. 25]

ABSTRACT

In conjunctive hypertext, activities are combined into a whole as opposed to being alternatives. A single localized construct may contain several actemes. Their relationship may be ambiguous, they may be peers, may have space relationships or time relationships. The conjunction must be actualized, by such devices as co-presentation, delegated presentation, peer traverse, and subscreening. An incomplete conjunction contains pending structure which must be indicated. Actemes may have generalized boolean relationships. Larger-scale conjunctivity is related to narration issues, gathering, and other issues related to secondary structure.

INTRODUCTION

The concept of conjunctive hypertext was originally introduced in [38] (see also [39]). Normally we associate node-link hypertext with the ability to *choose* links: if a given lexia has links A, B, C the user can choose A *or* B *or* C. Perhaps no one else has put this association of hypertext with choice in quite so succinctly lyrical a way as Shelley Jackson: "Hypertext is the banished body. Its compositional principle is desire." [22][1] However, there is another possible relationship between a whole and its parts: a construct may have components A, B, C, in which the construct consists of A *and* B *and* C. Because in logic the 'and' operation is called a conjunction and the 'or' operation is called a disjunction, the term *conjunctive hypertext* refers to hypertext constructions where the relationship between a component and its elements is 'and' rather than 'or'. I.e. whereas disjunctive hypertext presents activities as *alternatives*, conjunctive hypertext presents activities as elements to be *combined* into a whole effect. While presentation issues are important in a discussion of conjunctive hypertext, conjunctivity does not derive simply from a presentation method. Rather, conjunctivity is a particular attitude toward how multiple activities in a hypertext construct relate to one another. Conjunctive constructs arise quite naturally in spatial hypertext, which has been a very active area of study in recent years. Thus it seems opportune to review issues pertaining to conjunctive hypertext generally. In pursuing conjunctive vs. disjunctive hypertext, we are inquiring into the relationship among actemes and the relationship of actemes to structure. (The terminology of [39] will be used throughout this paper. The term *acteme* refers to a very low-level unit of activity, such as following a link. The term is useful as a generalized unit of activity that can be applied in situations where there may be no links.)

It is important to emphasize at the outset that this paper is in no way making any kind of claim whatsoever that conjunctive methods are somehow "superior" to disjunctive methods. Authors should have available the widest possible variety of methodologies, and they should all be available together.

THE MULTI-ACTEME CONSTRUCT

The most familiar hypertext structure is a simple binary[2] link. The link is associated with an anchor at

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[1] I am indebted to N. Katherine Hayles [20] for this quotation.

[2] By "binary link" is meant a link with a single source anchor and a single destination anchor; it is a binary structure in the sense that the two endpoints are joined by the link. It could just as easily be described as a unary structure, by analogy with unary functions, in that following a link yields a single destination anchor. Referring to a typical link as binary rather than unary seems less confusing when considering the possibility of multi-headed and/or multi-tailed links.

each end; although the link may be bidirectional, unidirectional links are more common. In this case the link is activated by (typically) clicking on a point within the bounding region of the source anchor. The focus then changes to the destination anchor, which most often involves either changing the user's location within the same lexia or opening a new lexia. Thus the binary link is a structure with a single acteme: following the link. This section considers constructs that contain multiple actemes. Of course a multi-acteme construct need not be conjunctive; indeed the relationship among actemes in a multi-acteme construct may even be ambiguous.

An example will serve to illustrate this concept. Figure 1 shows a construct I call a *simultaneity* taken from [40]. The aggregate entity consists of a spatially overlaid *cluster*, whose members are either phrases or other clusters. As the mouse approaches the cluster, it "opens", revealing one of the members of the cluster. At the same time a stacked set of frames appear. These serve as "on mouseOver" style hot-spots; when the mouse enters one of these hot-spots, the layer associated with that member of the cluster comes to the top and is displayed. Thus the cluster has an acteme for entering each member, which all act as *peers*. The cluster consists of *all* of its members; the members do not function as "alternatives" any more than the various parts of a sentence act as alternatives to one another.

Note that the relationship of the actemes in a construct like the simultaneity described above is quite different from the relationship of actemes composed into an *episode* (in the terminology of [39]). Composition of actemes results in a larger-order unit, such as a *trail* of links, or in the conjunctive case perhaps descending into a hierarchy and visiting an entire sub-hierarchy. Typically the episode need not be localized; in speaking here of a muti-acteme construct we are speaking about a single localized construct.

Acteme Relationships May Be Ambiguous

In speaking about a mult-acteme construct, the term "construct" may or may not mean "structure". A system such as VIKI [33], CAOS [37], or VKB [43], may allow spatial relationships that are by design ambiguous and whose structural relationship is unclear. Consider a "brainstorming session" where you aren't really sure whether an idea is related to those you've placed in a named collection. You might place it "close to" the collection. By doing so you've placed it where you won't forget about it when you consider the collection, but it isn't in the collection because you haven't decided that that's where it belongs. "Close by" is a type of relationship one might describe as *parastructural*. Artistic and literary works often present examples of parastructure. For instance, *passage* [7] by Philippe Bootz contains actemes where the presence of the acteme is not even clear; if you don't activate it within a certain window of time you may have lost the ability to activate it at all.

Sets provide another arena where structural relationships may be ambiguous. (The pioneering reference on set-based (taxonomic) hypertext is [36]. Taxonomic hypertext remains at this writing an underutilized form of hypertext, particularly in literary hypertext.) Does a set consist of "all" of its members? For a given element, what supersets does it belong to? Is one supposed to "choose" a superset? Does one have to "visit" all of them? Answers to such questions may be a matter of context. (Structure completion is discussed in more detail below.)

A more complex case is provided by the *n-ary link* — a link where there may be an arbitrary number of associated anchors. Several systems support n-ary links, such as Chimera [1], HyperDisco [45], Webvise [16, 18], and the HyTime aggregate link [14]; the n-ary link is explicitly supported in the Open Hypermedia Protocol (OHP) [10]. Unfortunately, the literature on user experience with n-ary links is not extensive. In a typical case an n-ary link will have a single source anchor and multiple destination anchors. "Following" the link means opening *all* of the destination anchors – as opposed to opening a *menu* which would allow the user to choose which destination anchor to open. In this sense the n-ary link is a conjunctive construct, yet if there is only one source anchor there is only one acteme, so it would appear that we don't have a multi-acteme construct here. However, once all the destination anchors are open, each destination lexia may contain actemes of its own. At a minimum, each destination lexia is likely to have a *close* acteme. What is the relationship among these actemes? If they can all be opened at once, can they all be closed at once? [41] discusses the concept of non-unitary location. "Where" is the user after an n-ary link has been activated? Once destination lexia have been activated, what is the relationship among the original set of destination anchors? Is it even clear?

Of course, everyone is familiar with at least one form of potentially multi-acteme construct: the lexia itself. The structure of the lexia is less well studied than it should be. Often the lexia is simply considered to be an atom in hypertextual structure; the real meat of hypertext is thus presumed to be elsewhere. A lexia which contains several links might be presumed to structure those links by *the content of the lexia*. This

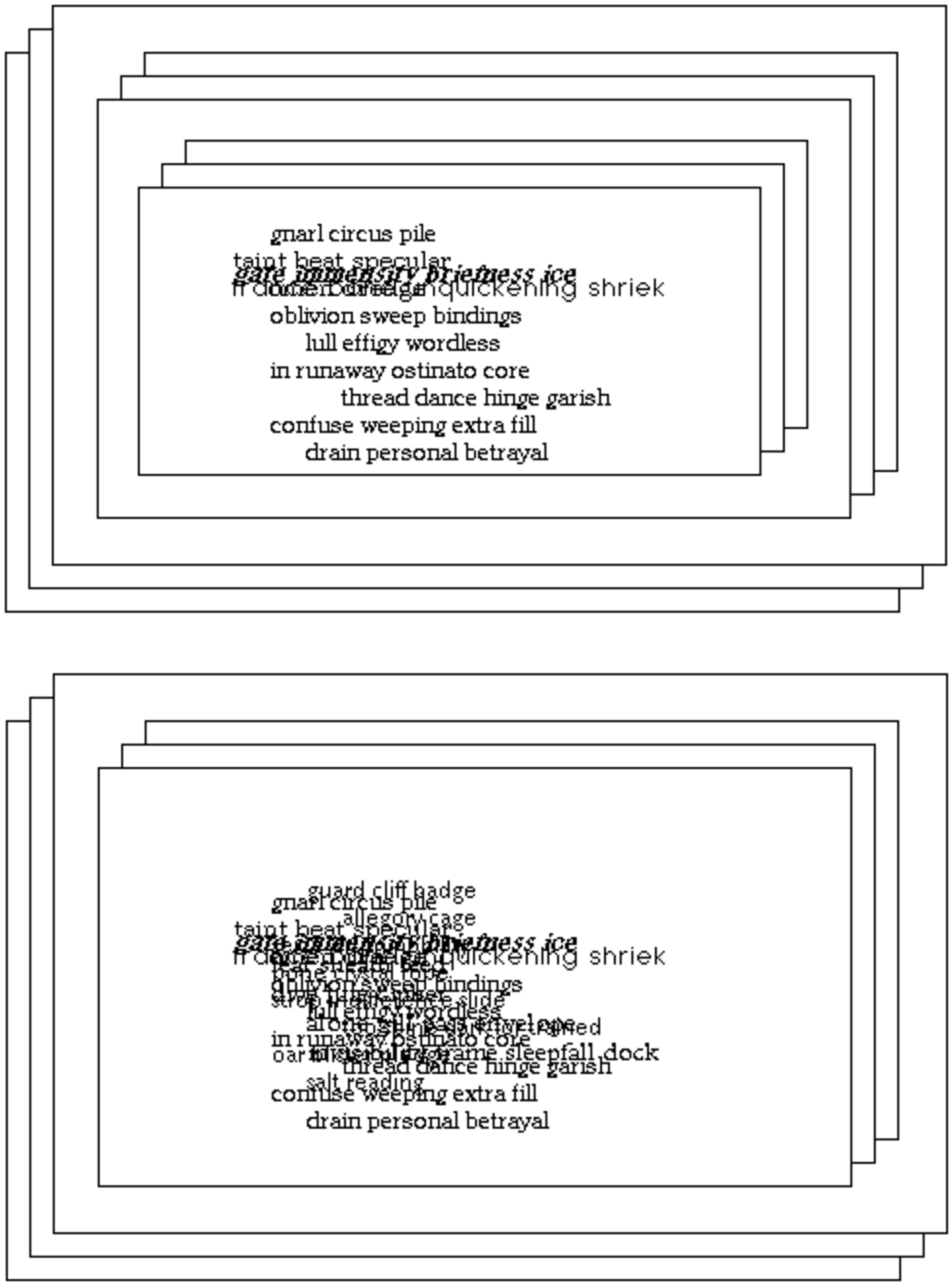

Figure 1

The top half shows the simultaneity open; the bottom half shows it closed. When open, a "stack" of frames appear. These frames are "on mouseOver" hot-spots that allow peer navigation — entering a frame which is "stacked underneath" brings it to the top. Note this simultaneity is nested inside of a larger one (and contains a still smaller one, shown closed in the top half).

presents actemes whose relationship to one another is as general as language itself.

Peer Relationships

The simultaneity structure discussed above is an example of actemes in a peer relationship to one another. Peer relationships may have the following properties:

- The construct as a whole has behavior.

- A navigation interface allows movement from one peer to another.
- An operation may affect all components at once. E.g. if the construct has a close operation, when the construct is closed, all of the component peers are closed.

Another example of a peer structure is the tabbed dialog box familiar in many operating system user interfaces. (However a tabbed dialog box is most likely not conjunctive, since the user can simply choose which tab to view in the same way as choosing links.)

Implicit Spatial Relationships

An extremely useful form of implicit spatial relationship is the *pile* — objects placed "loosely" in spatial proximity. Piles have been supported by spatial hypertext systems such as VIKI, CAOS, VKB, and Web Squirrel [2]. An interesting study of the pile as a user interface metaphor was given by Mander et al [29]. Their prototype included some useful concepts, such as the ability to *spread out* a pile by means of a mouse gesture. Current spatial hypertext systems are somewhat primitive in their interface provisions for pile handling; they typically require an object to be *selected* to bring it to the top. This poses serious problems for an object which becomes completely occluded. (And it could be argued this makes the conjunctivity of the pile construct problematic.) An interface that treated a pile as a peer structure would be extremely useful.

A pile is often not permanently represented by an internal structure in spatial hypertext systems, but is computed on the fly by a *spatial parser*. E.g. a double-click may select an entire pile, yet not present that pile to the user as a specific structure in a hierarchical display of a document's objects. Is the pile a structure, or a particular artifact of behavior?[3]

Another kind of implicit spatial relationship is the *grid:* elements arrayed in vertical and/or horizontal alignment [42]. The conjunctivity of grids is especially clear, since they are normally presented so that all elements are visible.

Time Relationships

Instead of being associated spatially, elements of a hypertext may occur in the same space associated by time. For instance, two elements might *oscillate* back and forth. (For an interesting and undeservedly obscure study of some of the larger issues raised by oscillation in hypertext, see [21].) More generally, a sequence of elements may be presented in a *loop*. In this case conjunctivity arises from the elements "all being there" through time rather than space.[4]

Formal Relationships

There are numerous ways in which multiple elements may be presented in a formal relationship. The "most formal" of these is the *relation*, as implemented for example in Aquanet [31].[5] A more familiar form of formal relationship is the *hierarchy*. At its simplest, the hierarchy consists of a single parent object and some number of contained objects; in hypertext theory this is usually referred to as a *composite* [19, 15, 17 chap. 7].

ACTUALIZING THE CONJUNCTION

"Actualizing" a binary link is a simple matter: the user clicks on the link and is taken to the target. For a conjunctive construct with possibly many actemes, "putting together" the terms of the conjunction raises several much more complicated issues, which are dealt with in this section.

Co-presentation

The easiest method of actualizing a conjunction is to simply present all the elements on the screen at once. The most common instance of this is the HTML frame set[6]. Co-presentation has some obvious difficulties. Screen real estate limits how many elements can be presented together. This can be particularly awkward if the elements are themselves compounds. A concept like the HTML frame set works well when there is only a single top-level structure (the page) and a single set of frames; with nested structures the navigation interface can become confusing. The pile represents a particular challenge for co-presentation, as already discussed.

The concept of tabletop [44, 30] provides an interesting antecedent to co-presentation, though with a com-

[3] Integration of behavior into the structural computing paradigm emerged as an open question at the Second Workshop on Structural Computing, San Antonio 2000.

[4] The familiar animated gif is certainly a loop, but has no actemes.

[5] In my opinion, the "lesson" of Aquanet has been widely misread. User experience research with Aquanet determined that users are often unwilling to commit to "hard" structures in advance [32]. This led directly to the creation of VIKI, with extensive support for emergent and ambiguous structure. This support is extremely welcome. However, the Aquanet experience has been read as evidence that users do not want to commit to "hard" structures *ever, at all* — and thus support for relational structures has disappeared from hypertext systems. This is unfortunate. Explicit structuring such as relations, particularly with Aquanet-like graphical rendering, should be provided *along with* the more implicit and ambiguous forms of structure in VIKI, CAOS, and VKB. Since we have no hypertext systems in which both forms of structuring are available, there is no data on the basis of which one might conclude — as the results from Aqanet are often portrayed — that when both forms of structure are available that users simply avoid hard explicit structuring completely.

[6] David Stotts considers the HTML frame concept to be the most common example of a multi-tailed link [personal communication]; but it seems more reasonable to view the entire frame set as a link target — a composite perhaps.

pletely different purpose. Tabletops allowed co-presentation of multiple lexia in a hypertext in a pre-programmed way as a kind of illustration of a juncture point in forming an episode. (As used, tabletops tended to be disjunctive, like the hypertexts they typically commented upon.[7])

For an interesting literary example of co-presentation used in a straightforward way see [8], which is implemented using HTML frames.

Delegated Presentation

A layer of hypertext infrastructure may *delegate* to some other layer of software the actualizing of a conjunction. E.g. an Open Hypermedia Systems (OHS) component may link-enable productivity applications such as a word processor or spreadsheet. If an OHS link service responds to clicking on an anchor with a multi-tailed link, it may be left to the native operating system windowing environment to display the destination lexia, where it is unlikely that there is any real "awareness" of the conjunctive nature of the n-ary link. Once the link service has completed its work, any awareness that the anchors retrieved are in any sense peers is likely to be absent. Needless to say, this is a fairly weak form of conjunctivity. If a document author requires presentation behavior for actualizing a conjunction that embodies conjunctive awareness, this may make delegated presentation problematic.

Traverse and the Concept of Focus

Our notions of both of these two concepts have been mainly formulated with respect to the binary link. Thus we tend to think of the focus being "at" a single node; traverse takes us to another single node. [41] discussed the concept of non-unitary location: in conjunctive hypertext one may located "in" many places at once.

Peer Traverse

Conjunctive structures have a special kind of traverse: traverse among peers. Discussions of composites typically ignore this issue, and many user interfaces do not allow easy navigation among peers. Instead, one often has to *return* to a parent structure to navigate among peers. This yields a particular structural form of *cycle*, in the sense of [4]. (Bernstein's concept of cycle lumps together a number of disparate concepts, which require separate elaboration. Several will be examined in this paper.) This type of purely "mechanical" cycle — which could be eliminated with proper peer navigation — is quite different from a genuine case of "revisitation" along a trail of binary links. Peer-to-peer traverse is important in conjunctive hypertext to "put together" the conjunction in cases where co-presentation is not practical. Just as it might take multiple readings to resolve a sentence containing a difficult idea, it might take multiple peer traversals to resolve a conjunction. (This might also give the appearance of what Bernstein would describe as a cycle.) It is interesting to note that Grønbæk and Trigg cite traversal as a key element in distinguishing composites from links: "Containment and opening are suggestive of a composite, while connection and traversing are suggestive of a (possibly multiheaded) link." [17, p. 87] This distinction completely misses the issue of peer-to-peer traverse.

An interesting question regarding peer traverse is where this functionality should reside. Advocates of composites might argue that no "special" behavior is required here; if an author wants peer traverse, that can always be arranged by specifically creating links among the peers. This can raise difficulties, particularly in an OHS context. Perhaps the conjunctive structure is aggregating elements over which one has no authorial control. In this case the peer navigation needs to reside either in an external structure base or with the higher-level construct. Whatever structure server is providing the terms of the conjunction needs to provide the peer navigation mechanism as well. Indeed a lexia which is one among several peers in a conjunction may not "know" it is a peer, or what its other peers are; this depends on what conjunctive structure has been activated. It would certainly be possible for a peer lexia to contact a link service to inform it of other peers (or to inform it of a higher-level "controller" object), though of course that would require the link service to maintain a high degree of state. Even given a link service which supported peer or controller identification and navigation, the service presenting a peer would have to "know" it needed to contact the link service to obtain this information. In the example presented earlier in Figure 1, peer navigation was of course built in to the interface.

Subscreening

Another method of dealing with traverse in conjunctive structures may be described as *subscreening:* An area of the screen is divided into sub-regions, with traverse allowed independently in each sub-region. This is the approach taken in HTML frame sets. This has numerous potential complications for the user interface. There are now two concepts of "back": back within the subscreen, and back for the higher-level unit as a whole. It is quite common with HTML frame sets that there is no visual cue that subscreening is in effect: you often don't know you've been "captured" inside a frame until you follow a link and find that traverse only occurred inside a subscreen. When subscreening

[7] The self-referential character of hypertexts with tabletops should be of great interest to the literary community, considering the widespread use of self-referentiality in postmodern literature.

is occurring, what should be bookmarked? The discomfort one may have at answering this question is one of the clues that location in conjunctive structures is not always unitary.

Subscreening is subject to a particular form of disorder that may be called *anti-conjunctive drift:* the conjunctive relationship among subscreens may at first have been clear, but as traverse occurs in each subscreen, this relationship can deteriorate. HTML frame sets illustrate an extreme version of this problem. Frames are sometimes used to provide links but still "capture" the reader "within" a particular URL. While normally we would think of a conjunctive relationship as "cooperation" among the terms of the conjunction, in this case it can deteriorate to almost a kind of parasitism. Anti-conjunctive drift works quite counter to peer-to-peer traverse; indeed one could describe this problem as a sudden feeling by the reader that objects that are supposed to be peers no longer are peers. Interestingly, there is no common interface which under these circumstances will "release" the association of subscreens — e.g. to make a separate window out of each subscreen. (Though of course some web browsers allow opening a single subscreen as a new window.) Release of subscreens might help considerably to counteract this problem. It would represent a recognition in the user interface that what had been the terms of a conjunction are no longer operating that way and should henceforth operate disjunctively.

Pending Structure

When the familiar binary link is followed, nothing in this structure is left pending: the user leaves the source lexia, arrives at the destination lexia, and the transaction is complete, so to speak. Conjunctive structures (and n-ary structures in general) raise a very large issue: as the conjunction is being actualized, this actualization may be *incomplete*. Some method must be found to indicate to the user what parts of the structure are still pending. Indication of pending structure is an ancient problem: syntax itself may be described as a precoding of the message so that the mind knows where to park pieces of the text for processing later to pick up pending parts of the structure.

Does a structure "have to be" completed? Structure completion is related to the literary concept of *closure;* where closure deals with a feeling by the reader that experience with an entire work has reached a kind of completion, structure completion may be described as the issue of closure in the small. (For a discussion of hypertext closure, see [12].) Scale does matter here: discussions of closure for a hypertext work as a whole are complicated by the problem that the number of potential paths through the whole work may be overwhelming, but the number of "slots" in a structure is typically small. Many hypertexts — particularly literary ones — do not provide a systematic display of "all" of the lexia, but conjunctive structure is normally displayed so that all slots may be visited — whether by co-presentation, peer navigation, or some other method. However this picture becomes less clear when structure slots contain complex structures which may require a descent of several levels for completion. In this case structure completion begins to resemble closure as an issue.

An interesting question is the issue of whether the notion of conjunction "requires" completion. After all, it might be argued, if structure X consists of *all* of A, B, C, ... how can we say X has been visited unless all of the components have been visited? This is a matter of context, and the intentions of the hypertext author. We do tend to believe that a conjunctive structure such as a sentence should be read in its entirety or not at all; it would be very strange to say of a document, "Yes, I read a good deal of it, but I just picked the part of each sentence that looked like the best." On the other hand, we often are selective in not reading "all" of a work without requiring that the components of a work be thought of as alternatives. One can imagine a dynamically computed conjunctive structure in which elements continually arrive and depart; the elements are not alternatives to one another but visiting all of them is impossible (by design) because in the time it would take to visit all elements some of them have disappeared and others have been created. Conjunctive structures may be described as somewhat biased toward completion "in the small", but as conjunctivity scales up to large structures, there is little difference on this issue between conjunctive structures and disjunctive structures.

How is pending structure to be indicated? Bread crumbs [3] are a familiar device for indicating structure *already visited*. One approach to the display of pending structure would be to use such a graphic marking device to display those parts of the structure already visited, with the presumption that the unmarked parts are pending. Current spatial hypertext systems are somewhat weak in their facilities for displaying pending structure. It is typically assumed in the case of a pile, for instance, that all members are visible enough to be accessible by clicking. If a pile member becomes completely occluded, there is typically no method for indicating that it is still pending in visiting the structure: spatial hypertext systems tend to rely completely on co-presentation.

Many other methods of indicating pending structure are possible. For instance, a system might use some

form of *graphical biasing* so that pending members of a structure are brought to the top of a display or indicated more prominently in some way.

The notion of pending structure is related to some classical issues in hypertext rhetoric. George Landow has argued that in spite of the extent to which following a link may seem to be an atomic transaction, the way should be eased at each end of the link by a rhetoric of departure and arrival [26]. Where structure is left pending, this rhetoric must be considerably extended. To departure and arrival must be added "pushing" and "popping" — as well as perhaps "rotating" (among peers) — pending structure. Where pickup of pending structure must be implemented by a *return* to a local root node, we must consider a rhetoric of re-arrival. In this case a component is not so much "departed" as "closed". (In this respect the Grønbæk-Trigg formulation for the distinction between composites and links cited above is right on the mark.)

Finally, it is interesting to relate the issue of pending structure to a *protocol* such as the Open Hypermedia Protocol (OHP). There is an interesting resonance between protocol design and rhetoric. Protocol designers often construct *scenarios:* idealized or paradigm exchanges between parties which serve as test cases for what messages need to be passed and what state rules should apply. There is an uncanny similarity between such scenario construction and the kind of exemplar studied in rhetoric. (For OHP scenarios, see [35].) Pending structure is analogous to protocol messages *not yet sent*. This may in fact provide an implementation framework for displaying pending structure. If an OHS component has a display mechanism for displaying the result of acting on an OHP message, perhaps a similar mechanism could be used for displaying a potential message which is "imminent" but not yet received, similar to a look-ahead mechanism that pre-fetches link targets not yet followed as a performance optimization.

GENERALIZED BOOLEAN MULTI-ACTEME RELATIONSHIPS

If actemes can in exist in "or" relationships and "and" relationships, then clearly we should investigate a more general logic of acteme relationships. The relationship of *boolean implication* is related to the concept of Guard Fields [6]. A guard field is a form of conditional linking in which a link is accessible only after some other link has already been traversed. To be somewhat more precise, a guard field expresses a boolean relation

$\neg X \quad \neg Y$

— if you haven't activated acteme X then you can't activate acteme Y.

The subject of oscillation has already been mentioned. Oscillation may be considered an example of boolean exclusive-or: object X is presented or object Y is presented, but not both.

Clearly we should be open to the use of the full range of boolean possibilities. A difficult question here is: what should *show* in the user interface concerning the boolean relationship of actemes? Typically guard fields are not displayed to the user. For instance, *Afternoon* [23] gives the reader no cue — visual or otherwise — that a guard field exists. It is not unknown in literary hypertext for critics to determine that behavior at a particular lexia is controlled by a guard field only by opening the hypertext in a full authoring version of the hypertext environment — an option not available to the typical reader. Where boolean behavior such as conditional linking is controlled by scripting — e.g. JavaScript in the case of the Connection System [25] — the script itself may be accessible to the reader; JavaScript is always accessible from the "View Source" menu command. Certainly viewing the source code for scripting is a less extreme act on the part of the reader than opening a hypertext in an authoring system, but even View Source may be described as a heavy-weight activity that should not be expected of the reader.

CONJUNCTIVITY IN THE LARGE

In what preceded, we have been considering what may be described as conjunctivity in the small: conjunctivity at the fine-scale granularity of actemes. In this section we consider much larger-scale hypertext activity — at least at the level of what was described in [39] as the episode.

Conjunctive Narration

The conjunctive, or *additive*, character of narration has been a subject of commentary beyond the realm of hypertext. Walter Ong, for instance, comments on the conjunctive character of biblical narration [34 p. 37]. A more complex case is the narrative method described by Genette as *iterative* [13 chap. 3]. Iterative narration collapses several repeated occurrences into a single passage. Genette gives extensive treatment to Proust's use of iterative narration. The iterative concept may be said to have an inherent conjunctivity, in that multiple occurrences are conjoined into a single description. Beyond that, because the reference of an iterative passage can span considerable amounts of time — and therefore several "locations" in the plot of a narrative, there is a kind of implicit additivity to the overlay of multiple separate iterative passages, which act together

in a kind of collage effect. Finally, for an interesting discussion of conjunctive cinematic narration, see [28].

Of course the sentence itself may be described as a conjunctive structure: the parts of a sentence, such the noun phrase, verb phrase, etc., are hardly alternatives to one another.

An interesting hypertext example of conjunctive narration is provided by *Califia* [9]. While in the small *Califia's* formal devices appear to be those typical of disjunctive hypertext, Coverley herself states that the concept of conjunctivity was explicitly in her mind as as she wrote this work [personal communication]. There are a number of specific effects at work in this hypertext that reinforce its conjunctive character. The use of photography to evoke specific times and places is very distinctive; each new photograph gives the reader the feeling of adding to an album of experience of the characters in the novel. The navigational interface continually presents paths for the characters that reinforce the importance that the story is the story of *all* of them. Indeed, throughout *Califia* the navigation is more additive than alternative.

There are several important questions about how the conjunctivity of narration is functioning in a particular hypertext: (1) Is it clear to the reader what pathways might be taken as additive as opposed to alternative? (2) For those pathways that the reader has taken as additive, does the addition "take"? (In the terminology from above, this is the question of whether conjunctions have been successfully actualized.) (3) How have the reader's expectations about the amount of additivity been satisfied?

Secondarily Conjunctive Hypertext

A hypertext may employ typically disjunctive relationships among actemes when viewed locally, but a more conjunctive picture may emerge from the reading experience as a whole. The most familiar concept illustrating this idea is the well known topic of *contour* [5]. In [24 pp. 82-83] Michael Joyce describes how a spatial view in Storyspace — and even more indirect structures such as "linkplots" — can give topographic overviews to hypertext. In such a view the density of pathways converging on a particular node can emphasize the additive character of those pathways, in a way that is not apparent looking at a particular lexia.

An interesting form of secondary structure which may be called the *link-name lexia*[8] is found in *Samplers*, by Deena Larsen [27]. In this work a set of link names brought up by a menu forms a lexia in its own right; Larsen recites these lexia as small poems when reciting this work. Conjunctivity here is somewhat equivocal. These link-name lexia typically form sentences, and as noted above, the sentence is a conjunctive structure. However, it is not clear that the structuring provided by the link-name lexia is intended to structure the link-following actemes in their original source lexia.

The concept of *gathering* was discussed in [39]; in effect gathering is the construction of a secondary hypertext with materials carried from the primary hypertext being viewed. Even if the primary hypertext is purely disjunctive, when materials are assembled in a gathering interface, that interface may offer conjunctive methods, such as spatial hypertext. Structural methods from the secondary hypertext may be used to organize higher-level structures from the primary hypertext transparently. In this way *the reader's* hypertext may become conjunctive even when the author's hypertext is not.

Various forms of secondary texts are customarily employed in literary theory. Such concepts as *plot* and *close reading* are both examples of secondary texts. Close reading poses a difficult question. A close reading may be described as a "discourse text" where there is an intense localized topological mapping between the discourse text and the text being discussed. It is at least arguable that by this measure, it is impossible to create a close reading of a hypertext without creating a second hypertext. However, we are severely lacking examples of this. Can one properly give a close reading of a disjunctive hypertext as a conjunctive hypertext, or vice versa? Or, should a close reading match the conjunctivity of the text being discussed? Plot is quite often discussed in additive terms; a scene is often said to add to (or to complicate, and in that sense subtract from) our understanding of the plot. Perhaps readings of hypertexts will devise a new body of practice with a new concept of reading not entirely matched by the close reading model. Answers to these questions await further study.

CONCLUSION

A great deal of hypertext may be summarized as endowing the word with activities that provide multiplicity in amidst the words from the reader's point of view. These multiplicities may provide for alternatives in the disjunctive case, or combinations in the conjunctive case. Conjunctive multiplicities raise many issues that don't occur in disjunctive hypertext, involving peer traverse among the terms of the multiplicity at the local level, actualizing the conjunction, and indicating what part of a structure is still pending, among others. "Building the transaction of the and" raises many fruitful issues for further study.

[8] This term is mine, not Larsen's.

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