SMART PAGE AND SCREEN LAYOUT
by Jerry Michalski

The online world makes many publishers queasy. Historically, publishers have had almost complete control over how their materials look. Whether the domain is paper, radio or tv, the steps from writing and editing copy to film shoots and post-production work are arranged in a way that offers enormous control over the output and well-defined boundaries of responsibility. If film is bad, printers reject it; if copy ends up in print with typos, management knows whom to blame; and if the resulting page layout is ugly, they can stop it or fix it. They see what the recipient sees.

CD-ROMs mostly adhere to this model. Publishers have to master some new development tools, but CD-ROMs offer a degree of control similar to traditional publishing media. The CD-ROM includes all required viewers, and people the publisher knows (and usually has contracts with) generate and test the content. The end-user experience is predictable: All that he can see is contained, although he may use only a subset. Only the sequence and selection are in the user’s control. The worst that can happen is that the CD-ROM doesn’t run at all, that the sound card is misconfigured or the monitor’s color balance is off enough to ruin the experience.

Online services are different from traditional media and CD-ROMs. Early experiments with online services have fascinated, frustrated and frightened publishers. None of the online services is a powerful publishing platform; the publishers have to make do within each system’s constraints.

For example, to create a presence on America Online, publications such as Time Magazine and Wired upload a logo, some icons and their content. How they organize and nurture that content is essential, since AOL offers little to allow one company to differentiate itself from another visually. On Prodigy, would-be publishers must master NAPLPS, the international computer-graphics standard. While NAPLPS allows for more variety of presentation than AOL’s software, it is cumbersome and primitive-looking. On CompuServe, where subscribers use various front-ends and offline readers, it’s catch-as-catch-can.

Indeed, the major commercial online services are quite different from each other, which makes it difficult for a company to create re-usable...
content for several services and address larger audiences efficiently.
(Text content is relatively easy to re-use, as long as you don't want to do anything fancy with it on-screen. However, current screen resolutions make it unpleasant to read large amounts of text.) There's clearly more to online publishing than streamed text.

AOL, Prodigy, CompuServe and other online services are developing improved user interfaces to provide publishers more expressiveness and control. In the (virtual) lead is Ziff-Davis Interactive's upcoming Interchange Online Network, which is specifically designed to offer publishers more presentation control and a way to create a separate corporate identity (see below). The Microsoft Network's developers promise that it will also offer better publishing tools.

### Interchange's efforts

In order to offer a better publishing environment than existing online services, Interchange has taken matters into its own hands. It has created new tools to support subscriptions, links between elements and more flexible publishing. It is also offering a private-label platform. That combination attracted the Washington Post, whose subsidiary Digital Ink is building a service based on the newspaper with the Interchange engine. Interchange is in beta now, expected to go live early next year. The Washington Post expects to go live at the same time.

One of the keys to Interchange's improved publishing is its proprietary Book Design Language (BDL), a system which lets designers create a specific look and feel for each publication on Interchange. When the Interchange client software opens a document, it calls the appropriate book design. The book designs include presentation settings such as fonts, styles, buttons and layout, as well as rules, restrictions and behaviors for the objects to follow. There are guidelines for which elements can scroll, which can resize and so on.

So far, only Interchange technicians can create or modify book designs. However, Interchange plans to offer its information providers WYSIWYG editing tools in 1995. Interchange will also extend the Book Design Language to include more interactive and graphical presentation capabilities and more HyperCard-style programmability. Ziff-Davis participates in the News in the Future project at the MIT Media Lab and is aware of the relational grammar work described on page 13. If that or other approaches to smart layout emerge as dominant forces, Interchange will adapt accordingly. Until then, though, it may well have a hard-won advantage over other online services for publishers, although probably with a smaller audience than the large, general-purpose online services have.

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1 As of this writing, Interchange is the major remaining unsold piece of the Ziff-Davis empire.
What They See Ain't What You Sent

However, the electronic channel that makes publishers really queasy is the Internet -- specifically the World Wide Web (see Release 1.0, 1-94). The problem is that the Web has only the most rudimentary layout features, a fact that publishers weren't too concerned about until the recent and amazing rise of Mosaic, the Web's most popular graphical browser. The Web pages that people can produce for display within Mosaic are more impressive than what they can do with any prior broadly available technology, mostly because the Web allows for integrated multimedia elements such as images, video clips and sounds through Mosaic. But the Mosaic context is pretty awful from a design perspective.

To display information, Web browsers interpret documents that use the HyperText Markup Language (HTML, an application of SGML, the Standard Generalized Markup Language; see Release 1.0, 9-94). As a browser interprets an HTML file and the other elements it refers to (e.g., embedded images and sounds, which are typically stored separately), it pours each element into its display window sequentially. Text flows in a single, wide column, all the way down the display window until it is interrupted by graphics, which it can't flow around or overlap. A small thumbnail graphic causes a major visual break on a page. It's hard to create narrower columns or double spacing: You have to hard-code carriage returns and do other workarounds, and there are no provisions for vertical rules. Two-column layouts are more difficult, and you can forget three-column formats with pictures or more complex graphics wound through the text.

As structural markup languages, SGML and HTML intentionally avoid presentation specifics. Most Web document-presentation parameters are set in the browsers, not by the incoming documents. Text shows up in a particular browser's default font and color, as do highlighted text and other elements such as headlines, which have separate, but fixed, settings. Of course, different browsers use different fonts and parameters. Users can change these settings, but they seldom do. Publishers can't, though they wish they could.

Publishers have no simple and efficient way to get a specific font displayed on the World Wide Web, never mind to achieve any kind of consistent presentation, so they rely on bitmapped graphics and creative use of HTML to convey much of the look they want. Optimistic designers treat the limitations the way poets treat meter. Most are just frustrated and are working to find ways to enrich delivery and retain control.

Organizations are stretching HTML in different ways, some congruent with the general movement in the HTML community, some not. For example, HotWired, Wired Magazine's spot on the Web, makes creative use of existing HTML and Web protocols to create a more interactive space. HotWired uses available and forthcoming features such as interactive forms in novel ways, but it doesn't invent new features. Netscape, the new browser from Netscape Communications (formerly Mosaic Communications) reflects the pressure that the publishing community brings to Web developers. Netscape's team implemented new HTML tags that include presentation information. Unfortunately, these tags are non-standard and do not accord with the HTML working group's desire to keep presentation and markup separate.
Take back the screen!

This issue of Release 1.0 picks up where the September issue, "Content in context: the future of SGML and HTML," left off. SGML and HTML are ways to encode documents with structural information but not presentation specifics. In contrast, smart layout solutions turn those abstract document elements into bits on a screen and ink on a page automatically (or nearly so) in a way that (1) looks hand-crafted yet requires little or no human intervention and (2) balances publishers' and readers' often conflicting desires for control. An ideal solution allows publishers to convey the look they want, and readers to set the preferences they want.

There is clearly activity beyond SGML and the Web, but the Web has galvanized attention and has become a center of effort. Until the Web's emergence, the outlook for a general-purpose smart layout solution seemed bleak. The market stalled; the only candidates are either proprietary and customized or standard and unsatisfactory.

On the proprietary side are applications such as Interleaf's Active Documents, a powerful, Lisp-based, object-oriented system that was well ahead of its time (see Release 1.0, 3-90). An Active Document can, for example, redraw a graphic based on a database field value that it looks up every time the illustration is invoked. However, only people running Interleaf's TPF 5.0 can use Active Documents.

Another proprietary system is Pages by Pages, which does a spectacular job of managing document elements to create layouts that meet complex design constraints -- on NeXT systems. We first covered Pages in July, 1991; we revisit them this month because they are pursuing strategies that should make them more of a mainstream player (see page 9). Other significant proprietary solutions are optimized for specific high-volume markets, such as Yellow Pages and catalogs.

Those unsatisfying standards

Companies that want to follow standards to have some control over layout must choose from a few as-yet unsatisfactory paths. The paths include page description languages, which we assess below; an unwieldy ISO draft specification related to SGML called the Document Style Semantics and Specification Language (DSSSL, see opposite page); the very mature graphics standard we mentioned above called NAPLPS;2 and TeleGrafix's RIPscrip, a recent improvement on NAPLPS that is the latest rage in the bulletin-board world. Unfortunately, NAPLPS and RIPscrip aren't too useful for publishers.

Page description languages (PDLs) offer full-fidelity, page-oriented output across multiple computer platforms. Many companies offer such products, including Adobe's Acrobat, No Hands' CommonGround, Farallon's Replica and WordPerfect's Envoy (see Release 1.0, 2-93). They are good options for companies who want to make legacy documents available online -- sometimes referred to as "shovelware." PostScript is already a common interchange standard, since most people can print such files on compatible printers,

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regardless what computer they use. Viewers for each of these formats will likely be available within the World Wide Web structure, which means any component of a Web page could be a PDL file.

However, PDLs are not a great way to create and publish original works for the new media, whether they are online services or the World Wide Web. For starters, PDLs are page-oriented: Readers have to zoom and pan to see pieces that are outside the screen image. The fidelity that PDLs offer does not always offset the interface power and flexibility that they lack. PDLs offer no simple way for users to set preferences for big type, Braille output or text-to-speech. PDL vendors are working to extend their products' capabilities, but their original design goals make it difficult to move their architectures toward more useful solutions.

Companies that are on the SGML trail are looking to the Document Style Semantics and Specification Language as a way to achieve presentation fidelity. However, the early DSSSL draft specification is overly complex and there are no implementations yet. There are some bright spots. DSSSL is designed to be extensible, and SGML/Open members are at work on a smaller, less complex version that could act as a more practical starting point.

Slow progress; the Web as hub of activity

Many potential electronic publishers today feel that they are trapped between three less-than-optimal approaches: The rigidity of Acrobat, the anonymity (for publishers) of the major online services or the loss of control of Mosaic and the Web. This tension heightens the appeal of services that emphasize publishing and presentation, such as ZDI's Interchange. It has also heated up interest in other approaches, such as the research on visual language using relational grammars underway at Bellcore and MIT's Media Lab (see page 13).

A clearer, standard way to do smart layout will take a while. There has been surprisingly little commercial focus on this area until lately. The World Wide Web has been an important catalyst. The Web's appeal, aside from its growing audience and transaction potential, is its useful architecture for distributing and developing such protocols.

The Web handles multimedia objects by invoking viewers or interpreters appropriate to different kinds of media. There are typically viewers for still and moving images, and players for sound files. This model is easily extensible, even with proprietary protocols. The NCSA Mosaic browser available from Spyglass uses this capability (and a Mosaic extension from SoftQuad called Panorama) to present Adobe Acrobat files.

This is how DSSSL Light, or whatever it may be called, might become one of several ways to provide presentation information for Web documents. A Web page could contain objects that require DSSSL or Acrobat viewers in order to display their contents. If the viewers are not available, they might be downloaded and kept for future use. Some viewers might cost money; specialized ones might come bundled with subscriptions, to make the content more elegant or unavailable to outsiders.

Invoking viewers works for objects embedded in HTML pages, but doesn’t improve the pages themselves. Another way the Web might acquire more per-
Passive layout smarts is through a tag in the header information of an HTML page that would point to one or more style sheets (see page 11). These style sheets could be anywhere else on the Web, offering specific presentation information. This approach's benefit is that it keeps presentation stuff separate from structural stuff.

Developers are still at work on proprietary layout systems, but most of them now watch activity on the Web and will follow if compelling standards emerge. Many are already linking their efforts to the Web or have changed their strategies altogether to take advantage of it. We describe some of these companies, but first we address the complex issues involved in adding smarts to page and screen layout.

LAYING OUT THE ISSUES

It's easy to do better automated layout than today's Web browsers: The bar is not set very high. In fact, the next round of improvements to HTML is likely to offer designers much more variety and power. It's not easy to do consistently attractive and interesting layout automatically, and it's quite difficult to automate the myriad interacting judgements that give output a professional, finished look.

Professional designers are paid to resolve ambiguities and balance conflicting goals. When they deal with predictable inputs such as product catalogs or tables of contents, they can do a great design once, and include some spatial negotiation routines to make certain subtle design decisions at view time. That's hard to do with unpredictable inputs. The Holy Grail of smart page and screen layout is a way to abstract, bottle and reconstitute design intent dynamically.

Sophisticated layout may take active human intervention or powerful and MIPs-consuming expert systems, especially to take into account human limitations (e.g., scaling this image this small makes it illegible), resource constraints (this PC doesn't have the bandwidth to display bulky objects) and timing efficiencies (calling a huge image at this time will slow down the user experience too much). That level of sophistication may also be impossible or economically undesirable. Publishers have to decide where to put their energy. They have to balance the gains in presentation attractiveness with the complexity of the resulting system.

"You have to offer a certain 'wow' factor. If you don't, you're out of business. Unfortunately, it's hard to do the right thing consistently."

-- Chris Hassett, PED Software

At play with the fields on the page

Many factors affect the attractiveness of information presented on a page or a screen. For one thing, the two media are extremely different. Fonts that look great on a page may be horrible on-screen. You may want to put five images on a tabloid page, but only one image per screen. Or the page
may have five columns and the screen version one. Blends, screens, bleeds, fountains and other special effects rarely translate well from page to screen or vice versa. Color is a major headache all by itself, even within the paper world.

A screen offers more presentation options than paper, as well as its own nightmares. A footnote can be visible below the text, as it would be in a paper report, or it can be a tag and pop up in a new window only when invoked. Some things are hard to do on-screen, such as dropped or raised initial caps. There’s no marginal cost for flowing onto an extra "page" on-screen. Your raw-material and delivery costs won’t go up. If you don’t see well, you have the luxury of going to EXTRA LARGE TYPE on a screen.

Since there is virtually unlimited real estate in the electronic publishing environment, designers could add tags that point directly to interview notes or database information and make it available alongside the summary table they published in the afternoon paper. The References section at the end of this newsletter could contain live links. (We’re working on it!)

Screens that move and dance

The problems multiply when you add interactivity. Designers need to make room for buttons and tags, and allow for scrolling fields or animations. Publishers may wish to anchor an element to a spot on the screen and flow other stuff around it. They may want to add navigational tools to the background or invoke a floating palette with navigational icons. They will have to manage the number, placement and sequence of open windows. Linked elements might come from other systems and be of unknown size and shape.

Then there’s variance between screens. Certainly you want to handle PDAs differently from workstations with 21-inch megapixel displays, but even the difference between VGA and SVGA is significant, as is the amount of video RAM present.

Finally, there are concerns about brand identity. If a publisher downloads a proprietary font to a subscriber’s machine, that person might use the company’s brand-identified font for correspondence -- or for a ransom note that shows up on CNN. That font (or color, or logo...) may be one of the principal ways that the company establishes a visual brand identity online. How about that custom dingbat?
FOUR APPROACHES

The following profiles offer different practical perspectives on smart layout. R.R. Donnelley, a large-volume printer of relatively straightforward materials, wants more flexibility, but is hamstrung by the industry's limited foresight. Pages, a small vendor of tools that help ordinary mortals make good-looking documents, is looking for a way to grow beyond its original NeXT platform without losing the power that platform offers.

The last two are research efforts that point to ways that smart (and even smarter) layout can happen on the World Wide Web. The first is the Web-based style-sheet effort mentioned above. The second is basic research with relational grammars, which allows for more powerful layout automation and may be a useful addition to the Web.

R.R. DONNELLEY MANAGES SCALE

R.R. Donnelley is extremely efficient at printing and distributing millions of catalogs, phone books and other materials. Lately, it has been redesigning its physical plant and information flows to fit smaller runs -- although still in the hundreds of thousands of copies. Its long-term goal is "scalable reach": the ability to print and distribute materials in batches from millions down to single copies.

In a fulfillment system with scalable reach, smart layout could allow a cataloger to generate and send a targeted catalog to a subset of its audience in order to promote slow-moving items. Coupled with information architectures tuned for re-use, a company could use the same image for a partial page advertisement, a fax-on-demand image, a CD-ROM backdrop and a downloadable screen-saver giveaway. But it's not that easy.

The need for re-use is clear. The number of channels is expanding dramatically and the number of audiences is exploding into more and more tightly targeted market segments, down to markets of one. Until recently, a company might have needed to create materials for radio, print and tv. Soon the list could easily include CD-ROM, several online services, electronic catalogs, Home Shopping Network and the Internet. Planning for re-use should make all the channels more viable.

The problem is that many companies have digitized their particular channels without regard for the broader industry, or even the rest of their business. Leading-edge companies may be all-digital in ad production and transmission to magazines, but they usually don't have flexible architectures. They can't use the same content in an online service or with a newspaper. Much of their content is trapped in proprietary, final-form data formats (e.g., pre-press color separations), instead of in a useful intermediate format.

As Ron Weir, president of manufacturing support for R.R. Donnelley's commercial print sector says, "Many companies that say 'we're digital' haven't planned for re-use. They've digitized a single channel but haven't made provisions to search, resize and customize the materials for other channels." Sometimes paving the cowpath was the only way to make a digital process economically or practically feasible. The transition to multi-purpose content with automated layout will be slower than people hope.
When you’re watching a bad presentation, don’t you wish there were an application that would prevent people from putting 500 words on a single overhead slide or from using 6-point fonts? Pages by Pages, the NeXT-based application that Pages Software shipped last March, does a great job of automating typography and layout -- including presentations -- within style constraints.

Pages offers inexperienced document creators a rich variety of options for document design while it limits their ability to mess up. It’s similar to the way the animal-coded tags on Garanimals help kids dress without clashing. (Now, if someone would just do that for adult wardrobes....)

Start here

Users must first choose from one of several design models, which are collections of interactive elements -- objects and rules, to be techy. Design models don’t offer a single look or layout, like templates: They offer choices that lead to a consistent design appearance and pleasing, professional presentation. They give untrained people access to style sense, expertise and rule enforcement from professionals.

Design models contain multiple elements such as titles, captions and by-lines. Each element has multiple styles, and design information that indicates how that element and its styles should be used with other elements to produce a consistent design appearance. Pages’ system allows designers to create complete styles that cover many kinds of documents, from memos and business letters to newsletters, brochures and presentations. It’s similar to the relationship between font families and specific type faces.

You really don’t want that font, do you?

Document creators choose elements off palettes (matching objects with instance data), and the system helps to direct their style choices. For example, styles that don’t go with what they’ve chosen are not available on the palette. They can choose fonts, but the system will then present only fonts that complement the earlier selections. A design model also controls where they can place titles or illustrations: Graphics won’t stick where they don’t belong. If the design model is open and light, the system won’t let users crowd the page with too much stuff.

Pages comes with several such design models. Writer is for simple documents. April and Victory are more sophisticated, yet look different from each other (see examples, opposite). April has an open, lighter feeling than Victory and favors stub headlines and small graphics that protrude into the margin. Users can apply different design models to the same content, and thus get the look and feel of a different publication -- or a screen version consistent with the same one.

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3 We first covered Pages Software in Release 1.0, 7-91, when the company had a working prototype.
Pages does not come from the worlds of SGML or HTML, but it has much in common with them, starting with the separation of content and style. The Pages application (with five design models) costs $600. Companies can customize those models with the Designer Toolkit ($1000) and effectively create corporate style sheets that are more flexible and powerful than those created with word-processing or desktop-publishing programs. Pages offers site licenses with favorable discounts to encourage this. Companies can also contract with Pages for custom models or create their own.
Even though it is porting the software to OpenStep, a platform strategy that has breathed some new life into the troubled NeXT system, Pages will have to do extraordinarily well in order to recoup the substantial investments from Paragon Venture Partners, Battery Ventures and Enterprise Partners. With sales gated by the number of accounts that have adopted Next-Step, Pages must find an audience beyond the NeXT environment for its technology soon.

Paging through some options

One option is to position Pages as a callable, network-based layout engine on a server. Pages recently announced its Pages Remote Objects API, which makes Pages fully scriptable, enabling it to generate some documents automatically. However, it is hard to see this as a large revenue stream.

Another path is the Web. Pages just finished a design model for output to the Web. Compared to some of the more sophisticated layout problems Pages has faced, the Web has a simple, highly constrained output with a few complications such as the anchor tags that reference other documents.

Perhaps more interesting is the potential of a light version of Pages that could also be a powerful Web browser for publishers, who could enhance their content feeds with embedded hints. (HTML allows for private tags. Interpreters or browsers that can't process the tags simply ignore them, as opposed to crashing, which is how SGML compilers react to strange tags. That lets Pages and others embed layout hints in the text without disrupting the fabric of the Web.)

Finally, Pages could act as a smart frame that combines multiple feeds from different sources and presents them in a uniform style. Imagine a personalized newspaper that changes during the day but looks good all the time as you get e-mail, as new stories hit the wire or as the local weather changes in relevance. Although it is not a current project for Pages, it fits well with the current trend toward smart browsers and custom layout.

STYLE SHEETS IN HTML

Most of the progress that Internet working groups have made on HTML 2.0 and even 3.0 adds elements and functionality, not presentation information (see Release 1.0, 9-94, for more details). The working groups would prefer that HTML remain a description language for structural document elements, and that it be kept separate from specific presentation details so that the details could vary from instance to instance.

That doesn't mean that the HTML community doesn't want a way to provide more presentation control. In fact, several participants have proposed that HTML documents point to separate style sheets that they would gather and interpret at display time, in a way similar to how graphics or sounds are currently referenced within a Web document.

Arena, the HTML 3.0 testbed browser currently under development (led by Dave Raggett of Hewlett-Packard's laboratories in Bristol, UK), includes style sheets, an effort currently led by Hakon Lie of CERN, the European Laboratory for Particle Physics in Switzerland.

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Here's what the extra information to support style sheets might look like:

In the header of the Web page:

```
<LINK REL="style" HREF="http://NYT.com/style">
```

In the referenced style sheet
(http://NYT.com/style):

```
h2.font.size = 20pt 40%
head.align.style = center
and other statements
```

The style settings state first that level-two headings should be shown in a 20pt font, and that all headings should be centered. The "40%" is an influence setting. If another style setting affects that parameter and asserts a stronger influence, it might dominate, or the values might be averaged. More on that in a moment.

Preferences, not commands

The styles are hints and suggestions, not hard-coded rules. The style language is not a real programming language. It's a way to declare constraints and preferences. In addition to font, alignment and spacing settings, style sheets could contain information that sets other parameters, such as background, foreground and text color; tone, pitch and volume settings for text-to-speech programs; alignments for print, as distinct from screen display; and window size, location and transparency.

Style sheets could exist anywhere on the Internet. Companies might sell access to particularly excellent ones, or bundle them with subscriptions to their own materials. Some browsers would be able to interpret the styles; others wouldn't, and would ignore the extra presentation information.

Sheet after sheet after sheet...

CERN's Lie has proposed an intriguing and potentially useful twist to the style-sheet scenario: cascading style sheets (for a pointer to his full proposal, see Resources, page 16). The idea is that blended styles allow for a primitive form of inheritance, as well as negotiation of preferences by author and browser. The user supplies the initial sheet. Style declarations have an influence percentile, which the user might set at 100%, to take full control of presentation parameters.

Style sheets can call other style sheets, which are appended and merged as they are encountered. The sheets could cascade endlessly, but there are clearly practical limitations. Mixing simple rules with cascades seems to give reasonable results, though it's not clear that an aesthetic task can be achieved with weighted averages.

This is clearly early work. Interested parties are just getting proof-of-concept code written and distributed. It's important to note that the style sheet work isn't among the working group's top priorities, so it will advance only as quickly as the most interested parties move it forward. Nevertheless, this is one of the most promising paths to enhanced presentation, on screens and on paper.

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RELATIONAL GRAMMARS IN BLOOM

Style sheets are relatively simple and have limited functionality and flexibility. For example, it’s difficult to design them so they will adapt appropriately to different displays and printed output formats. They’re not very conditional; they’re templates, not programs. Rule-based systems are a high-end approach to smart layout, but they rapidly get tangled in sequence and control problems, which take a lot of time and power to solve. A broadly useful smart-layout solution should solve layout problems quickly without consuming too many computation, transmission and storage resources.

The field of computational linguistics offers some technology that can tackle smart layout efficiently. The field contains many subdisciplines based on grammars, which range from simple string grammars to higher-order grammars. String grammars are useful for tasks such as parsing sentences to check their (English or other) grammar. Higher-order grammars offer a natural flow of control over well-structured information and can handle complex relationships in domains such as visual languages, where simple string grammars are just not expressive enough. Relational grammars manage automated two-dimensional design articulation. They are designed to deal with adjacency, proximity, symmetry, sequence and other semantic, pragmatic, geographic and topological relationships.

Other grammars -- including array, attribute, tree, and graph grammars -- each have constructs and representational schemes suited to a particular problem domain. Relational grammars allow for semantic and spatial constructs such as "subordinate-to," "next-to," "same-page," "equal-width" and "linked-to," as illustrated in the figure below. Graph grammars are similar, but allow for nodes, arcs and relevant functions in that domain.

On the practical side

Bellcore researchers use relational grammars to automate the design (and redesign) of highly complex telephone-network engineering diagrams. There is related research in kitchen design, user interfaces, CAD, flow charts.
and other areas. One of the more notable research centers in the field is the MIT Media Lab's Visible Language Workshop, which was formerly directed by the late professor Muriel Cooper and is now in transition. Cooper was a graphic designer at the MIT Press and founded the Visual Language Workshop 20 years ago.

Louis Weitzman, a graduate student in the program, is working on a software system called the Visual Information Architecture (VIA). Weitzman's principal collaborator in this work is a former colleague from MCC in Austin, Kent Wittenburg of Bellcore's Computer Graphics & Interactive Media Research Group. The VIA project assumes an environment in which designers develop relational grammar rule sets that define various layouts. Weitzman has defined three projects within VIA.

- **Automatic Presentation.** Finished rule sets process incoming multi-media document content automatically to achieve a given style. This is a "full automation" interaction mode.

- **Interactive Design.** Designers process content manually, with interactive help from an improver-based system. If designers begin to create the components of a captioned figure, without much precision, the system will identify the elements properly, help create them and enforce design rules and constraints.

- **Grammars by Example.** An intelligent system infers design rules from designers' actions in an authoring or layout tool. The system attempts to capture design intent and encode it as a rule set.

Weitzman has developed proof-of-concept prototypes of all three projects, though the latter problem is clearly more difficult and the prototype is correspondingly less developed.

The automatic presentation project is a good example of what relational grammars are and how they can be used, so we'll elaborate on it here. Its goal is not automated design, but rather the automatic implementation of existing designs. It's about articulation within constraints. It also assumes that the input elements and their relationships are identified.

Weitzman's prototype parses those elements into a derivation tree, which is sort of a diagram for complex documents. Then it applies the grammar rules to translate the derivation tree into a set of media objects with spatial and temporal constraints. The system then tentatively executes the constraint rules and solves for the actual positions (x and y coordinates) of the media elements using a constraint-propagation system called DeltaBlue developed at the University of Washington. It repeats this process, recursively, until it solves the problem. Finally, it presents the results on the page or screen. In principle, different sets of grammar rules can create different "looks," as illustrated on the next page.

The current automatic presentation engine is over a megabyte of Lisp code. It's not optimized and has many features a commercial version won't need; runtime interpreters should be far more compact. The prototype doesn't tackle markup or flex to different output formats. Weitzman has done some work with HTML, but closer integration with it and the Web will take more time. The HTML working group at the World Wide Web Organization is inter-
ested in the potential of relational grammars as a form of advanced style sheet, but it is not a top priority at this moment. Although Weitzman has many ideas of what to do with relational grammars once he has finished his PhD, he is not sure where he will carry that work out.

Research directions

Weitzman has several research directions in mind. Since HTML allows for custom tags (see page 11), he wants to embed more information in source files. He and an undergraduate are adding such hints to HTML as an experiment. Weitzman would also like to increase the intelligence of authoring tools, as in the "grammars by example" project. Before that, though, he will likely work to add more support for ambiguity to make the interactive design system more flexible for designers.

Long-term directions involve applications of relational grammars in multimedia and three dimensions. Documents could have temporal constraints, branching, linking and embedded simulations. A slider bar could control inputs to a physics simulation, or could change size of a down-tube in a bicycle design.

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RESOURCES & PHONE NUMBERS

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For further reference:

Hakon Lie’s Web node on style sheets is at
http://info.cern.ch/hypertext/WWW/Style/

Kent Wittenburg’s home page is at
http://community.bellcore.com/kentw/home-page.html

Louis Weitzman’s home page is at
http://www.media.mit.edu/students/weitzman/home-page.html

Netscape’s extensions to HTML are at
http://home.mcom.com/home/how-to-create-web-services.html

The DSSSL specification is at ftp://ftp.jclark.com:/pub/dsssl

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**Release 1.0 Calendar**

**November 28-29**  Consumer Information Appliance V - New York. Organized by Jupiter Communications. Call Harry Larson, (800) 488-4345 or David Schwartz, (212) 941-9252; fax, (212) 941-7376.

**Nov 29 - Dec 2**  CAUSE94 - Orlando. Education meets technology. Sponsored by CAUSE. Call Christopher Vinall, (510) 428-2225; fax, (510) 420-9010.

**Nov 30 - Dec 2**  The Western (Cable) Show - Anaheim. Sponsored by the California Cable Television Association. Call Gina Shackleford, (510) 428-2225; fax, (510) 420-9010.

**December 5-7**  Computer Fax Conference - San Diego. Sponsor: BIS Strategic Decisions. Call Chris Mellyan, (800) 874-9980, x349; fax, (617) 982-1727.

**December 5-7**  IT Services '94 - Santa Clara. Sponsor: Creative Expos and Conferences. Call Cherif Moujabber, (508) 660-7099; fax, (508) 668-2416.

**December 5-9**  31st Internet Engineering Task Force - San Jose. Sponsor: Sun Microsystems. The closest you'll get to Internet HQ. Make decisions about IPng and more. Call Steve Coya, (703) 620-8990; fax, (703) 620-0913; email, ietf-info@cnri.reston.va.us.

**December 6-8**  DB/Expo '94 - New York City. Produced by Blenheim NDN. Call Lori Silva. (800) 2DB-EXPO; fax, (415) 966-8934.


**December 12-14**  Expert Systems '94 - Cambridge, UK. Sponsor: British Computer Society. Call Kit Stones, (234) 343-384; fax, (234) 343-384; email, kstonestcc@citl.compulink.co.uk.

**December 15-17**  Int'l Conference on Computer Applications in Industry and Engineering - San Diego. Sponsor: ISCA. Call Gordon K.F. Lee, (919) 515-5292; fax, (919) 515-7968; e-mail, glee@eos.ncsu.edu.

**1995**

**January 11-12**  Resolving the Addressing Dilemma - Palo Alto, CA. Sponsored by Cavanagh Associates. Tired of messy addressing schemes? Participate! Call Mike Cavanagh, former executive director of the EMA, (703) 875-8666; fax, (703) 875-3780; e-mail, mcavanagh@aol.com.

**March 5-8**  **Platforms for Communication Forum - Phoenix. "Local <-> Global: Creative Tension." See page 18. Sponsored by us: You read the newsletter; now meet the players. Call Daphne Kis, (212) 924-8800; fax, (212) 924-0240; daphne@edventure.com.

* Events Esther plans to attend.
@ Events Jerry plans to attend.

Lack of a symbol is no indication of lack of merit.
Please let us know about other events we should include. -- Christina Koukkos

Release 1.0 22 November 1994
1995 PC (Platforms for Communication) Forum
Local <-> Global
Creative tension

We invite you to attend the Eighteenth Annual PC Forum, to be held this year in Phoenix, Arizona, from March 5 to 8. Each Release 1.0 subscription (plus the fee!) entitles you to two registrations for the Forum. All paid subscribers got their invitations last week.

Each year, the Forum raises issues that play out in the year that follows. Last spring, our theme was "Interactivity is two-way" -- a theme echoed through the year as the Internet caught the popular imagination and highlighted the implications of two-way communication and feedback loops on commerce and community.

This year, we anticipate 1995 with our new theme: "Local <-> Global: Creative tension" (pronounced "local to global"). The two-way interactivity we explored last year is now taken for granted, but it raises many further questions. Communications technology is erasing the physical distinctions between local and global, but business, cultural, legal and social distances persist; the once popular notion of a global community looks specious. Global is not just local writ large -- and local successes may not scale to global reach.

This Forum will examine the boundaries between local and global: how we can erase them, or alternatively how we can add value as we cross them. How can business exploit (rather than resolve) the creative tension between local and global?

Our theme has business, social and technical facets. We will discuss everything from the computer architectures necessary to operate on a worldwide basis, to the trade-offs between local privacy and a global "open society." We'll consider what happens when a company's notion of "local" starts to include its customers or suppliers through means such as EDI, Lotus Notes or the Internet. What are the necessary underpinnings to manage financial transactions, integrity, natural-language translation, membership qualification and verification? We'll ponder what happens when the rules and protocols of one local community clash with those of another on the global net -- in contexts ranging from contract and tax laws to standards for language, data security, freedom of expression and culture.

What are the implications for software and information design -- and for business design? How can information/communication services sell a "local" feel along with global reach?

Moreover, we will explore the computer industry's own globalization into the foreign worlds of entertainment and consumer marketing. How do we create virtual presence and persistent (virtual) places where consumers and business people can engage with each other?
Release 1.0 editor Esther Dyson and managing editor Jerry Michalski will moderate the Forum, which operates as a series of talks, interviews, debates and panel discussions with active audience participation. In short, we’re holding a local meeting of the computer/communications/media industry’s leaders to address these global issues.

In addition, Jerry will organize Release 2.0 of last year’s popular Rumpus Room with a variety of online services and communities available for attendees to explore -- many of them still in beta. We will also show some "local" computer-industry technologies such as tools for qualitative data (everything from file management to visualization of discussion threads or discussion participants), language translation tools and groupware tools.

Speakers will include:

- Carol Bartz
- Eric Benhamou
- Gabor Bojar
- Stewart Brand
- Jim Clark
- Scott Cook
- Adam Curry
- Russell Daggatt
- Bob Frankenberg
- Wayland Hicks
- Eric Hughes
- Bob Kavner
- Alex Mandl
- Jim Manzi
- Nathan Myhrvold
- Mike Nelson
- Carol Peters
- Bert Roberts
- Mort Rosenthal
- Gerhard Schulmeyer
- Sherry Turkle
- John Warnock

- Autodesk
- 3Com
- Graphisoft (Hungary)
- Global Business Network
- Netscape Communications
- Intuit/Microsoft
- OnRamp Inc.
- Teledesic
- Novell
- Nextel
- Abraham, Hughes
- Creative Artists Agency
- AT&T
- Lotus
- Microsoft
- Executive Office of the (US) President
- daVinci Time & Space
- MCI
- Corporate Software
- Siemens Nixdorf (Germany)
- MIT
- Adobe

If you are a Release 1.0 paid subscriber and have not yet received your registration materials, call us at (212) 924-8800, or send us e-mail at daphne@edventure.com.
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Daphne Kis
Publisher