

**Integrated Information Retrieval for Law  
in a  
Hypertext Environment**

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A prototype information retrieval system for lawyers, *Justus*, has been developed on a Sun workstation to run in a Guide hypertext environment. The hypertext database is created automatically by Justus from machine readable versions of the ordinary printed texts, ideally the publisher's typesetting tapes. The database incorporates primary legal sources, such as statutes and cases, and secondary sources, such as textbooks and a dictionary. Initially, the lawyer may select any document in the system. From this initial document, he may access any other document, or part of any other document, to which reference is made. Reference selection is by a pointing device, such as a mouse. There is no limit on the number of selections that can be made, and no restrictions on the path through the system.

### 1. Introduction

The paper begins by discussing hypertext systems in general, and Guide in particular. It describes Justus from a user's point of view, and explains how reference retrieval works, using examples from the general legal dictionary, the most densely cross-referenced text in the database. It then goes on to discuss some of the problems that arise in automatic conversion to hypertext format because of heavy cross-referencing and inconsistencies in the text. It concludes by looking at some of the advantages and problems inherent in producing an integrated system.

### 2. Hypertext Systems

The term *hypertext* was coined by T. H. Nelson in 1967. In [NELSON67], he defined it as:

*the combination of natural language text with the computer's capacities for interactive branching, or dynamic display...a nonlinear text... which cannot be printed conveniently...on a conventional page.*

Hypertext systems are, therefore, systems that encourage the author to provide a framework for his document more extensive than the traditional linear text, segmented at random intervals into chapters and sections.

The first document systems that did more than project the unadulterated text of the printed document used the ubiquitous tree as the underlying hierarchical model.

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Text could be inserted at any node in the tree. In theory, readers could gain an overview of a work by perusing only the higher levels of the tree and detailed knowledge by studying the lower levels. At each level, the answer to a question or a choice from a menu determined what the next view would be. Similar methods were used in Computer Assisted Learning schemes. Students who wanted a refresher course and could answer test questions after minimal instruction could proceed rapidly through the subject. Quick learners steered a middle course, while slow learners ploughed to the leaf of every tree to find extra instruction and examples.

To be effective, an inner node of the tree must be a summary or an abstract of the nodes subtended from it. This can inhibit the natural style of the author, and make the document appear odd to a reader looking for the ordinary linear exposition to which he is accustomed. It implicitly demands of the reader an understanding of the hierarchical techniques the computer is using; a reader who is not interested in computer methods may find this demand tiresome, even intolerable. The technique spread into ordinary printed texts but never became widely popular, possibly because such documents were difficult to write and laborious to read with much repetition at different levels in the tree.

A method that gives more flexibility than a tree structure is a directed graph, and it is systems which use directed graphs that are, to-day, called hypertext systems. A directed graph is a set of nodes each of which may, in theory, access any other node. The nodes may contain text and illustrations, selectable elements and other keywords that may be used to satisfy retrieval requests. The nodes themselves may be, and usually are, organised into a formal nested structure such as a tree, but access to individual nodes is not necessarily through the structure, but via the links of the directed graph. A link has an origin and a destination; it must appear in the origin node highlighted in some way to show the reader that via the link he can access that destination. In some systems, the link's origin is used to return the reader to his starting point if he requires it.

In the world of printed books, dictionaries are the oldest examples of directed graphs. Each dictionary entry is a node, from which the reader may access any other node, either because he has been advised by the compiler of the dictionary to do so, or because he has not understood a word in the entry. An interesting modern development of the directed graph technique is the children's adventure book where the text is divided into numbered sections or nodes. The child reader plays the hero or chief protagonist, and, by his choice of actions or responses to questions, influences the sections read and, consequently, the course and outcome of the story. These appear to be much more popular than their forerunners, the structured teaching texts: Puffin Books claim sales of over eight million for their *Fighting Fantasy Books*, of which [DARVILL-EVANS87] is an example.

### 3. Information Retrieval and Guide

#### 3.1. Guide as a hypertext system

Guide is a hypertext system, which was originally devised and implemented by Professor P. J. Brown at the University of Kent at Canterbury: [BROWN86], [BOVEY87]. One application is to help authors to create written material suitable for a variety of users with different levels of expertise and ability. That is, by carefully constructing the original document, an author can provide information displays for either an overview of his topic, or for a comprehensive and detailed description, or for many intermediate versions that lie between these two extremes. By selecting displays appropriate to his current knowledge and reading objectives, the reader can use the original text to create a document that is uniquely tailored to his individual needs.

This document may be of transient interest only, or may be saved for future use.

### 3.2. Justus and Guide

The purpose of Justus is to convert into Guide format, documents which already exist in machine readable form but which were not originally conceived as Guide documents. Its methods are appropriate for heavily cross-referenced material; therefore, law is a particularly amenable subject.

### 4. Information Retrieval in Law

In law, all the source material is printed, and it is heavily cross-referenced. The density and type of referencing varies with the material. For example, cases are a crucially important legal source, but, if the full text of a law report is processed, the density of references to other sources is low. There is a variety of type of reference: other cases, sections or paragraphs in acts and schedules, and, occasionally, textbooks (though these are only *Authority* if the author is dead!). On the other hand, text from an act often has a high density of references, but there is little variety in reference type. Only internal references to other parts of the same act, or external references to other statutory material are found. Of the source material available to me, the most densely cross-referenced was the law dictionary: Osborn's Concise Law Dictionary, published by Sweet and Maxwell: [OSBORN83]. This also has the greatest variety of reference types. There are internal references to other terms in the dictionary; external references to statutes and to cases that substantiate the definitions. Consequently, I have used it as a source for examples in this paper, although much of what is said about Osborn applies to other texts. An alternative approach to legal dictionaries is described in [HEATHER87].

### 5. A user's view of Justus

An overview of the system may be helpful at this point.

#### 5.1. Entering the system

When a lawyer enters the Justus system, a list of all the major sources available under the system is displayed for him: figure 1.

```
shelltool ~ /bin/csh
Quit New Down/Up Save Block-edit Author
.....JUSTUS.....JUSTUS.....JUSTUS.....JUSTUS.....JUST
JUSTUS.....JUSTUS.....JUSTUS.....JUSTUS.....JUSTUS....
.....JUSTUS.....JUSTUS.....JUSTUS.....JUSTUS.....JUST

Osborn: A Concise Law Dictionary

Redundancy Payments Act 1965

Industrial Relations Act 1971

Trade Union and Labour Relations Act 1974

Employment Protection Act 1975

Industrial Relations Cases
```

Figure 1

```
shelltool ~ /bin/csh
Quit New Down/Up Save Block-edit Author
.....JUSTUS.....JUSTUS.....JUSTUS.....JUSTUS.....JUST
JUSTUS.....JUSTUS.....JUSTUS.....JUSTUS.....JUSTUS....
.....JUSTUS.....JUSTUS.....JUSTUS.....JUSTUS.....JUST

OSBORN: A CONCISE LAW DICTIONARY

A1 at Lloyd's
A and B Lists
a coelo usque ad centrum
a fortiori
a mensa et thoro
a posteriori
a priori
A.R.
a tempore cujus contrarii memoria non
existet
```

Figure 2

He selects one of these with a pointing device, such as a mouse. His choice will, of course, depend on his prior knowledge and present purposes. An experienced lawyer working in his specialist area may go directly to a case, or to an Act of Parliament; a student, or a lawyer working in an area unfamiliar to him, is more likely to request a secondary source, such as a dictionary or textbook. Once a document has been selected, its title is replaced on the screen by a structured representation. This varies with the document: for a textbook, it might be a list of chapter headings; for an Act of Parliament, a list of part and section headings; for a dictionary, a list of head words. Figure 2 shows the display after the dictionary has been selected.

## 5.2. Scrolling the display

If the representation is too large for the screen, the user may scroll the display until he finds the section of the document he requires. There are two ways to do this. At the top of the screen is the Guide menu. The user may select a command from the menu, using the mouse. The Down/Up command enables him to move consecutively through the document: in this example, through the dictionary.

A second means of moving through the dictionary is provided by the *scroll bar*, which represents the position within the complete Guide document of the text displayed on the screen. The black part represents the current frame of view; the white part, the rest of the document. The user may move about the document by pointing at the scroll bar and pressing a button on the mouse.

## 5.3. Dictionary definitions

When the user has found the part of the document he requires, he selects it. This will give either a lower level structural display, in which the selection process must be repeated, or a display of full text of the document. Figure 3 shows the screen after it has been scrolled to display the dictionary headword *actus Dei nemini facit injuriam*; figure 4 is the display after *actus Dei nemini facit injuriam* has been chosen.

```

shelltool - /bin/csh
Quit New Down/Up Save Block-edit Author
-----
actus curiae neminem gravabit
actus Dei nemini facit injuriam
actus legis nemini facit injuriam
actus non facit reum, nisi mens sit rea
actus reus
ad arbitrium
ad avizandum
ad colligenda bona
ad diem
ad eundem
ad hoc
ad idem
ad interim
ad litem
ad medium filum viae
ad quaestionem facti non respondent

```

Figure 3

```

shelltool - /bin/csh
Quit New Down/Up Save Block-edit Author
-----
actus curiae neminem gravabit

actus Dei nemini facit injuriam.
[The act of God prejudices no one.]
See ACT OF GOD

actus legis nemini facit injuriam
actus non facit reum, nisi mens sit rea
actus reus
ad arbitrium
ad avizandum
ad colligenda bona
ad diem
ad eundem

```

Figure 4

The phrase has been replaced on the screen by the definition that appears in the original printed dictionary. In Guide parlance, the dictionary headwords are *definition buttons*. Associated with each definition button in a Guide document, there must be a *replacement text*. For many Guide documents, the replacement text is set up in advance by the author of the document. In Justus, the Guide documents are created automatically from documents written by authors who were unaware of Guide's existence. The Justus programs must, therefore, recognise automatically the terms that are potential definition buttons for the different types of document; Justus must also recognise the replacement text corresponding with each definition button. For the dictionary, this is simple because all dictionary headwords are definition buttons i.e. the basic text that the user sees on entering the dictionary is composed entirely of Guide definition buttons. The replacement text for each definition button is the complete dictionary entry for that definition button (i.e. for that head word). When the user selects a definition button, the replacement text for that definition button replaces the definition button on the screen, and the field of view is adjusted to accommodate the augmented text. In the dictionary, the definition is always longer than the defined term, so the field of view always changes, often radically.

The original field of view is restored if the Guide definition is revoked or *undone*. A definition can be undone simply by pointing at it and pressing the *undo button* on the mouse.

#### 5.4. Recognising definitions in other documents

For documents with a more complex structure, the task of recognising definitions is more demanding. Any component of the document that might be referred to in a cross-reference must be converted into a definition button. For example, in an Act of Parliament, every part, section and subsection heading is a definition button, as, of course is the name of the Act itself. More detail on the conversion of statutory material can be found in [WILSON88].

#### 5.5. Cross-referencess

In the full text of any document, there may be references to other parts of the same document, or to other documents, or to parts of other documents. The user may select any of these references, one at a time. If the chosen document is in the database, text from the appropriate section will be displayed on the screen. The user may retain a reference until the end of a session, and then make a permanent record of it; or, if it proves irrelevant, he may discard it immediately. If the reference refers to other documents, the user may select these in turn. Unless the physical capacity of the machine is exceeded, there is no limit to the depth of nesting for reference calls, and no limit to the length of the reference trail. Let us first consider a simple example.

#### 5.6. A simple internal reference

In figure 4, the replacement text for  
*actus Dei nemini facit injuriam*

contains an explicit reference: that is the compiler of the dictionary has advised the reader to

See ACT OF GOD.

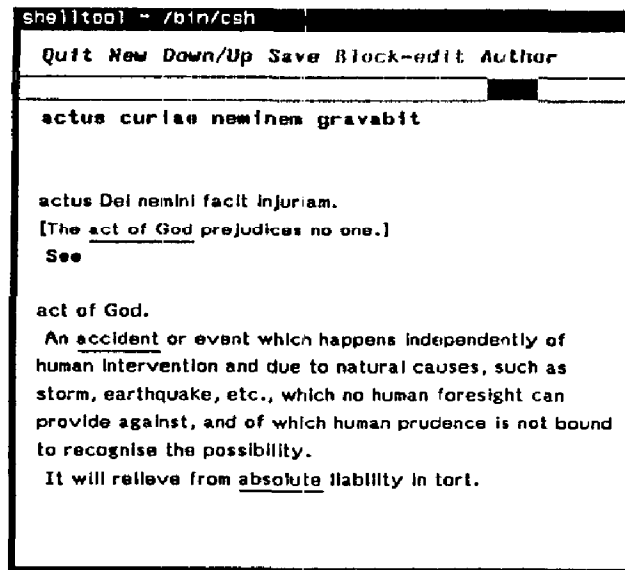


Figure 5

Figure 5 shows the field of view after *ACT OF GOD* has been selected. The replacement text for *ACT OF GOD* has effectively become part of the dictionary definition of the headword *actus Dei nemini facit injuriam*. In Guide terminology, *ACT OF GOD* is a *usage button*. A usage button has no replacement text of its own; but, if the usage button term has already been used as a definition button, the replacement text associated with that definition button replaces the selected usage button in the display, and the field of view is once more adjusted to accommodate the augmented text. Usage button replacements can be revoked, or undone, in the same way as definition replacements: by pointing at them and pressing the undo button on the mouse. It is not necessary to undo them before looking up another word. For example, we could scroll up the dictionary to find the word *abrogate*, (Figure 6), and select it, (Figure 7).

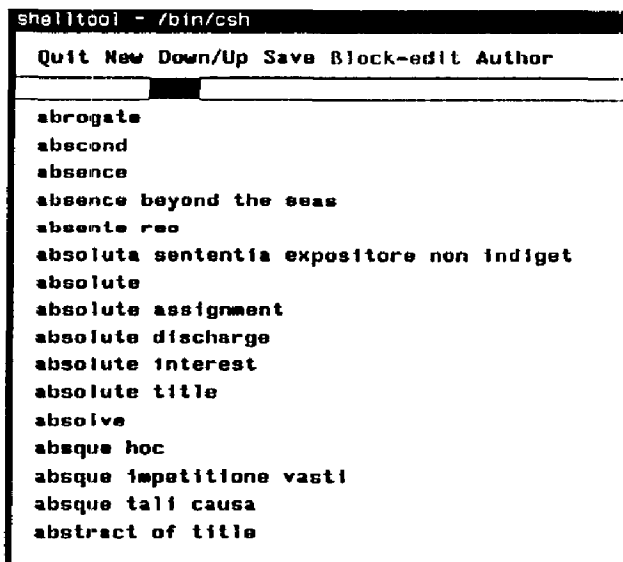


Figure 6

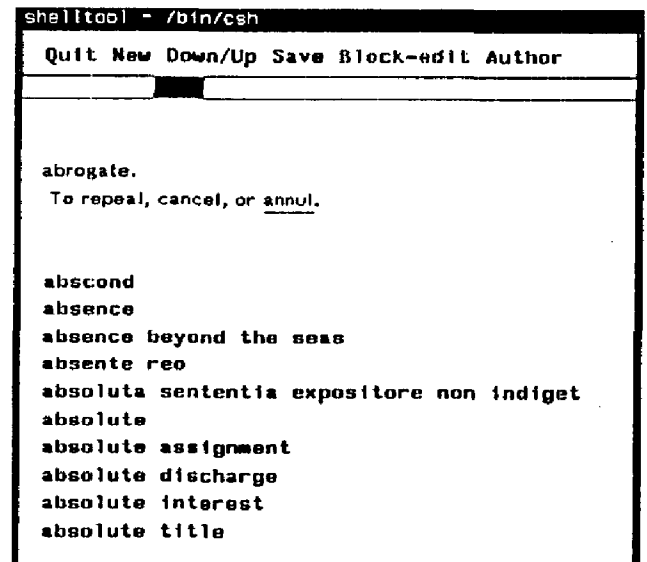


Figure 7

### 5.7. An implicit reference

In the definition of *abrogate*, the word *annul* is also highlighted. *Annul* is an *implicit* reference. The compiler of the dictionary has not drawn our attention *explicitly* to this term, as he did to *ACT OF GOD*; but the Justus program that converts the typesetting file to a Guide file has discovered that there is a dictionary entry for *annul* and has automatically highlighted it. Thus, an *implicit reference* is a reference discovered by the Justus conversion programs that the original author of the document is unaware of, or considers inappropriate for his 'average' reader at that point in his document. For instance, a dictionary compiler may have defined a word using terms so familiar to himself that he considers a gloss unnecessary; a naive reader may not agree with him. This system allows the reader to judge for himself the advantage of consulting other material. He does not have to select any of the highlighted terms; if he chooses to, the process is much simpler than in a conventional paper-based system. He does not have to find another book; he does not risk losing his place in the current volume. Guide's *undo* mechanism ensures that the reader can always get back to where he started from.

### 5.8. The glossary window

When we select *annul*, the console screen of figure 7 changes to the representation shown in figure 8.

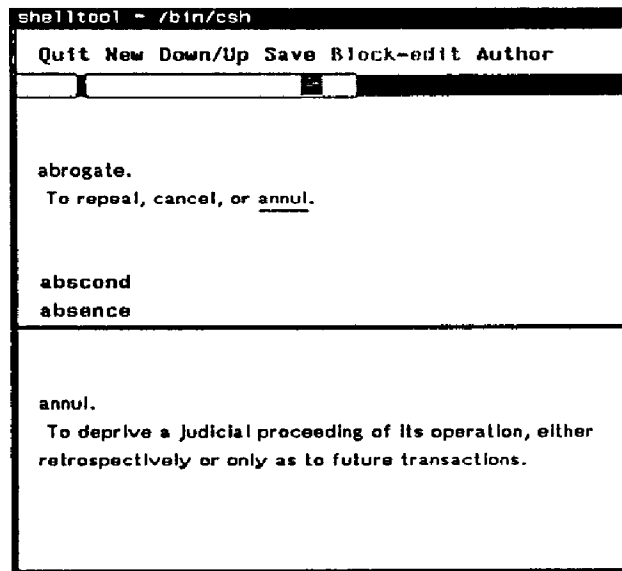


Figure 3

In figure 8, the screen has been split into two parts or *subwindows*; the upper part, or *main subwindow* still displays the main dictionary text, (but with a reduced field of view), while the lower part has become a *glossary subwindow*. Glossary subwindows are used to display information that is more appropriately displayed outside the main body of text. With more conventional texts, glossary subwindows might be used to display footnotes, citations or attributions, or, as the name suggests, glosses or definitions for terms used within the main text. In this dictionary application, implicit definitions are, in a sense, secondary definitions; consequently, it seemed more appropriate to display

them in a glossary subwindow, than to augment the main text.

A glossary subwindow is created the first time the user selects a *glossary button*. Glossary buttons are like usage buttons in that they have no text of their own, but, if the term has been defined elsewhere within the Guide system, then the text associated with that definition will be displayed in the glossary subwindow when that term is selected. There is only one glossary subwindow, and the replacement text for glossary buttons selected later will be displayed in the same subwindow. Terms are held within the glossary subwindow in alphabetical order, so that the user can easily find any gloss he has asked for. He need not retain all the terms he selects; he can discard at any point glosses that he considers unimportant or irrelevant. If he discards all the glosses, the glossary subwindow will disappear. The user can re-examine the contents of the glossary by scrolling the glossary subwindow. This works in the same way as main window scrolling. Notice that, in figure 8, the scroll bar has been split into two parts: the part on the left represents the main subwindow; the part on the right, the glossary subwindow. Text within the glossary subwindow can contain other highlighted terms (i.e. other glossary buttons and replacement buttons.) The user may select any of these, in any order, from the glossary window.

## 6. Analysis of References

Now that we have worked through a simple example, it might be appropriate to look at some of the more complex issues in the automatic conversion process.

### 6.1. Additional Definition Buttons for the Dictionary

When the Guide dictionary file is opened, the text displayed is the list of headwords as they appear in the original printed dictionary, with the addition of some automatically generated entries. These extra entries occur:

- (i) when the original entry is not stored under the first word of the phrase.

**angary, right of**

would generate two entries:

**angary, right of**

and

**right of angary.**

- (ii) when the original entry has an alternative stored with it.

**folcland; folkland**

would generate three entries:

**folcland; folkland**

**folcland**

and

**folkland.**

A headword becomes a Guide definition button for which the replacement text is the complete dictionary entry for that headword. For multiple headwords, the complete phrase in natural word order, or the first of a set of alternatives, becomes the definition button. Thus, in the above examples, the definition buttons would be

**right of angary**

and



folcland.

The extra entries in the headword list are Guide definition buttons, but they have as their replacement text, usage buttons to the main entry. Thus, the replacement text for the definition button

angary, right of

is the usage button

right of angary.

## 6.2. Cross referencing in the Dictionary.

Before a program to recognise cross-references could be produced, I had to analyse the possible types of reference. The descriptive categories I have used below are of my devising; I hope they accord with the intentions of the dictionary compiler. I use them to refer to both printed and computerised dictionary, because the textual contents of the dictionaries are identical. Obviously, the terms can only have operational significance in the computer dictionary.

Cross-referencing within the dictionary text can be split into two major divisions: *internal* and *external*. Internal references are references to other entries in the dictionary. They may be either *explicit references* or *implicit references*.

### 6.2.1. Explicit internal references

Explicit internal references are easy to recognise; each is introduced or followed by a keyword from a standard set. Explicit references can be divided into *primary references* and *secondary references*. Primary references are introduced by *see* and *compare*.

E.g. A and B Lists. See CONTRIBUTORY.

a vinculo matrimonii. [From the bond of matrimony.] See DIVORCE.

Act of law. The effect of the operation of law, e.g. succession to property or intestacy. See also ACT IN LAW.

avulsion. The cutting off of land from the property to which it belongs, as may happen if a river changes its course. The ownership of the land remains unchanged. Compare ALLUVIO.

Words that are explicitly referenced become *usage buttons* in Guide. When a Guide usage button is selected by the reader, it is replaced on the console screen by the replacement text of its definition button; here, the text of the dictionary definition of the term selected.

Sometimes several terms are grouped in a single reference as in

affidavit of documents. See DISCOVERY; SUMMARY JUDGMENT.

ambassadors. Diplomatic agents residing in a foreign country as representatives of the states by whom they are dispatched. See DIPLOMATIC PRIVILEGE; EXTRATERRITORIALITY.

A usage button will be automatically generated for each of the terms.

### 6.2.2. Secondary Internal References in the Dictionary

Secondary internal references are followed by (*q.v.*). Because the marker follows the reference term, secondary references are not always clearly defined, and are sometimes ambiguous.

For example, in

**accountant-general.** The officer of the Supreme Court in whom funds paid into court are vested: the Clerk of the Crown (*q.v.*) (Judicature Act 1925, s. 133; Administration of Justice Act 1965).

the term referenced is *Clerk of the Crown* not *Crown*.

However, in

**annates.** Synonymous with first fruits or *primitiae*, the first year's whole profits of every spiritual preferment; originally payable to the Pope, then by the statute 26 Hen. 8, c. 3, to the Crown, and from 1703 to the Commissioners of Queen Anne's Bounty (*q.v.*). By the First Fruits and Tenths Measure 1926, as from July 16, 1926, first fruits and tenths were either extinguished or provision was made for their redemption.

the term referenced is not *Commissioners of Queen Anne's Bounty*; only *Queen Anne's Bounty* appears as a headword.

Similarly in,

**absque impetitione vasti.** [Without impeachment of waste (*q.v.*).]

the referenced term is

impeachment of waste;

while in

**adultery.** Voluntary sexual intercourse between persons of the opposite sex one of whom is married to a third party.

Adultery was formerly a tort actionable by writ of trespass in an action of criminal conversation (*q.v.*). The action was abolished but damages could be claimed against a co-respondent but this was abolished by the Law Reform (Miscellaneous Provisions) Act 1970, s. 4.

we must look up

*criminal conversation.*

In

**acquittal.** Discharge from prosecution upon a verdict of not guilty, or on a successful plea of pardon or of *autrefois acquit* or *autrefois convict* (*q.v.*). Acquittal is a bar to any such subsequent prosecution.

there are two terms to consult

*autrefois acquit*

and

*autrefois convict.*

Sometimes, too, entries seem to be somewhat arbitrary. For example, in

**alieni juris.** [Roman law.] A person under *potestas*, *manus* or *mancipium* as opposed to *sui juris* (*q.v.*).

I do not see why the user should need to look up *sui juris* but not *potestas*, *manus* and *mancipium* (or, why *manus* and *sui juris* are entry terms while *potestas* and *mancipium* are not). However, since I have neither the expertise nor the authority to remedy the deficiencies of the dictionary, and am concerned only to use what exists as efficiently as possible, I have avoided the ambiguities of (*q.v.*) references by treating them in the same way as implicit references.

### 6.2.3. Implicit references

Implicit references in the dictionary occur when terms (i.e. words or phrases) that are themselves headwords for dictionary entries are used to define other words. For example

*bail-bond*. A bond with surties entered into by a defendant to a sheriff, on arrest upon a writ of *capias ad respondendum*, conditioned for the defendant's appearance within the required period; upon which he was entitled to discharge. See *arrest*.

Only *arrest* is explicitly referenced, but there are also entries for

*bond*  
*surety*  
*defendant*  
*sheriff*  
*writ*  
*capias ad respondendum*  
*discharge*.

All such terms become *glossary buttons* in Guide. Locating the terms and inserting the glossary buttons is simple in principle, although tedious in practice. A concordance of the text is generated, giving for every word a list of locations in bytes. This is used with the list of terms that appear as headwords in the dictionary. The list is ordered by decreasing length. The program attempts to match the longest term first. That is, it will match

*Lord High Admiral*

before

*Admiral,*

and

*Clerk of the Crown*

before

*Clerk*

or

*Crown*.

Occurrences of head words within the text of the definitions are turned into glossary buttons, except where the term is already in a Guide button or part of a Guide button, or is repeated within the replacement text of its own definition.

## 6.3. External References in the Dictionary

Explicit external references are easy to recognise, but, because the information comes from many disparate sources, it is more difficult to provide the necessary replacement text to make the Guide buttons generated effective. External references fall into two major categories: references to statutes and references to cases. Statutory references, i.e. references to Acts, Schedules, Statutory Instruments and Ordinances, take several forms.

### 6.3.1. Simple References

*acknowledgment of wills*. If a will is not signed in the presence of witnesses, the testator must acknowledge his signature in their presence (Wills Act 1837, s. 9).

*allonge*. A slip of paper annexed to a bill of exchange for endorsements when there is no room for them on the bill (Bills of Exchange Act 1882, s. 32 (1)).

Each reference generates a single usage button in Guide.

### 6.3.2. Extended References

Extended references give a range of sections or subsections.

**advertisements.** ... Advertisements relating to hire-purchase must comply with the Consumer Credit Act 1974, ss. 43-54.

**appeal.** ...

(1) Appeals from the County Court lie to the Court of Appeal (*q.v.*) leave may be required (Supreme Court Act 1981, s.108(1)-(5); ...

These references are expanded automatically and generate twelve and five Guide buttons respectively, i.e. one for every section referenced.

### 6.3.3. Multiple References

Multiple references offer two or more distinct references, often to different levels, e.g. subsection, section or part of a schedule. The appropriate number of distinct Guide usage buttons must be generated.

**amalgamation.** The merger of two or more companies or their undertakings. See Companies Act 1948, ss. 206, 208.

**Arches, Court of.** An ecclesiastical court: the judge of which is the Dean of Arches. It entertains appeals from the Consistory Courts, and has taken over the jurisdiction of the provincial Court of the Archbishop of Canterbury. See also the Ecclesiastical Jurisdiction Measure 1963, ss. 3, 8, 13, 82.

**adventure.** Formerly, the sending of goods abroad at owner's risk in a ship in the charge of a supercargo or agent who was to dispose of them to the best advantage.

An adventure in the nature of trade, is treated as a trade under Sched. D, Income and Corporation Taxes Act 1970, ss. 109, 526 (5).

**association, articles of.** Regulations for the management and internal arrangement of a company (see the Companies Act 1948, ss. 6-10). The First Schedule to that Act, Table A, consists of a specimen set of articles applicable to the case of a company limited by shares. See also the Companies Act 1967, ss. 14 (8) (c), 130, Sched. 8, Part III.

### 6.3.4. Complex References

Complex references are multiple references containing at least one extended reference.

**approved schools.** These are being replaced by community homes (Children and Young Persons Act 1969, ss. 35-59, Sched. 3, Sched. 6.)

### 6.3.5. Non-standard references

A further complication is that the referenced sections are sometimes remote from the name of the Act.

**animals.** The common law rules with regard to strict liability in respect of animals *ferae naturae* were abolished by the Animals Act 1971. Where damage is caused by an animal of a dangerous species the keeper of the animal is generally liable. In the case of an animal not of a dangerous species the keeper of the animal is liable for damage which that particular animal is likely to cause (s. 2). A trespasser cannot, as a rule recover damages (s. 5 (3)). The keeper of a dog is, as a rule, liable for damage by killing or injuring livestock (ss. 3, 5).

**association, memorandum of.** Seven or more persons (or, for a private company, two or more persons) may by subscribing their names to a memorandum of association

and otherwise complying with the statutory requirements as to registration, form an incorporated company with or without limited liability (Companies Act 1948, s. 1). The memorandum must state (a) the company's name, (b) the situation of the registered office, (c) its objects. The memorandum of a company limited by shares or guarantee must also state that the liability of its members is limited, and if the company has a share capital, the memorandum must state its amount, and every subscriber must subscribe it with the number of shares he takes (*ibid.* s. 2).

Sometimes old forms of references are used.

Act of Settlement 1701. The statute 12 & 13 Will. 3, c. 2, which enacted: ...

Act of Supremacy. The statute 1 Eliz. 1, c. 1, passed in 1558 to establish the supremacy of the Crown in ecclesiastical matters.

Act of Uniformity. The statute 14 Car. 2, c. 4, passed in 1662 to regulate public worship.

appeal of felony. An accusation of having committed a felony made by one person against another. The person charged had the right to trial by battle, which took place between him and the accuser, the combatants being each armed with a leather shield and a cudgel, and having to fight for a day, or until one of them gave in. Abolished by the statute 59 Geo. 3, c. 46. See BATTLE, TRIAL BY.

Statute references are varied but the problem is containable, and all Statutes are available in machine readable form. The references to cases are less tractable.

#### 6.4. Case References

The format of case references is simple. There are usually three elements: name of the case, date and source; the last two are often integrated. The name frequently has the form <N> v. <M>:

e.g. *R. v. Dudley and Stephens*  
*Blyth v. Birmingham Waterworks Co.*

but not always:

e.g. *Six Carpenters' Case*  
*The Anna*

The name of the case is followed by

<date> and the source:

e.g.  
(1884) 14 Q.B.D. 273  
[1960] 1 W.L.R. 873

If the reference is to give the attribution of a quotation or dictum there is a preliminary element introduced by *per* followed by a <name>.

E.g. *per* Bowen L.J.  
*per* Lord Atkin

The problem lies in providing access to the source.

Law reporting started in the Thirteenth Century and case citations may range from a report in Anglo-Norman from the Year Books covering the years 1290-1535 (in about six acceptable, but overlapping editions) to a case in the latest issue of Weekly Law Reports. There are many sources: in Osborn's dictionary, the list of accepted abbreviations and corresponding single-line definitions occupies about 40 pages. Not all these sources are used in the dictionary, but many that are, are not easily accessible. Another problem for a comprehensive data base for law at some future date is that neither are they unique.

E.g. T.L.R. might be Times Law Reports  
or Tasmania Law Reports  
or Tanganyika Law Reports

which all overlap in time; while

Moo. might be Moody  
Moore, E.F.  
Moore, Sir Francis  
or Moore, J.B.

of which only three overlap. There are others!

Initially there is no prospect of supplying the text for every case cited; I would be happy to have access to even one of the current series of Law Reports.

## 7. Implementation

### 7.1. Programs

The Justus programs have been developed in the C programming language on a Sun workstation under the Unix operating system, [BELL LABORATORIES79]. They depend heavily on formal descriptive techniques for recognising those syntactic/semantic features of the text that are important for the automatic generation of the codes needed to convert the unaugmented printed text to the hypertext version. Terms that must be automatically recognised include: headwords, the names of cases, the titles of Acts of Parliament, and explicit referencing signals.

### 7.2. Some Figures

At time of writing, the complete dictionary has not been transferred, but some figures for a single letter may be of interest. For the letter A, there are:

529 entries.  
205 explicit references to other entries.  
361 secondary or implicit references to other A entries.  
196 references to sections or subsections of 156 different Acts.  
50 references to cases.

I estimate that the final figures will be at least twenty times greater than these.

## 8. Conclusions

The advantages of the automated information retrieval system are ease and speed of access. The user in pursuit of a reference need not search for another book, and then find his place in it. It is easier to re-trace his path, or to re-scan previous references; there is no need for numerous slips of paper to mark places in an array of volumes. To the user, the system appears fully integrated; he can move between different types of source material effortlessly and without necessarily knowing anything about the different structures of the various documents. By using Justus to generate Guide format automatically, we take full advantage of texts that already exist and have been proved over many years in their printed versions.

There are no disadvantages, but there are physical limitations on the system. The vast volume of legal data makes it unlikely that all of it will be immediately accessible from a single workstation. Currently, I envisage a series of specialist workstations in circumscribed areas, such as industrial relations, which is the specialist area of the present Justus system. Other areas under consideration are Wills and Probate, together with Family Law.

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