# Word's numbering explained

*Article by John McGhie*

## Table of Contents

# 1. Overview

Numbering in Word is difficult to understand because Word attempts to hide "complexity" from us. In many cases, it provides insufficient detail in the explanation of features. Regrettably, a simplistic explanation does not help understanding of a complex subject. It fills our heads with loose ends, which makes the problem worse!

Let me warn you: this subject is a real brain-breaker. You can use Word very successfully and professionally without ever knowing or understanding this stuff. I wrote it for the real masochists among us who just **have** to **know** how it works.

Do not let me lead you into a headache under false pretences: this FAQ is not going to tell you how to fix a document that contains broken numbering. It simply explains how the numbering works: this is valuable information if you work with Word a lot, and by understanding it, you can often work out how to fix a document. However, this FAQ is not going to tell you how. (For a discussion of fixes, see: **How to cure Word's List Numbering with a dose of VBA**).

# 2. File formats and structures

Before we can begin, we need to know that there are four different file formats produced by products named Microsoft Word. Even though 16 products all used the ".doc" file extension, there are actually only four major file formats. Within each, there are several minor variations adding new bits. However, the four main underlying structures of the saved files determine how numbering behaves in the product, and what goes wrong with it.

The four major file formats are:

- Word for DOS

- Word for Windows 1 and 2 and Mac Word 4 and 5

- Word 6 and 95 and Mac Word 6

- Word 97, 98 and 2000.

Within these formats, there are two basic "structures." The command-stream structure, and the OLE Container structure.

## 2.1 Command-stream Formats

Word for DOS and the first two versions of Word for Windows produced command-stream file formats. Their files contain ASCII text and printer commands, in the order Word will send them to the printer. It's a very simple format, and very robust. It's... ummm... the format WordPerfect uses ....

In these formats, the numbering exists in the text as real text and remains stable once created. Unfortunately, people rarely use these versions of Word these days.

There's no real point in describing the command-stream format product numbering. You use it, it works, it doesn't break. Ahhhh... memories....

## 2.2 OLE Container Formats

Word versions 6 and above produce OLE container formats. The file is a nested series of containers like Chinese Eggs. For example, each paragraph is a container of characters. Each section break is a container of paragraphs. Each document is a container of section breaks.

Each container contains "something" (it may be a stream of characters, a set of drawing objects, or a binary object). The container also contains one or more "pointers" that connect it with property tables that determine the formatting and behaviour of the contained "something."

In Word versions 6 and higher, numbering is expressed as a property, a little container that contains a marker to say where in the text it is to print, and a pointer to an entry in a list of numbering formats that determines what kind of number it is, and how it increments. It's important to our understanding to learn that this property does not contain the number text. Word fills in the number text itself just before it displays or prints the document.

# 3.  Multiple Kinds of Numbering

In the container formats, many different items can have numbering, and Word tends to treat them as different things. There are three different kinds:

- Fields
- Simple Lists
- Outlines

The "kinds" determine the behaviour of the three types. It may be worth noting that in Word versions 6 and above, a bulleted list and a numbered list are actually the same thing: only the "number format" is different.

The following pages explain what the three kinds of numbering are, and the variations within each kind.

## 3.1  Field Numbering

Field-based numbering is the simplest and the most robust. Pages, Captions and Footnotes are examples of numbering done with fields.

A field in a Word document is simply a placeholder that contains "the instructions for working out what should go here," rather than the text itself. In this case, it contains the instructions for displaying and incrementing a set of numbers. A field is simply a small section of computer code embedded in a special container that tells Word to interpret the contents as computer instruction code instead of text.

Word automatically inserts and maintains the fields for some forms of field-based numbering. The most commonly used numbering fields are pages, number of pages (page x of y) and footnotes.

### 3.1.1  Captions

Captions are a special case: if you use Word's Insert Caption command, it inserts the fields for you, but the field itself is a good old-fashioned **SEQ**(uence) field, and some people prefer to insert them manually so they have complete control over the formatting and incrementing.

A SEQ field can belong to only one sequence and it can produce only one level of numbering. You can number your headings using SEQ fields: if you do, you have to define a named sequence for each level of numbering. You also need to handle your own re-setting of each level when a higher level occurs.

Field-based numbering is very stable and rugged, but a little fiddly and complex to use or maintain. Many professional writers such as technical writers use field-based numbering exclusively, because of its stability and ruggedness. They can export or

import documents containing field-based numbering to any of the Word file formats. They can convert the text backwards and forwards from Word 6, 95, 97, 98 and 2000 as many times as they like, and the field-based numbering will always be correct.

### 3.1.2    Clause Numbering

Legal clause numbering requires that a single paragraph contains more than one number. Word 97 and 2000 introduced a new field called the **LISTNUM** field, designed especially for this. Regrettably, it will not down-convert to versions below Word 97, unless you unlink all the fields (press **Ctrl+A** followed by **Ctrl+Shift+F9**) prior to saving in Word 6/95 (or earlier) format.

For clause numbering, you should stick to the **AUTONUM** field unless you are sure the documents will never needed to be edited in an earlier version of Word than Word 97 .

### 3.1.3    Page x of y

Word can automatically produce "page x of y" page numbering. Word performs this numbering with a pair of automatically inserted fields. Unfortunately, one of the fields has had a notorious bug in it since Word 6: you can end up with a sequence such as "page 1 of 1, page 2 of 2, page 3 of 3 ..." where the second part of the page x of y does not update correctly. The bug is actually in Word's pagination algorithm. Word makes up the print image of the page before it has finished paginating the document, so it really doesn't yet know how many pages there *are* ... Service Release 1 for Word 2000 finally fixed the bug. See separate article **Page x of y displays or prints as Page 1 of 1, Page 2 of 2 etc.** for some workarounds for earlier versions.

Technical writers rarely use "page x of y", and where they do, they work-around the bug by constructing page x of y manually using a bookmark on the last page of the document and a cross-reference to its page number.

## 3.2    List Numbering

List-based numbering is simple to use, but very difficult to understand or fix. But wait... it gets worse: it is essential to understand list-based numbering before you can understand Outline Numbering. And that's... ummmm ... awful!

Common examples of list-based numbering are paragraphs and footnotes. Paragraphs **can** be numbered lists, but footnotes are **always** simple lists.

We all know what a "shopping list" is. It's a list of names of products and the number you need to buy. OK, in Word a Numbered List is a list of paragraphs and the kind of number to put on each of them. If you were to examine the code internally, you would see an HTML-like structure:

**Begin List Definition**
 List Definition
Begin Ordered List
 List item
 List item
 List item
 ...
**End Ordered List**

The whole key to the idea is that a list has a definition, a beginning, one or more items in the list, and an end. The most important distinguishing feature of "List Numbering" is that in a list, there can be only one level of numbering. Numbering levels are explained in the Outline Numbering pages.

In a simple numbered list, a definition says "List number 23 is a sequence of Arabic numerals starting at 1, incrementing by 1, indented 3cm, and formatted in 12-point Times New Roman bold." This definition is a List Template stored at the end of the document (hidden in the Default Section Break that is contained in the last paragraph mark).

### 3.2.1   List Galleries

Just for completeness, there are three kinds of list template: *bulleted lists*, *numbered lists* and *outline numbered lists*. These three types are collectively stored in three list galleries. A document always has three list galleries, whether or not the document contains any numbering. All three are stored in the default section break. The **Format>Bullets and Numbering** command shows you the first seven formats in each of the three list galleries.

### 3.2.2   Default List Templates

Word has a set of factory-default list templates built in. The three supplied list galleries each contain seven pre-set formats. These settings are hard-coded into Word.

If you use the **Format>Bullets and Numbering** command, you see a **Reset** button on the dialog. This resets the selected list template to its factory default. We often ask people to do this as a preliminary step when trying to fix numbering. It restores each list template to a known good state.

### 3.2.3   Applied List Templates

Because you can customise your list templates, the list templates you actually apply in a document often bear no relation to the list templates displayed in the **Format>Bullets and Numbering** command.

Unfortunately, Word can have literally several hundreds of list definitions in a single document. Some or all of these may be "applied" to the text. The **Format>Bullets and Numbering** command can show you only the seven most-recently used in each of the three categories.

## 3.3   Simple Lists

Now, somewhere in the document, let's find a sequence of paragraphs in a numbered list. Let's say there are five of them, and they are paragraphs 43 to 48 in the document. Each of them has a tag indicating that it is a member of a list, and a pointer to list template 23, which formats that list.

Now for the exciting bit: There can be more than one list in the document. "Of course there can," you're thinking. "Any technical manual has lots of little procedures expressed as numbered steps. Maybe five to seven items in each, and maybe one list every couple of pages."

Oh if only it were that simple...

In Word, you can indeed have multiple lists. However, each "list" can have more than two "ends." That sounds absurd, right? That's because it is...

Let's take a typical technical procedure: ten pages and six sets of numbered steps. The first three sets of numbered steps are all members of the same list. The list restarts at "1" three times: at the first paragraph of each of the three sets of numbered steps. The second three sets of numbered steps are also all members of the same list. Again, they each restart at "1" on the first paragraph of each set of numbered steps. To Word, that document contains **two** lists, not six.

The key distinction I am making is that the thing Word calls a numbered list is a larger structure than that which you or I know as a numbered list. Word considers a numbered list to be what you or I might describe as a "family" of numbered lists.

### 3.3.1   Illustration of Simple Lists

Think of a sporting goods shop that sells billiard balls. On one shelf, it has several boxes of balls by one manufacturer. Each ball has a number painted on it, as billiard-balls must have. On another shelf, the shop has more boxes of balls by a different manufacturer. Moreover, on a third shelf, three boxes by yet another manufacturer.

What you and I call a "numbered list" is one box of balls. Microsoft Word uses the name "list" for the entire shelf. Microsoft has never been shy about changing the English language to suit itself...

There may be several shelves of balls in the shop. Each set of numbered steps in the document may be a member of a different list. Or there may be only one shelf. Each numbered list in the document may be a member of the same list.

Unfortunately, that last case is unlikely to be true if we have a document that needs fixing. There is likely to be quite a large number of lists in the document. There's a celebrated bug, reported in the Microsoft Knowledge Base, which explains that things get a bit uncertain when a document contains more than 200 list templates...

But it can get worse...

Any given paragraph in the document may be a member of any of the lists. If we have seven paragraphs numbered 1 through 7, there is no guarantee that they are all members of the same list. They could each be a member of a different list: one list starts at "1", the next starts at "2", the next starts at "3" ... you get the idea...

Oh, but it can get worse...

How can we tell which list a particular paragraph resides in? Sigh... we can't, unless we use VBA. Short of using Word 2000 to save the document to HTML and reading the code, there is no way to tell which list a particular paragraph or set of paragraphs currently resides in. We can make some guesses, and in the FAQ about fixing numbering, we will tell you how to improve the accuracy of your guesses, and how to ensure that a given set of paragraphs belongs to a specified list. However, short of saving the document out to HTML and reading the code, there is no way to discover what is wrong.

## 3.4   Outline Numbering

The most common form of Outline List is Heading Numbering. We often see this in technical, engineering and academic documents. In legal documents, body text paragraphs are frequently outline-numbered.

An Outline List is a nested set of **nine** lists.

The brain-breaking feature of Outline Lists is that everything I said about "simple" lists is true...multiplied by nine!

All the complexities of the Numbered list also occur in Outline Numbered Lists. There can be multiple lists in a document, or only one. Each list can restart multiple times or only once.

I'll type this slowly so we can all follow... an Outline List has more than one level of numbering, and each of the lower levels numbers independently to, but inherits from, its higher levels. The following is an outline numbered list:

**Heading 1**
>  **Heading 1.1**
>  **Heading 1.2**
>>  **Heading 1.2.1**
>>  **Heading 1.2.2**
>  **Heading 1.3**
>>  **Heading 1.3.1**

**Heading 2**

No, I typed those out by hand: there's no way I could send that sequence across the Internet as Word numbering: if I tried, I have no idea what you would see! Notice there are three "levels" of numbering in the list.

Item 1 and Item 2 are both members of Level 1. Items 1.1, 1.2, and 1.3 are members of level 2. Items 1.2.1, 1.2.2 and 1.3.1 are members of level 3.

An Outline List has an extra property that simple List Numbered lists do not have: the paragraph's level. Actually, the level property exists in the simple lists, but is always set to 1 and ignored. In an outline numbered list template the level is an integer between 1 and 9 that determines the paragraph's level in the numbering scheme. This list level operates independently of the style and controls the number formatting. This is how legal documents can have multi-level lists in which all the paragraphs are formatted with the Normal style.

Each of the levels of an outline list can number in a different sequence, and each level can have a different ordinal digit. The ordinal digit is a "number" to you and I, although you can specify a letter; or in a bulleted list, a character.

To fully appreciate this horror, you need to consider the following:

1.  **The first item**
2.  **The second item**
    a.  **The first sub-item**
    b.  **The second sub-item**
        i.  **A sub-sub-item**
    c.  **Another sub-item**
3.  **Another top-level item**

The above example demonstrates three of the levels of a default outline list.

In the example, there are seven paragraphs. They may all be members of the same list template, or they could have more than one list templates applied. Each paragraph could be attached to a different list template.

When I prepared the example, it had only one style applied. However, there could be three. The list template may associate a single style with all nine levels, or one style for each level, or no style at all (which means it could be applied over the top of any style(s)).

Of course, if some or all of the paragraphs are assigned different list templates, the actual style definitions applied become close to random. A Word document tends to crash if the number of list templates in a single list gallery exceeds 256, so we have potentially 2,304 combinations of formatting for each list. In a 300-page manual with a list on each page, that's more than half a million differences in the numbering within a single document. In a document that is supposed to follow the company's standard style guide.

Now you can understand why MVPs often advise people simply to remove all the numbering from a document and start again: the complexities far exceed the capacity of a human being to work with them.

# 4.  Applying Numbering

Now we've busted our brains trying to understand how numbering works, we also need to think about how to apply it the document. The exact method by which you apply numbering has a dramatic effect on how stable it is and what goes wrong with it.

## 4.1  Numbering Button

One problem we run into is the **List Number Default** button on the **Formatting** toolbar. This is normally called the **Numbering** button.

In previous versions of Word, it always applied a predefined list numbering format. In Word 2000, this was changed. It now applies an outline list template, and the list template it applies is the one used most-recently by the particular user-ID on that particular computer.

If you select ten paragraphs in Word 2000 and click the Numbering button, the list will be an Outline list by default. There is no indication of this, but each paragraph has become a member of a list that contains nine levels. To change levels:

- If, on the **Edit** tab of the **Tools + Options** dialog, you have the *Tabs and Backspace set left indent* checkbox ticked, you can change levels by placing your insertion point at the beginning of the paragraph, just after the number, and hit **Tab** to go down a level, or **Shift/Tab** to go up a level. Most people don't know this, or why their numbering keeps changing. Exciting, isn't it?

- Fortunately the above option can be turned off and most seasoned Word users do turn it off. Corporate users (should) have it turned off for them (this is very simple to achieve using an AutoExec macro in an Addin).

- If you have the *Tabs and Backspace set left indent* checkbox turned **off**, you can change levels by clicking anywhere in the paragraph and pressing **Alt/Shift/Left Arrow** to go down a level or **Alt/Shift/Right Arrow** to up a level (these commends can be dragged onto the toolbar if desired - they are **OutlinePromote** and **OutlineDemote**, respectively).

Let's say I select some paragraphs and choose **Format>Bullets and Numbering>Numbered** and choose one of the list templates. This will make the list template I chose my "Default". From then on, each time I click that button on that computer using that user-ID, I will apply exactly the same list template. If I have gone further and defined that list template to associate with a style, whenever I click that button, the list template and the style will both be applied.

However, if I take the document home, and apply some numbering from there, the numbering applied by that button will be the default list template on that machine. It will be different: it may also apply a different style. If another user gets hold of the

document, the numbering they apply will be different again. Yet all three times the users hit exactly the same button whenever they wanted numbering!

## 4.2   Direct numbering

Numbering can be applied directly to paragraphs, just as a font or indent can be. This is known as direct formatting numbering. If you select a paragraph or set of paragraphs and click the Numbering button on the toolbar, you will get direct numbering. If you use the **Format>Bullets and Numbering** command on the Format menu, you may get direct numbering, or you may get style-based numbering, depending upon which list template you choose.

Direct numbering is by far the most common numbering seen in the corporate environment, and overwhelmingly the most troublesome and difficult to fix.

When you apply direct numbering, the paragraph simply contains a pointer to a list template. If you copy the paragraph to another document the list template is copied to the other document as well, as a separate object, and added to the ones that are already in it.

Consider a list of seven items. Five were created in the document. They have list template number 213 applied. Two were copied from another document. Two users edited the other document. The two paragraphs have list templates 7 and 128 applied. The result now has list templates 213, 7 and 128 applied to the seven paragraphs. The seven paragraphs are actually members of three separate lists, and only one of them is applied anywhere else in the document.

Similarly, if you move a paragraph from one list to another within the same document, you will get exactly the same problem; and you are likely to get "spaghetti numbering" as soon as you do so, as a result of the mixture of list templates present within a single sequence of consecutive paragraphs. (to give the simplest example, you might end up with a list numbered: 1,2,5,3,4).

If other users apply or adjust any of these paragraphs, they will apply their own list template to some of them. Nevertheless, chances are the numbering will break before that happens.

## 4.3   Style-based numbering

A numbered or bulleted list may be associated with a style. It does not have to be. The recommended way, and the most stable approach to numbering, is to define it using **Format>Style**. If you do, your numbering will be associated with a style.

When numbering is associated with a style, Word sets a pointer in the style definition that links the style with a list template in the document. The style does not

*store* the numbering list template; the style merely indicates **which** list template to use.

This exposes us to the danger of circular references. If, say, your Heading 1 style points to Outline List Template 4, the list template can point to nine styles, one for each level of the list. In fact, one of the hard and fast rules of defining outline list templates is that you must never associate the same style with more than one level. Unfortunately, Word does not prevent this.

In a corrupt document, you often find that Heading 1 points to one list template, Heading 2 to another, and Heading 3 to yet another. But each of the list templates have nine levels, so each list template points back at nine styles (a circular reference).

## 4.4    Style-Template conflicts

Where numbering is style-based, both the style and the numbering list template store indents, margins, and tabs. As does the paragraph the combination is applied to. It is possible for the measurements in the style to conflict with the indents in the list template. And for both to conflict with the measurements already applied as direct formatting to the paragraph.

Direct tabs and indents applied to the paragraph will always override any others. The formatting of the list template will always override the style. If both of the above are absent, the indents and tabs come from the style.

Whenever you define the formatting of a list template, it always overrides the settings of the underlying style. This is a bug.

A second bug is that when you define list template formatting, it transposes some of the measurements. The paragraph has a left margin, an indent, and a first-line indent. The list template has no left margin, it has a position and a hanging indent. Whenever you adjust the formatting of a list template, it will transpose its hanging indent measurement into the style's left margin setting. You need to remember to go back and correct the formatting of the style each time you adjust a list template.

Recall that the style does not contain the list template formatting. This means that it is quite possible to have more than one style attached to the same list template. In amateur documents, it is quite common to have several styles with different names used for the same type of paragraph. They may all point to the same list template. Or they may each point to different list templates that may or may not have the same formatting.

If multiple styles point to the same list template, this gets exciting when someone redefines one of the styles. The measurements will no longer suit one of the list templates, and things rapidly go down hill. It gets even more perplexing if you have multiple styles pointing to different list templates. You may redefine the list template: only some of the paragraphs come right. You may redefine a style: again,

only some of the paragraphs will follow. You need to hunt down all the styles and all the list templates and unify them all.

The converse cannot be true: You cannot have multiple list templates in paragraphs formatted with the same style. This is why we recommend that you always apply list numbering with a style. If you always apply the same style name, you will always apply the same list template.

## 4.5    Template conflicts

There are two common causes of template conflicts.

If individual users have different definitions for the various list templates involved, the numbering breaks each time a different user opens the document. I recommend that you orphan Normal style so that it is not used in the document, and ensure that none of the styles that contain numbering in the document are based upon it. This lessens the number of times you will suffer the problem.

The second conflict occurs if any document with numbering is attached to its template with "Automatically update styles on open" set to ON. Each time you open the document, Word resets the style. This either conflicts with or resets the list template, and breaks the numbering.

# 5.   Numbering in action

Let's take a simple technical manual: It has a TOC, Index, Five Chapters and numbered headings. That's one outline numbered list so far.

In the body, there are some footnotes: a numbered list. There are some numbered steps, also a numbered list. It also has two multi-level numbered lists, which in this case will be two separate outline lists.

In the footer there is a Page x of y page number, and in the body, some figure captions. These are two field-based lists: one is automatic (using LISTNUM fields), the captions are manual (using SEQ fields).

This is a simple example, so let's stop there. The following pages will go through the various kinds and types of numbering in the document and explain some of the pitfalls.

## 5.1   Page numbering

Word produces page numbering with a simple built-in field that it automatically updates as it paginates. Page numbering is very stable and rarely gives trouble.

It is worth mentioning that in Word, "pages" do not exist in the document file. Like a professional typesetter, Word makes up its pages on the fly when it displays or prints a document. Word uses measurements from the installed fonts and the installed printer driver to do this. It is almost impossible to get two machines so exactly similar that a document will paginate with exactly the same page breaks on each. Sometimes people complain that when they open the document on a different machine, some of the page numbers in the TOC or Index are "wrong". They're not: when the document is opened on the other machine, minute variations in set-up that do not show over a ten page memo will cause variations in the position of page breaks in a 1,000-page manual. If you remember to update the TOC and Index before you print, the problem corrects itself.

The other classic cause of bad page numbering is multiple "sets" of page numbers in the document. There are two places you can add page numbers: to the "document", or to the running Footers. If you use Insert>Page Numbers, you add the page numbers in little floating fields that sit in the drawing layer above the text layer. If you open View>Headers and Footers and click in a footer, then click the hash sign # you insert the page number field in the footer, on a section-by-section basis.

Unfortunately, there's nothing to stop you adding them in both places, and having them start at different numbers. If you find that the numbering is out for just one section of the document, this is a classic sign that you have conflicting sets of page numbers in the document.

## 5.2    Tables of contents

The Table of contents (TOC) is not a Numbered List. It simply copies the text of the headings in page number order, including any numbering that may be applied. If the headings have numbers, the TOC generator copies those numbers. The generator automatically applies TOC Styles 1 to 9 to format the TOC. The generator sets the styles to Automatically Update, which enables it to automatically set their formatting according to hard-coded defaults chosen by the TOC format setting. If you want to prevent this, set your TOC format to "From Template". Word will then leave the formatting of your TOC styles alone.

Simple and stable: not much goes wrong with TOCs for this reason. The only catch is that the entire TOC is a field itself, and if you don't know this, you can mangle it.

The generator actually generates the page numbers in the TOC by inserting a hidden bookmark at every Heading in the document. In the TOC itself, Word 97 generates a hyperlinked PAGEREF field for each page number, referencing the appropriate heading (if you click on the page number it takes you to the Heading).  In Word 2000 it generates a more complex hyperlinked field, which allows you to click on the text in the TOC to go to the referenced Heading.

Either way, you can see these hyperlink fields by right-clicking any page number and selecting "Toggle Field Codes".  You can see the hidden bookmarks by selecting any Heading in the document, selecting **Insert>Bookmark**, and ticking the "Show Hidden Bookmarks" checkbox.  The hidden bookmark applied to the heading you are in will be selected in the dialog, and its name will tally with that in the relevant field in the TOC itself.

When you update the TOC (by selecting it, pressing F9, and choosing "Update entire Table"), all the hidden bookmarks that have been applied to the Headings are deleted and recreated - you can see that their names have changed, if you look. However, prior to Word 97, the hidden bookmarks were not deleted when you regenerated the TOC; instead, a new set of bookmarks was created each time;  so you could very quickly end up with hundreds of redundant bookmarks, leading to a huge increase in file size and, frequently, to document corruption.

You can convert the entire TOC to ordinary text. If you do, the styles remain applied and the entries are all converted to hard text. People sometimes do this to prevent document corruption. In Word 6, if you re-generated the TOC too many times, the document would corrupt, so people would convert the TOC to hard text to prevent this happening. This is no longer so necessary in Word 95 and above, but you may find it in up-converted documents. The problem with the technique is that when the document gets to a different computer, the page numbers in the TOC will be wrong.

You will rarely see problems with TOC numbering. If you do, unless the user has manually typed the wrong numbers into the TOC, the problem exists in the body of the document, not in the TOC. If you regenerate the TOC, you remove any manually

typed numbers, unless they are in the body of the document. In fact, the TOC is an excellent device for looking for numbering problems in the body of the document. Since you have to check the TOC anyway before you publish, you might as well look for numbering problems while you are at it.

## 5.3    Index

The Index works in a similar way to the TOC (although unlike the TOC, the index contains no hyperlinks). Index styles 1 to 9 set the formatting, and the Index generator automatically applies them. The index generator copies the page numbers from the page number built-in counter Word maintains. Again, it is simple and stable.

If you see bad numbers in the Index, it means the page numbering in the document is bad. Often, it is because the user has forgotten to suppress the display of hidden text before generating the Index. The hidden text throws various paragraphs onto the following page: when you print the book, the page numbers in the index don't match those printed. A trap for young players...

## 5.4    Chapter numbering

There are several ways of applying Chapter Numbering. You can apply it as part of a style, or as direct formatting, or type it.

By rights, the Chapter heading should be Heading 1 style, and the user should have used the list template that shows the word "Chapter" in its picture. If they did, the chapter numbers are part of the heading numbers outline numbered list template.

Some people elect to type in the chapter number, particularly if the chapters are separate files. If they do this, they frequently forget to check the chapter numbers when they add a chapter. Gotcha!

People working with multiple files sometimes use Heading 1 for the Chapter heading, but manually set its starting number. If you right-click the chapter title, immediately after the chapter number, you can set the Start-At number. This is a fertile source of bother. Any time the user updates the style, they must manually reset all the chapter numbers. If the chapter ever becomes part of a master document, the master document resets the chapter numbering each time a user opens the document. If the template is attached with Automatically Update Styles set, the chapter numbers are reset each time the document opens.

If the chapter numbering is applied by direct formatting, odd corruptions are possible if you redefine the style upon which the numbering is based. The classic case is where the direct formatting list template is different from the list template associated with the styles. The cure is to remove all numbering and re-apply just one kind.

## 5.5    Heading numbering

Heading Numbering is simply a list template in which levels 1 to 9 are attached to styles 1 to 9 (normally, Heading 1 through Heading 9).

Heading numbering is more stable than other types because (as long as you define it correctly initially) it is usually a single list, and it almost never restarts. Where you get problems with heading numbering, remove it and re-apply it. This should re-create it as a single list if it has become broken into pieces.

You have to be looking for trouble to break heading numbering. Unfortunately, converting the document to a different format is "looking for trouble." Converting between Word 6 or 95 and Word 97/98/2000/2001 is thrill seeking, and converting a document to or from WordPerfect is almost guaranteed to break it.

In the default list templates seen in the Format>Bullets and Numbering dialog under the Outline Numbered tab, three of the samples show the word "heading" in their pictures. These list templates are automatically associated with the built-in heading styles Heading 1 through Heading 9. By default, Word's built-in heading styles have list levels 1 to 9 assigned. It's this list level that governs the operation of the heading outline numbering.

There are three ways of applying heading numbering: with a style, by direct formatting, or typing. Professional writers tend to apply it with styles, corporate users tend to apply it as direct formatting. Users in trouble sometimes try to correct it by typing it. Any document that has ever been saved to a text-based format or to a format earlier than Word 6 will have hard-typed numbering throughout.

If the numbering has been applied with styles, it is robust and unlikely to malfunction. Because each style can point at only one list template, all headings in the document are likely to be members of the same list. Text copied from other documents should assume the style definition of the destination document, and thus, become a member of the same list.

When applying heading numbering, it pays to take great care that you use a default list template that is associated with the Heading styles. These list templates have special properties: they "know" that they belong on Headings. If you decide to use a different list template for heading numbering, you must first create your styles 1 through nine, then assign each of the styles an outline level, and finally associate each level of your outline list template with a different style. It's a lot of work, and it's not worth it: Use the built-in Heading styles: the work has been done for you.

You should apply heading numbering using **Format>Style**.

Trouble may break out if the user starts fiddling around with the style definitions. They may associate the same style with more than one level in the list template. A classic example is to have Heading 1 associated with Level 1 (the chapters) and Level 5 (the appendices). This was a recommended work-around for Appendix numbering

in Word 6 and 95, so you will often see it in up-converted documents. You need to reset the list template to cure this.

A rare error, but a far more damaging one, is to have the same style associated with more than one level in a list. You often see this in corporate documents: the list template is simply cactus: remove and replace it.

A variation on this is that various heading levels are members of different list templates. This is perhaps the most common spaghetti-numbering error in corporate documents. Both list templates are now corrupt: you have to remove both, reset both, and re-apply just one of them.

### 5.5.1    Direct Formatting Headings

If the numbering is applied as direct formatting, it should be applied from the first Heading 1 in the document, all the chapters should be in the same document, and the Chapter Titles should all be Heading 1 style. If the author follows these rules, all will be well. And pigs might fly...

If you apply heading numbering using **Format>Bullets and Numbering** you apply it as direct formatting, which is not stable. The list template it is applied as direct formatting, but only to those paragraphs that currently have the built-in Heading styles applied. This updates the document's internal style so that it points to the list template. However, paragraphs copied in from another document may not correctly accept the numbering, and if the style is re-applied from the template, the headings may lose their numbering, or the template numbering may conflict with the local numbering and corrupt the document.

This can lead to a really nasty situation where you re-apply, for example, Heading 3. This sets the Heading 3 paragraphs in the document as members of a different list.

Problems will occur when text is copied from another document. That text may or may not have heading numbering already applied. Even if it does, it cannot have the same list template applied. So some or all of the copied text may be in a different outline numbered template from the rest of the document. This is the beginning of the "spaghetti numbering" bug. In spaghetti numbering, one or more heading numbers are out of sequence, and try as you might, you cannot get all the headings to number correctly.

If you catch it early, the cure is simple: remove the heading numbering, save the document and close it. Then re-open it, and re-apply the heading numbering from the first Heading 1 in the document.

## 5.6    Simple Lists

If you apply numbering with **Format>Bullets and Numbering**, you can choose either a Numbered list or an Outline Numbered list. If you choose a Numbered list, your list will be a simple single-level list.

A single-level list does not change its numbering style if the paragraph indent changes. There is only one level, and each paragraph in the list will have the same kind of number, regardless of the paragraph formatting.

However, a typical manual may contain a list of numbered steps on each page. These may all be members of the same list they may each be members of a different list.

If you select some paragraphs, format them with numbering, then choose **Format>Bullets and Numbering**, or right-clicks the list and chooses Bullets and Numbering, a dialog appears with two radio-button options: Continue Previous List and Restart Numbering. If you choose **Continue Previous List**, this list will be a member of the same list as the preceding list in the document that had that list template applied. If you choose **Restart**, you create a different list.

When you start copying, pasting or moving paragraphs, you can move paragraphs from one list into another. This doesn't matter if all the numbered lists in the document are members of the same list. If you have multiple lists, the moved paragraphs can retain membership of a different list. Some paragraphs in a set of numbered steps are not numbering in sequence with the others. You get Spaghetti Numbering.

If you copy the paragraphs from a different document, they can't be members of the same list as other paragraphs in the destination document, because their list is not in the document. Word's answer is to copy their list template into the destination document with them and insert it into the list template gallery. If you then move some of these paragraphs around, you can produce some interesting effects. What you cannot do is guarantee that all numbered paragraphs with the List Number style will all be members of the same list and all number contiguously from top to bottom.

## 5.7    Outline Lists

On the **Format>Bullets and Numbering>Outline Numbered** dialog, the four samples that do not show the word "Heading" in their pictures are not, by default, associated with styles.

These templates produce outline list paragraphs. We used to know such lists as multi-level numbered lists. You use the Promote and Demote buttons to change the levels of the paragraphs. When you do, you change both the numbering level and the indentation.

Unless you create them using styles, **and define the styles using VBA**, Outline-numbered list paragraphs will break pretty much every time you close the document unless you happen to be a highly-skilled user such as a technical writer who understands all the stuff you read here and bears it all in mind every minute they work! If you do that, the numbering will break only about half the time {grin}.

When you define such a list using **Customise**, you get the choice of associating a different style with each of the nine levels, or associating just a single style with all levels. If you decide to associate only a single style, ensure that it has its level property set to "1", and that it is associated with the first level.

When a corporate user is creating numbering, they are likely to do it with either AutoFormatting or **Format>Bullets and Numbering**.

AutoFormat converts the list format the user types into a Word numbered list. Unless the user is sufficiently accurate to type exactly the same format each time, AutoFormat tends to add a new list template each time the user creates a numbered list.

In a major behind-the-scenes change, in Word 2000, Outline Numbering became the default type of numbering. In earlier versions, clicking the default "Numbering" button on the **Formatting Toolbar** would produce a Numbered list. It now produces an Outline Numbered List. You would never notice the difference if nothing ever went wrong. Unfortunately, things do go wrong, and when they do, the complexity of the problem is indescribable; made worse by the fact that you have no idea what is going on.

**Format>Bullets and Numbering** invites you to select a numbered list each time. Most people will select the same list each time, so in a document produced with **Format>Bullets and Numbering**, the document is likely to contain just a single list. Each time you want a new numbered list, you select the format, then right-click the first item and choose the "Restart Numbering" option. The single list contains multiple restarts.

If multiple users have edited the document, it is likely to contain both multiple lists and multiple restarts. Regardless of which technique each person employs. Each individual user's numbering is different. Word stores its numbering formats in the Registry, so each user has their own. No two are ever the same.

If multiple users use AutoFormat... well, you work it out! The results are pretty close to random.

## 5.8    Footnotes

Word automatically creates footnotes as list-based numbering.

The number in the text is actually a cross-reference to the number of the footnote. Word automatically numbers the footnote paragraphs and creates the cross-reference when you insert the footnote.

Footnote numbering tends to be very stable. Difficulty can arise when pasting text that contains footnotes from document to document, although it is rare. It is also possible to get problems with footnotes that have multiple references. Sometimes, the cross-reference field for one or more of the references gets broken and calls either in the wrong footnote or none at all.

If a footnote appears on a different page from the page in which the footnote reference occurs, this is the result of a known bug; and the fix is to define the paragraph formatting of your body text to have exact line spacing.

When fixing footnote numbering, you must first find out whether you are dealing with the original footnote reference or a subsequent cross-reference. If it is a cross-reference, you can simply delete it and re-create it. If you delete the original footnote reference, you will also delete the footnote, so don't do that. If your footnote numbers are out of sequence, chances are one or more of the references is not actually a footnote. To find out, double-click it: if it is a footnote, the footnote editing window opens, if it isn't, nothing happens.

## 5.9　Field numbers

Captions and LISTNUM fields are examples of field-based numbering.

In captions, the field is a simple SEQ field. A SEQ field can belong to only one sequence and it can produce only one level of numbering. You can make heading numbering using SEQ fields: if you do, you have to define a named sequence for each level of numbering. You also need to handle your own re-setting of each level when a higher level occurs.

The SEQ field takes a "name" that identifies which list contains this particular SEQ field. For captions, that name must be "Caption." When SEQ fields go wrong, it's usually because you have forgotten to update them, or the list name is wrong. To update SEQ fields, select all the document text (Ctrl + a) and hit F9.

LISTNUM fields are a much more advanced kind of field introduced in Word 97. They are a bit flighty, because Word maintains and automatically updates them. And there is a bug in the Help: it appears as though you can define various list names in a LISTNUM field the same way as you can in SEQ fields. In fact, you can't: there are only three pre-defined list names: AUTONUM, AUTONUMOUT, and AUTONUMLGL. It also appears that you can control the formatting of a LISTNUM using switches: again: wrong! The name in the list name parameter controls the numbering formatting. Each of the three names has predefined formatting: what you see is what you get.

The LISTNUM field is a single field that generates nine levels of numbering. It reads the "level" property of the paragraph format to determine which level to display. You can have multiple LISTNUM fields within a paragraph: if you have, they number sequentially from the beginning of the paragraph. You can have multiple levels of LISTNUM field in a paragraph: if you select the LISTNUM field result and press the Indent or Outdent buttons, the level will change, overriding the level of the paragraph. This is the first place to look if a LISTNUM field won't behave: once set, the hard-coded level set in the LISTNUM field does not change if you change the level of the containing paragraph. Reveal field codes and remove the level parameter to make it behave.

Technical writers often use AUTONUMLGL fields to generate heading numbering. They are rock-solid stable and transportable across all versions of Word from Word 6 to Word 2000. Microsoft makes concerted attempts in the Help to steer us away from these fields: instead suggesting that we should use Outline Numbered Lists or LISTNUM fields. Sorry, we're not that silly! LISTNUM fields are not backwards compatible with Word versions earlier than Word 97. Most other word-processors haven't a clue what to do with LISTNUM fields. Everything can handle AUTONUMLGL fields. Moreover, if Outline List Numbering was any good, you wouldn't be reading all this!

## 5.10  Professional issues

For professional purposes, field-based numbering is the recommended method: you have complete control and it never breaks.

However, it is impracticable, and thus silly, to introduce field-based numbering into the corporate workplace. It's years since corporations stopped providing word-processor training for their staff. Even if they were to do so, the Microsoft Word training available these days is so simplistic that it never gets anywhere near the professional-level features of Word such as field-based numbering. You should not expect corporate users to understand Word well enough to use field-based numbering. So you should very definitely expect a disaster if you send such people a document containing it: you will certainly get one.

I did not leave the numbering samples in this FAQ as Word numbering to send to you: I can't because I have no idea how the numbering will appear when you look at it: the numbering can change dramatically when your computer applies your local preferences to it. I prepared the example in Word 2000, then saved it in Word 2 for Windows format, closed it and re-opened the file. This is the simplest way to strip the numbering back to ordinary typed text that won't change no matter where you display it.

This is a major issue in Word numbering, and is the reason that corporations are reluctant to roll out the higher levels of Word (97, 98, 2000 and 2001). The numbering is simply not transportable from user to user, machine to machine, or office to office.

Since that is a fundamental requirement for corporate documents, many large corporations have gone no further than Word 95. Others have rolled back to WordPerfect 9. As yet, there are no alternatives we can offer you, other than the fix covered in **How to cure Word's List Numbering with a dose of VBA**).