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Consistency of Use of the International Patent Classification

Studies on Patent Classification Systems I

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Report on the result of a small-scale test of the consistency of use of IPC for the same invention by two sets of examiners in the USA and UK in two different subject areas: inorganic chemistry and biochemistry. Reasons for inconsistency are given and conclusions for the use of Derwent's and INPADOC's services are drawn. I.C.

1. Introduction

A good classification system needs rules which are both clear and unambiguous, so that two people classifying the same document will arrive at an identical result. This is especially true for a classification scheme which is intended to be used by many different classifiers all over the world and with differing levels of expertise in the scheme.

The International Patent Classification (IPC) is an outstanding example of such a universally used classification scheme. It is employed as either the primary means of patent classification or as a secondary means, by most of the major patent offices in the world. (See Table 1, adapted from Ullmer's paper (1).)

Table 1: *Countries that use IPC to classify patents*

IPC only
Belgium, Brazil, Bulgaria, Chile, Czechoslovakia, West Germany, Egypt, Finland, France, East Germany, Hungary, Ireland, Israel, Italy, Netherlands, Norway, Spain, Sweden, Switzerland, USSR.

IPC and a national classification
Australia, Austria, Cuba, Denmark, Japan, Poland, Rumania, South Africa, UK, USA, Yugoslavia.

Hyams has remarked (2) that in his opinion IPC notations are not being applied consistently by patent examiners over the world for the same invention, and he provided some particularly blatant examples. An inventor can, and often does, apply for a patent in several countries for an invention. Assuming these patents are granted in countries whose Patent Offices employ the IPC, the IPC notations assigned by the various national offices should be reasonably consistent. This is particularly true as a full description of the classification has been published (3) and is regularly updated. We therefore decided to carry out a small-scale test of the consistency of use of IPC for the same invention by two sets of examiners (in the USA and UK) in two different subject areas: inorganic chemistry and biochemistry.

2. Selection of patents

(a) Inorganic chemistry

British Patents between 1425001 and 1450000 were examined. Those which included any subject-matter relevant to the inorganic chemistry of alkali metals, copper, silver, gold, titanium, vanadium, chromium and aluminium were selected. All the patents had been published in 1976. The IPC notations assigned by the British examiners to each of these patents were noted. A search was then carried out using Derwent's *World Patent Index* to find how many US equivalents had appeared to these British patents. A US equivalent is defined as a patent appearing in the USA covering the same subject-matter and claiming the same priority date and number as the British patent. At the time this study was carried out 52 such US equivalents could be found. The IPC notations assigned by the US examiners were then noted by examining these 52 US patent specifications. Consistency was then measured by the method described below.

(b) Biochemistry

In a similar fashion, we selected patents from British patents between BP 1425001 and 14500000. This time the patents related to di- and polypeptides, enzymes and their degradation products, nucleic acids, and obtaining polysaccharides by synthesis and by using microorganisms. Once again the British IPC notations were noted, and then US equivalents were identified using *World Patent Index*. 51 such US equivalents were identified, and the IPC notations assigned by the US examiners recorded.

3. IPC consistency

Ullmer (1) has described a simple method for evaluating IPC consistency. He assigned a score of zero to each case of identical IPC in the two specifications, a score of 1 to each instance of a superior/subordinate relationship, a score of 3 to each instance of different IPC sub-groups within a main group but not in a superior/subordinate relationship and a score of 10 to each instance of different groups within a class or sub-class being assigned.

Group consistency (G.C.) was then defined as

$$G.C. = \frac{1ON - \Sigma S}{1ON}$$

where N = no. of comparisons
and S = sum of all the scores.

The G.C. could vary between 0 (no consistency) and 1 (complete consistency). Ullmer recommended that any figure above 0.8 be considered satisfactory. Ullmer's method suffers from two disadvantages: firstly it does not consider the possibility of a drastic inconsistency in which one examiner assigns a heading from one class and the other examiner assigns a heading from a totally dif-

ferent class. (Within the IPC, classes and sub-classes represent the major divisions of technology; within any given class, headings are divided into groups and then into sub-groups (3).) Secondly, Ullmer did not make it clear how he carried out a calculation in which one examiner assigns (say) one IPC and another assigns (say) five. Are the extra four all to score 10 points or should they be compared in turn to the one classification given by the first examiner?

We have therefore extended Ullmer's equation by adding a new score, 20, for headings of different classes or sub-classes, and by modifying the equation as follows:

$$G.C. = \frac{2ON - \Sigma S}{2ON}$$

Furthermore, a procedure was formalised so that the two classifications which bear the nearest relationship to one another were compared, and then not used again for another comparison. Thus for example, if examiner A assigned COIF 7/54 and examiner B assigned COIF 7/50; COIF 7/54, the group consistency would be calculated as follows:

A	B	Score
COIF 7/54	COIF 7/54	0
—	COIF 7/50	20

G.C. = 0.5

Ullmer (1) also used a so-called "sub-class consistency" measure, which is simply the % of patents with the same class and sub-class. By incorporating the score of 20 into our calculation, we believe we have a single measure which combines his two measures.

4. Results

(a) Inorganic chemistry

44 of the 52 patents were compared. In the case of the remaining 8 patents, the US examiners had used an older edition of the IPC and so a valid comparison could not be made. The mean G.C. for the 44 patents was 0.413 with standard deviation of 0.380. Only in 11 of the patents was Ullmer's target of 0.8 exceeded. In the case of 14 patents, the consistency was 0. These results indicate a very serious inconsistency of use of the IPC between British and US examiners.

(b) Biochemistry

All 51 patents with equivalents were compared. The mean G.C. was 0.290 with a standard deviation also of 0.290. Only in 3 of the 51 cases was Ullmer's "ideal" score of 0.8 attained, and in the case of 20 patents the consistency was 0. These results are substantially worse than the poor results obtained for inorganic chemistry patents. In short, there is virtually no correlation between the IPC's assigned to biochemistry patents by British examiners and by US examiners.

5. Reasons for inconsistency

There are many possible reasons for this inconsistency in the use of IPC. It can be due to the lack of expertise of the classifier, and on the low priority given to IPC classification within the Patent Office. In this regard, it is possibly significant that for both the US and British Patent Offices, IPC is a secondary classification. In addition we found that some "mis-classifications" were often in reality due to misprinting. Furthermore, the patent document itself will vary from country to country depending on the variation in patent laws and how stringently they are applied; this could mean the equivalent patents may differ to some degree, though this will always be marginal. Finally, inconsistencies can be due to errors or misleading entries in the IPC itself.

One particular reason for this inconsistency can be identified with confidence – the relatively small number of IPC notations assigned by the US examiners and British examiners. Hyams (2) noted this lack of IPC assignment before, and provided some data to support his allegation. We carried out a similar test on the 52 inorganic patents and 51 biochemistry patents. We counted the number of IPC, British classification and US classification headings assigned by the examiners. The results are shown in Table 2 for the inorganic chemistry patents.

Table 2: *Number of headings assigned by examiners for 52 inorganic chemistry patents*

Classification System	Examiner	Mean no. of Classes assigned	Standard Deviation
IPC	British	2.27	2.01
IPC	US	2.14	1.28
British Patent	British	14.04	13.6
US Patent	US	4.37	3.67

An extreme example was BP 1430175 which had 71 British classification headings and one IPC heading! The US equivalent had two IPC notations assigned to it. Table 3 presents the results for biochemistry patents.

Table 3: *Number of headings assigned by examiners for 51 biochemistry patents*

Classification System	Examiner	Mean no. of Classes assigned	Standard Deviation
IPC	British	1.82	1.16
IPC	US	1.67	0.79
British Patent	British	9.00	14.75
US Patent	US	3.28	Not calculated

Table 4 summarises the results from Tables 2 and 3 and confirms the relative under-use of IPC by British and US examiners when compared to their own national classifications. This is despite the fact that all three classifications are approximately the same size in terms of numbers of headings available for use.

Table 4: *Ratio of national classes assigned to IPC notations assigned*

Country	Subject Matter	
	Inorganic Chemistry	Biochemistry
UK	6.19 : 1	4.95 : 1
USA	2.04 : 1	1.96 : 1

We extended our study in the case of seven families of biochemistry patents (those based on BP 1436181, 1437404, 1433887, 1435582, 1442715, 1440740 and 1434092) to the IPC notations assigned by other nation-

al examiners. We carried out the same calculation for G.C., in each case compared to the IPC notations assigned by the Britih examiner. The results of this study are given in Table 5. They indicate that the results obtained in the UK/US study would probably be replicated if extended to other countries on a large scale, and indeed research in this area is currently being undertaken in this Department (4).

Table 5: *Group consistency between IPC notations, assigned by national examiners and IPC notations assigned by British examiners*

Country of comparison	No. of Patents Checked	Mean Group Consistency
West Germany	6	0.51
France	5	0.64
Netherlands	4	0.47
Belgium	2	0.25
Sweden	I	0.48
Japan	I	0.17
East Germany	I	0.50
Israel	1	0.48

6. Conclusions

These results demonstrate that US and British examiners are highly inconsistent in their use of the IPC when classifying equivalent documents in inorganic and biochemistry and that they considerably underuse the IPC. Whilst it is true that the IPC is of secondary importance as far as many national offices are concerned, two major patent information retrieval systems – Derwent's (2) and INPADOC (5) – employ the IPC notations assigned by national examiners for their services. These two systems are widely used by searchers throughout the world and it would be helpful to the public at large if these national offices were to improve their use of the IPC.

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