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Classification in Scientific and Technical Writing

Jelisaveta Šafranj, Marina Katić, Jelena Zivlak
University of Novi Sad, Faculty of Technical Sciences, Department for Fundamental Disciplines in Engineering, Novi Sad, Serbia

Introduction

Classification is one of the fundamental ways of organizing and explaining technical materials. The writer's subject is always different and comprises technical objects, ideas, material properties or products of imagination (Kieft, 2016). In classifying not only differences, but similarities are stated, too. In a class containing a large number of members, the writer chooses those members that are important to the subject under discussion and uses one or more characteristics he considers important as classification basis (Herbert, 2018).

Classification can be divided into two groups: explicit and implicit, depending on whether the information is stated directly (explicit classification) or indirectly (implicit classification). In addition, classification can be complete or full and partial or incomplete, depending on whether the criterion of difference is given or not. Also, classification can be simple or complex, depending on the number of levels of generality given (Jordan, 2015).

Explicit classification

Explicit classification (simple):

"Printing inks are principally made up of colorants (pigments, dyes), vehicles (binders), additives, carrier substances (solvents). Depending on the type of printing process, inks have largely variable flow properties which range from extremely thin (watery), through highly viscous, up to dry (powderlike). The ink transfer mechanism and the type of drying/fixing of the ink on the substrate principally determine the structure and the components of a printing ink." (Kipphan, 2001: 211).

The writer provides the following information:

(1) the name of the class: printing inks,
(2) the members of the class,
(3) the basis for classification.

This classification is given on one level of generality and it is considered simple.

Explicit classification (complex)

" Liquids can be classified as viscous liquids and thin liquids, depending on whether they offer a large or small resistance to motion relative to solid surface. Typical viscous liquids are thick oils and glycerine, while typical thin liquids are water and gasoline. The shear coefficient of viscosity of the typical viscous liquids are high, about 100 times higher than the shear coefficient of viscosity of the typical thin liquids. The thin liquids and gases are considered as fluids having very small (shear coefficient) viscosity." (Owczarek, 2008: 43)

This classification is given on two generality levels.

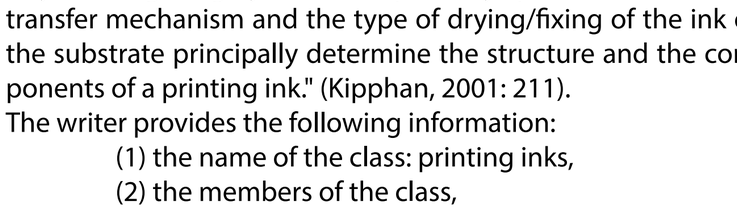

Figure 1: *Complex explicit classification*

On the first level the writer differentiates the members of the main class (liquids) according to the resistance they offer to motion relative to a solid surface. The basis for classification is not given. The reader receives all 3 kinds of information which every complete classification should give:

a) the class,
b) the important members of the class,
c) the criterion of difference.

If the reader is given this information, the classification is considered complete. When the reader is given the class and the members, but not the criterion of difference, the classification is partial (Jordan, 2015).

Partial classification in EST

"All forms of matter can be grouped into two classes: solids and fluids. Webster's dictionary defines a fluid as a substance which yields to any force however small, tending to alter its shape. In somewhat more technical terms, a fluid may be described as a substance which cannot sustain a shear force. Solids, on the other hand, can withstand such forces, and although they may remain at rest, displacements or strains of the material result. A shear force can be sustained in a fluid, however, when relative motions between the particles of the fluid take place. Under ordinary conditions this distinction, between fluids and solids is readily apparent for such materials as water, air, or steel. However, it is difficult to determine whether some substances should be classified as solids or fluids." (Owczarek, 2008: 17).

Here an explicit (partial) classifying information is given in a reversed order:

There are two chemical drying methods:

a) oxidation is a polymerization of the binder – vehicle of printing ink,

b) polymerization by cross-linking through UV radiation or cross-linking through electron beams

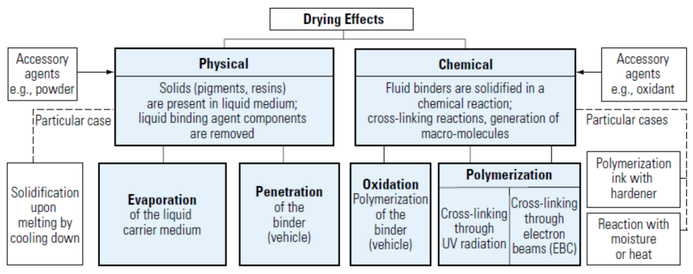

Figure 2: *Drying processes*

The two types of drying methods are chemical methods. Physical method or absorption is Penetration achieved by the interaction of printing ink and substrate.

There are two levels of generality of this complex explicit classification. But for the reader to be able to abstract and reorder the information given, in the form of the above drawn diagram is not easy, unless he possesses at least elementary technical knowledge of the particular subject.

Implicit classification

If the reader can take information not stated as classification and arrange it into the form of classification, it is called implicit classification. The implicit classifying information is buried in the information which supports and develops the core generalization. Thus, implicit classifying information should be extracted and reordered from the supporting information. Like explicit classification, implicit classification is found in both a simple and a complex form.

Implicit classification (simple)

"A distinction is made between technologies requiring a master, conventional printing, and so called nonimpact printing (NIP) technologies which do not require a printing plate. Printing technologies requiring a printing plate are technologies like lithography (offset), gravure, letterpress, and screen printing. The most common NIP technologies are electrophotography and ink jet." (Kipphan, Handbook of Print Media, 2001:681).

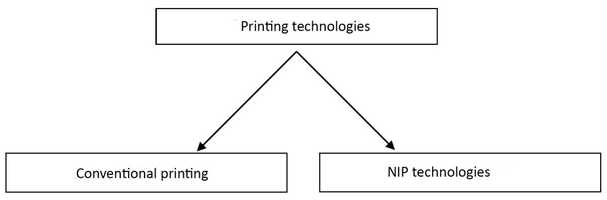

Figure 3: *Simple implicit classification*

Implicit classification (complex)

"Printing inks are principally made up of colorants (pigments, dyes), vehicles (binders), additives, carrier substances (solvents). Depending on the type of printing process, inks have largely variable flow properties which range from extremely thin (watery), through highly viscous, up to dry (powder-like). The ink transfer mechanism and the type of drying/fixing of the ink on the substrate principally determine the structure and the components of a printing ink. Colorants are divided into: pigments (organically or inorganically coloured, white, or black substances that are insoluble in the ink vehicle.) These are solid particles and/or molecular agglomerates that must be held in suspension in the base liquid), dyes (organic compounds that are dissolved in the system during application) which are present in molecular form. Pigments consist of molecules that are cross-linked with one another as crystals. Normally pigments have a particle size of 0.1–2 µm. A pigment particle can consist of several million molecules. Only around 10% of the molecules lie on the surface, and it is only these molecules and a few underneath that can absorb light. Pigments disperse light and, as such, are opaque. They have a wide absorption band and are therefore not as "pure" as dyes, which possess an extremely narrow absorption band." (Kipphan, 2001:130).

The core generalization of the paragraph is stated in the first sentence. Buried in the supporting details is information that can be put in the form of an explicit classification. From the two sentences of this paragraph, two-level classification can be extracted and reordered in the form of the following diagram:

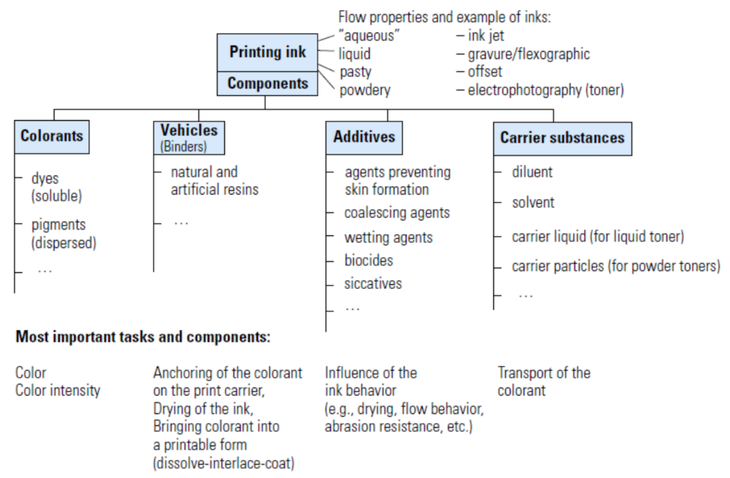

Figure 4: *Complex implicit classification on two levels*

Conclusion

The purpose of the basis for classification is to tell the reader in what essential way each member of the class differs from every other member of the class. Therefore, it is a major meaning component in a statement of classification. Statements of classification also contain basis for similarity by implication. Obviously, the given members of a class have one or more areas of similarity or they would not be members of the same class. A named class is not a mere sum of the members that fall within the class. It is, rather, the idea, the concept of the qualities that any particular member should have in order to fall within the class. A class is determined by a complex of significant characteristics shared by all members of the class. Since the rhetorical device of classification is manmade, a single thing may be, and usually is, classified in a number of ways depending on the basis on which the classification is made. The basis of classification will always reflect the particular purpose of the writer making classification.

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