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A Plea for Integrated Paper Research.

Scientific analysis, sensory perceptions and deconstruction analysis.

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Summary

Paper is studied in many different ways. Some 120 years ago the first microscopical analysis of paper samples showed spectacular results. Ever since science gave us many more techniques and methods. Today paper history is an established auxiliary science, not in the least thanks to the IPH, founded 40 years ago. But there are other less orthodox ways to study paper. The use of our 'common' senses is a heavy underrated method for one. The toolkit of social scientists, in particular anthropologists, is another one. By de-constructing the meanings that are assigned to paper, a brand-new way of analysing paper is added to paper research. Nonetheless not one of these methods will bring us universal happiness. We need them all to better understand the object of our study called paper. Thus paper research is not only an interdisciplinary undertaking, but should above all be an integrated approach.

Scientific analysis can be divided into structural and analytical methods. Most of the paper tests are designed in the period between the two World Wars. Different from traditional paper research is that paper scientists nowadays turn their attention more and more to testing the quality of paper. Besides there is hardly an instrument specifically build for paper research anymore. The sophisticated high-tech testing apparatus of today has a more general application.

Because of our partiality for scientific analysis we easily forget the value of information gathered in a less systematic way. Bookbinders, printers, paper dealers have always relied on their sensory perceptions to assess the quality of paper. Like the craftsmen of yesterday many paper workers of today do not have a laboratory to their disposal. They too have to rely on their senses but most of the time they forgot how.

In addition to historical methods social sciences offer us very utilizable research tools. From the study of material culture we learn that paper can be regarded as a meaningful object. Thus when we contextualize paper we find out what paper means to people from distinct backgrounds in different situations. That is why researchers employing the deconstruction analysis have to learn to read the signs; they have to master the 'language of paper'.

In our hunger for the new and more we easily forget that much knowledge has already been gathered. Unfortunately much of the paper knowledge is fragmented and only to be found in worn books and torn booklets. Indeed we are in great need of a compact and clear handbook.

Introduction

The study of paper has fascinated me for a long time. Several times I sat at a table with a sheet of paper or a book in front of me and people hopefully look up to me expecting a prompt answer from me, *the expert*. Without exception they are all instantly disappointed when they hear I have to carefully study the object first. Because there are many ways to research paper. Indeed paper can be studied in many different ways, not one of them being the only way or true way. In discussing these possible methods with friends and colleagues slowly but surely three clusters of research methods surfaced:

- o the methods of scientific analysis
- o skilled perceptions with our five senses
- o the method of analysing the many meanings of paper by deconstructing its context.

Some 120 years ago Julius von Wiesner studied paper samples under the microscope for the first time at the Kaiserliche Akademie der Wissenschaft in Vienna. He was looking at the oldest papers known at that time, 8th – 9th century samples from the El-Fajum papers belonging to the Papyrus Erzherzog Rainer Collection. He could prove that they were made of rags, mainly linen, and sized with starch. Since then it is impossible to image paper research without the *scientific method*.

However, not all the people dealing and working with paper have such an expensive laboratory at their disposal. In von Wiesner's time printing and binding grew at a dizzy speed. The urbanized masses were hungry for knowledge. These craftsmen too had ways to judge the quality of their papers. Ways they learned from their fathers and grandfathers. Next to using simple equipment they heavily relied on their *senses*.

The main point of *deconstruction analysis* is that paper, as part of a material culture, can be studied as *a social object*. That is a meaningful object, an object that can take on different meanings depending on time and place. Generally we regard paper as *a physical object*. But when we contextualize paper we find out what paper means to people from distinct backgrounds in different situations. In unravelling these meanings, in *deconstructing* these meanings, we can learn a lot about a specific paper.

All of these three methods are helpful research tools, but not one of them is enough. Just feeling, smelling or tasting the paper is not enough. Just aimlessly bombarding the paper with all kinds of physical or chemical tests is not enough either. Results of scientific tests need to be interpreted which can only be done within a meaningful context. Thus in order to uncover the secrets of paper we require to *integrate* scientific analysis, sensory perceptions and deconstruction analysis.

I assume that most of my colleagues are well informed of scientific paper testing and are familiar with the many sensory paper tests. That is why the emphasis in this paper will be on deconstruction analysis, a rather unusual way of looking at paper.

Scientific analysis

Since the days of rationalism people more and more demand hard evidence to circumstantiate any statement. Those of paper historians included. Fortunately at the end of the 19th century paper scientists showed sensational results. They could prove that a certain material was not papyrus but true paper. But today the situation is different. First of all when you immerse yourself into paper testing now you soon find out that there is no decent handbook on the subject. You either find books on testing modern papers, like TAPPI provides them, the American based *Technical Association of the Pulp and Paper Industry*, or you have to go shopping for individual tests at other disciplines like archaeology, material sciences, art history, and last but not least conservation science. They provide useful tools, yet none of them specifically designed for testing old paper, the study of which is our main concern as paper historians. In the past, however, the study of paper was a much more exciting one. From the time of Julius von Wiesner, the 1880-ies, until the Second World War scientists broke new grounds into the scientific investigation of paper. Several German scholars published amazing techniques to investigate paper, old and new, like Höhnel's *Mikroskopie der technisch verwendeten Faserstoffe* (1905), Herzog's *Mikroskopische Papieruntersuchung* (1935), and Herzberg's *Papierprüfung* (1927). In France the Rostaing brothers published their *Précis historique, descriptif, analytique et photomicrographique des végétaux propres à la fabrication de la cellulose et du papier* (1899) which was succeeded in 1939 by the impressive fibre atlas *L'analyse microscopique des papiers* from Louis Vidal. Already in 1887 the Englishmen Cross and Bevan wrote their *Report on indian fibres and fibrous substances exhibited at the colonial and indian exhibition, 1886* followed by their *Cellulose* (1900).

These early and fundamental studies cover both the structural research, the physical-mechanical study of a sheet of paper, and the analytical research, the establishment of the constituent parts that make up paper. This way a real practical paper testing apparatus came into existence. Ever since not much was contributed to this apparatus. But what is worse, the knowledge and the skills of old paper tests is disappearing. For instance how many scientists can still recognize old paper fibres under the microscope?

Of course over the years new research methods were developed and very advanced ones at that: X-ray fluorescence, infrared spectrometry, particle-induced X-ray emission (PIXE), X-ray diffraction, ion and gas chromatography. Nonetheless there is a main difference with the traditional methods. The modern paper tests are not specifically developed for testing paper as the old methods were. They are the result of scientific and industrial research of many different disciplines. The present-day study of paper as a physical object is in the service of the modern paper industry. That industry is only interested in the quality of a paper as a product and not in the composition of paper as a characteristic material.

Thus, as paper historians we heavily rely on old techniques and methods of investigating paper. That is not easy as most of the information is not ready at hand. It becomes clear that the compilation of a handbook on all different paper testing techniques, analytical as well as structural, is long overdue.

Sensory perceptions

To survive human beings are equipped with five senses: hearing, seeing, tasting, smelling and touching. Although sometimes it seems as if a sixth sense is involved: *Fingerspitzengefühl*, unsatisfactorily translated as sensitivity. It is astonishing what a trained eye can see and what a trained ear can hear. Does not the *rattle* tell us a lot about the paper? A low pitch, or a soft sound, indicates fillers, bulky fibres points to grass fibres, generally a weak paper. On the other hand a high pitch, a hard sound, designates heavy sizing, rag or straw fibres, or a long beating time.

And what can we infer from a paper held against the light, besides watermarks, chain lines and laid lines. Papers made of rag fibres look cloudy, those of straw look glassy, and those of esparto look creamy. And didn't you ever smell the pungent odour of animal glue? Didn't you ever wet the paper with your fingertip to see whether it was loaded or sized? There is a lot we can learn about paper by these simple sensory tests. When we are lucky we find some of these tricks described in handbooks for printers, bookbinders, papermakers and sometimes even conservators. Again, you will not find them in the modern handbooks. Today's printing, binding and papermaking is all done by computer-controlled machines, the craftsman of olden days is today's engineer. So look for books like that of Jahans from 1931 with the habitual long title: *Paper testing and chemistry for Printers: a valuable book on the raw material of the printers' craft, giving full details of the various methods of testing stationary and allied materials.*

Deconstruction Analysis

In general the papers we study are nearly all data carriers; they are broadsheets or quires that contain some kind of information. They are part of a book, printed or hand-written, part of an archive or the base of a piece of art, often a print. Besides this perceptible and purposeful information the paper also can carry socio-cultural information. Often this is directly related to intended purpose of the information carrier. But other times they represent a surprisingly different concept and take on a meaning far beyond it was intended for. To find these other, frequently unintended, meanings of paper we may analyse paper as an object of material culture. Putting paper within a certain cultural context will bring us a startling wealth of information.

Material culture

Around 1900 material culture is an important subject of study. The attention, however, started already some 50 years earlier and originates from '*cabinets de curiosités*', cabinets of curiosities.

The 'art' collections fell into two groups: on the one hand there were the collections of fine arts, *des beaux arts*, including not only paintings and sculpture but also ceramics, fine metal work and coins. On the other there were the accumulations of 'artificial curiosities', strange things made by human artifice. These last collections were generally what we would call nowadays archaeological or ethnographic material. They formed the basis of the emerging ethnographic museums. That is why material culture is still associated with pots, baskets, textiles, spears, shields and masks.

In the early years it was common to compare these curious objects with each other. The scholars were looking for a system or a pattern. Those were the days of measuring and comparing. More and more the objects are looked upon in their context. And then in the 1920-ies the anthropologist finally leaves his armchair and goes into the field. Because the understanding grew that the real meaning of an object and its ties to the rest of the culture, could only be grasped *in situ*, on site. For example a feathered headgear is not only beautiful, it is also suppose to impress the visiting guest. For one it makes the chieftain look longer, thus the visitor smaller. Usually the feathers are very rare and difficult to get, expressing wealth and power. It is clear that objects stand for more than only their functional use: a hat is more than a covering for the head. To get a better grip on the concept 'hat' we have to place it in its socio-cultural context. And all this is what we call: material culture.

Often material culture is compared to language, that is in theory. That is the reason why we come across so many linguistic terms in the study of material culture. We speak of the 'language of things', a quest for meanings or meaningful constructs. What do the objects tell us, how do they speak to us, what is their grammar, what are the rules by which these meanings are constructed? The method to unravel all these rules and meanings is called: *deconstruction*. When we deconstruct 'the language of hats', the hat-language, we are looking for matters as: what is their use, how are they made, who can make them, what are the do's and don'ts, who can wear them and who can not, what is the colour symbolism, what is the economical value, at which occasion is it worn,

what place does this particular hat occupy in the whole range of hats, what is their place in relation to other garments, what is the aesthetic value that it produces, at what times or occasions can the hat be worn, etc. How a simple hat can raise so many questions in the mind of an anthropologist.

The method of deconstruction

What does the notion of material culture mean for our study of paper. Is it possible at all to look at paper in this way, in other words is there a 'language of paper'? If there is, what do we need to read the signs, to deconstruct, to unfold the hidden meanings? In my experience the consideration of paper as an object of material culture is a very useful and stimulating exercise that truly leads to a better understanding of our subject of study: paper. Like with any other object of material culture there is not one particular language of paper, there are many languages. Depending on the context the grammar of the 'paper language' changes. For the sake of argument the 'anthropology of material culture' is reduced to a method here. It is not our goal to study a cultural entity nor to find out how a culture is reflected in the objects it creates.

Like in any scholarly approach we have to try to find the order of things. In this case the order is researched by collecting the data in an inductive method that are analysed qualitatively. When we study our paper we simply go look for all kinds of meanings people could have ascribed to this particular paper. These meanings are dependent on the context. Thus we try to find those contexts and the people who under those specific circumstances assign those meanings. Yet, the context is not only what you see but also what you can imagine, a situation in which you can place that paper fictitiously. Of course, for that you need some background information. In our case, the information what meaning paper does have in a particular situation is as important as the meaning it definitely does **not** have. So do not forget to look for the opposite.

To summarize the tools to find the 'language of paper'

- o look for a general context
- o place the paper in a 'logical' context, that you can construe
- o image such a 'logical' context on basis of background information
- o what the paper is **not**, is as significant as what it is, look for the opposite

In order to apply this method of deconstruction, you need to be able to **see** these meanings. Fortunately one can acquire this skill. Just as one can learn to write and read, it is also possible to learn this 'visual literacy', as it is sometimes called. Students in material culture are trained in this kind of literacy.

It is not easy to follow the lines of reasoning in anthropology, even when it is applied science, and along which the language of paper is explained. That is why the deconstruction of paper is illustrated below with some examples from my own study.

Example 1 : Kailian Paper

Studying the writing materials of Javanese manuscripts I stumbled on a very strange sort of paper. Scrutinizing the literature I came across the expression 'Kailian Paper', which was never heard of so far. The author apparently based his knowledge on a report from 1679 written by the governor of Ternate on the Molucca Islands. It was stated that the people from 'Kaili' produced paper, also called Javanese paper. Further I found in the daily records of the Dutch East Indian Company from 1681 a note on the import of 50 sheaf of 'Selian paper' from Butan, a village in Southern Sulawesi. What was 'Kailian paper' and 'Selian paper'? After a long search I discovered that both names stood for the same 17th century important kingdom on the island of Sulawesi. The paper from that region was so much in demand that the Chinese exported it to their continent, to the Philippines, and as it seemed also to the island of Java. Now I had solved the etymological problem: Kailian = Selian = a 17th century kingdom in South Sulawesi.

Yet, I still could not believe that Indonesia was manufacturing paper in the 17th century.

From other studies I knew that Sulawesi in those days was very famous for its high quality tapa, beaten bark cloth that looked very much like paper. I had seen several samples in museums. At the same time I knew that the Javanese also manufactured a tapa that was sometimes called 'Javanese paper'. Could this 'Kailian or Selain paper' be tapa? Indeed fibre analysis, botanical and microscopical investigations confirmed my assumptions: the 'Kailian or Selian paper' was not paper at all, but tapa that resembled only paper.

This part of my research prompted me to look into the etymology of certain expressions. I had to resort to list of old geographical names in Indonesia, knowing that the 17th century Dutch language was certainly not standardized and knowing at the same time that many officials of the Dutch East Indian Company were not very literate at all. I also had previous knowledge of a non-paper material from that area. In other words: I specified the context. To be sure I had some scientific tests done that corroborated my findings.

Example 2: Buy Indian paper

On a field trip to India I bought an old empty notebook in Ahmadabad. Although it needed some repair I felt very happy to have acquired such a treasure because old Indian paper is very hard to come by. Besides, on the front cover a ream label was fixed. Those are even harder to come by. As a paper historian I was very curious what kind of paper I acquired. The label read that the paper was specially made for a company in Ahmadabad by a Bengal company in Calcutta. It was very obvious that the paper was machine made. About the period I was not quite sure as already from the 1870-ies upwards the Indians were actively manufacturing machine made paper, in particular in the Bombay and Calcutta area. The ream label looked from around 1900, it was done in a Jugendstil-style. Nevertheless the print shops in the colonies continued to use certain styles long after it was outdated in the mother country. Of course, I could look for the company history to try to date the paper, but there was one thing that fascinated me more.

On either sides of the ream label two other small labels were attached. They read *Buy Indian Paper* and *Indian Paper Sales Association (Bombay)*. It didn't mean much to me until I remembered that Ahmadabad was the location of Mahatma Gandhi's seat: the Satyagraha Ashram. Gandhi was the father of the Indian National Movement and the founder of the Khadi Movement. This movement promoted the traditional arts and crafts, including the handmade paper industry, to better the conditions of life of the poorest in society. Reading more about the Indian struggle for independence and the role of the Gandhian movement, I came upon the economical boycott of the Indians against their colonisers. To support his work Gandhi founded the *All India Village Industries Association* in 1934. This initiative was soon taken over by the residencies of Hyderabad, Jaipur and Bombay. Their mutual motto became *Boycott British, Buy Indian*. Both the stickers on the notebook must be placed against this background. The paper seller from Bombay, who must have been a member of the *Indian Paper Sales Association*, must have felt the need to make a political statement. From these historical facts I estimate the paper to be 20 tot 30 years later than I originally estimated on the basis of the ream label. I could narrow down the period of the paper as the context, the political-economical data, changed and without even physically investigating the paper itself.

Example 3; Thai folding books

On mission in Thailand the beautiful paper folding books immediately captivated me. Reading about the Thai manuscripts I was very surprised to find that most of the authors claim these books were written on *khoi* paper, made of the tree that goes by the Latin name of *Streblus asper*. That is certainly not consistent with the raw material the Thai use for their paper in the north, around ChiangMai. There they use *saa*, papermulberry, *Broussonetia papyrifera* Vent. To end this confusion I decided to look more closely into the codicology of these manuscripts.

The Thai came to the present region from southern China, Yunnan, where they came to power in the 13th century by conquering the Mon and the Khmer. In this period the Thai script was designed. Unfortunately the library in the capital Ayuthaja was completely burned down by the Burmese in 1767. Consequently there is hardly any Thai manuscript today that dates before that disaster. The Thai use distinct scripts in different parts of the country at different times. Some are simple, others are decorated. Also some scripts are mainly used in palmleaf Manuscripts.

During my investigation it became clear that Thai manuscripts could be classified in different groups. In accordance with this we hardly find any important religious texts in folding books. Almost all these texts are written on a luxurious material or long palm leaves. Next the religious texts can be recognized from the use of the old sacred Pali language in the Khom script. We seldom encounter historical texts or texts on law in paper folding books. What we do find in the yellowish cream paper or grey paper leporello books are for the most part illustrated texts, like the famous Buddha legend of Jataka, manuals on cosmology, astronomy, military affairs, fortune telling, some animal stories and finally some very simple Buddhist hymns and rituals. On the black paper manuscripts often the most common things are written down like court records, writing exercises, notes, and rough copies of literature. Thus the choice of writing material is largely decided by the content of the manuscripts. For the other part also by the status of the recipient, in case of a gift, the donor or the sponsor of the manuscript. In order of diminishing importance we distinguish the writing materials into

- o luxurious materials (precious metals, ivory, lacquered palmleaf)
- o long palmleaves
- o short palm leaves
- o yellow cream paper
- o grey paper
- o black paper.

Thus we know the Thai use yellowish cream coloured paper, grey paper and black paper. The black paper is grey paper made black, as we learn from other sources. We assume that the black paper and perhaps the grey paper as well are of an inferior quality because of the more or less hierarchic order in writing materials.

Reading on the subject I got the feeling that the geographical distribution of the folding book played a part in the choice of the raw material used for the writing material. The folding books from the surrounding countries (Burma, Laos, Cambodia) are principally made of papermulberry, which paper looks yellowish. The paper manufactured by some of the hill tribes that occupy the northern border areas of Thailand (Lolo, Yao, Nachi, Hmong) depends mainly on their intended use. For religious rituals most of the tribes make bamboo paper and for book production only the Nachi use papermulberry, the Yao employ either rice straw or bamboo. Unlike the Nachi the Yao make no use of the folding book technique, they bind their manuscripts in a Chinese manner. The northern Thai folding books from the Lan Na period (1450 - 1558) are practically all made from *saa*, papermulberry. The history of the *saa* paper, still manufactured today in Northern Thailand, shows that the paper was also used for the manufacture of umbrellas and parasols. The farmers utilized the oiled paper umbrellas in the field and the most exquisite ones were donated to the monks on religious holidays. Others mention that the *saa* paper was employed as wrapping paper and sanitary paper. Further study reveals that the *khoi* paper was mainly produced in Central Thailand, around the old capital Ayuthaja. This paper has a greyish look. Since the Second World War the production of *khoi* paper stopped. The story goes that during the Japanese occupation all the *khoi* trees were cut down. Since then the Thai make their folding books only from *saa* paper.

From the above it appears that the *saa* paper production has concentrated in the North of Thailand and the bordering regions. Consequently the *khoi* paper production has centred in the middle of Thailand and perhaps the southern regions as well. We may also assume that the yellowish papers in the Thai folding books are manufactured from *saa* paper and the grey

and black paper manuscripts from *khoi* paper. Another distinction between the papers might be the size of the mould. The *saa* paper is produced on a rectangle mould, often not bigger than 100 cm x 50 cm and the *khoi* paper on an oblong mould, about 45 x 200 cm. These data are corroborated in interviews with *saa* papermaking villagers in Northern Thailand and in interviewing possibly the last *khoi* papermaking family, living in a suburb of Bangkok. They also made clear that *saa*, as a raw material, was much more appreciated than *khoi*. The last one was definitely considered of lower quality.

This preliminary study of the Thai folding books shows promising results. There are strong indications that the northern Thai folding books, like the Lan Na manuscripts, are written on *saa* paper, the yellowish cream coloured paper. The other Thai folding books are most likely written on *khoi* paper, the grey coloured paper as well as the black coloured ones. The grey and black paper books are less appreciated than the yellowish ones, which is reflected in their content. Besides, the length of the papers used in the manuscripts can also give us a clue as to which sort of paper was used.

Fieldwork, interviewing and a modest literature survey helped us define the context of the Thai folding books. It can assist us to narrow down the possible raw materials of which the different folding books are made of.

Conclusion

It is my opinion that all paper researchers, each representing one of the three suggested methods, should closely work together to give us a clear and more complete picture of the complex material called paper. If we all accept our limitations, we can easily tear down the walls that keep us apart. As is so nicely put in German: *In der Beschränkung kennt sich der Meister*. Only then we can speak of a real integrated approach to paper research. None of the three mentioned tools are sufficient, we need all three of them, over and over again.

The use of our 'common sense' is a heavily underestimated method for one, deconstruction is a novel way of analysing paper and because of our partiality to scientific testing apparatus we easily forget the value of information gathered in a less systematic way.

Don't we all look at paper first before we do anything else? Usually we take our time and look through the paper, feel it, smell it: *use our senses*. Only then we decide which road to pursue. Perhaps we look for the context of the object first, we investigate the non-paper aspects. What do those elements tell us about our paper. On basis of these combined results it is much easier to decide which physical or chemical tests we want to perform. These test results should of course be in line with the other findings. Only then they fully make sense!

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