Digital images and art historical knowledge: Connoisseurship today between 'top-down design' and 'bottom-up' capabilities

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'A painting by the studio of Rembrandt is less valuable, less a masterpiece, than a painting by Rembrandt himself.' With this statement, American philosopher Daniel C. Dennett highlights the stubborn persistence of the traditional concept of the artistic genius.[1] Only the famous name counts, even though – in the case of Rembrandt, for example – it is now possible to reconstruct relationships within the workshop, offering a more nuanced understanding of the authorship of his paintings.[2] Dennett's statement about the significance of the name for the value of Rembrandt's paintings is, of course, also true of his drawings. However, the question of the authenticity of a drawing is complicated by the fact that (at least so far,) art historians specialising in the field of drawing do not generally take into account that drawings attributed to the artist may actually have been produced by more than one hand, as is the case for some of his paintings. Above all, the American philosopher uses the traditional concept of the genius to make a case for his idea of collectively organised scientific practice, which he has developed in view of the digital networking of knowledge. He presents his thinking on this subject in his book *From Bacteria to Bach and Back. The Evolution of Minds*. Based on his own experience, Dennett is convinced, for example, of the benefits of scientific cooperation, '(…) in which theoreticians – who understand the math – and experimentalists and fieldworkers – who rely on the theoreticians without mastering the math – work together to create multiple-author works in which many of the details are only partially understood by each author'.[3] And finally, he adds: 'Other combinations of specialized understanding flourish as well.'[4]

Taking Dennett's ideas as a starting point, the question of connoisseurship today – and tomorrow – also aims to find new forms of scientific collaboration in order to take account, at least to some extent, of the changed conditions for art historical scholarship in the field of drawing.[5] Thus, any repositioning of the concept of connoisseurship is confronted both with the digitisation and corresponding visualisation of almost all drawing collections, and with the emergence of

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[1] Daniel C. Dennett, *From Bacteria to Bach and Back. The Evolution of Mind*, New York: Penguin books, 2017, 375.

[2] See Ernst van de Wetering, *Rembrandt's Paintings revisited. A complete survey* [...] 2 vols, Dordrecht 2017, 1 vol., plates, chaps. 1 and 2, 1-53, 55-60.

[3] Dennett, 2017, 375–376.

[4] Dennett, 2017, 375–376.

[5] An attempt at a methodical differentiation of traditional style criticism that is still worth discussing is Alexander Perrig, *Michelangelo und die Zeichnungswissenschaft – ein methodischer Versuch*, Frankfurt a. M./Bern, 1976; cf. the review by Wolfgang Kemp, 'Alexander Perrigs Michelangelostudien', *Kritische Berichte* 5, 1977, 1, 34-42.

completely new forms of knowledge generation. Of particular significance is the fact that scientific research methods provide us with new knowledge concerning the materiality of drawing, which will, in future, only be available to scholars in digital form. In this knowledge transformation process, however, the previous legitimacy of the connoisseur and his practice of judgement is, if not questioned, then at least reassessed. For whereas the authenticity of a painting or drawing was previously at the discretion of whichever connoisseurs got their hands on the drawing – their judgment always being authoritative – the role of expertise, previously based primarily on meticulous examination of the physical work, is now being supplanted as newly generated knowledge is made available by digital technology. However, this will require a renegotiation of the question of scholarly authority that is inherent in every traditional judgement regarding attribution – 'This work is a Rembrandt' / 'This work is not a Rembrandt!' – a verdict to which the art market is only too happy to refer. This renegotiation now needs to also take place in the field of drawing science.

After all, Dennett might ask, who really cares who makes the judgement, since the question is first and foremost one of legitimacy, and hence of the methodological credentials of the newly generated statements concerning the object under investigation, namely the drawing. In an initial step, this paper proposes using the terms 'top-down design' and 'bottom-up processes', likewise borrowed from the book *The Evolution of Minds*, to describe the shift in the concept of connoisseurship in light of the digital database.[6] A second step will characterise the particular knowledge about the materiality of the drawing that can only be gained with a digital approach to the object, a process that will require us to modify the traditional concept of connoisseurship if this term is to have any relevance at all in contemporary art historical discourse.[7]

The storeroom as a privileged centre of knowledge

Up to now, the storeroom of a graphic art collection has been the self-evident focal point for connoisseurship regarding drawings. As the physical location where these works of art are held, the storeroom is always simultaneously a centre of knowledge where each drawing is integrated into an overarching classification system according to century, school, and artist, an arrangement that has never been fundamentally challenged. As the location of this 'ideal configuration',[8] however, the storeroom has also always been a privileged place, one which has continuously produced a certain type of knowledge: namely, the expertise that enables a connoisseur to evaluate a drawing and say 'This is/is not a Rembrandt'. The drawings attributed in this way could then be entered into the cataloguing system sheet by sheet under the relevant name. Over the centuries, this connoisseurly

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[6] In the following, we refer to *the* database as the imaginary sum of all databases.

[7] This article has been produced in collaboration with the following persons: Christien Melzer (art history), Uwe Golle and Carsten Wintermann (materials analysis), Klassik Stiftung Weimar; Georg Dietz (paper analysis) and Oliver Hahn (analysis of artefacts and cultural assets, Bundesanstalt für Materialforschung und -prüfung, Berlin).

[8] Jacques Derrida, *Dem Archiv verschrieben. Eine Freudsche Impression*, Berlin, 1997, 13 [*Mal d'Archive. Une impression freudienne*, Paris, 1995].

practice was the responsibility of a small circle of experts (usually the curators of the respective collection) who had direct access to the storeroom. Max J. Friedländer used the term 'subaltern connoisseurs' to describe art historians who devote most of their time to studying lesser known artists who are not the big names of art history, but whose works make up the bulk of every graphic art collection.[9] In the case of these artists, attribution has so far not been a problem: with sufficient knowledge of an artist's drawing oeuvre, it was (and is) not difficult to identify as yet undiscovered drawings in the same hand, according to the principle 'I do not search, I find', as Pablo Picasso once said (a quotation that is also cited by Dennett)[10]. The storeroom is thus the privileged centre of knowledge whose duty is to retain the arrangement of works according to schools, centuries, and, in particular, artists' names. This knowledge was also binding for all analogue art historical classification systems, such as the card index box, the photographic collection (cf. the Gernsheim Photographic Archive), and the academic catalogue raisonné of a collection.

The placeless space of the database

However, it is not only the traditional forms of representing connoisseurly knowledge that have become obsolete as a result of the digital database. The database has also forcefully opened up previously hidden storerooms of major collections (such as the Rijksprentenkabinet in Amsterdam, the Département des Arts Graphiques at the Louvre, the Print Room of the British Museum, and the Albertina in Vienna) and turned them inside out. Today, thanks to the intelligent 'top-down design' of the database – its sophisticated search and link options – every user is in a position, ideally, to know everything there is to know about a collection, even without access to the storeroom. Upon closer examination, the first striking difference between the storeroom and the database is that the physical arrangement inside the storeroom is no longer evident in a digitised collection, as it still was in the card index box, the photo collection, or the catalogue. Database users viewing a collection via a digital interface on a computer are thus no longer confronted with the 'ideal configuration' of a collection. As they enter the virtual database, they are, as it were, taken into a placeless space to begin their search. This placelessness is also reflected in the fact that the digital image of a drawing appears in the user interface, fulfils its desired purpose, only to then dematerialise again and be consigned to the virtual pool of algorithms. At least, that is how a non-specialist user imagines the functioning of a database. The term 'bottom-up' capabilities can therefore be used to describe what is required of the 'subaltern connoisseur' in the face of a plethora of digital images in as yet unsynchronised databases. Limited competence, acquired through mere experimentation (which often depends on chance), contrasts with the intelligent functioning of digital search engines – although, paradoxically, these are still not unlike the first chess-playing automaton created in 1769 in that they must likewise be 'fed' material (and knowledge) by experts in the storeroom if they are to be of any use to external users. For them, the departure point of their connoisseurly activity will change very little at first. They will continue to search the proverbial needle in a haystack, except that the process of

[9] Max J. Friedländer, *Von Kunst und Kennerschaft*, West Berlin, 1955, 135.
[10] Dennett, 2017, 149.

finding information takes on completely new dimensions owing to the volume of pictorial material available. Scouring extensive databases that are not broken down by keywords offers completely new opportunities. Thus, the digital database allows us to further compile the graphic work of truly subaltern artists of whom we know only a few drawings so far (such as Cesare Bedeschini, Giovanni Maria Morandi, and Girolamo Troppa).[11] And due to the sheer quantity of digital images, we are also confronted with marginal drawing practices for the first time, such as counterproofing, tracing, and cutting and pasting, which certainly have the power to modify our traditional concept of drawing. All these marginal techniques are, at any rate, evidence of a pragmatism in drawing that has hitherto been disregarded in the traditional classification system of the storeroom; only the database brings them to the surface. In this context, the materiality of the drawing, if recorded in the database, also becomes a focus of attention, giving greater prominence to such issues as the use of drawing materials. When, where, and why, for example, was sanguine (red chalk) favoured as a drawing medium? This is just one of many possible questions arising from purely quantitative data surveys provided by the database, which require further modification through connoisseurship, as formulated by authors like Werner Busch, who asks: 'In what ways are changes in drawing techniques historically determined, and how do technical changes influence the generation of meaning through drawing?'[12]

The flood of digital images is thus altering the demands on classical connoisseurship, which, as digital connoisseurship, is confronted with the full spectrum of graphic forms of expression for the first time. A significant result of the digital database could thus be that our traditional concept of drawing, with its interplay of inspiration, imagination, and the direct act of drawing, is in need of conceptual expansion. The act of drawing is not only the spontaneous, individual, and immediate expression of a pictorial idea preconceived in the imagination, the *concetto*, which has only been waiting to be executed as a drawing. Nor is it limited to producing a study or draft composition. Rather, the drawing material, revealed in all its diversity in the database, suggests that each drawing is initially integrated into an everyday, sometimes downright trivial, pragmatism of drawing activity, which can sometimes be reduced to mere hand movements, but which can, in turn, function as inspiration for the continued act of drawing. This new pragmatic approach to the act of drawing thus enables the integration of what are still considered 'marginal drawing techniques' today, a development that presupposes a modified concept of what constitutes drawing.[13]

[11] See 'Die Zeichnungen des Giulio Cesare Bedeschini. Schätze aus der Jesuitensammlung I', Exhibition catalogue Wallraf-Richartz-Museum & Fondation Corboud, 2014; 'Giovanni Maria Morandi. Ein Barockkünstler in Rom', Exhibition catalogue Wallraf-Richartz-Museum & Fondation Corboud, 2015; 'Girolamo Troppa. Der Zeichner. Ein Phantom', Exhibition catalogue Wallraf-Richartz-Museum & Fondation Corboud, 2016.
[12] Werner Busch, Frankfurter Allgemeine Zeitung, no. 135, 13 June 2012, 4.
[13] See 'Der Abklatsch. Eine Kunst für sich', Exhibition catalogue Wallraf-Richartz-Museum & Fondation Corboud, 2014; 'Die Kunst der Pause. Transparenz und Wiederholung', Exhibition catalogue Wallraf-Richartz-Museum & Fondation Corboud, 2017.

The digital image as a knowledge-generating image

Apart from the freely available abundance of digital images – which, however, always first have to be accessed – digital images of drawings obtained using material science research methods have an even greater influence on connoisseurship today – and tomorrow. This is because the digital image confronts drawing connoisseurs with knowledge that was previously unavailable, which can provide new foundations for their regular attributional practice. This knowledge-generating function of digital images can be illustrated by an example from Rembrandt's drawing oeuvre. In view of the importance of this body of works for the development of connoisseurship among drawing specialists, it is perplexing that this artist's immense drawing oeuvre – the full extent of remains unclear – blithely continues to be studied by the traditional method of mere visual inspection. The new catalogue raisonné of all of Rembrandt's drawings produced by Peter Schatborn, for example, contains approximately 700 drawings, without any justification for their inclusion and without any prior investigations regarding the drawing materials and papers used.[14] In view of this methodological stagnation of classical style analysis, it therefore seems more than advisable to point out the potential of a non-destructive material science research method whose findings, which can only be made visible by digital means, might provide a broader foundation for traditional connoisseurship – at least that is our hope. The digital image itself can generate completely new knowledge about the materiality of drawings.

The materiality of drawings

Figure 1 Man Sharpening a Quill, Pen and brown ink with brown wash, red chalk, corrections in lead white, 125 x 123 mm, Klassik-Stiftung Weimar, Graphische Sammlungen, inv. no. KK 5492 @ Klassik Stiftung Weimar

The *Man Sharpening a Quill* held in Weimar (fig. 1), which until recently was regarded as a drawing by Rembrandt himself, was omitted from Peter Schatborn's

[14] *Rembrandt. Sämtliche Zeichnungen und Radierungen*, Cologne, 2019.

new catalogue.[15] It is one of the most interesting sheets among all the works produced by Rembrandt's circle. The draughtsman's attention is focused particularly on the scrutinising gaze of the figure; in his left hand, he holds the quill, while carefully positioning the knife with the other hand – since everything depended on a well-shaped nib. In just a moment, this man will continue his letter or drawing on the sheet of paper in front of him. From the centre of the sheet, the line of writing dissolves into a confusion of curves, intense marks, and dark brown washes, which seem to be the result of 'a subjectivity created by the movements of the hand'[16] rather than an expression of calculated draughtsmanship. The identity of the person depicted is unclear, but it is certainly not a portrait of Rembrandt. Perhaps it does not matter who is drawing or writing here; what is important to us is, for one thing, the semantics of drawing practice, the dissociation between signifier and signified, and, for another, the materiality of the drawn object, which cannot be appreciated by the connoisseurly eye alone. Only the 'fingerprint' of the drawing, based on investigations using material science research methods, shows us – in the form of a digital image – the combination of drawing materials that brings about the aesthetic effect (fig. 2).[17]
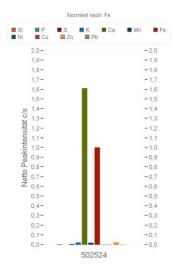

Figure 2 Combination of drawing materials used in the drawing Man Sharpening a Quill with peaks for chalk (Ca) and iron gall ink (Fe) @ Klassik Stiftung Weimar

We can identify an ink in two different concentrations, white chalk used for masking, corrections done in red chalk, as well as washes in iron gall and carbon ink. In addition, an analysis of the corrections (done using chalk and sanguine), which are difficult to discern on the original, gives us the first opportunity ever to

[15] Pen and wash in bistre, 125 x 123 mm, Klassik-Stiftung Weimar, inv.no. KK 5492; see 'Goethe & Rembrandt. Zeichnungen aus Weimar', Exhibition catalogue Museum het Rembrandthuis, 1999, 82f.

[16] Sabine Slanina, 'Die Negation der Linie: Delacroix' Zeichnungen nach Fotografien', Werner Busch, Oliver Jehle, Carolin Meister (eds.), *Randgänge der Zeichnung*, Munich, 2007, 141–164, esp. 142.

[17] The following methods were employed: X-ray fluorescence spectroscopy (XRF), fingerprint analysis, 3D paper structure analysis (PS), ultraviolet fluorescence spectroscopy and infrared reflectography (UFS and IRR), infrared false colour photography (IRFC), multispectral image analysis (MIA).

investigate the draughtsman's intention in making these corrections. The digital visualisation of the drawing reveals two states of this depiction of a *Man Sharpening a Quill*: an initial – provisional – interim state, which was then modified in a second phase (fig. 3). This direct comparison, which is only possible using digital technology, enables us to find plausible explanations for the draughtsman's actions by examining both states simultaneously. This reconstruction of how the *Man Sharpening a Quill* was created, along with the aforementioned 'fingerprint', could be compared with other drawings that are considered to be definitely attributable to Rembrandt in order to obtain further arguments for not attributing, or even for re-attributing, the Weimar drawing to Rembrandt. The ink analysis showed, for example, that the iron gall ink is based on an unusual, previously unknown mixture. What is special about this iron gall ink, however, is that it was not produced with iron vitriol, but rather by means of a different iron-supplying ingredient. It is possible that this ink can also be found in drawings that are attributed to Rembrandt with certainty – an insight that might be of interest to the connoisseur.[18]

Figure 3 Two states of Man Sharpening a Quill @ Klassik Stiftung Weimar

Finally, let us return to Daniel C. Dennett's methodological approach: Art historians specialising in drawings also need to collaborate with the natural sciences and modern technology in order for their connoisseurly work to benefit from new research findings on the materiality of drawings, which are revealed by digital images. However, the digital image – which is not an analogue photograph, but rather a true image of the drawing's material substance, generated by the underlying material science investigation – also requires hermeneutic analysis for a correct evaluation and interpretation. Only then is it also usable for the connoisseur. Hence, the aim should be to use further material science research methods to provide a secure foundation for the attributional practice that has hitherto been

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[18] Usually, iron gall inks are produced by reaction of iron vitriol (iron sulphate) and tanning agents. The special feature of the iron gall ink of the *Man Sharpening a Quill* is that it was not made with iron vitriol, but with another iron-supplying ingredient.

based solely on visual inspection. Classical criticism would thus be supplied with valuable new insights that need to be evaluated.[19] In individual cases, such as that of the *Man Sharpening a Quill*, however, the digital image already offers us somewhat better insights into the act of drawing in all its complexity, irrespective of who created it, a question that may, in the foreseeable future, be only one among many, and perhaps no longer the most important one.[20]

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[19] See, in general, Raphael Rosenberg, 'Bridging Art History, Computer Science and Cognitive Science: A call for Interdisciplinarity Collaboration', *Zeitschrift für Kunstgeschichte*, 79, 2016, 3, 305-314.
[20] See Roland Barthes, 'Der Tod des Autors', Fotis Jannidis et al. (eds.), *Texte zur Theorie der Autorschaft*, Stuttgart, 2000, 185-193 ('La mort de l'auteur', Manteia, 1968, 12-17).