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**On the Contemporaneity  
of Roger de Piles' *Balance des Peintres*\***

Victor Ginsburgh  
ECARES, Université Libre de Bruxelles and  
CORE, Université catholique de Louvain  
Belgium

and

Sheila Weyers  
Université catholique de Louvain  
Belgium

**Abstract**

In his 1708 *balance des peintres*, De Piles is concerned with decomposing value into several basic properties (composition, drawing, colour and expression). He is probably the first to rate painters of his and previous times on these dimensions. We show that his ratings, especially the one on colour, still correspond to what is thought today of the painters he rated in 1708. The quantitative method that is used to reach this conclusion is also a possible answer to Vermazen's concern of making independently valued properties commensurable.

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\* We are grateful to François Mairesse who introduced one of us to de Piles, and to Neil de Marchi and Philippe Junod for their comments and warm support.

De Piles (1635-1709), the French art theorist and critic who, without being "revolutionary",<sup>1</sup> does not share the views of the French artistic establishment of his time. He advocates the importance of colour, going as far as writing that "there is no painting if colour does not go with drawing," or that "colour is the soul of painting," while the Académie Royale de la Peinture et de la Sculpture created in 1648 by the French Court, considers drawing to be the most important element. This is not new, but merely pursues a debate which had already started during the sixteenth century in Italy.<sup>2</sup> While Vasari complained that Titian should have been more careful in drawing, Dolce considered colour as being as important as drawing. The official French doctrine pursued by the Academy is Poussinisme, after Poussin, who had written that "colours in painting are blandishments to lure the eyes." Le Brun, Louis XIV's official painter "associate[s] true value in art with drawing, which exemplifies 'reason', with colour being of lower account because it is concerned with the senses."<sup>3</sup> These views are supported by André Félibien (1619-1695), the official art historian of the Académie Royale. His *Entretiens sur les vies et les ouvrages des plus excellens peintres anciens et modernes*, published between 1666 et 1686,<sup>4</sup> celebrates classicism, glorifying Poussin and Raphael.

In his *Dialogue sur le coloris* published in 1673, de Piles, on the contrary, blames Poussin for neglecting colour. His admiration goes to Rubens, Van Dijck, Corregio and Titian,<sup>5</sup> and he is probably the initiator of what came to be called Rubénisme, in opposition to Poussinisme. In his *Cours de peinture par principes* (1708),<sup>6</sup> he decomposes painting into four fundamental properties: composition, drawing, colour, and expression. In an appendix to this work, he publishes a table, the so-called *balance des peintres* in which he grades each of these properties on a scale between zero and twenty for 56 painters from his and previous times. Rembrandt, for example, is very low on drawing and obtains 15, 6, 17 and 12 on the properties just mentioned, while Michelangelo is very high on drawing, with scores of 8, 17, 4 and 8 respectively.<sup>7</sup>

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<sup>1</sup> Jacob Rosenberg, *On Quality in Art*, London: Phaidon Press Ltd, 1967, p. 31.

<sup>2</sup> And even much earlier, according to Junod who traces it back to ancient times: Plutarch v. Pliny, Vitruvius, etc. See Philippe Junod, *Critique d'art*, in Michel Laclotte et Jean-Pierre Cuzin, eds., *Dictionnaire de la Peinture*, Paris: Larousse, 1996.

<sup>3</sup> See Geoffrey Newman, *Colour*, in Jane Turner, ed., *The Dictionary of Art*, New York: Grove, 1996, vol. 7, 626-631.

<sup>4</sup> See the version edited by Sir Anthony Blunt, Farnborough: Gregg Press, 1967.

<sup>5</sup> As well as to Raphael, though de Piles' appreciation of Raphael's way of using colours is not very high.

<sup>6</sup> See the version edited by Jacques Thuillier, Paris: Gallimard, 1989.

<sup>7</sup> For the scores attributed by de Piles, see de Piles' *Cours de peinture par principes*. See also the table presented in Appendix. Note that in their paper, W. Gerald Studdert-Kennedy and Michael Davenport,

De Piles himself looked at this as a game, but his contemporaries considered it as a "clever way to characterize genius."<sup>8</sup> Later on, this view changed. Julius von Schlosser hates it.<sup>9</sup> Gombrich<sup>10</sup> describes the exercise as a "notorious aberration." In his book on de Piles' theory of art, Puttfarken<sup>11</sup> thinks of de Piles as having been "at his worst when he tried to be most systematic."

The originality of the *balance* is that it introduces a view of aesthetics that can be considered "as either breaking up beauty into its parts or supplementing beauty with additional concepts."<sup>12</sup> This is of course the very same idea as the one expressed by the economist Lancaster<sup>13</sup> according to whom a commodity can be thought of as a bundle of properties, purchased by consumers not for itself, but for the value it provides by combining such properties.<sup>14</sup>

In both cases, this means that the "value" of a good (a painting, or an automobile) is obtained by adding the values of all the properties embodied in the good (such as composition and drawing for a painter, or speed and number of doors for a car); each value is, in turn, the product of the unit value of the property or its weight  $\beta_i$ , times the number  $x_i$  of such units. If the good can be fully described by say, four properties its total value  $V$  is simply:

$$V = \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4.$$

If we follow de Piles, the properties of a painter (and, by extension, of a painting) are composition, drawing, colour, and expression, while the number of units of each property is the score that each painter obtains. If one could determine the unit

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The balance of Roger de Piles: a statistical analysis, *Journal of Aesthetics and Art Criticism* XXXII (1974), 493-502, Muziano is misnamed as Murillo. See also François Mairesse, *Réflexion sur la balance des peintres de Roger de Piles*, *Recherches Poïétiques* 8 (1999), 43-49.

<sup>8</sup> See Jacques Thuillier, Préface, in de Piles' *Cours de peinture par principes*, Paris: Gallimard, 1989, p. xxvii.

<sup>9</sup> See his very long comments in his *Kunstliteratur*.

<sup>10</sup> Ernst Gombrich, *Norm and Form. Studies in the Art of the Renaissance*, London: Phaidon, 1966, p. 76.

<sup>11</sup> Thomas Puttfarken, *Roger de Piles' Theory of Art*, New Haven: Yale University Press, 1985, p. 42.

<sup>12</sup> George Dickie, *Introduction to Aesthetics. An Analytic Approach*, New York and Oxford: Oxford University Press, 1997, p. 3. See also J. O. Urmson, On grading, *Mind* 59 (1950), 145-169, as well as the discussion in George Dickie, *Evaluating Art*, Philadelphia: Temple University Press, 1988, chapter 9, 157-182. See also George Dickie, Art and value, *British Journal of Aesthetics* 40 (2000), 228-241, who distinguishes between a descriptive and an evaluative sense of art. One can think of the properties as describing the work of art, while ratings evaluate it.

<sup>13</sup> Kevin Lancaster, A new approach to consumer theory, *Journal of Political Economy* 74 (1996), 132-157.

<sup>14</sup> A car is not bought for itself, but for the services it ensures, at a certain speed, with a certain comfort (number of doors, air conditioning, length, width), at a given cost (miles per gallon), etc.

value of each property, it would be possible to compute  $V$ . One way of doing this is very intuitive. It consists in adding the four grades to obtain 50 for Rembrandt and 37 for Michelangelo. This implies to arbitrarily assume that all the weights  $\beta_i$  of the above formula are equal to one. (It is worth noting that de Piles was careful enough not to do that). One could also think that drawing is three times as important as the other parts, and thus set  $\beta_2 = 3$ , giving Rembrandt and Michelangelo values of 62 and 71, respectively. The previous ordering of the two artists would be reversed, giving the impression that all this is very arbitrary, and that de Piles was right to consider his *balance* to be a game.

It is, however, possible to determine the  $\beta$  if the value  $V$  of each painter (or painting) is known. Then, one can, using a statistical method known as regression analysis, determine the weights,  $\beta_1$  to  $\beta_4$ , in an objective way. This raises two issues: what is regression analysis doing and how can one determine the values  $V$ .

Regression analysis is concerned with the relation between one variable (say values,  $V$ ) and a set<sup>15</sup> of other variables (the  $x_i$ , here the scores on composition, drawing, etc.), leading to an "equation" which has exactly the same representation as the one used above. The difference is that now the  $V$  and the  $x_i$  are given, while the  $\beta_i$  (the weights of each property in the total value  $V$ ) will be determined through a calculation (or, as is often said, will be "estimated"). This is easy to explain if the set of "other variables" consists of a single one, say composition, since in that case, one can give a convenient graphical representation of the problem in which now, the equation is simply  $V = \beta_1 x_1$ , a special case of the one considered earlier.

In Figures 1a-1c, a painter is represented by a point (an observation). On the vertical axis, one can read his "value," on the horizontal one, his score on composition. In Figure 1a, the scatter of points leads us to conclude that there exists a positive, upward sloping relation between the two variables (the larger the score on composition, the larger the value of the painter), that can approximately be represented by the line which goes through the scatter of points.<sup>16</sup> If all the points were exactly on the line (as in Figure 1b), one could obtain the value of a painter by simply reading his score on composition. This is the ideal case, since, more generally, the relation between the two variables will be more fuzzy, but if the scatter of points is reasonably flat in one direction and elongated in the other direction (as it is in Figure 1a), one can accept that there exists a relation, and compute, using some criterion,<sup>17</sup> the slope of the line. In Figure 1c, we also represent a scatter that does not have the

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<sup>15</sup> Note that this set may consist of a unique variable.

<sup>16</sup> This implies that the equation is written  $V = \beta_1 x_1 + u$ , where  $u$  is the distance between a point and the line.

<sup>17</sup> Such as minimizing the sum of distances (or of squared distances) between the line and the points.

same southwest-northeast pattern, and there is no obvious choice for the slope: it can be anything. This points to two extreme cases, the first in which all points lie on the line (a perfect adjustment) and the second, where any choice of slope is as good, or as bad as any other (almost every line is possible). The case illustrated in Figure 1a is intermediate, and is due to the fact that  $V$  is measured with some error or that composition (the  $x_1$  variable) does not explain value in a perfect way so that, instead of  $V = \beta_1 x_1$ , the relation should be written  $V = \beta_1 x_1 + u$ , where  $u$  is a random disturbance, which originates from elements that we ignore.

These considerations lead us to define a coefficient which will measure the quality of the adjustment of the line to the scatter of points. This coefficient (called R-squared) is defined in such a way that it will vary between one (perfect adjustment, Figure 1b) and zero (any adjustment is possible, Figure 1c), while intermediate values will hold for cases such as the one in Figure 1a.

The slope of the line,  $\beta_1$ , is a number that can be estimated. It will come with two more numbers which describe an "interval" in which the slope can vary, a measure of the relative uncertainty with which the slope is estimated.<sup>18</sup> A narrow interval will correspond to a good adjustment (the slope is equal to 0.20, but it can vary between 0.19 and 0.21, which is pretty accurate). A wide interval is the sign of a poor adjustment. For instance, if the calculated slope is equal to 0.20, but the interval goes from -0.30 to 0.70, then the direction of the line is not determined with much accuracy. It could be downward instead of upward sloping so that even if the estimated coefficient is equal to 0.20, there is some likelihood that it could also be equal to zero (since zero belongs to the interval  $[-0.30, 0.70]$ ). If so, then the variable has little or no influence (a non significant influence) on  $V$ , and can thus be ignored.

This reasoning can easily (at least in mathematical terms, not in graphical ones) be extended to the case of a relation between one variable  $V$  and a set of variables,  $V = \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + u$ , where again,  $u$  is a disturbance term due to non measured variables or to some randomness or measurement errors in  $V$ . For each variable of this set, one can determine a coefficient (a slope) together with the interval in which it can vary. If this interval is narrow, the variable has an influence on  $V$ . If it is large and contains zero, the variable can be discarded, since it does not contribute to explaining  $V$ .

We now discuss how values can be determined. It may appear that this turns out to be as "subjective" as what de Piles did in quantifying the properties in which he

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<sup>18</sup> At a given probability level.

decomposed a painting, though this is often done by critics for some artistic productions, such as movies,<sup>19</sup> but rarely so, if ever, for paintings or painters.

Art philosophers put the burden of the proof of quality (or of value) on specialists; they also believe that some unanimity among specialists, even if subjective, is needed,<sup>20</sup> but they never "quantify" quality. Therefore, values have to be "quantified" in an indirect way. We describe two possible measures, each of which is incomplete and prone to defects. However, if both lead to similar conclusions, one may think that it was worth the effort.

The first measure is the length of the entry that is devoted to each artist in a contemporary encyclopedia, in this case, the 34 volumes of the *Dictionary of Art*, edited by Jane Turner, and published in 1996.<sup>21</sup> The length of the entries constitute probably a subjective choice,<sup>22</sup> but this choice was made by a large group of art historians, the editors of the dictionary, according to some reasonably well established (and hopefully) consistent rule.

The second measure is inspired by economists who argue that prices are good indicators of values. And these may indeed be good approximations, at least in the competitive world of auctions--the source of the data used in our paper. In an auction, the price is set by those who bid for the painting: museums curators or collectors who usually rely on specialists before bidding. Moreover, prices obtained at auction are "accepted" since they will serve as yardsticks for future auctions (and transactions by art galleries), and thus have a certain flavor of unanimity, at least among specialists. Even art historians believe that it would be "absurd"<sup>23</sup> to ignore the information carried by prices, though prices fluctuate too much to be of help in explaining tastes. Junod<sup>24</sup> goes even farther by claiming that "financial transactions [of artworks] are the expression and the criterion of aesthetic judgments...the construction of contemporaneous values is more and more resulting from the collusion between dealers, critics, collectors, curators and, sometimes, artists themselves." Finally, though sociologists disagree with economists that "the auction paradigm embodies

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<sup>19</sup> See e.g. Leonard Maltin, *Movie & Video Guide 1998*, New York: Penguin, who rates movies between 0 and 4. This is also very common for wines and restaurants.

<sup>20</sup> See e.g. Malcolm Budd, *Values of Art*, London: Penguin, 1995, p. 182.

<sup>21</sup> Jane Turner, ed., *The Dictionary of Art*, New York: Grove, 1996.

<sup>22</sup> It is interesting to note that even art historians may be sensitive to differences in lengths of entries. Anthony Blunt, for instance, notes that Vasari devotes only two pages to Duccio (who was from Siena), while Giotto, a Florentine artist, gets 25 pages. See Anthony Blunt, *Artistic Theory in Italy 1450-1600*, Oxford: Clarendon Press, 1956, chapter on Vasari.

<sup>23</sup> See Francis Haskell, *Rediscoveries in Art. Some Aspects of Taste, Fashion and Collecting in England and France*, London: Phaidon Press, 1976.

<sup>24</sup> Philippe Junod, Comment une oeuvre d'art devient un classique, in Pierre Gisel, ed., *La Sélection*, Lausanne: Payot, 1995, 95-108.

rational economic man in his purest form," auctions can nevertheless be regarded as "processes for managing the ambiguity and uncertainty of value by establishing social meanings and consensus."<sup>25</sup> Thus again, unanimity or at least consensus about values comes at the foreground in the sociological appreciation of auctions. We shall thus also use prices obtained at art auctions (held between 1977 and 1993) to represent values.

Finally, one can also wonder why we choose "values" measured in the late twentieth century--entries in a recent (1996) dictionary and prices obtained at auction between 1977 and 1993--for masters considered by de Piles in 1708, almost three hundred years earlier. There are three reasons for this. First, widening the time span between the date of creation and the date at which the value of a painter (painting) is assessed is a way of taking into account what art philosophers have come to call "the test of time," which makes it possible to separate fashion from art. Second, it makes it possible to test whether the judgment passed by de Piles in the early eighteenth century has itself passed the test of time. Third, data on prices for more recent years are probably less prone to "measurement errors," including cheating.<sup>26</sup>

Estimation of the weight parameters  $\beta_i$  requires observations concerning the values  $V$  of painters, and the scores given to each of them by de Piles. The length of the entries in the dictionary are easy to measure. For prices, the situation is more complicated since instead of observing a price for each painter, we can only observe the prices for his paintings when they are sold at auction, but this is easy to circumvent.<sup>27</sup>

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<sup>25</sup> See Charles W. Smith, *Auctions. The Social Construction of Value*, New York : The Free Press, 1989, pp. 162-163.

<sup>26</sup> As is well known, and more so in the past than nowadays, works of art are sometime "sold" to walls or chandeliers, instead of being sold to real buyers. See Alice Beckett, *Fakes. Forgery and the Art World*, London: Richard Cohen Books, 1995, p. 79.

<sup>27</sup> One could think of computing an average price for each painter. The problem with such an approach is that averages would mean little since prices are not constant over time (here, 17 years), vary with the dimensions of the works, and may differ across salesrooms. Therefore, it is sensible to remove as much as possible the effects of these heterogeneities, and compute average prices for (hopefully) more homogeneous paintings. This can be obtained by a first stage in which prices of individual paintings are regressed on their dimensions, and sets of categorical variables representing years and salesrooms. (For each year between 1977 and 1993 and for each salesroom in which a painting was sold during these years, a categorical variable is defined, which takes a value equal to one or to zero. Assume for instance that we deal with a painting sold in 1989 by Christie's. The categorical variables representing the year 1989 and the one representing Christie's will take the value one, while the values of all the other categorical variables (other years and other salesrooms) defining that sale will take the value zero. For further details, see Olivier Chanel, Louis-André Gérard-Varet and Victor Ginsburgh, The relevance of hedonic price indices. The case of paintings, *Journal of Cultural Economics* 20 (1996), 1-24. The price of each painting is then corrected in order to take out the effect of dimensions, year of sale and salesroom. What is left is the price of a painting which includes the value of the painter, and some random unknown effects that are smoothed out, by computing average prices for each painter. It can be shown that the same result can be obtained by including in the regression categorical variables representing painters. One additional and final step is needed and is easy to understand. Instead of

The results, shown in Table 1 are based on 41 of the 54 painters<sup>28</sup> scored in de Piles' *balance of painters*. They lead to the following comments.

The statistical quality of the adjustments is not very good since the R-squared (which can vary between zero for bad fit and one for excellent fit) are hardly larger than 0.30. The results concerned with the properties considered by de Piles' are nevertheless extremely interesting. One of these, drawing, is never significant (check that 0 is contained in the confidence interval). Colour is significant in both cases, while composition and expression contribute to value only when value is represented by prices.

The coefficients can be interpreted as measuring the impact on value of a small change in the rating given by de Piles. Consider colour again. When value is measured by the length of entries in Turner's dictionary, the number 64.6 means that every additional point given by de Piles in his grading of colour adds 64.6 lines to the entry. Likewise, when values are measured by prices, an extra point on colour raises the price of the painter by 11.9%.<sup>29</sup>

Colour is the most important explanation of value, whether value is measured by art historians (in the *Dictionary of Art*) or through prices.

What these calculation imply is that the contemporary valuation of our 41 painters does not fit with de Piles' ratings of drawing, only mildly so for expression, and composition, but very positively for colour. One can wonder why de Piles' valuations of properties other than colour (and, to some extent, expression and

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representing each painter by a categorical variable, we can as well represent him by the four scores given to him by de Piles. The equation that is finally estimated looks very much like the one discussed above, except that it includes variables representing dimensions (height, width and surface), categorical variables for years and salesrooms, and a random term:

$$V = \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \gamma_1 \text{ height} + \gamma_2 \text{ width} + \gamma_3 \text{ surface} \\ + \text{effects of categorical variables representing years and salesrooms} + u.$$

The only parameters in which we are really interested are the  $\beta$  representing the effects of the properties described by de Piles (composition, drawing, colour, expression). We shall also discuss very briefly the effects of dimensions: We expect height and width to have a positive effect on value ( $\gamma_1$  and  $\gamma_2$  should be positive), but dimensions should not become too large, so that surface is expected to have a negative effect ( $\gamma_3$  should be negative). Note that the parameters affecting the categorical variables describing years can be combined to obtain a price index over time, while those affecting salesrooms will tell whether, *ceteris paribus*, some salesrooms are able to sell at higher prices than others.

<sup>28</sup> There are 56 painters in de Piles' *balance*, but for two of them (Guido Reni and Polidoro da Caravaggio), de Piles gives scores for three properties only. There are 14 painters (among whom Polidoro da Caravaggio) of whom no painting was sold at auction between 1977 and 1993, and for comparison purposes, we decided to consider the same 41 painters in both cases. See the Appendix for data listing the 56 painters, de Piles' ratings, the number of sales for each of them, and the length of the entry in the *Dictionary of Art*.

<sup>29</sup> Since prices are measured in logarithms, the effect an extra point has on prices is  $\exp(0.112) - 1 = 11.9\%$ .



composition) are not in line with contemporary views. Jacob Rosenberg's comments<sup>30</sup> are very illuminating in this respect. He writes that "if de Piles himself often failed to make adequate judgments of particular artists and their works, again it was due to the restrictive hold classicism still had on him. While his method of analysis was progressive in breaking down the appreciation of painting into the four components of composition, drawing, colour and expression, it was only in his judgment of colour that he was free from the prevailing prejudices."

Rosenberg's quotation leads us back to the title of our paper. De Piles clearly breaks new ground in (re)introducing the concept of colour in painting. In that respect, he is obviously close to contemporaneous views, but was not good enough at guessing how the late twentieth century would view other properties, especially drawing, in painting.

Why should one use quantitative methods in a field where they are very uncommon,<sup>31</sup> and where Rosenberg (and probably many others) could reach a similar conclusion without such tools. A possible answer is given by Burke<sup>32</sup> who writes that though one often learns little from quantitative methods that one did not know already, one should use them to confirm previous knowledge. In the same way as does the discovery of fresh documents, they will strengthen our conclusions.

But there are two other, maybe more interesting, concluding comments. First, our approach illustrates what Bruce Vermazen<sup>33</sup> refers to as incommensurable properties, which make it impossible "to rank [works] with respect to the degree of two different independently valued properties." In Vermazen's words, the  $\beta$  which translate the degree of one property into that of an other<sup>34</sup> are not known. Here, we determine the  $\beta$ , which is a solution to the problem raised by Vermazen, since these  $\beta$  make properties commensurate: One unit of property 1 has the same influence on value as  $\beta_2/\beta_1$  units of property 2. For example, one point given by de Piles to colour is worth 0.67 (= 43.8/64.6) point given to expression (in terms of the value as measured by the number of lines in the *Dictionary of Art*). Second, our results which use two very different notions of "value" in art. The first is the implicit aesthetic rating by art historians, derived from the length of the entries in a contemporary art

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<sup>30</sup> Jacob Rosenberg, op. cit., p. 47.

<sup>31</sup> Note that in his well known book on art history during the seventeenth century in France, Teyssèdre devotes three chapters (chapters 1 to 3 in part 2) to a quantitative analysis of de Piles' *balance*. See Bernard Teyssèdre, *L'histoire de l'art vue du Grand Siècle*, Paris: Julliard, 1964. See of course also W. Gerald Studdert-Kennedy and Michael Davenport, op. cit.

<sup>32</sup> Peter Burke, *The Italian Renaissance: Culture and Society in Italy*, Cambridge: Polity Press, 1987.

<sup>33</sup> Bruce Vermazen, Comparing evaluations of works of art, *Journal of Aesthetics and Art Criticism* XXXIV (1975), 7-14, pp. 9-10.

<sup>34</sup> This is what economists call the "marginal rate of substitution."

dictionary, the second is the one given by markets (prices obtained for the same artists at auction). The parameter values in Table 1 show that the two views are perfectly consistent: the order in which the four properties are rated is identical. Color is rated highest; it is followed by composition and expression, and finally by drawing, which does not seem to matter at all (in none of the two cases is the coefficient or weight picked “drawing” significantly different from zero).

Figure 1a

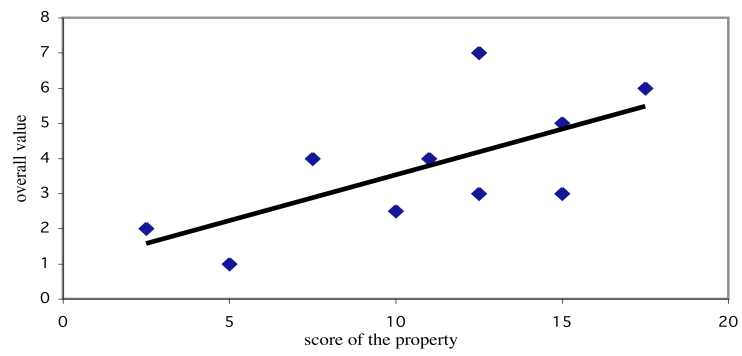


Figure 1b

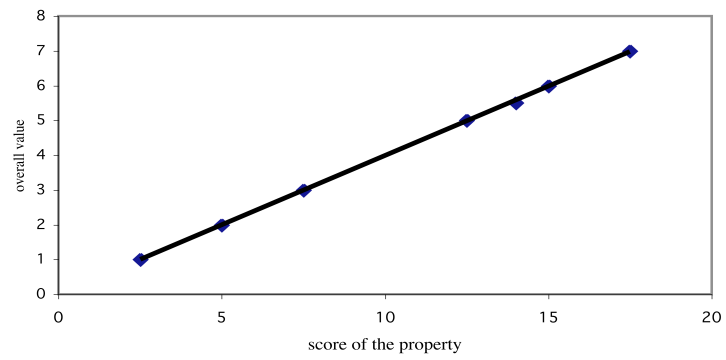
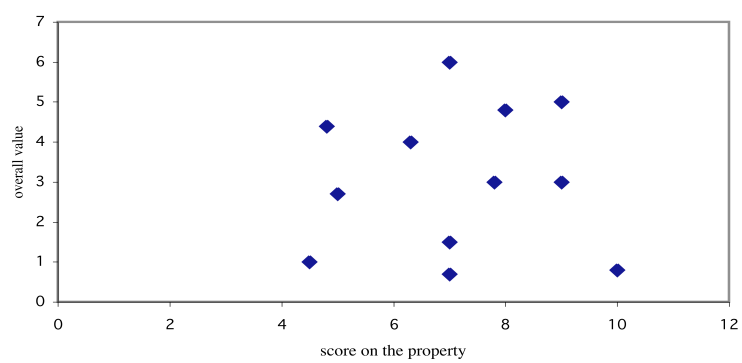


Figure 1c



**Table 1 Estimation results**

	Parameter value	Bounds of interval*		Parameter is significant
		Lower	Upper	
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<b>Values are lengths of entries in the <i>Dictionary of Art</i></b>				
<b>Score on</b>				
Composition	45.052	-21.501	111.605	no
Drawing	-6.754	-96.552	83.045	no
Colour	64.644	13.285	116.003	yes
Expression	43.792	-14.779	99.479	no
Goodness of fit (R-squared)	0.335			
No. of observations	41			
<b>Values are prices** obtained at auction</b>				
<b>Score on</b>				
Composition	0.047	0.004	0.090	yes
Drawing	0.007	-0.048	0.062	no
Colour	0.112	0.081	0.143	yes
Expression	0.046	0.015	0.077	yes
<b>Dimensions***</b>				
Height (100 cm)	0.576	0.186	0.966	yes
Width (100 cm)	0.452	0.017	0.887	yes
Surface (100 sq.cm)	-0.014	-0.037	0.009	no
<b>Other variables****</b>				
Years	17 parameters			contribute in a significant way
Salerooms	7 parameters			
Goodness of fit (R-squared)	0.315			
No. of observations	525			

\* The bounds of the interval are computed using the usual 5% probability level.

\*\* For statistical reasons, we use the logarithm of prices instead of absolute prices.

\*\*\* All three variables have the expected sign. Height and width contribute positively to the price of a work; surface contributes negatively, since a painting loses relative value if it gets too large.

\*\*\*\* The detailed results are not reported. Suffice it to say that the 17 parameters which capture the evolution of prices over time are different from each other, which points to the fact that price movements were important between 1977 and 1993 (recall the surge followed by the large drop of prices before and after 1990). Likewise, the 7 parameters which capture the saleroom effects are not equal: *ceteris paribus*, some salerooms do better than others.

**Appendix Table.**  
**Scores attributed by de Piles, number of paintings sold at auction between 1977**  
**and 1993 and length of entry in Turner's *Dictionary of Art***

	Composition	De Piles scores on		Expression	No. of paintings sold	No. of lines in Turner*
		Drawing	Colour			
Albani	14	14	10	6	11	434
Barocci	14	15	6	10	1	579
Bassano	6	8	17	0	9	628
G. Bellini	4	6	14	0	5	1503
Bourdon	10	8	8	4	16	293
Caravaggio	6	6	16	0	-	2436
The Carracci	15	17	13	13	17	2603
Corregio	13	13	15	12	-	1083
Cortona	16	14	12	6	-	1139
Da Udine	10	8	16	3	2	144
Del Piombo	8	13	16	7	1	676
Del Vaga	15	16	7	6	-	209
Del Sarto	12	16	9	8	-	742
Diepenbeek	11	10	14	6	2	222
Domenichino	15	17	9	17	5	725
Durer	12	16	9	8	-	2165
Giordano	13	12	6	6	72	696
Giorgione	8	9	18	4	-	1392
Guercino	18	10	10	4	10	634
Giulio Romano	15	16	4	14	1	1257
Holbein	9	10	16	13	1	902
Jordaens	10	8	16	6	34	758
Josepin (Arpino)	10	10	6	2	2	249
Lanfranco	14	13	10	5	6	924
Le Brun	16	16	8	16	4	725
Leonardo da Vinci	15	16	4	14	-	2657
Le Sueur	15	15	4	15	7	396
Michelangelo	8	17	4	8	-	3650
Muziano	6	8	15	4	1	205
Palma Giovane	12	9	14	6	22	281
Palma Vecchio	5	6	16	0	4	264
Parmigiano	10	15	6	6	2	601
Penni	0	15	8	0	-	94
Perugino	4	12	10	4	3	982
Polidoro da Caravaggio	10	17	-	15	-	154

\* There are two columns per page, making for 2 times 62 lines per page. Reproductions of works as well as references are taken into account as well.

**Appendix Table (continued).**  
**Scores attributed by de Piles, number of paintings sold at auction between 1977**  
**and 1993 and length of entry in Turner's *Dictionary of Art***

	Composition	De Piles scores on		Expression	No. of paintings sold	No. of lines in Turner*
		Drawing	Colour			
Pordenone	8	14	17	5	-	298
Pourbus	4	15	6	6	9	290
Poussin	15	17	6	15	4	1577
Primaticcio	15	14	17	10	-	313
Raphael	17	18	12	18	2	1694
Rembrandt	15	6	17	12	7	3435
Reni	-	13	9	12	19 <sup>°</sup>	1014
Rubens	18	13	17	17	48	1965
Salviati	13	15	8	8	2	777
Teniers	15	12	13	6	133	359
Testa	11	15	0	6	2	421
Tintoretto	15	14	16	4	25	1610
Titian	12	15	18	6	9	1638
Van Dyck	15	10	17	13	25	1665
Vanius	13	15	12	13	1	88
Van Leyden	8	6	6	4	-	683
Venius (Van Veen)	13	14	10	10	5	186
Veronese	15	10	16	3	13	1414
Volterra	12	15	5	8	1	172
F. Zuccaro	10	13	8	8	1	307
T. Zuccaro	13	14	10	9	1	268

\* There are two columns per page, making for 2 times 62 lines per page. Reproductions of works as well as references are taken into account as well.

<sup>°</sup> Though 19 of his paintings were sold, Reni is not included in our calculations, since de Piles did not rate him on composition.