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MEASURING MASTERS AND MASTERPIECES: FRENCH RANKINGS OF FRENCH PAINTERS AND PAINTINGS FROM REALISM TO SURREALISM

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Measuring Masters and Masterpieces: French Rankings of French Painters and Paintings from Realism to Surrealism
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ABSTRACT

For 35 leading painters who worked in France during the first century of modern art, this paper uses illustrations in French textbooks as the basis for measuring the importance of both painters and individual paintings. The rankings closely resemble those obtained earlier from a similar analysis of American textbooks. They also pose a puzzle: why do some of the greatest artists not produce famous paintings, while some relatively minor artists produce famous individual works? The answer appears to lie in a difference in approach between experimental artists, who innovate incrementally, and conceptual innovators, who produce individual breakthrough works. This paper further demonstrates the value of quantifying artistic success, for doing so can improve our understanding of the sources of human creativity.

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Quantifying Artistic Success

In 1962, art historian George Kubler remarked that "the modern professional humanist is an academic person who pretends to despise measurement because of its 'scientific' nature," and although the passage of four decades has now produced exceptions to Kubler's generalization in some disciplines within the humanities, art history is not prominent among them.[1] As recently as 1998, for example, curator Robert Storr of New York's Museum of Modern Art could declare that an artist's success "is completely unquantifiable."[2]

Yet Storr's belief is mistaken. As in other disciplines, quantitative evidence in art history has proven useful not only for explaining things, but for showing what there is to be explained. One recent study, for example, not only quantified artistic success, but helped to reveal an underlying structure of the creative process that deepens our understanding of the achievements of individual painters. The present paper extends this investigation, testing its conclusions by extending its analysis to a new body of data.

The study in question used a quantitative analysis of the illustrations contained in published surveys of modern art to produce convincing measurements of art historians' own judgments of the relative importance of modern French painters, and paintings.[3] That study drew its evidence from 33 books published in English during the past three decades. One further question raised by this procedure concerned the possible impact of culture: would French scholars define the canon of French modern art differently from American and English scholars? The present study will answer this question by carrying out a parallel analysis based on surveys of modern art published in French.

The artists examined will be those considered by the earlier study. They are listed in

Table 1: Artists Included in this Study

Artist	Country of birth	Year of birth	Year of death
Arp, Jean	France	1886	1966
Bonnard, Pierre	France	1867	1947
Braque, Georges	France	1882	1963
Cézanne, Paul	France	1839	1906
Chagall, Marc	Russia	1887	1985
Courbet, Gustave	France	1819	1877
Degas, Edgar	France	1834	1917
Delaunay, Robert	France	1885	1941
Derain, André	France	1880	1954
Duchamp, Marcel	France	1887	1968
Dufy, Raoul	France	1877	1953
Gauguin, Paul	France	1848	1903
Gogh, Vincent van	Holland	1853	1890
Gris, Juan	Spain	1887	1927
Léger, Fernand	France	1881	1955
Manet, Edouard	France	1832	1883
Masson, André	France	1896	1987
Matisse, Henri	France	1869	1954
Miró, Joan	Spain	1893	1983
Modigliani, Amedeo	Italy	1884	1920
Monet, Claude	France	1840	1926
Picabia, Francis	France	1879	1953
Picasso, Pablo	Spain	1881	1973
Pissarro, Camille	West Indies	1830	1903
Redon, Odilon	France	1840	1916

Artist	Country of birth	Year of birth	Year of death
Renoir, Pierre-Auguste	France	1841	1919
Rouault, Georges	France	1871	1958
Rousseau, Henri	France	1844	1910
Seurat, Georges	France	1859	1891
Soutine, Chaim	Lithuania	1893	1943
Tanguy, Yves	France	1900	1955
Toulouse-Lautrec, Henri de	France	1864	1901
Vlaminck, Maurice de	France	1876	1958
Vuillard, Edouard	France	1868	1940
Whistler, James	United States	1834	1903

Source: See text.

Table 1. The sample was designed to include the most important modern painters who lived and worked in France for most or all of their careers, who were born between 1819 (the birth year of Gustave Courbet) and 1900.[4] In addition to Courbet and Manet, key figures in the transition to modern painting, the sample includes the central members of the groups - the Impressionists, the Post-Impressionists, the Fauves, the Cubists, and the Surrealists - that dominated modern painting France in the nineteenth century and well into the twentieth.

The evidence was drawn from all available books, published in French since 1963, that provide illustrated surveys of modern painting. A total of 31 such surveys were found; these are listed in the Appendix. The data set for this study was created by listing every reproduction of every painting shown in these books by all of the 35 artists in the sample.

As might be expected, there are fewer college texts published in French than in English, but there also appears to be a larger range of French reference works and surveys aimed at a general audience, and these provide a strong basis for this study. As in the earlier study, published surveys of art history were chosen as the source of the data in order to draw on the judgments of art scholars as to the most important painters and paintings. The dozens of authors represented include many distinguished academic art historians, critics, and curators of the recent past and present. Yet regardless of the distinction of the authors, all have taken the (usually considerable) time and trouble necessary to communicate their views of the history of modern art. And although the eminence of the authors varies, the number of books is sufficiently large that no significant result depends on the opinions of any single author, or the emphasis of any one book.

This investigation is analogous to a citation study. Yet using illustrations as the unit of

observation has an advantage, in that illustrations are considerably more costly than written references. In addition to the greater cost of printing, authors or publishers must also bear the cost of obtaining permission to reproduce each painting, and a suitable photograph. This higher cost in both time and money tends to make authors more selective in their use of illustrations, and this may make illustrations an even more accurate indication than written references of what an author believes to be genuinely important.

It might be objected that illustrations are chosen not according to the importance of the work, but instead to the ease of obtaining the relevant permissions and photographs. Yet for major artists, whose work has had many decades to find its way into public museums, the constraint posed by problems of access is not great. So for example 23 different works by Cézanne from just the collection of the Musée d'Orsay are illustrated in the 31 books used by this study, as are 24 works by Monet, and 23 by Degas; 16 different illustrated Matisses are held by the Musée National d'Art Moderne, and 25 Picassos are held in Paris by either the Musée National d'Art Moderne or the Musée Picasso. Scores of other paintings by these artists are of course held by other great museums.[5] And the works owned by museums tend to be important ones, because curators - particularly at major museums - have little interest in acquiring unimportant works. Thus it seems clear that authors can readily choose among large numbers of important works in illustrating their books. Their decisions as to which to use will consequently tend to give a good indication of which they consider most important.

Cross-Cultural Canon Comparison

The two most basic rankings defining the canon of French modern art are straightforward: Table 2 ranks the artists by total illustrations, and Table 3 ranks individual paintings by the same

Table 2: Ranking of Artists by Total Illustrations

French rank	Artist	French illustrations	US rank	US illustrations
1	Picasso	206	1	335
2	Matisse	121	2	169
3	Cézanne	120	3	136
4	Monet	108	5	125
5	van Gogh	101	6(t)	116
6	Manet	97	4	130
7(t)	Braque	85	6(t)	116
7(t)	Gauguin	85	8	97
9	Renoir	75	10	74
10	Degas	74	9	81
11	Courbet	73	12	68
12	Bonnard	62	20(t)	29
13	Léger	61	15	51
14	Toulouse-Lautrec	58	16	40
15	Seurat	53	14	60
16	Delaunay	51	20(t)	29
17	Miró	49	13	64
18	Gris	41	28	19
19	Duchamp	40	11	72
20(t)	Chagall	37	18	35
20(t)	Derain	37	24	27
22	Rousseau	36	23	29
23(t)	Picabia	35	27	20
23(t)	Pissarro	35	17	38
25	Modigliani	34	34	10

26	Rouault	27	19	31
27(t)	Masson	26	33	12
27(t)	Redon	26	26	23
29(t)	Dufy	25	35	7
29(t)	Vuillard	25	29(t)	18
31	Whistler	23	20(t)	29
32	Soutine	22	31	14
33	Vlaminck	20	30	15
34	Tanguy	18	32	13
35	Arp	14	25	26

Note: This and subsequent tables are based on the data set constructed for this study. See text and Appendix for description.

Table 3: Ranking of Paintings by Total Illustrations

French rank	French illustrations	Artist, Title	Date	Location	US rank	US illustrations
1	25	Picasso, *Les Demoiselles d'Avignon*	1907	New York	1	30
2(t)	18	Manet, *Olympia*	1863	Paris	8(t)	15
2(t)	18	Picasso, *Guernica*	1937	Madrid	2	25
4	17	Seurat, *Sunday Afternoon on the Island of the Grande Jatte*	1886	Chicago	3	24
5	16	Manet, *Le Déjeuner sur l'Herbe*	1863	Paris	4(t)	21
6	14	Duchamp, *Nude Descending a Staircase, No. 2*	1912	Philadelphia	4(t)	21
7	13	Monet, *Impression, Sunrise*	1872	Paris	19(t)	11
8(t)	12	Courbet, *Burial at Ornans*	1850	Paris	14(t)	12
8(t)	12	Duchamp, *The Bride Stripped Bare by Her Bachelors, Even*	1923	Philadelphia	7	16
10(t)	11	Courbet, *Young Women on the Banks of the Seine*	1856	Paris	--	--
10(t)	11	Gauguin, *The Vision After the Sermon*	1888	Edinburgh	8(t)	15
10(t)	11	Rousseau, *The Snake Charmer*	1907	Paris	--	--

measure. Each table also shows the corresponding American ranking of the respective painters and paintings.

The similarity between the French and American rankings is striking. Considering first Table 2, Picasso holds the top place in both France and the US, in both cases by a large margin over his closest competitors, who are in both cases Matisse and Cézanne, respectively. Although there are minor differences in their ordering, the top 10 painters are identical in both rankings. Larger discrepancies in order appear lower in the rankings, as the distances among painters in numbers of illustrations become smaller, but the rankings remain similar; so for example only one of the top 19 painters in the French ranking fails to appear among the top 20 in the American ranking.

Table 3 shows that French and American scholars are also in substantial agreement on the greatest individual paintings. Picasso's *Les Demoiselles d'Avignon* tops both rankings by a convincing margin, and four of the next five works in both rankings are the same, as French and American scholars agree on the great importance of Picasso's *Guernica*, Seurat's *Grande Jatte*, Manet's *Déjeuner sur l'herbe*, and Duchamp's *Nude Descending a Staircase*. Eight of the top 12 works in the French rankings appear among the highest American 11, and two more of those top French 12 are ranked in the top American 21. Thus only two of the 12 paintings most highly esteemed by French scholars - Courbet's *Young Women* and Rousseau's *Snake Charmer* - fail to appear among the 21 most favored by American scholars.

Tables 2 and 3 therefore clearly show that there is no significant disagreement between French and American art scholars on the identity of the painters and paintings that constitute the canon of French modern art. But examination of the French rankings raises several intriguing

puzzles. Two of these emerge from a comparison of Tables 2 and 3. One is that some of the very highest-ranked painters in Table 2 - including Matisse and Cézanne, who rank second and third, respectively - have no paintings listed in Table 3. A second is that fully half of the 12 paintings in Table 3 were made by painters who do not rank even among the top 10 artists in Table 2. And a third puzzle concerns the composition of the works in Table 3. In this highly selective ranking of a mere handful of the most important individual paintings of French modern art, no less than four artists have two entries apiece. This third puzzle may furthermore have some relation to the second, for one of the painters with two entries in Table 3 is Marcel Duchamp. It is striking that a painter who ranks only 19th in total illustrations has two paintings among the greatest nine individual works in modern French art, while no less than 12 artists who rank above Duchamp in total illustrations have none.

Why did some of the greatest masters not produce the most often illustrated masterpieces? Why were some of the most important masterpieces produced by painters who do not rank among the greatest masters? And why did some artists produce more than one of the most often illustrated masterpieces? These are obviously intriguing questions, but they are not easily answered through reference to the existing literature on modern art. This paper will suggest answers , based on a new typology of modern painters.

Importance in Modern Art

Since the 1860s, when Baudelaire declared that painters of modern life must continually search for new ways to portray the ever-changing beauty of the present day, and Zola asserted that every great artist would present a new and personal vision, leading art critics and scholars have understood that innovation is the source of real importance in modern art.[6] From Courbet

and Manet on, modern painters have made innovations in many areas, including subject matter, composition, scale, materials, and techniques. But whatever the specific form of an artist's innovation, its importance depends on its influence on other artists. The more widespread the adoption of an innovation by other artists, and the more profound its effect on their practice, the more important its creator. The importance of individual works similarly depends on the extent of their influence. The most important individual paintings are those that announce the appearance of important innovations.

Recognizing innovation as the source of importance in modern art allows a restatement of the puzzles raised earlier. Why did some of the most important innovators not produce individual landmark works that announced their innovations? Why were many of the most important individual embodiments of innovations not produced by the most important innovators? And why were several artists able to produce more than one major landmark work declaring significant innovations?

A Typology of Artistic Innovators

The answers to these questions may follow from the recognition that there have been two very different types of innovation in the history of modern art. What distinguishes them is not their importance, for both types are represented prominently among the major innovations of modern art. What distinguishes them is instead the method by which they are produced. One of these methods can be called aesthetically-motivated experimentation, the other conceptual execution.

Modern artists who have produced experimental innovations have been motivated by aesthetic considerations, for their art has sought to present visual perceptions. These painters'

goals are imprecise, so they have proceeded toward them tentatively and incrementally. They typically repeat themselves, painting the same subject many times - often painting over a single work many times - but always gradually changing its treatment by a process of trial and error. They generally regard even their finished works as provisional; many never consider their efforts as anything more than work in progress, and have great difficulty in declaring a painting to be finished. Each work leads to the next, and in advance none is privileged over any other, so experimental painters rarely make specific preparatory sketches or plans for a particular painting. Experimental painters' innovations appear by degrees over extended periods; they are rarely declared in any single work, but appear piecemeal in a large body of work. Experimental painters build up skills over the course of their careers, learning and advancing slowly toward their goals.

In contrast, modern artists who have produced conceptual innovations have generally been motivated by criteria that are not visual, for their art has been intended to communicate emotions or ideas. Their goals for a particular work can usually be stated precisely, in advance of its production, either as a specific desired outcome or a particular procedure for the work's production. They often make careful preparations for their work, in the form of detailed sketches or plans. Their work is typically systematic: because they begin with a precise mental image of the finished work, or with a set of rules that are to be carried out without deviation, they often describe the actual execution of a painting as perfunctory. Conceptual innovations appear suddenly, with the formulation of a new idea, and they are often embodied in individual breakthrough works. Unlike experimental artists, whose inability to achieve their imprecise goals often ties them to a single problem for a whole career, the conceptual artist's satisfaction

that a problem has been solved can free him to pursue new goals, and the careers of some conceptual artists have consequently been marked by a number of innovations, each quite different from the others.

The life cycles of experimental and conceptual innovators tend to be very different. The long periods often required for the production of experimental innovations mean that they frequently occur late in an artist's career, but conceptual innovations can occur at any age. Fundamental conceptual innovations are in fact most often made by young artists, who are not yet committed by habit of thought to existing conventions and methods, and who might consequently be able better to perceive and appreciate more radical deviations from them.

Categorizing Painters: Quantitative Evidence

The data set constructed for this study can be used to consider whether the typology of artistic innovation proposed here can help to resolve the puzzles raised earlier. Table 4 begins this process by presenting evidence on the degree of inequality in the distribution of each artist's illustrations.[7] Economists often measure the degree of inequality of a country's income distribution by calculating the share of total income received by the wealthiest members of the country's population. Here, instead of people, the units of observation are paintings. Thus Table 4 shows the share of each artist's total illustrations that are accounted for by the 20% of the artist's illustrated paintings that are most often reproduced.

Table 4 shows that the greatest inequality in the distribution of illustrations is for Marcel Duchamp: the most heavily illustrated 20% of his reproduced paintings account for nearly two-thirds of the total illustrations of his paintings. Duchamp was an archetypal conceptual innovator. His express goal was to change the focus of modern painting: "I was interested in

Table 4: Share of Top 20% of Paintings in Each Artist's Total Illustrations, for Artists with more than 30 illustrations

Artist	Share of Top 20%	Total Paintings Illustrated
Duchamp	65%	12
Seurat	64	20
Manet	63	32
Courbet	62	28
Monet	56	58
Rousseau	56	14
Braque	55	55
Picabia	51	20
Picasso	51	126
Renoir	51	41
Gauguin	49	40
Pissarro	49	22
van Gogh	48	62
Matisse	46	74
Bonnard	42	41
Cézanne	42	74
Gris	42	31
Degas	41	51
Miró	39	36
Modigliani	38	22
Toulouse-Lautrec	38	42
Chagall	38	26
Léger	38	44
Delaunay	37	31
Derain	35	30

ideas - not merely in visual products. I wanted to put painting once again at the service of the mind."[8] Duchamp wanted to make painting more precise and scientific, and toward this end he worked on a series of different problems: "I had a mania for change... One does something for six months, a year, and one goes on to something else."[9] His *Nude Descending a Staircase*, which ranks sixth in Table 3, presented a novel approach to producing a static image of movement, and his *Bride Stripped Bare*, tied for eight place, was an even more enigmatic work that used mechanical elements to represent the human anatomy. Duchamp painted the *Nude* when he was just 25, and the *Bride* at 36, by which time he had largely given up painting. Duchamp made other innovations in modern art, including what he called "readymades," manufactured objects he purchased and signed, which later had an enormous influence on generations of artists who would continue his exploration of the question of what constitutes art. But although his career as a painter was brief, and his output very limited, Duchamp's conceptual approach allowed him to place two landmark works in Table 3.

Georges Seurat closely follows Duchamp in Table 4. Appropriately, Seurat was the modern painter whom Duchamp professed to respect the most, for Duchamp clearly recognized a fellow conceptual innovator.[10] In the mid-1880s, when Paris' advanced art world was captivated by the discoveries of the Impressionists, Seurat set out to substitute scientific method for the unsystematic approach of Monet and his friends. At the age of 25, he began work on a major project that would apply to painting recent research on chromatics by a number of scholars, including the American physicist Ogden Rood. Two years later, after a process that involved more than 50 preparatory studies, Seurat exhibited the finished painting at the last group exhibition of the Impressionists. The *Grande Jatte*, ranked fourth in Table 3, was immediately a

focus of critical debate, and soon became the most famous painting of the decade.[11] Critic Felix Fénéon declared that Seurat was the first to demonstrate the advantages of optical mixture - placing contrasting colors separately on the canvas and allowing the eye to mix them, rather than mixing them on the palette - that allowed him and his followers to replace the haphazard techniques of Impressionism with a "deliberate and constant" method.[12] As Seurat remarked when visitors to his studio praised the *Grande Jatte*, "They see poetry in what I have done. No, I apply my method and that is all there is to it."[13]

Having solved one problem, Seurat then set out to solve another: "If ... I have been able to find scientifically the law of pictorial color, can I not discover an equally logical, scientific, and pictorial system to compose harmoniously the lines of a picture just as I can compose its colors?"[14] Seurat's work on this, based on the theories of Charles Henry, a young mathematician and aesthetician, was cut short by his death at the age of just 31. Yet as many art scholars have remarked, Seurat's youth was not a barrier to accomplishment: thus Meyer Schapiro observed that "Seurat was a complete artist at twenty-five when he painted the *Grande Jatte*."[15] The analysis presented here suggests that this early maturity was a direct consequence of Seurat's conceptual approach. After his death, a friend succinctly described his approach and its source:

> Not only did he never begin his canvases without knowing where he was going, but his concern went even beyond their success as individual works. For him, they had no great meaning if they did not prove some rule, some artistic verity, some conquest of the unknown. If I understand him correctly, Seurat gave himself the mission of releasing art from the tentative, the vague, the hesitant, and the imprecise. Perhaps he thought that the scientific and positivist spirit of his time required, in the realm of the imagination, a more clear and solid tactic for the conquest of the beautiful. He wanted to inscribe this tactic point by point at the very foundation of each of his canvases, and often he succeeded.[16]

Only two other painters in Table 4 had more than 60% of their total illustrations accounted for by one-fifth of their reproduced works. One was Gustave Courbet. Courbet made detailed preparatory plans for his major works, often making full-scale drawings which he would then duplicate on the canvas as the initial step in making the final work. In 1854, while at work on one of his major paintings, *L'Atelier*, he wrote to a friend that in spite of a recent illness, "I have managed to sketch my painting, and at the moment it is entirely transferred to the canvas, which is twenty feet wide and twelve feet high."[17] When a friend, the philosopher Pierre-Joseph Proudhon, was writing a treatise on art, Courbet sent him some observations, including a clear description of his belief in a conceptual approach:

> Works of art are conceived all at once, and the composition, once it is well established and firmly outlined in the mind in all its details, casts it into its frame on paper or on canvas in such a way that there is no need to modify it in the course of the execution. The beauty of the execution results from the clarity of the conception.[18]

Courbet produced a series of landmark works, two of which appear in Table 3. In this series of works he elevated the countryside and its common people to suitable subjects for advanced painting, and became the leading practitioner of Realist art. That he produced these innovative works before the age of 40 appears to have been a direct consequence of his conceptual approach.

One of the most important painters with an entry in Table 4 below 45% is Edgar Degas. The absence of key individual masterpieces from the latter's career would not have surprised his admirers. One, the English writer George Moore, remarked of Degas' paintings of the ballet that "He has done so many dancers and so often repeated himself that it is difficult to specify any particular one."[19] The books surveyed here confirm this judgment, as 18 of Degas' illustrations are accounted for by portrayals of dancers, but no one of the 13 paintings represented appears

more than three times. Degas' experimental approach involved repeated study of the same subject, and he often began a new drawing or pastel by tracing the previous one. His dealer, Ambroise Vollard, noted that "Because of the many tracings that Degas did of his drawings, the public accused him of repeating himself. But his passion for perfection was responsible for his continual research."[20] A friend, the poet Paul Valéry, compared Degas to "a writer striving to attain the utmost precision of form, drafting and redrafting, canceling, advancing by endless recapitulation, never admitting that his work has reached its *final* stage: from sheet to sheet, copy to copy, he continually revises his drawings, deepening, tightening, closing it up."[21] Degas hated to sell his work, because "I always hope eventually to do better."[22] His hope of improvement lay in repetition: "One must redo ten times, a hundred times the same subject."[23] Degas made innovations in the use of pastel, in the use of color, and in the representation of space, yet these were not declared in individual breakthrough paintings, but rather in a large body of work. His career was notable for the extended and gradual evolution of his style over many decades. When Degas was told of another artist's excitement at having found his style, he responded "I'm glad I haven't found my style yet. I'd be bored to death."[24]

Immediately below Degas in Table 4 is Joan Miró. Like a number of other Surrealist painters, Miró used an experimental approach in an attempt to explore the unconscious. To avoid preconceived images, he began a painting with arbitrary marks, then developed the images he saw implied in these beginnings: "I start a canvas without a thought of what it may eventually become ... I begin painting and as I paint the picture begins to assert itself, or suggest itself under my brush. The form becomes a sign for a woman or a bird as I work."[25] Like Degas, Miró never felt his work reached a definite conclusion: "when I've finished something I discover it's just a

basis for what I've got to do next. It's never anything more than a point of departure... I'd paint over it again, right on top of it. Far from being finished work, to me it's just a beginning."[26] Interestingly, early in his career Miró gave a remarkably complete general description of the experimental approach to painting. In a letter to a friend, he described an artist who "sees a different problem in every tree and in every bit of sky: this is the man who suffers, the man who is always moving and can never sit still, the man who will never do what people call a 'definitive' work... [He] is always saying *not yet*, *it is still not ready*, and when he is satisfied with his last canvas and starts another one, he destroys the earlier one. His work is always a new beginning."[27] Miró also understood the implications of his experimental approach for the life cycle, as he believed firmly that "one's serious work begins only in maturity."[28]

Table 5 shows that Degas was 43 in the single year represented by the largest number of reproductions in the books surveyed here, which places his entry among the highest in that tabulation. The painter who ranks first by this measure is Degas' contemporary, Paul Cézanne, who reached the peak of his achievement in the final year of his life, at the age of 67. Cézanne is perhaps the greatest experimental painter considered in this study. His letters provide an eloquent account of his progress as an experimental innovator. Thus for example in early September, 1906, just six weeks before his death, he wrote to his son:

> Finally I must tell you that as a painter I am becoming more clear-sighted before nature, but that with me the realization of my sensations is always painful. I cannot attain the intensity that is unfolded before my senses. I have not the magnificent richness of coloring that animates nature. Here on the bank of the river the motifs multiply, the same subject seen from a different angle offers subject for study of the most powerful interest and so varied that I think I could occupy myself for months without changing place, by turning now more to the right, now more to the left.[29]

Table 5: Artist's age in year of most illustrations, for artists with more than 30 total illustrations, and at least 10 in one year

Artist	Year	n	Age
Cézanne	1906	19	67
Rousseau	1907	12	63
Pissarro	1877	11	47
Degas	1877	10	43
Gauguin	1888	21	40
Matisse	1906	12	37
Courbet*	1855	12	36
Renoir	1876	14	35
van Gogh	1888	31	35
Picabia	1913	10	34
Modigliani	1917	20	33
Miró	1925	13	32
Monet	1872	17	32
Braque	1913	12	31
Courbet*	1850	12	31
Manet	1863	35	31
Toulouse-Lautrec	1894	11	30
Delaunay	1913	14	28
Seurat	1886	19	27
Derain	1906	19	26
Picasso	1907	35	26
Duchamp	1912	19	25

*two entries tied for most illustrations.

In this short passage Cézanne describes his visual motivation, the elusiveness of his vague but ambitious goal, the slowness of his progress toward it, the incremental and serial nature of his enterprise, his view of his work as research, and his frustration. The irony of this frustration stems from the fact that in time not only would Cézanne come to be widely recognized as the most important painter of his time, but that as indicated in Table 5, it would be the work he did late in his life that would be judged his greatest contribution. His late work would influence almost every significant artistic development of the next generation. These included movements as diverse as the Cubists, who saw in Cézanne's brushstrokes a structure of planes that could define three-dimensional space, and the Fauves, who seized instead on the surface pattern created by the colors of those brushstrokes.

Cézanne's work provides a prime demonstration of why experimental artists do not produce famous individual works. Among the most famous images of the latter stages of his career are his views of Mont Ste-Victoire. Had he produced just a single painting of this motif, it would likely rank at or near the top of Table 3. But instead he made dozens: 12 different views of the mountain made in the last two decades of his life are illustrated in the books surveyed here, a total of 21 times. Cézanne loved the landscape of his native Provence, and it is not surprising that he made his vision of its most commanding feature a cornerstone of modern art. Yet in view of his doubt that he would ever be able to create a "well-realized canvas," it is equally unsurprising that the importance of this motif was not achieved in a single celebrated image, but rather in the form of a series of works that document Cézanne's painstaking progress along what he considered the artist's "true path - the concrete study of nature."[30]

Art historians have sometimes been puzzled by, and even critical of, Cézanne's casual

attitude toward his paintings.[31] He rarely signed them; he would sometimes deliberately slash a canvas with a palette knife; he would discard paintings in the garden outside his home at Aix, to be destroyed by his servants; and he would laugh in amusement when his young son poked holes in his paintings.[32] But rather than demonstrating a lack of professionalism or respect for his craft, this apparent negligence appears to have resulted from Cézanne's experimental view of his paintings as research. Thus he advised the young painter Emile Bernard that "painters must devote themselves entirely to the study of nature and try to produce pictures which will be an education."[33] The importance of his own paintings consequently lay in what he learned while making them: "he never ceased declaring that he was not making pictures, but that he was searching for a technique."[34] Failed experiments were of no further value: "When a picture isn't realized, you pitch it in the fire and start another one!"[35] And the final object of the research always lay further ahead, as for example near the end of his life he complained to Bernard that "I progress very slowly, for nature reveals herself to me in very complex ways; and the progress needed is endless."[36]

Duchamp and Seurat are among the lowest entries in Table 5, as both did their most frequently illustrated work in their mid-20s. The other major artist whose single peak year occurred before he reached the age of 30 is Pablo Picasso. His entry in Table 5 of 1907 marks the year he painted *Les Demoiselles d'Avignon*, the single most reproduced painting in the history of modern art. The *Demoiselles* is generally considered the forerunner of Cubism, which is in turn often regarded as the most important artistic revolution of the modern era. There is no doubt that Picasso specifically intended the *Demoiselles* to be a landmark work. The project may have originated in Picasso's rivalry with Matisse for preeminence in Paris' advanced art world.

Fauvism had first aroused controversy in 1905, and the next year Matisse's leadership of the movement was underscored by his exhibition of a large painting called *The Joy of Life*. Late in 1906 Picasso began working on the large painting that he appears to have considered his answer to Matisse's challenge.[37] During the fall and winter he filled one sketchbook after another with preparatory studies. William Rubin concluded that in all "there are at least some four to five hundred studies ... *associated* in one way or another with the genesis of the *Demoiselles*," which Rubin believed constituted "a quantity of preparatory work unique not only in Picasso's career, but without parallel, for a single picture, in the entire history of art."[38] At the age of 25, Picasso thus appears to have deliberately set out to make the most important work of his career, and remarkably he succeeded.

The *Demoiselles* marked a break with the art of the past in its extreme conceptual approach to the treatment of space and the representation of objects. A young poet and friend of Picasso's, André Salmon, quickly recognized its conceptual basis, describing its figures as "stark problems, white numbers on a blackboard. This is the first appearance of the painting-equation."[39] The development of this conceptual approach by Picasso and his friend George Braque made Cubism the most influential artistic innovation of the first half of the twentieth century.[40] As historian John Golding emphasized, the Cubist paintings of Picasso and Braque "are not so much records of the sensory appearance of their subjects, as expressions in pictorial terms of their idea or knowledge of them. 'I paint objects as I think them, not as I see them,' Picasso said."[41]

Picasso could preconceive his works even when he did not use preparatory sketches. His dealer Daniel-Henry Kahnweiler described to a friend how Picasso took a novel approach to

making prints from linoleum plates. Instead of the normal procedure of cutting a separate plate for each color, Picasso used only one: after printing one color, he would recut the plate and print another color. Kahnweiler explained that by repeating this process Picasso produced very complex prints, with as many as a dozen colors. Whereas the traditional approach permitted adjustments during the printing process, by allowing changes to any of the plates to make the separate images of the individual plates consistent with each other, Picasso's method provided no such margin for error, for the plate for each color was irreversibly altered when the unique plate was recut to print the next color. Kahnweiler marveled at Picasso's ability to arrive at excellent results by this uncompromising process: "He must see in advance the effect of each color, because there's no pentimento possible!... I would call it 'pictorial premonition'. I was at his home and saw him working. When he attacks the lino, he makes out or sees in advance the final result."[42]

Picasso became the most celebrated artist of the twentieth century, and produced other landmark works including *Guernica*, which appears tied for second place in Table 3. The frequency and abruptness of his stylistic changes during the nearly eight decades of his career have become a commonplace among the many scholars who have studied his work. Thus for example critic John Berger observed that "In the life work of no other artist is each group of works so independent of those which have just gone before, or so irrelevant to those which are to follow."[43] This independence , like the periodic appearance of the great landmark works that announced his innovations, was a direct consequence of Picasso's conceptual approach to art. Unlike Cézanne, who once told a younger artist "I seek in painting," Picasso valued conclusions: "In my opinion to search means nothing in painting. To find, is the thing ... I have never made

trials or experiments. Whenever I have had something to say, I have said it in the manner in which I have felt it ought to be said."[44]

Differences in the amount of time it took artists to reach their peak achievements are suggested by Table 6. Its measure of the time between an artist's earliest illustrated work and the date of his peak year for illustrations gives an indication of the interval between the artist's first significant accomplishment and his most important contribution. It is not surprising to see that the highest entries in Table 6 are for Cézanne and Degas, and that among the lowest are those for Duchamp and Seurat. Yet this measure clearly calls attention to the need for a significant qualification to the analysis presented above, in identifying two cases of important artists for whom the usual relationship between age and professional experience does not apply. These cases are those of Paul Gauguin and Vincent van Gogh. Both came to full-time painting late, Gauguin at 35 after a successful career in the stock exchange, and van Gogh at 28 after unsuccessful careers as an art dealer and pastor. Their careers were also both brief, Gauguin's lasting only 20 years before his death in the Marquesas Islands in 1903, and van Gogh's just a decade before his suicide in Auvers in 1890. Yet both artists nonetheless made innovations that would have enormous influence on the development of modern art.

The careers of Gauguin and van Gogh call attention to the fact that it is not necessarily youth that is critical to radical conceptual innovation, but rather professional inexperience. As the artist's exposure to existing practices increases over time, it becomes more difficult for him to perceive radical alternative conceptual approaches. Although their innovations were not made when they were young, both Gauguin and van Gogh made conceptual innovations early in their careers as painters. Gauguin's principal innovation was embodied in his *Vision After the*

Table 6: Time Elapsed Between Year of Artist's First Illustration and Year of Artist's Most Illustrations, for Artists with more than 30 illustrations, and at least 10 in one year

Artist	Years elapsed	Artist	Years elapsed
Cézanne	40	Toulouse-Lautrec	7
Degas	22	Picasso	6
Rousseau	17	Modigliani	5
Courbet*	13	Delaunay	4
Pissarro	10	Manet	4
Matisse	9	Picabia	4
Renoir	9	Seurat	3
Courbet*	8	van Gogh	3
Braque	7	Derain	1
Miró	7	Duchamp	1
Monet	7	Gauguin	0

* two entries tied

Sermon, which he painted in Pont-Aven in 1888, and which ranks tenth in Table 3. The painting became a manifesto for young Symbolist artists for the way Gauguin used distortions of scale, space, and color to separate real from imagined figures: in describing the work to van Gogh, Gauguin wrote that "I believe that in my figures I have achieved a great simplicity, which is both rustic and superstitious." Gauguin studied with Pissarro when he first decided to become a painter, but he became dissatisfied with Impressionist techniques, which he found were "bound by the shackles of verisimilitude. For them there is no such thing as a landscape that has been dreamed, created from nothing." Gauguin's goal was to make his paintings express ideas: "I do not paint by copying nature... Everything I do springs from my wild imagination." Because of this, Gauguin believed that progress could be made quickly, so he advised his friend and fellow painter Emile Schuffenecker "don't sweat over a painting; a great sentiment can be rendered immediately."[45]

As Table 5 indicates, van Gogh made his greatest contributions near the end of his life. When he arrived in Paris from Holland in 1886 his art was transformed by his first exposure to Impressionism, but he soon discovered that he needed other means to express his emotions, and he was encouraged in this pursuit by his association with Gauguin, Emile Bernard, and other Symbolist painters. From Arles in 1888 he wrote to his brother that the Impressionists would no doubt disapprove of his new work, "Because instead of trying to reproduce exactly what I have before my eyes, I use color more arbitrarily, in order to express myself forcibly." So for example when he painted a night café in Arles, he told Théo that he had "tried to express the terrible passions of humanity by means of red and green," in order "to express the idea that the café is a place where one can ruin oneself, go mad or commit a crime." His letters to Théo also reveal the

preconception of his work, as when he explained how he could complete a painting in a single sitting: "understand that I am in the midst of a complicated calculation which results in a quick succession of canvases quickly executed but calculated long *beforehand*."[46] The art of Gauguin and van Gogh inspired not only younger Symbolists of their own day, but also painters of later generations as varied as the Fauves, Cubists, and Expressionists. In part this was a consequence of the liberating example of their conceptual approach, which demonstrated how powerfully painting could be used to express intense emotions directly, without the need for the tedious apprenticeships emphasized by the more traditional academic approach.

In histories of art, a prominent place is often given not simply to an important artist's great individual works, but to a short period in which the artist makes his principal contribution. Narratives of modern art are often organized around these episodes, for these have often been key periods in which the work of a small group gave rise to a new movement, from Impressionism and Neo-Impressionism through Fauvism, Cubism, and beyond. Table 7 uses the quantitative data to give an indication of which short periods are considered most important, by identifying the episodes that include the largest number of illustrations of paintings by individual artists within any five-year period. This may not exactly correspond to the historians' analyses, for artists' creative episodes vary in length, but five years constitute a period long enough to capture many of the most important breakthrough phases in modern artists' careers.

The analysis presented above would predict that Table 7 should be dominated by conceptual innovators, because of the greater temporal concentration of their achievements, and this is clearly the case. Interestingly, in spite of Picasso's preeminent position in Table 2 and the enormous importance of Cubism, Table 7 is headed by van Gogh, as his years in France emerge

Table 7: Ranking of Five-Year Periods in Artists' Careers, by Total Illustrations

Rank	Artist	Starting age	Illustrations	% of Artist's total illustrations
1	van Gogh	33	91	90
2	Picasso	25	65	32
3	Gauguin	40	55	65
4	Manet	30	46	47
5(t)	Toulouse-Lautrec	28	38	66
5(t)	Braque	28	38	45
5(t)	Seurat	25	38	72
8(t)	Monet	29	37	34
8(t)	Picasso	30	37	18
10	Delaunay	25	36	71
11	Courbet	34	33	45
12(t)	Matisse	35	32	26
12(t)	Picasso	52	32	16
14	Modigliani	31	30	88
15	Renoir	33	29	39
16	Derain	25	28	76
17	Gris	25	27	66
18(t)	Cézanne	63	26	22
18(t)	Duchamp	24	26	65
20	Matisse	41	24	20

Note: The final column shows the percentage of each artist's total illustrations (Table 2) made up by illustrations of paintings from the periods identified here.

as the most heavily illustrated episode in the period studied here. The invention and development of Cubism from 1906 to the outbreak of World War I does account for the high positions of Picasso (both second in Table 7 for 1906-10 and tied for eighth for 1911-15) and Braque (tied for fifth for 1910-14), as well as for the appearance of Juan Gris, the only other painter who worked with Picasso during the Cubist period (seventeenth for 1912-16). Gauguin's leading role in Symbolism, from his *Vision* of 1888 through his first trip to Tahiti, places him third in Table 7. And Edouard Manet's crucial role in the transition to modern painting during 1862-66 places him fourth.

Manet was celebrated by Zola, Mallarmé, and other advanced critics of the 1860s and '70s as the leader of the new movement of innovative painters. Two of his landmark works painted in 1863 caused great public controversy - the *Déjeuner sur l'herbe*, first exhibited at the Salon des Refusés in 1863, and the *Olympia*, first shown at the Salon of 1865. These paintings dramatically announced striking innovations in both technique and subject matter, as in both Manet abandoned the traditional use of the graduated tones that produced shadow to create the illusion of three-dimensionality, and posed contemporary figures in classical settings, with nude female figures who looked directly and immodestly at their viewers. That both paintings rank among the top five works in Table 3 reflects their enormous impact on the early development of modern French painting. Thus for example Cézanne declared of the *Olympia* that "The whole of our Renaissance dates back to that painting," while Monet felt so strongly about the painting that after Manet's death, he devoted nearly a year to raising the funds necessary to buy the painting, then negotiated with the French government to assure that it would eventually be hung in the Louvre.[47]

Manet's conceptual approach is reflected not only in the abrupt introduction of the innovations embodied in these famous individual paintings, but also in his selection of motifs and his practice. Unlike his colleagues Degas and Cézanne, whose experimental approach led them to return repeatedly to study the same subjects, Manet's friend Théodore Duret wrote that the painter "had no circumscribed circle. He painted indifferently all that the eye can see - men and women under every aspect and in all sorts of groupings, landscape, seascape, still life, flowers, animals, in the open air, and in the studio. His method was to have a constant change of subject, and never to stale a success by repetition."[48]Manet's major paintings, including the *Déjeuner* and the *Olympia*, were based on preparatory studies: "his favorite method was to use watercolor for the preliminary studies for his pictures, in order to establish the proper color-scheme and composition."[49]

Monet and Matisse

The quantitative data presented above have thus provided strong evidence for the categorization of a number of major artists according to the scheme suggested earlier. So for example Picasso made two of the greatest individual works in the history of modern art, and the one generally considered the more important when he was just 26 years old; he is easily categorized as conceptual. Cézanne, third overall in total illustrations, produced no individual works that rank among the landmark paintings of Table 3, and did his most celebrated work late in his long career; he is equally easily categorized as experimental. Gauguin and van Gogh were not young when they executed their greatest works, but these nonetheless came early in their careers; that they could make such important contributions so quickly is a consequence of their

conceptual approach. Manet produced two of modern art's most celebrated paintings at the age of 31; these dramatic innovations of a young painter clearly identify him as a conceptual innovator.

But the quantitative evidence might not point as clearly to the categorization of two of the most important painters considered in this study. The earlier of these is Claude Monet. That Monet has a painting listed in Table 3, which he executed when he was just 32 years old, might suggest that he was a conceptual innovator, as might his appearance among the top ten entries in Table 7, for a five-year period that began when he was under 30. Yet Monet was in fact quintessentially an experimental innovator. Throughout his career he repeatedly stressed the visual character of the goal of capturing the "instantaneity" of nature, with "the same light spread over everything," and like Cézanne, he found his goal elusive: "I'm never satisfied when working from nature." He also had recurring doubts about finishing his work: in 1893, at age 53, in spite of his established reputation and growing commercial success, Monet wrote to a friend that "the further I get, the more difficult it is for me to convey what I feel; and I tell myself that anyone who claims he's finished a painting is terribly arrogant. To finish something means complete, perfect and I'm forcing myself to work, but can't make any progress; looking for something, groping my way forward, but coming up with nothing very special."[50] His use of the serial approach to chosen subjects in the 1890s - grainstacks, poplars, Rouen cathedral, the cliffs of Normandy, the Seine, and the Thames - famously elevated the experimental approach to an explicit strategy, with each of a set of paintings considered as a related observation of some chosen motif, but in fact his instinct had always been to work in series. Thus in 1886 he wrote to a friend that "I do know that to paint the sea very well, you need to look at it every hour of every

day in the same place so that you can understand its ways in that particular spot; and this is why I am working on the same motifs over and over again, four or six times even;" but since the intent was visual, he added that "I'll be able to explain all this to you much better when I see you with my paintings laid out in front of you."[51]

Monet's early artistic achievement, reflected in his peak five-year period in Table 7 spanning ages 29-34, is an anomaly for an experimental innovator, and appears to have resulted from his ability effectively to take advantage of a research project that others had begun. Art historians have long repeated Monet's account of how he initially rejected the advice of the older artist Eugène Boudin to paint from nature, and of the valuable lessons about working in the open air that he eventually learned from Boudin and his friend Johan Jongkind after he had understood their methods and intentions. Yet after receiving this tuition - from Boudin in the late 1850s, and Jongkind in the early '60s - Monet formulated goals more ambitious than those of his predecessors, and it was only after further experimentation that he discovered "the principle of the subdivision of colors" that allowed him to achieve novel "effects of light and color."[52] This breakthrough is often traced to the summer of 1869, which Monet spent painting with Renoir at a riverside café near Paris, and Table 7 shows that Monet's prime period for illustrations begins in that year. That Monet could achieve this breakthrough at such an early age in spite of his experimental approach thus appears to have been a consequence of his ability to adapt to his own purposes the results of the earlier experiments of his teachers. And the evidence of Table 7 hints at Monet's experimental approach, for although it shows that the years 1869-74 were those of his greatest concentration of illustrations, the number of reproductions from that period rank only tied for eighth place in that tabulation, in spite of the fact that Monet ranks fourth among artists

in Table 2. Clearly much important work lay ahead in his career, spread over many years.

The question nonetheless remains of why Monet's *Impression, Sunrise* of 1872 is ranked seventh in Table 3. How is it that a single work by an experimental painter achieves such a privileged position? The answer appears straightforward. The importance of *Impression, Sunrise* does not stem from its announcement of any new technique or method, since the most dramatic breakthroughs of Impressionism had already been embodied in Monet's work of the preceding three years. What elevated this painting was rather its title. *Impression, Sunrise* was included in the first group exhibition of independent artists arranged by Monet and his colleagues in 1874. A hostile review of that show referred to the group by the derisory name of Impressionists. Although some scholars deny that Monet's painting was the specific inspiration for the critic's mocking label, Monet himself claimed that it was.[53] The artists later accepted the name of Impressionists, and it has since become one of the most celebrated terms in all of art history. And as the fame of Impressionism has grown, *Impression, Sunrise* has become a convenient part of many narratives of the history of modern art. Unlike the other landmark works in Table 3, Monet's painting therefore appears to have achieved its position because of its usefulness for scholars rather than for other artists.

The other major painter whose categorization is not clearly indicated by the quantitative evidence is Henri Matisse. Although he ranks second only to Picasso in total illustrations, he has no work listed in Table 3. He does have two five-year periods ranked among the top 20 for all artists in Table 7, but both are for work he did after the age of 35. This evidence might appear to suggest that Matisse was an experimental innovator, but in fact he was not. Instead he appears to have been a conceptual innovator who made a series of significant contributions over a long

period, without one that clearly dominated his career. Matisse's single most celebrated contribution was his leading role in Fauvism; this is the source of his 12th-place ranking in Table 7 for the five-year period of 1904-08. Fauvism came into existence suddenly, it was practiced only during 1904-07, and it was then largely abandoned. Given these characteristics, it is not surprising that its origins were conceptual: as André Derain, who worked most closely with Matisse in creating the movement, later recalled, "We painted with theories, ideas."[54]

Matisse's statements about his art clearly reveal his conceptual approach. In his first and most famous published essay, which appeared in 1908, he stated that his goal was not visual, but was rather to express his emotions: "What I am after, above all, is expression ... I am unable to distinguish between the feeling I have about life and my way of translating it." His work was the product of a clear initial intent: "For me, all is in the conception. It is thus necessary to have a clear vision of the whole right from the beginning."[55] Later in his life, in words that reflected the certainty that separated him from experimentalists like Cézanne and Degas, when an interviewer asked him when he considered a work to be finished, Matisse replied: "When it represents my emotion very precisely and when I feel that there is nothing more to be added."[56]

Matisse planned his works carefully. His preparations for one of his major early works, *Luxe, calme, et volupté*, occupied the whole winter of 1904-05. Watercolor sketches he had made the previous summer of the bay of St. Tropez became the basis for oil studies. He added studio studies of nude figures, then produced a full-scale charcoal drawing of the whole composition. After his wife and daughter transferred this drawing to a large canvas using a traditional technique called pouncing, Matisse painted within the outlines they had traced to produce the finished work.[57] Even Matisse's celebrated ink line drawings were based on

preparatory sketches. He explained in 1939 that they were "always preceded by studies made in a less rigorous medium than pure line, such as charcoal or stump drawings, which allow me to consider simultaneously the character of the model, her human expression, the quality of surrounding light, the atmosphere." These studies might occupy several sessions, until Matisse felt that he was "drained by the work," and it was then "that my mind is cleared and I have the confidence to give free rein to my pen."[58]

Matisse was among the most influential artists of the twentieth century, and his career had a number of celebrated phases. Although Fauvism is generally considered his most distinctive innovation, it did not have the enormous impact on other artists that Cubism would have, and it does not stand out as far more influential than a number of Matisse's other achievements.[59] Table 7 again points to Matisse's conceptual approach, as it shows that only he and Picasso had more than a single five-year period with an achievement great enough to rank among the most important in French modern art. Having moved beyond Fauvism, during 1910-14 Matisse made very different contributions with such major works as *Dance II* (1910) and *Red Studio* (1911). In contrast to most of the other major conceptual innovators considered in this study, whose careers were dominated by one influential period, Matisse appears to have produced a number of innovations throughout a long career.

The Masterpiece of the Unknown Artist

In Balzac's story *The Unknown Masterpiece*, a legendary painter spent years creating a masterpiece which he then destroyed. In 1888, modern art produced an event that might seem no less curious, as an obscure young artist produced a painting that became famous as the inspiration for an artistic movement, while the artist himself remained obscure.

Paul Sérusier (1863-1927) is known today as a minor Symbolist painter. Had he been included in the sample of artists for this study, the 14 total illustrations of his work in the 32 books considered would have placed him at the bottom of Table 2, tied for last place with Jean Arp. Remarkably, however, 11 of those 14 illustrations are of a single painting, which would have placed that painting in a tie for tenth place in Table 3. A painting by the little-known Sérusier thus appears in more books than any single painting by such celebrated masters as Cézanne, Matisse, and van Gogh. How is this possible?

In 1888, as a 25-year-old art student Sérusier visited the artists' colony of Pont-Aven. Late in the summer he approached Paul Gauguin and spent a morning painting with him at the edge of a small forest. Their session was later immortalized by another young painter and future critic, Maurice Denis, in an often-quoted passage:

> "How do you see this tree," Gauguin had said, standing in one of the corners of the Bois d'Amour. "Is it really green? Use green then, the most beautiful green on your palette. And that shadow, rather blue? Don't be afraid to paint it as blue as possible."[60]

When Sérusier returned to Paris, the small landscape of the *Bois d'Amour* that he had painted under Gauguin's prompting electrified a group of Sérusier's fellow students. Sérusier, Denis, Edouard Vuillard, Pierre Bonnard, and several other young artists began to meet regularly to discuss Gauguin's new ideas as transmitted by Sérusier: "The extremely philosophical intellect of Sérusier very quickly transformed the least words of Gauguin into a scientific doctrine, which made a decisive impression on us."[61] The group named itself the Nabis, the Hebrew word for prophets, and took Gauguin's ideas as a license to free themselves from the constraints of academic art. For a time their painting shared a pattern of flat colors that was even more

simplified than that of Gauguin, and the Nabis became well known in the advanced art world of Paris until they were surpassed by more radical developments, including Fauvism.

But although the group adopted the *Bois d'Amour* as their mascot, renaming it *The Talisman* in recognition of its inspiration for their art, Sérusier's little landscape played an even greater indirect role in the history of modern art because of Maurice Denis' literary talents. In 1890 Denis published an essay that opened with a sentence that attracted immediate attention: "It is well to remember that a picture - before being a battle horse, a nude woman, or some anecdote - is essentially a plane surface covered with colors assembled in a certain order."[62] In a eulogy for Gauguin written in 1903, Denis identified *The Talisman* as the source for his earlier critical advance:

> It was at the beginning of 1888 that the name of Gauguin was revealed to us by Sérusier, back from Pont-Aven, who showed us, not without a certain mystery, a cigar box cover on which could be seen a landscape ... Thus was introduced to us for the first time, in a paradoxical and unforgettable form, the fertile concept of the plane surface covered with colors assembled in a certain order.[63]

The Talisman was therefore credited with a causal role in Denis' provocative early statement of formalist art theory, which would eventually be used to justify the abandonment of representation in painting. The influence of *The Talisman* was consequently extended even beyond its impact on the Nabis to many of the central developments in modern painting of the twentieth century. The fame of *The Talisman* is a striking example of conceptual innovation: its importance rests on its embodiment of an idea that was expressed by Gauguin, even though it was recorded by another hand.

In *The Unknown Masterpiece*, Balzac produced a classic portrayal of an experimental

artist in Frenhofer, who "has meditated deeply on color, on the absolute accuracy of line, but he has investigated so much that he has at last reached the point of doubting the very object of his investigations."[64] Frenhofer's fatal frustration at his inability to achieve his ultimate artistic goal has such a strong parallel to Cézanne's profound frustration at his inability to "realize my dream of art that I have been pursuing all my life" that it is hardly surprising that Cézanne would see himself in the fictional master.[65] The tension of Balzac's story, as of the story of Cézanne's life, stems from the long and painful search by a great artist for the unattainable goal of the definitive masterpiece. There is considerably less drama in the true story of the production of the *Talisman*. Unlike Frenhofer or Cézanne, Paul Sérusier was not a great artist, and the few hours he spent with Gauguin painting on the cover of a cigar box hardly bear comparison to the decades Frenhofer and Cézanne spent struggling toward their goals. But recognition of the two very different sources of artistic innovation allows us to understand how, in the course of a brief and casual session, a young painter who would never become more than a minor figure could produce a masterpiece that would have a profound impact on the history of modern art.

Conclusion

In his inaugural lecture as professor of art history at Cambridge University in 1933, the distinguished critic Roger Fry declared that "we have such a crying need for systematic study in which scientific methods will be followed wherever possible, where at all events the scientific attitude may be fostered and the sentimental attitude discouraged."[66] In the spirit of Fry's appeal, the present investigation has carried out a systematic analysis of a body of data created by art scholars, using evidence drawn from published surveys of French modern art. This study has produced several significant results. One is the demonstration that there is no cultural gap

between French and American scholars on the composition of the canon of French modern art. Picasso commands a unique position from the vantage points of both Paris and New York, and experts in both art capitals have no disagreement over the fact that he was joined by his friends Matisse and Braque in dominating the twentieth century, or that his most distinguished predecessors of the nineteenth century were Cézanne, Monet, van Gogh, and Manet. Scholars on both sides of the Atlantic also agree that Picasso's early masterpiece, *Les Demoiselles d'Avignon*, is the single most important work of French modern art.

Interestingly, this quantification of the canon of French modern art also appears to bear on a substantive issue that Roger Fry raised in his inaugural lecture nearly 70 years ago. Fry observed that:

> When we look at the late works of Titian or Rembrandt we cannot help feeling the pressure of a massive and rich experience which leaks out, as it were, through the ostensible image presented to us, whatever it may be. There are artists, and perhaps Titian and Rembrandt are good examples, who seem to require a very long period of activity before this unconscious element finds its way completely through into the work of art. In other cases, particularly in artists whose gift lies in a lyrical direction, the exaltation and passion of youth transmits itself directly into everything they touch, and then sometimes, when this flame dies down, their work becomes relatively cold and uninspired.[67]

Fry immediately conceded that his remarks were "rather wildly speculative and hazardous," but this may no longer be true. For Fry may have had in mind the distinction supported by the quantitative evidence examined here, in which the innovations of conceptual artists have been embodied in a smaller number of key works, typically made at younger ages, and concentrated in shorter periods, than have those of artists who have followed an experimental approach. So conceptual innovators like Courbet, Duchamp, Manet, Picasso, and Seurat produced innovations

embodied in specific masterpieces early in their careers, whereas Cézanne, Degas, Miró, Monet, and Pissarro followed an incremental procedure in which innovations appeared gradually in larger bodies of work, and usually at older ages.

Like the study that preceded it, this investigation has demonstrated that artistic success can be quantified, with substantial gains. It has also demonstrated that the greatest gains come from the combination of both quantitative and qualitative evidence in studying artists' achievements; neither type of evidence used alone can produce results as rich as when both are used together. As in a series of other disciplines which innumerate practitioners had declared immune to quantification but that were subsequently transformed by the application of quantitative analysis, the boundaries of quantification in art history will be limited in future only by the ingenuity of its researchers.

Endnotes

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1. George Kubler, *The Shape of Time: Remarks on the History of Things* (New Haven: Yale University Press, 1962), p. 83.

2. Christina Duff, "In Payscales, Life Sometimes Imitates Art," *Wall Street Journal*, May 22, 1998, p. B1.

3. David W. Galenson, "Quantifying Artistic Success: Ranking French Painters - and Paintings - from Impressionism to Cubism," *Historical Methods* (forthcoming 2001).

4. On the selection of the artists, see Galenson, "Quantifying Artistic Success."

5. For some quantitative evidence, see Galenson, "Quantifying Artistic Success."

6. Charles Baudelaire, *The Painter of Modern Life and Other Essays* (New York: Da Capo Press, 1986), pp. 12-14; Emile Zola, "Edouard Manet," in Francis Frascina and Charles Harrison, editors, *Modern Art and Modernism: A Critical Anthology* (New York: Harper and Row, 1982), pp. 30-31; Robert Jensen, *Marketing Modernism in Fin-de-Siècle Europe* (Princeton: Princeton University Press, 1994), pp. 88-99.

7. Table 4 and subsequent tables will be restricted to the most important artists in the sample, defined as those with more than 30 total illustrations.

8. Michel Sanouillet and Elmer Peterson, eds., *The Writings of Marcel Duchamp* (New York: Da Capo Press, 1989), p. 125.

9. Pierre Cabanne, *Dialogues with Marcel Duchamp* (New York: Da Capo Press, 1987), pp. 37-39.

10. Calvin Tomkins, *The Bride and the Bachelors: The Heretical Courtship in Modern Art* (New York: Viking Press, 1965), p. 24.

11. Robert L. Herbert, *Georges Seurat, 1859-1891* (New York: Metropolitan Museum of Art, 1991), pp. 170-72.

12. John Rewald, *Georges Seurat* (New York: Wittenborn, 1943), pp. 32, 36.

13. John Rewald, *Post-Impressionism: From Van Gogh to Gauguin* (New York: Museum of Modern Art, 1956), p. 86.

14. Meyer Schapiro, *Modern Art: 19th and 20th Centuries* (New York: George Braziller, 1968), p. 104.

15. Rewald, *Post-Impressionism*, p. 86.

16. Norma Broude, editor, *Seurat in Perspective* (Englewood Cliffs, NJ: Prentice-Hall, 1978), p. 29.

17. Petra ten-Doesschate Chu, editor, *Letters of Gustave Courbet* (Chicago: University of Chicago Press, 1992), p. 129.

18. Chu, *Letters of Gustave Courbet*, p. 230.

19. George Moore, *Impressions and Opinions* (New York: Brentano, 1913), p. 229.

20. Ambroise Vollard, *Degas* (New York: Dover, 1984), p. 102.

21. Paul Valéry, *Degas, Manet, Morisot* (Princeton: Princeton University Press, 1989), p. 39.

22. Vollard, *Degas,* p. 102.

23. Marcel Guérin, editor, *Lettres de Degas* (Paris: Bernard Grasset, 1931), p. 107.

24. Vollard, *Degas,* p. 117.

25. Margit Rowell, editor, *Joan Miró: Selected Writings and Interviews* (New York: Da Capo Press, 1992), pp. 209-11.

26. Rowell, *Joan Miró*, p. 98.

27. Rowell, *Joan Miró*, p. 51.

28. Rowell, *Joan Miró*, p. 79.

29. John Rewald, editor, *Paul Cézanne Letters*, p. 327.

30. Ambrose Vollard, *Cézanne* (New York: Dover, 1984), p. 87; Rewald, *Paul Cézanne Letters*, p. 302.

31. E.g. see Richard Shiff, *Cézanne and the End of Impressionism* (Chicago: University of Chicago Press, 1984), p. 162.

32. Vollard, *Cézanne*, pp. 62-3, 77; Ambroise Vollard, *Reflections of a Picture Dealer* (Boston: Little, Brown, 1936), p. 182.

33. Rewald, *Paul Cézanne Letters*, p. 303.

34. Theodore Reff, "Painting and Theory in the Final Decade," in William Rubin, editor, *Cézanne*: *The Late Work* (New York: Museum of Modern Art, 1977), p. 37.

35. Vollard, *Cézanne*, p. 105.

36. Rewald, *Paul Cézanne Letters*, p. 302.

37. John Richardson, *A Life of Picasso, Volume 1: The Early Years, 1881-1906* (New York: Random House, 1991), pp. 411-17, 471; Richardson, *A Life of Picasso, Volume 2: 1907-1917* (New York: Random House, 1996), pp. 14, 43-45.

38. William Rubin, Hélène Seckel, and Judith Cousins, *Les Demoiselles d'Avignon* (New York: Museum of Modern Art, 1994), pp. 14; 119.

39. Beth Gersh-Nesic, *The Early Criticism of André Salmon* (New York: Garland, 1991), p. 40.

40. On the diffusion of Cubism, see Douglas Cooper, *The Cubist Epoch* (London: Phaidon, 1970).

41. John Golding, *Cubism*, Third edition (Cambridge: Harvard University Press, 1988), p. 51.

42. Brassaï, *Conversations with Picasso* (Chicago: University of Chicago Press, 1999), p. 347.

43. John Berger, *The Success and Failure of Picasso* (New York: Vintage Books, 1989), pp. 35-36.

44. Shiff, *Cézanne and the End of Impressionism*, p. 222; Alfred H. Barr, Jr., *Picasso: Fifty Years of His Art* (New York: Museum of Modern Art, 1946), pp. 270-71.

45. Paul Gauguin, *The Writings of a Savage* (New York: Da Capo Press, 1996), pp. 5, 24, 139, 204. For a discussion of Gauguin's use of a preparatory study for a major work, see David Sweetman, *Paul Gauguin* (New York: Simon and Schuster, 1995), pp. 455-56.

46. Vincent van Gogh, *The Complete Letters of Vincent van Gogh* (London: Thames and Hudson, 1958), Vol. 2, pp. 606-07; Vol. 3, pp. 6, 28-31.

47. André Malraux, *Picasso's Mask* (New York: Holt, Rinehart, and Winston, 1976), p. 58; Daniel Wildenstein, *Monet, or the Triumph of Impressionism* (Koln: Taschen, 1996), pp. 256-68.

48. Théodore Duret, *Manet and the French Impressionists* (Philadelphia: J. B. Lippincott, 1910), p. 57.

49. Duret, *Manet and the French Impressionists*, p. 90; also see Alain de Leiris, *The Drawings of Edouard Monet*, (Berkeley: University of California Press, 1969), pp. 29-35, 109; Theodore Reff, *Manet: Olympia* (New York: Viking Press, 1977), pp. 72-79.

50. Richard Kendall, editor, *Monet by Himself* (New York: Knickerbocker Press, 1999), pp. 112, 172, 178.

51. Kendall, *Monet by Himself*, p. 122.

52. Linda Nochlin, editor, *Impressionism and Post-Impressionism, 1874-1904: Sources and Documents* (Englewood Cliffs, NJ: Prentice-Hall, 1966), p. 42.

53. Norma Broude, *Impressionism: A Feminist Reading* (New York: Rizzoli, 1991), p. 73.

54. Marcel Giry, *Fauvism: Origins and Development* (New York: Alpine Fine Arts, 1982), p. 250.

55. Jack Flam, *Matisse on Art*, Revised edition (Berkeley: University of California Press, 1995), pp. 37-40.

56. Flam, *Matisse on Art*, p. 145.

57. Hilary Spurling, *The Unknown Matisse* (New York: Alfred A. Knopf, 1998), p. 293.

58. Flam, *Matisse on Art*, pp. 130-31.

59. E.g. see John O'Brian, *Ruthless Hedonism: The American Reception of Matisse* (Chicago: University of Chicago Press, 1999), Chapter 6.

60. Herschel B. Chipp, *Theories of Modern Art: A Source Book by Artists and Critics* (Berkeley: University of California Press, 1969), p. 101.

61. Chipp, *Theories of Modern Art*, p. 102.

62. Chipp, *Theories of Modern Art*, p. 94.

63. Chipp, *Theories of Modern Art*, p. 101

64. Dore Ashton, *A Fable of Modern Art* (New York: Thames and Hudson, 1980), p. 26.

65. Rewald, *Paul Cézanne Letters*, p. 313; Ashton, *A Fable of Modern Art*, p. 9.

66. Roger Fry, *Last Lectures* (Boston: Beacon Press, 1962), p. 3.

67. Fry, *Last Lectures*, pp. 14-15. For evidence that Titian and Rembrandt were experimental innovators, see David W. Galenson and Robert Jensen, "Young Geniuses and Old Masters: The Life Cycles of Great Artists from Masaccio to Jasper Johns," (unpublished paper, University of Chicago, 2001).

Appendix: The books surveyed by this study are listed below in chronological order. In a number of cases, two or three books included in a series were treated as a single entry.

1. Maillard, Robert, editor, *Nouveau Dictionnaire de la Peinture Moderne* (Paris: Fernand Hazan, 1963).

2. Maillard, Robert, editor, *Dictionnaire Universel de l'Art et des Artistes*, 3 volumes (Paris: Hazan, 1967).

3. Jaffé, Hans L.C., *Histoire Générale de la Peinture, V: XIX*e et *XX*e *Siècles* (Paris: Flammarion, 1968).

4. Janneau, Guillaume, and Marcel-André Stalter, *L'Art Moderne* (Paris: Presses Universitaires de France, 1970).

5. Cabanne, Pierre, *Dictionnaire International des Arts*, 2 volumes (Paris: Bordas, 1979).

6. Christ, Yvan, *L'Art au XIX*e *Siècle: Du Second Empire á la fin du Siècle* (Paris: Flammarion, 1981).

   Lassalle, Hélène, *L'Art au XX*e *Siècle: De 1900 á la Seconde Guerre Mondiale* (Paris: Flammarion, 1986).

   Lassalle, Hélène, *L'Art au XX*e *Siècle: De L'Après-Guerre á Beaubourg* (Paris: Flammarion, 1986).

7. Bazin, Germain, *Histoire de L'Art de la Préhistoire à Nos Jours*, cinquième edition (Paris: Massin, 1986).

8. Plazy, Gilles, *Les Aventures de la Peinture Moderne* (Milan: Liana Levi, 1987).

9. Delacampagne, Christian, *L'Aventure de la Peinture Moderne* (Paris: Editions Mengès, 1988).

10. Breuille, Jean-Phillippe, *Dictionnaire de la Peinture Francaise: La Peinture en France du Moyen Age à Nos Jours* (Paris: Larousse, 1989).

11. Cabanne, Pierre, *L'Art du XIX*e *Siècle* (Paris: Somogy, 1989).

    Cabanne, Pierre, *L'Art du Vingtième Siècle* (Paris: Somogy, 1982).

12. Cachin, Francoise, et. al., *L'Art du XIX*e *Siècle: 1850-1905* (Paris: Editions Citadelles,

1990).

Bouillon, Jean-Paul; Paul-Louis Rinuy; and Antoine Baudin, *L'Art du XX^e Siècle: 1900-1939* (Paris: Editions Citadelles et Mazenod, 1996).

13. Bornay, Erika, *Histoire Universelle de l'Art, Tome IX: Le XIX^e Siècle* (Paris: Larousse, 1990).

Suarez, Alicia, and Merce Vidal, *Histoire Universelle de l'Art, Tome X: Le XX^e Siècle* (Paris: Larousse, 1990).

14. Châtelet, Albert, and Bernard Philippe Groslier, *Histoire de l'Art* (Paris: Larousse, 1990).

15. Ferry, Luc, *Le Sens de Beau: Aux Origines de la Culture Contemporaine* (Paris: Editions Grasset et Fasquelle, 1990).

16. Felici, Lucio, editor, *L'Encyclopedie de l'Art* (Paris: Librairie Generale Francaise, 1991).

17. Rancillac, Bernard, *Voir et Comprendre la Peinture* (Paris: Bordas, 1991).

18. Argan, Giulio Carlo, *L'Art Moderne* (Paris: Bordas, 1992).

19. Sprocatti, Sandro, *Guide de l'Art: Peinture, Sculpture, Architecture du XIV^e Siècle à nos jours* (Paris: Editions Solar, 1992).

20. Carrassat, Patricia Fride R., and Isabelle Marcadé, *Comprendre et Reconnaitre les Mouvements de la Peinture* (Paris: France Loisirs, 1993).

21. Marseille, Jacques, and Nadeije Laneyrie-Dagen, *Les Grands Evénements de l'Histoire de l'Art* (Paris: Larousse, 1993).

22. Barilleau, Michèle, and Francois Giboulet, *Histoire de la Peinture* (Paris: Hatier, 1994).

23. Loilier, Hervé, *Histoire de l'Art* (Paris: Spadem, 1994).

24. Dagen, Philippe, and Francoise Hamon, *Histoire de l'Art Flammarion: Epoque Contemporaine XIX^e - XX^e Siècles* (Paris: Flammarion, 1995).

25. Mérot, Alain, editor, *Histoire de l'Art, 1000-2000* (Paris: Editions Hazan, 1995).

26. Lavaud, Jose, *Grands Courants Artistiques et Esthetiques depuis la Renaissance* (Paris: Ellipses, 1996).

27. de Beaucorps, Monique; Raoul Ergmann; and Francois Trassard, *La Peinture des Grands Maîtres Europeens* (Paris: Editions de la Martinière, 1997).

28. Laclotte, Michel, and Jean-Pierre Cuzin, *Dictionnaire de la Peinture* (Paris: Larousse, 1997).

29. Anquetil, Jacques, *Le Grand Guide de l'Art* (Paris: Le Grand Livre du Mois, 1998).

30. Daix, Pierre, *Pour Une Histoire Culturelle de l'Art Moderne: De David à Cézanne* (Paris: Editions Odile Jacob, 1998).
Daix, Pierre, *Pour Une Histoire Culturelle de l'Art Moderne: Le XX*^{e} *Siècle* (Paris: Editions Odile Jacob, 2000).

31. Ferrier, Jean-Louis, *Brève Histoire de l'Art* (Paris: Hachette, 1999).