

Artistic styles: revisiting the analysis of modern artists' careers

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Abstract This paper is based on a global sample of the 214 most prominent modern visual artists born 1850–1945. Two analytical methods are used to analyse the age at which artists produce their best works—one based on year-of-birth cohorts of modern visual artists and the other on stylistic groups. The cohort-analysis shows that the career patterns develop similarly over time for artists working in the USA and Europe; over time the artists' peak ages first increase, reach their maximum for artists born between 1890 and 1909, and then decrease again. The study of stylistic groups shows that artists associated with Fauvism, the Nabis and Post-Impressionism experience an early peak, whereas artists associated with Surrealism, Impressionism, Abstract Expressionism, Art Informel, Pop Art, Expressionism and Cubism peak later in their careers.

Keywords Modern artists · Age · Life cycle · Creativity

JEL Classification N80 · Z11

1 Introduction

The literature on artistic careers, so far, has been shaped by three important research questions: how to measure the value of artistic output, the analysis of the age at which the best work was produced, and inferring postulates of creativity and innovation from the different career patterns of modern visual artists. This paper seeks to contribute to the two latter questions.

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With regard to the timing of an artist's best work, joint studies by Galenson and Weinberg (2000, 2001) pioneered in showing that artists' careers change over time. They study modern American artists born between 1900 and 1940 and French painters born between 1820 and 1900, respectively. Both these studies use year-of-birth cohorts of artists and show that artists born in later cohorts peak earlier in their careers. From this finding, they deduce that conceptual painters reach their peaks earlier in their careers than experimental artists. Conceptual artists plan their works ahead and use a systematic approach to execute these plans—the archetype conceptual painter is Picasso, an early bloomer. Experimental artists, however, use an incremental technique and seek perfection in their works—the archetype being Cézanne, a late bloomer.¹

Ginsburgh and Weyers (2006), on the other hand, find that old masters who are defined as 'conceptual' in their working methods do not reach career peaks early in their lives, and hence, they conclude that Galenson's and Weinberg's framework does not hold for old masters.² In addition, they point out that Galenson's and Weinberg's classifications of artists' creative approaches might be too restrictive at times.

On French artists Galenson and Weinberg (2001, p. 1069) conclude: "This difference in their careers was a systematic one, in which each of these masters represented a generation committed to a particular conception of how artistic advances could be made". As cohorts of artists merely represent the sum of artistic movements made by a generation of artists, the correlation between peak ages in cohorts and those of the individual art movements should be large. In other words, if the differences in peak ages found between cohorts of artists reflect changing working methods, it must be the case that there are also differences in peak ages across the stylistic groups of modern artists.

If Galenson's and Weinberg's implicit assumption that cohorts represent an artistic approach is generally true, we expect an econometric analysis of career patterns over time to produce the same peak ages for cohorts as for artistic styles, especially since the latter are a mere subsample of each cohort when aligned chronologically. The style-based estimation will be a test of Galenson's and Weinberg's assumption that cohorts of artists and their artistic approaches are correlated contemporaneously, with the cohort-analysis functioning as a benchmark for the career patterns generated by the estimation based on styles.

This paper uses a novel dataset of the 214 most prominent modern visual artists around the world as a basis for revisiting the estimation of creative life cycles of modern visual artists. With these data, the analysis can be expanded to cover more artists and a longer time period. In addition to analysing cohorts of artists, this paper also uses art movements to analyse the impact of working methods on peak ages in greater depth.

The dataset covers a global sample of 214 prominent artists born between 1850 and 1945 and auction results of their paintings yielded in modern art auctions from 1988 to 2007. These auction data are used as a measure for the quality of paintings,

¹ This classification of artists is described in detail in Galenson (2001, 2006).

² The old masters analysed in Ginsburgh and Weyers (2006) cover a birth-range from 1450 to 1634.

based on the assumption that market prices reflect the true quality of a painting.³ The dataset incorporates all important artists based on a prominence indicator and pools information on each artist's stylistic affiliation to an art movement with the price of paintings produced in each year of their careers (see Sect. 2 for details). The broad sample design ensures that there is no selection bias in terms of the artists' birth places, work locations or predominant working methods.

Compared with Galenson and Weinberg (2000, 2001), this paper extends the time frame in terms of birth years of artists up to 1945 and uses the same sample period for American as well as European artists.⁴ This expands the sample to a total of 214 artists compared to 51 American and 33 French artists, respectively, which were covered by Galenson and Weinberg (2000, 2001). Of the 214 artists in this study, 135 were born in Europe, 35 in the USA and 44 in the 'Rest of the World'; 150 worked mainly in Europe, 58 in the USA and 6 elsewhere. Hence, this broad sample incorporates artists from all over the world such that there is no bias towards 'local artists' and allows for the full capture of the different artistic movements originating in Europe and the USA in the late nineteenth and twentieth centuries.

Although many of the European artistic streams were centred in France, or more precisely in Paris, art movements such as Expressionism and Surrealism had strong roots in other European countries, such as Germany, Belgium and Spain.⁵ Thus, the comparison of the cohort- and style-based estimation includes the geographic location of the artistic innovations.

While using cohorts to estimate the life cycle creativity of artists has econometric advantages, cohorts are not necessarily a clear indicator of innovation and creativity patterns of artists.⁶ Hence, this paper examines a new mode of estimating artists' peak ages, namely, to model peak ages of artists using art historic groups, such as Cubists, Nabis, and Pop Artists. This has the advantage that artistic concepts and working methods can be included directly in the analysis. Thus, the basic method and ideology of each art movement can serve as a basis for conclusions on creativity. In addition, as art movements and the artists associated with them are defined *ex ante*, the estimation itself will show if artistic concepts matter for peak ages.

The estimation of creative life cycles based on artistic movements can be considered product-centred, with the art product being a result of two factors that are collectively referred to as the artistic style: the production technique and the topical content. Simonton (1988) suggests that specific features of the creative

³ Of course, there are other ways of assessing the quality of an artist's oeuvre, such as art criticism or the number of paintings reprinted in an arts dictionary or hung in a museum. However, as an objective measure and not least of all due to the number of observations for each artist, this paper is solely based on results of art auctions. Furthermore, one would expect there to be a large correlation between auction outcomes and other measures of quality.

⁴ Galenson and Weinberg use artists born between 1820 and 1900 for their study of French artists, and a birth range from 1900 to 1940 for American artists.

⁵ Galenson and Weinberg (2001) analyse French artists, however, in order to capture all European art movements, this paper is based on artists who work anywhere in Europe.

⁶ The time of one's birth is unarguably exogenous to an artist's decision to join a particular art movement.

process lead to different peak ages.⁷ It seems reasonable to assume that these process-specific features, such as the choice of subject and formal qualities, are systematically different for artists of the various artistic streams. In principle, this difference in creative processes should be traceable in the creative life cycles of the various art groups.⁸

Section 2 of this paper introduces the dataset used for the analysis, followed by some basic summary statistics. In Sect. 3, peak ages of cohorts of artists are estimated for the entire sample, and for the European and American subsamples separately. Then the ages at which the best works were produced by the different art movements are assessed and discussed with respect to each style's creative concept. In Sect. 4, the development of peak ages over the sample period under both estimation methods is evaluated. Section 5 concludes.

2 Data

The underlying dataset covers a global sample of 214 prominent modern visual artists born between 1850 and 1945 and auction results of their paintings yielded in modern art auctions from 1988 to 2007. This birth period not only encompasses many of the most influential artists of the past century but also most developments that define modern arts were made during this time frame.

The sampling technique is of utmost importance for this study and was performed on the basis of space dedicated to modern visual artists in the *Oxford Dictionary of Art: New Edition* (1997) and the *Reclam's Künstlerlexikon* (2002).⁹ Only artists who have more than 2.2 inches are included in the sample. This method is based on O'Hagan and Kelly (2005) and ultimately leaves us with a ranking of the top 269 visual artists born after 1850 and before 1945.¹⁰ However, only the 214 artists who had a minimum of 10 sold paintings during the period of 1988–2007 were included in the analysis.

All auction results were collected from <http://www.artvalue.com> (2007) and hammer prices were converted to real US dollar prices.¹¹ In addition, <http://www.artvalue.com> (2007) reports the size, support, medium used, and the year made for

⁷ Simonton (1988) focuses on interdisciplinary comparisons. The disciplines that peak early are lyric poetry, pure mathematics and physics; those that peak late are novel writing, history, philosophy and medicine.

⁸ The impact of technology and the production of human capital on productivity has been discussed by Bartel and Sicherman (1998) and Ben-Porath (1967).

⁹ The purpose of this cross-comparison is to avoid any oversampling of artists from the USA and the UK; O'Hagan and Kelly refer to this as a 'country marketing bias'. For full details, see O'Hagan and Kelly (2005) or Kelly and O'Hagan (2007).

¹⁰ The ranking of the most influential actors in a discipline has, for example, been undertaken by Murray (2003).

¹¹ The nominal prices were adjusted using the US CPI retrieved from the IMF's *International Financial Statistics*.

each painting.¹² Thus, each artist's portfolio of auctioned paintings can be attributed to the age at which he or she produced it.

The sample spreads across five cohorts, starting from 1850, in 20-year intervals; however, the last cohort only covers 15 years, 1930–1945. As most of the artistic movements of the past 150 years originated in either Europe or America—with clusters of modern art in New York and Paris (see Hellmanzik 2009 and O'Hagan and Hellmanzik 2008)—the empirical analysis focuses on artists who were mainly active in the US and Europe. All 214 modern visual artists that were included in this study are listed by birth cohorts and artistic styles in Table 1 along with their countries of birth, years of birth and death, the number of paintings auctioned and their main work locations.

In order to uniquely classify the artists' styles, the Grove Dictionary of Art: Online (2008) was referenced. From this source, biographical information on each artist's involvement with any artistic group or their main working styles were recorded. In the easiest of cases, an artist is clearly stated to be associated with a specific artistic style, such as Dalí with Surrealism. In cases where more than one artistic group was mentioned, the artist was classified to a movement depending on the one to which he or she was stated to have made the bigger impact. An example of this is Georges Braque, who was one of the leading figures of Cubism and also associated with the Fauvism movement in Paris; due to his more prominent role in the former, he is classified as a Cubist artist.

Altogether 10 different artistic styles represented by 133 artists are considered in this study:¹³ Impressionism, Post-Impressionism, the Nabis, Fauvism, Cubism, Expressionism, Surrealism, Abstract Expressionism, Art Informel and Pop Art.¹⁴ As the categorisation of artists into artistic groups is critical to this paper but a somewhat subjective undertaking, an elaboration on the method might be in order, especially in cases where a more general term is used to capture a range of artists.

Impressionism refers to the seven artists associated with the Impressionist movement, however, they might be thought of as late or young Impressionists, as the 'old masters' of this style, such as Cézanne and Monet, were born before the sampling period.¹⁵ The 11 Post-Impressionists are artists who were associated with Neo-Impressionism, Synthetism, Symbolism and Cloisonnism. The five Fauves are assigned to a unique stylistic group despite the fact that they are paralleled and somewhat similar to the Expressionists; this is due to the fact that they are a distinct group located in Paris and by themselves make up a large enough group for the analysis. In addition, artists who were directly referred to as Cubists, or who were either a member of the *Puteaux Group* or were exhibited at the *Salon de la Section d'Or*, were categorised as Cubists for a total of 16 artists. Art Informel refers to the European counterpart of Abstract Expressionism in the USA in the 1940s and 1950s.

¹² If this information was not available, the observation was not included in the sample.

¹³ These are the 133 artists who could be classified as a member of a particular stylistic group. The remaining 81 of the 214 artists could not be uniquely identified in terms of their styles.

¹⁴ A similar selection of formative art movements is presented and discussed in Janson (1977).

¹⁵ The sample period in this paper does not include artists born before 1850 and hence, early Impressionists like Cézanne who are included in Galenson and Weinberg (2001) are not covered.

Table 1 Artists included in this study

Artist name	Country of birth	Year of birth	Year of death	Number of paintings	Artistic style	Main work location
<i>Artists born 1850–1869</i>						
Corinth, Lovis	Germany	1858	1925	79	Expressionism	Europe
Ensor, James	Belgium	1860	1949	93	Expressionism	Europe
Jawlensky, Alexei von	Russia	1864	1941	312	Expressionism	Europe
Kandinsky, Wassily	Russia	1866	1944	97	Expressionism	Europe
Nolde, Emil	Germany	1867	1956	78	Expressionism	Europe
Matisse, Henri	France	1869	1954	140	Fauves	Europe
Forain, Jean-Louis	France	1852	1931	36	Impressionism	Europe
Pissarro, Lucien	France	1863	1944	82	Impressionism	Europe
Sickert, Walter Richard	Germany	1860	1942	138	Impressionism	Europe
Slevogt, Max	Germany	1868	1932	74	Impressionism	Europe
Steer, Philip Wilson	Britain	1860	1942	53	Impressionism	Europe
Bonnard, Pierre	France	1867	1947	385	Nabis	Europe
Serusier, Paul	France	1863	1927	114	Nabis	Europe
Vallotton, Felix	Switzerland	1865	1925	195	Nabis	Europe
Vuillard, Edouard	France	1868	1940	284	Nabis	Europe
Bernard, Emile	France	1868	1941	180	Post-Impressionism	Europe
Blanche, Jacques - Emile	France	1861	1942	72	Post-Impressionism	Europe
Gogh, Vincent van	Netherlands	1853	1890	61	Post-Impressionism	Europe
Hodler, Ferdinand	Switzerland	1853	1918	167	Post-Impressionism	Europe
Munch, Edvard	Norway	1863	1944	77	Post-Impressionism	Europe
Signac, Paul	France	1863	1935	116	Post-Impressionism	Europe
Toorop, Jan	Indonesia	1858	1928	28	Post-Impressionism	Europe
Brangwyn, Sir Frank	Belgium	1867	1956	45	–	Europe
Gallen-Kallela, Akseli	Finland	1865	1931	29	–	Europe
Henri, Robert	USA	1865	1929	68	–	USA
Josephson, Ernst	Sweden	1851	1906	17	–	Europe
Klimt, Gustav	Austria	1862	1918	22	–	Europe
Lavery, Sir John	Britain	1856	1941	205	–	Europe
Moses, Grandma	USA	1860	1961	56	–	USA
Mucha, Alphonse	Czech Republic	1860	1939	19	–	Europe
Prendergast, Maurice	Canada	1859	1924	19	–	USA

Table 1 continued

Artist name	Country of birth	Year of birth	Year of death	Number of paintings	Artistic style	Main work location
Sargent, John Singer	Italy	1856	1925	45	–	Europe
Valadon, Suzanne	France	1865	1938	105	–	Europe
Zorn, Anders	Sweden	1860	1920	98	–	USA
<i>Artists born 1870–1889</i>						
Albers, Josef	Germany	1888	1976	296	Abstract Expressionism	USA
Hofmann, Hans	Germany	1880	1966	155	Abstract Expressionism	USA
Baumeister, Willi	Germany	1889	1955	174	Art Informel	Europe
Bissiere, Roger	France	1888	1964	104	Art Informel	Europe
Braque, Georges	France	1882	1963	247	Cubism	Europe
Delaunay - Terk, Sonia	Russia	1885	1979	25	Cubism	USA
Delaunay, Robert	France	1885	1941	56	Cubism	USA
Dunoyer de Segonzac, Andre	France	1884	1974	29	Cubism	Europe
Gleizes, Albert	France	1881	1953	129	Cubism	Europe
Gris, Juan	Spain	1887	1927	81	Cubism	Europe
Kupka, Frantisek	Czech Republic	1871	1957	32	Cubism	Europe
La Fresnaye, Roger de	France	1885	1925	24	Cubism	Europe
Le Fauconnier, Henri	France	1881	1946	17	Cubism	Europe
Leger, Fernand	France	1881	1955	334	Cubism	Europe
Lhote, Andre	France	1885	1962	358	Cubism	Europe
Mondrian, Piet	Netherlands	1872	1944	72	Cubism	Europe
Picabia, Francis	France	1879	1953	284	Cubism	Europe
Picasso, Pablo	Spain	1881	1973	694	Cubism	Europe
Severini, Gino	Italy	1883	1966	103	Cubism	Europe
Villon, Jacques	France	1875	1963	142	Cubism	Europe
Beckmann, Max	Germany	1884	1950	57	Expressionism	Europe
Chagall, Marc	Belorussia	1887	1985	466	Expressionism	Europe
Dongen, Kees van	Netherlands	1877	1968	256	Expressionism	Europe
Hofer, Carl	Germany	1878	1955	237	Expressionism	Europe
Kirchner, Ernst Ludwig	Germany	1880	1938	79	Expressionism	Europe
Klee, Paul	Switzerland	1879	1940	83	Expressionism	Europe
Kokoschka, Oskar	Austria	1886	1980	25	Expressionism	Europe
Macke, August	Germany	1887	1914	30	Expressionism	Europe
Modersohn-Becker, Paula	Germany	1876	1907	36	Expressionism	Europe
Pechstein, Max	Germany	1881	1955	156	Expressionism	Europe

Table 1 continued

Artist name	Country of birth	Year of birth	Year of death	Number of paintings	Artistic style	Main work location
Permeke, Constant	Belgium	1886	1952	39	Expressionism	Europe
Rouault, Georges	France	1871	1958	193	Expressionism	Europe
Schmidt-Rottluff, Karl	Germany	1884	1976	54	Expressionism	Europe
Derain, Andre	France	1880	1954	260	Fauves	Europe
Dufy, Raoul	France	1877	1953	418	Fauves	Europe
Marquet, Albert	France	1875	1947	416	Fauves	Europe
Vlaminck, Maurice de	France	1876	1958	315	Fauves	Europe
Orpen, Sir William	Ireland	1878	1931	41	Impressionism	Europe
Denis, Maurice	France	1870	1943	210	Nabis	Europe
Carra, Carlo	Italy	1881	1966	140	Post-Impressionism	Europe
Goncharova, Natalia	Russia	1881	1962	47	Post-Impressionism	Europe
Heckel, Erich	Germany	1883	1970	43	Post-Impressionism	Europe
Larionov, Mikhail	Russia	1881	1964	28	Post-Impressionism	Europe
Arp, Jean (Hans)	France	1886	1966	88	Surrealism	Europe
Chirico, Giorgio de	Greece	1888	1978	468	Surrealism	Europe
Nash, Paul	Britain	1889	1946	22	Surrealism	Europe
Rivera, Diego	Mexico	1886	1957	81	Surrealism	Europe
Balla, Giacomo	Italy	1871	1958	102	–	Europe
Bellows, George Wesley	USA	1882	1925	31	-	USA
Boccioni, Umberto	Italy	1882	1916	20	–	Europe
Bombois, Camille	France	1883	1970	51	–	Europe
Carr, Emily	Canada	1871	1945	48	–	Europe
Feininger, Lyonel	USA	1871	1956	78	–	Europe
Foujita, Tsuguharu	Japan	1886	1965	179	–	Europe
Gilman, Harold	Britain	1876	1919	15	–	Europe
Glackens, William James	USA	1870	1938	26	–	USA
Harris, Lawren Stewart	Canada	1885	1970	60	–	USA
Jackson, Alexander Young	Canada	1882	1974	178	–	–
Lamb, Henry	Australia	1883	1960	45	–	Europe
Le Corbusier	Switzerland	1887	1965	69	–	Europe
Leck, Bart van der	Netherlands	1876	1958	21	–	Europe

Table 1 continued

Artist name	Country of birth	Year of birth	Year of death	Number of paintings	Artistic style	Main work location
Marin, John	USA	1870	1953	16	–	USA
Milne, David Brown	Canada	1882	1953	34	–	USA
Modigliana, Amedeo	Italy	1884	1920	81	–	Europe
O’Keeffe, Georgia	USA	1887	1986	43	–	USA
Orozco, Jose Clemente	Mexico	1883	1949	17	–	USA
Pascin, Jules	Bulgaria	1885	1930	137	–	Europe
Roerich, Nikolai	Russia	1874	1947	30	–	–
Russell, Morgan	USA	1886	1953	17	–	Europe
Schlemmer, Oskar	Germany	1888	1943	34	–	Europe
Schwitters, Kurt	Germany	1887	1948	157	–	Europe
Sloan, John	USA	1871	1951	30	–	USA
Stella, Joseph	Italy	1877	1946	19	–	USA
Thomson, Tom	Canada	1877	1917	20	–	–
Torres-Garcia, Joaquin	Uruguay	1874	1949	161	–	Europe
Utrillo, Maurice	France	1883	1955	585	–	Europe
Weber, Max	Russia	1881	1961	32	–	USA
<i>Artists born 1890–1909</i>						
Bush, Jack Hamilton	Canada	1909	1977	45	Abstract Expressionism	Europe
de Kooning, Willem	Netherlands	1904	1997	208	Abstract Expressionism	USA
Gorky, Arshile	Turkey	1904	1948	32	Abstract Expressionism	USA
Gottlieb, Adolph	USA	1903	1974	109	Abstract Expressionism	USA
Moholy-Nagy, Laszlo	Hungary	1895	1946	23	Abstract Expressionism	USA
Rothko, Mark	Russia	1903	1970	101	Abstract Expressionism	USA
Tobey, Mark	USA	1890	1976	62	Abstract Expressionism	USA
Tworkov, Jack	Poland	1900	1982	30	Abstract Expressionism	USA
Bill, Max	Switzerland	1908	1994	135	Art Informel	Europe
Dubuffet, Jean	France	1901	1985	461	Art Informel	Europe
Fautrier, Jean	France	1898	1964	191	Art Informel	Europe
Hartung, Hans	Germany	1904	1989	517	Art Informel	Europe
Masson, Andre	France	1896	1987	294	Art Informel	Europe
Nicholson, Ben	Britain	1894	1982	183	Art Informel	Europe
Pasmore, Victor	Britain	1908	1998	44	Art Informel	Europe

Table 1 continued

Artist name	Country of birth	Year of birth	Year of death	Number of paintings	Artistic style	Main work location
Poliakoff, Serge	Russia	1906	1969	375	Art Informel	Europe
Dix, Otto	Germany	1891	1969	60	Expressionism	Europe
Grosz, George	Germany	1893	1959	42	Expressionism	USA
Schiele, Egon	Austria	1890	1918	33	Expressionism	Europe
Soutine, Chaim	Belorussia	1893	1943	163	Expressionism	Europe
Spencer, Sir Stanley	Britain	1891	1959	55	Impressionism	Europe
Bayer, Herbert	Austria	1900	1985	20	Surrealism	USA
Dali, Salvador	Spain	1904	1989	152	Surrealism	Europe
Delvaux, Paul	Belgium	1897	1994	73	Surrealism	Europe
Ernst, Max	Germany	1891	1976	307	Surrealism	Europe
Giacometti, Alberto	Switzerland	1901	1966	40	Surrealism	Europe
Hayter, S.W.	Britain	1901	1988	67	Surrealism	Europe
Lam, Wifredo	Cuba	1902	1982	294	Surrealism	Europe
Magritte, Rene	Belgium	1898	1967	178	Surrealism	Europe
Miro, Joan	Spain	1893	1983	235	Surrealism	Europe
Sutherland, Graham	Britain	1903	1980	85	Surrealism	Europe
Tanguy, Yves	France	1900	1955	69	Surrealism	Europe
Bacon, Francis	Ireland	1909	1992	79	-	Europe
Balthus	France	1908	2001	78	-	Europe
Calder, Alexander	USA	1898	1976	63	-	Europe
Cavalcanti, Emiliano di	Brazil	1897	1976	52	-	Europe
Davis, Stuart	USA	1894	1964	16	-	USA
Dobell, Sir William	Australia	1899	1970	40	-	Europe
Fontana, Lucio	Argentina	1899	1968	529	-	Europe
Lempicka, Tamara de	Poland	1898	1980	87	-	USA
Lurcat, Jean	France	1892	1966	118	-	Europe
Macdonald-Wright, Stanton	USA	1890	1973	13	-	USA
Marini, Marino	Italy	1901	1980	93	-	Europe
Marsh, Reginald	France	1898	1954	46	-	USA
Merida, Carlos	Guatemala	1891	1984	75	-	-
Morandi, Giorgio	Italy	1890	1964	217	-	Europe
Nevelson, Louise	Russia	1899	1988	16	-	USA
Piper, John	Britain	1903	1992	62	-	Europe
Preston, Margaret	Australia	1893	1963	19	-	USA
Siqueiros, David Alfaro	Mexico	1896	1975	108	-	-
Tamayo, Rufino	Mexico	1899	1991	179	-	USA
Tchelitchew, Pavel	Russia	1898	1957	34	-	Europe

Table 1 continued

Artist name	Country of birth	Year of birth	Year of death	Number of paintings	Artistic style	Main work location
Vasarely, Victor	Hungary	1908	1997	700	-	Europe
<i>Artists born 1910–1929</i>						
Diebenkorn, Richard	USA	1922	1993	58	Abstract Expressionism	USA
Frankenthaler, Helen	USA	1928	2008	117	Abstract Expressionism	USA
Guston, Philip	USA	1913	1980	66	Abstract Expressionism	USA
Held, Al	USA	1928	2005	40	Abstract Expressionism	USA
Kline, Franz	USA	1910	1962	102	Abstract Expressionism	USA
Louis, Morris	USA	1912	1962	80	Abstract Expressionism	USA
Matta, Roberto	Chile	1911	2002	448	Abstract Expressionism	Europe
Motherwell, Robert	USA	1915	1991	182	Abstract Expressionism	USA
Noland, Kenneth	USA	1924	still alive	165	Abstract Expressionism	USA
Olitski, Jules	Russia	1922	2007	85	Abstract Expressionism	USA
Pollock, Jackson	USA	1912	1956	24	Abstract Expressionism	USA
Reinhardt, Ad	USA	1913	1967	56	Abstract Expressionism	USA
Alechinsky, Pierre	Belgium	1927	still alive	326	Art Informel	Europe
Appel, Karel	Netherlands	1921	2006	848	Art Informel	Europe
Atlan, Jean-Michel	France	1913	1960	241	Art Informel	Europe
Burri, Alberto	Italy	1915	1995	128	Art Informel	Europe
Davie, Alan	Britain	1920	still alive	105	Art Informel	Europe
Francis, Sam	USA	1923	1994	581	Art Informel	USA
Riopelle, Jean-Paul	Canada	1923	2002	352	Art Informel	Europe
Stael, Nicolas de	Russia	1914	1955	131	Art Informel	Europe
Tapiès, Antoni	Spain	1923	still alive	381	Art Informel	Europe
Lichtenstein, Roy	USA	1923	1997	173	Pop Art	USA
Nolan, Sir Sydney	Australia	1917	1992	151	Pop Art	Europe
Rauschenberg, Robert	USA	1925	2008	170	Pop Art	USA
Warhol, Andy	USA	1928	1987	1279	Pop Art	USA
Baziotes, William	USA	1912	1963	28	Surrealism	USA
Annigoni, Pietro	Italy	1910	1988	41	-	Europe
Boyd, Arthur	Australia	1920	1999	107	-	Europe

Table 1 continued

Artist name	Country of birth	Year of birth	Year of death	Number of paintings	Artistic style	Main work location
Cruz-Diez, Carlos	Venezuela	1923	2008	31	-	Europe
Freud, Lucian	Germany	1922	2008	56	-	Europe
Gruber, Francis	France	1912	1948	59	-	Europe
Guttoso, Renato	Italy	1912	1987	295	-	Europe
Hundertwasser, Fritz	Austria	1928	2000	50	-	Europe
Klein, Yves	France	1928	1962	113	-	Europe
Le Parc, Julio	Argentina	1928	still alive	30	-	Europe
Pearlstein, Philip	USA	1924	still alive	25	-	USA
Rabin, Oskar	Russia	1928	2008	42	-	Europe
Ronald, William	Canada	1926	1998	20	-	USA
Tinguely, Jean	Switzerland	1925	1991	104	-	Europe
Williams, Frederick	Australia	1927	1982	49	-	-
<i>Artists born 1930–1945</i>						
Blake, Peter	Britain	1932	2006	25	Pop Art	Europe
Dine, Jim	USA	1935	still alive	82	Pop Art	USA
Johns, Jasper	USA	1930	still alive	36	Pop Art	USA
Jones, Allen	Britain	1937	still alive	34	Pop Art	Europe
Kitaj, Ron B.	USA	1932	2007	41	Pop Art	Europe
Wesselmann, Tom	USA	1931	2004	334	Pop Art	USA
Christo, Javacheff	Bulgaria	1935	still alive	139	-	USA
Hockney, David	Britain	1937	still alive	92	-	USA
Riley, Bridget	Britain	1931	still alive	42	-	Europe
Stella, Frank	USA	1936	still alive	196	-	USA

Source: All information on artists was obtained from Grove Dictionary of Art: Online (2008)

Table 2 shows the proportion of artists in each cohort that can be identified as belonging to one of the 10 stylistic streams. The styles are ordered historically by the year in which they originated. The largest movements are Expressionism and Abstract Expressionism, each being represented by 22 artists; the smallest groups are the Nabis and the Fauves with only 5 artists each. Overall 62% of artists can be identified as members of a particular artistic style; the coverage of artistic styles varies by cohort and ranges from 58% for artists born from 1870–1889 to 68% for the first cohort 1850–1869.

These changes in the diversity of stylistic streams followed by artists is most apparent in the second cohort of artists, which at the same time is also the largest in terms of artists observed. Table 2 shows not only that artistic styles shift over time but also that most styles are prominent with at least two or three cohorts. Only Cubism is represented by a single cohort: artists born from 1870 to 1889. The last cohort, on the other hand, consists entirely of Pop Artists, however, one has to bear

Table 2 Art movements represented in cohorts

	All	1850–1869	1870–1889	1890–1909	1910–1929	1930–1945
Cohorts	214	34	79	51	40	10
Impressionism	7	5	1	1	–	–
Post-Impressionism	11	8	3	–	–	–
Nabis	5	4	1	–	–	–
Fauves	5	1	4	–	–	–
Expressionism	22	5	13	4	–	–
Cubism	16	–	16	–	–	–
Surrealism	16	–	4	11	1	–
Abstract Expressionism	22	–	2	8	12	–
Art Informel	19	–	2	8	9	–
Pop Art	10	–	–	–	4	6
Total (Stylistic groups)	133	23	46	32	26	6
As share of cohort	0.62	0.68	0.58	0.63	0.65	0.60

Source: All information on artists was obtained from Grove Dictionary of Art: Online (2008)

in mind that most artists' styles and influences cannot be determined until late in their careers or even posthumously.

Summary statistics for cohorts of the overall sample are displayed in Table 3. Most interestingly, we observe that the average age at which paintings are produced increases from the first to the third cohort and decreases again in the fourth and fifth cohorts. Prices are highest, and above half a million US dollars on average, for paintings produced by artists born in the nineteenth century. The average size of paintings increases steadily and almost doubles from the second to the third cohort. The share of paintings that are created on a canvas is steady at around 65%, however, for artists born after 1930, only 46% of all paintings are on canvas. Interestingly, the share of oil paintings decreases with every cohort, starting from 97% for the first cohort and reaching a minimum of only 33% for the last cohort.

Table 4 gives basic summary statistics for the different artistic groups. In terms of the average age at which artists produced their paintings, we observe the same basic pattern as for the cohorts—there first is an increase in age from mid-40s to early and even mid-50s, decreasing again for artists involved in Art Informel and Pop Art, the latest two art movements covered in this study. Prices vary tremendously for each artistic group as reflected by the large standard errors. The highest average price was yielded by Cubist paintings with over a million US dollars per piece, followed with a large gap by Post-impressionist pieces, selling for about \$830,000. The average painting increased significantly in size with the Surrealists and later movements. Oil is the most important medium for all art groups before the Second World War, encompassing 90% of all pieces. In the postwar movements, oil waned and was the medium used in only 66–70% of paintings from the Abstract Expressionist and Art Informel movement and in 20% of Pop Art works.

Table 3 Summary statistics for cohorts

	All	1850–1869	1870–1889	1890–1909	1910–1929	1930–1945
Year of birth	1895 (21.2)	1862 (4.9)	1880 (5.5)	1899 (5.6)	1920 (6.3)	1934 (2.7)
Year made	1946 (25.6)	1910 (15.9)	1932 (18.9)	1956 (16.3)	1968 (12.6)	1975 (10.9)
Age at production	50.7 (15.5)	47.8 (15.6)	51.7 (17.7)	55.7 (14.7)	47.1 (11.2)	41.7 (11.7)
Year of sale	1999 (5.5)	1998 (5.3)	1998 (5.4)	1998 (5.4)	1999 (5.7)	2000 (5.5)
Price (US\$)	438,431 (2,106,624)	605,780 (2,993,166)	525,301 (2,406,303)	412,580 (1,865,261)	285,230 (1,339,769)	284,554 (881,942)
Size (cm ²)	7,382 (45,422)	4,089 (22,365)	4,147 (5,716)	8,086 (86,654)	11,390 (18,679)	16,827 (23,781)
Canvas	0.66 (0.47)	0.64 (0.48)	0.68 (0.47)	0.66 (0.47)	0.66 (0.48)	0.46 (0.50)
Oil	0.76 (0.43)	0.97 (0.16)	0.93 (0.23)	0.75 (0.43)	0.48 (0.50)	0.33 (0.47)
Observations	29,243	3,589	10,006	7,288	7,339	1,021
Number of artists	214	34	79	51	40	10
Paintings per artist	137	106	127	143	183	102

Notes: Standard deviations are in parentheses. The nominal prices were adjusted using the US CPI retrieved from the IMF's *International Financial Statistics*. Sources: All information on artists was obtained from Grove Dictionary of Art: Online (2008). All data on paintings were obtained from <http://www.artvalue.com>

Table 4 Summary statistics for art groups

	Impressionism (1860–1885)	Post- Impressionism (1886–1905)	Nabis (1888– 1900)	Fauves (1898–1906)	Expressionism (1905–1920)	Cubism (1907–1914)	Surrealism (1917–1930)	Abstract Expressionism (1940–1950)	Art Informel (1940–1950)	Pop Art (1950–1960)
Year of birth	1867 (13.1)	1868 (11.7)	1867 (2.7)	1875 (4.0)	1879 (10.6)	1881 (4.7)	1897 (7.4)	1908 (12.7)	1909 (12.3)	1929 (6.0)
Year made	1912 (15.6)	1911 (21.4)	1910 (12.7)	1924 (14.1)	1930 (21.1)	1932 (18.6)	1949 (16.1)	1963 (11.6)	1963 (14.6)	1975 (10.5)
Age at production	46.2 (13.4)	45.2 (17.5)	43.3 (12.8)	48 (14.1)	52.8 (19.3)	51.2 (18.9)	53.9 (15.7)	55.6 (14.0)	51.1 (13.4)	47.7 (10.1)
Year of sale	1998 (4.5)	1998 (5.3)	1998 (5.5)	1998 (5.4)	1999 (5.3)	1998 (5.3)	1999 (5.3)	1999 (5.7)	1999 (5.7)	2001 (5.2)
Price (US\$)	82,486 (162,768)	827,926 (4,040,753)	308,913 (749,660)	431,463 (1,418,529)	596,925 (1,768,517)	1,034,943 (4,042,375)	406,592 (924,363)	477,138 (2,301,709)	133,147 (294,497)	557,301 (2,238,536)
Size (cm ²)	3,844 (7,202)	4,798 (5,414)	3,454 (3,362)	3,294 (3,914)	4,111 (3,960)	5,054 (8,539)	8,338 (156,373)	14,500 (19,426)	8,214 (10,069)	10,938 (16,581)
Canvas	0.83 (0.37)	0.78 (0.41)	0.62 (0.49)	0.85 (0.36)	0.62 (0.49)	0.76 (0.42)	0.75 (0.43)	0.57 (0.49)	0.59 (0.49)	0.70 (0.46)
Oil	0.98 (0.12)	0.98 (0.14)	0.95 (0.21)	0.99 (0.04)	0.93 (0.25)	0.95 (0.22)	0.91 (0.29)	0.70 (0.46)	0.66 (0.47)	0.20 (0.40)
Observations	479	959	1,188	1,549	2,668	2,627	2,207	2,484	5,571	2,325
Number of artists	7	11	5	5	22	16	16	22	19	10
Paintings per artist	68	87	238	310	121	164	138	113	293	233

Notes: The nominal prices were adjusted using the US CPI retrieved from the IMF's *International Financial Statistics Sources*. All information on artists was obtained from Grove Dictionary of Art: Online (2008). All data on paintings were obtained from <http://www.artvalue.com>

3 Empirical analysis

3.1 Cohorts: career paths of modern artists over time

First, we estimate the age at which artists produce their best works by cohorts following Galenson and Weinberg (2000, 2001) using a hedonic price model as discussed in Ashenfelter and Graddy (2006). In order to compare peak ages obtained in this study across time and geographic location, the cohort peak ages are estimated internationally and for artists working in Europe and the United States separately. Formally, the specification is given by

$$\begin{aligned} \ln(\text{price})_{ij} = & \sum_{c=1}^5 \left[\beta_1^c \text{age} + \beta_2^c \text{age}_{ij}^2 + \beta_3^c \text{age}_{ij}^3 + \beta_4^c \text{age}_{ij}^4 \right] [\text{cohort}_{ij} = c] \\ & + \gamma_1 \text{canvas}_{ij} + \gamma_2 \ln(\text{size}) + \gamma_3 \text{oil}_{ij} + \sum_{i=1}^{214} \alpha_i (\text{artist}_i = i). \quad (1) \\ & + \sum_{y=1988}^{2007} \theta_y (\text{saleyear}_{ij} = y) + e_{ij} \end{aligned}$$

Index i denotes the artist and j the painting; the artist's age Age_{ij} enters as a fourth-order polynomial to allow for single- and double-peaked career cycles.^{16, 17} Cohort_{ij} is an indicator function that is 1 for the cohort to be considered C . The hedonic characteristics of the paintings are controlled for by an indicator variable such as whether or not the painting is on canvas or some other material, if the painting was made using oil, as well as the size of the painting in square centimetres.¹⁸ In addition, controls are included for the sale year of the painting j to adjust for any trends in the art market, and artists' fixed effects were used to account for any individual specific characteristics that might explain prices at auction. As the number of observations and prices vary across artists, the model is weighted by the inverse of the mean square error for each artist.¹⁹ In addition, heteroskedasticity-robust standard errors are employed.

The results of the estimation are presented in Table 5; the first column refers to the full sample estimation, the second to artists mainly active in America and the third to artists working in Europe. The calculation of the age at which the best painting was produced is based on the age coefficients in the respective specification. The resulting peak ages are shown for each cohort and by work locations in Table 6. The overall sample as well as the American subsample do not show a significant age effect for the first cohort of artists, and hence produce a

¹⁶ This imposes the same relationship between age and price for each artist of a certain cohort or group, but nevertheless, allows for comparability of the results.

¹⁷ Galenson and Weinberg (2000, 2001) use the same polynomial in age as does Hodgson (2007).

¹⁸ We expect larger paintings to yield higher prices at auction. Similarly, oil paintings might sell for a higher price than paintings produced with less durable materials.

¹⁹ This weighting method follows Galenson and Weinberg (2000, 2001). The results are similar when each artist receives the same weight and when an unweighted estimation is used.

Table 5 Cohort specifications by geographic region

Log (Price)	Entire sample	European sample	American sample
Cohort1 * Age	−0.017 [0.059]	0.103 [0.090]	−0.028 [0.295]
Cohort1 * Age ²	0.000 [0.002]	−0.004 [0.003]	−0.003 [0.008]
Cohort1 * Age ³	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]
Cohort1 * Age ⁴	0.000 [0.000]	0.000 [0.000]	0.000 [0.000]
Cohort2 * Age	0.381 [0.043]***	0.349 [0.044]***	1.292 [0.230]***
Cohort2 * Age ²	−0.012 [0.001]***	−0.011 [0.001]***	−0.038 [0.007]***
Cohort2 * Age ³	0.000 [0.000]***	0.000 [0.000]***	0.000 [0.000]***
Cohort2 * Age ⁴	0.000 [0.000]***	0.000 [0.000]***	0.000 [0.000]***
Cohort3 * Age	0.494 [0.072]***	0.498 [0.076]***	0.800 [0.239]***
Cohort3 * Age ²	−0.011 [0.002]***	−0.012 [0.002]***	−0.021 [0.007]***
Cohort3 * Age ³	0.000 [0.000]***	0.000 [0.000]***	0.000 [0.000]**
Cohort3 * Age ⁴	0.000 [0.000]**	0.000 [0.000]***	0.000 [0.000]**
Cohort4 * Age	1.333 [0.094]***	0.952 [0.105]***	3.213 [0.327]***
Cohort4 * Age ²	−0.042 [0.003]***	−0.030 [0.003]***	−0.098 [0.011]***
Cohort4 * Age ³	0.001 [0.000]***	0.000 [0.000]***	0.001 [0.000]***
Cohort4 * Age ⁴	0.000 [0.000]***	0.000 [0.000]***	0.000 [0.000]***
Cohort5 * Age	0.973 [0.339]***	−4.265 [2.365]*	0.939 [0.366]**
Cohort5 * Age ²	−0.037 [0.012]***	0.150 [0.086]*	−0.036 [0.013]***
Cohort5 * Age ³	0.001 [0.000]***	−0.002 [0.001]*	0.001 [0.000]***
Cohort5 * Age ⁴	0.000 [0.000]***	0.000 [0.000]	0.000 [0.000]***
Log (size)	0.603 [0.006]***	0.606 [0.007]***	0.595 [0.010]***
Canvas	0.347 [0.015]***	0.277 [0.016]***	0.658 [0.035]***
Oil	0.294 [0.020]***	0.357 [0.023]***	0.134 [0.043]***
Artists fixed effects	Yes	Yes	Yes
Year of sale dummy	Yes	Yes	Yes
Observations	29,243	22,569	6,214
R-squared	0.70	0.71	0.68

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. Robust standard errors are in parantheses. Regressions are weighted by the inverse of the mean square error for each artist. The age polynomials for each cohort are jointly significant at the 1% level

corner solution. The same holds for the last cohort in the European subsample. For the first American as well as the last European cohort, this is due to the very limited amount of artists active in the respective area during these periods.²⁰

For the overall sample, we first observe an increase in peak age by 8.4 years from the second to the third cohort (from 31.0 years to 39.4), followed by two subsequent drops of 9.4 and 10.1 years. Looking at artists active in Europe only, we also find a sharp increase from the first to the second cohort by 6.9 years (from 23.5 to 30.4 years), another increase by 9.4 years for the subsequent cohort, and ultimately a fall by 10.2 years from the third to the fourth cohort. The American career path

²⁰ Only four artists out of the first cohort worked in the US. Similarly, only four artists out of the last cohort were active in Europe.

Table 6 Estimated peak ages for each cohort

		1850–1869	1870–1889	1890–1909	1910–1929	1930–1945
Entire sample		15.0	31.0	39.4	30.0	19.9
Observations	29,243	3,589	10,006	7,288	7,339	1,021
Artists	214	34	79	51	40	10
Europe		23.5	30.4	39.4	29.2	91.0
Observations	22,569	3,348	8,919	6,121	4,039	142
Artists	151	30	61	35	21	4
USA		15.0	32.9	35.2	33.4	21.4
Observations	6,214	241	859	984	3,251	879
Artists	58	4	15	15	18	6

Notes: Peak ages are estimated from specifications in Table 7

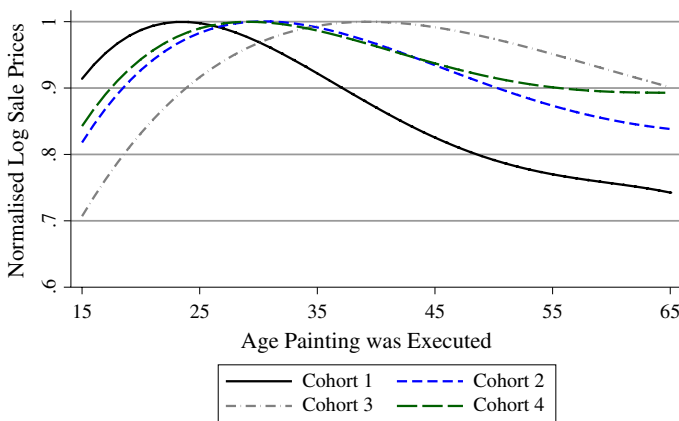


Fig. 1 European-based artists. Notes: Age-price profiles were estimated using specification 2 in Table 5. Prices were normalised at the respective cohort maximum

shows the same basic pattern—an increase in the peak age followed by a decrease—but seems to become much smoother, with the only sharp drop in the peak age of the last cohort of 12 years (from 33.4 to 214 years). Figures 1 and 2 depict the creative life cycles of artists based in Europe and the USA. The courses of creative life cycles over the entire time horizon of the modern arts seem to be independent of geographic location.

The increasing peak age for the second cohort (artists born 1870–1889) might be due to the fact that this is the most diverse cohort in terms of artistic streams (see Table 2). Another possible explanation for this might be the advancement of new concepts and approaches to art, such as Cubism, the first shift towards abstraction in modern arts. These new techniques were less interested in ‘naturalism’ and much more concerned with different ways of depicting reality (Grove Dictionary of Art 2008). Artists born 1890–1909 experience their career peaks the latest and were mainly Surrealists. Movements following Surrealism emerged at the end of the

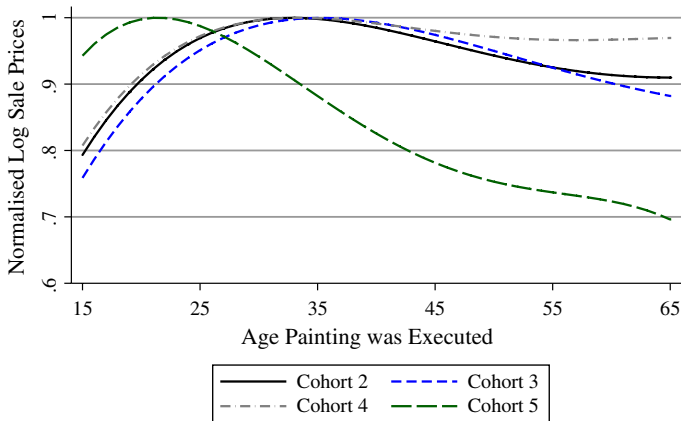


Fig. 2 American-based artists. *Notes:* Age-price profiles were estimated using specification 3 in Table 5. Prices were normalised at the respective cohort maximum

Second World War and continued into the early postwar period. Hence, the war might have had a severe impact on these artists' careers, causing them to peak much later than other cohorts.

Focusing on the hedonic parameters, a quick comparison between American- and European-based artists might be of interest. The coefficient on *oil* is almost double for artists working in Europe compared to their American counterparts. Given the much longer tradition of classical visual arts in Europe, the prominence of paintings in this rather traditional medium in the art market is not really surprising.²¹ This is also consistent with the fact that oil was mostly used by artists who were born earlier, whereas canvas has been a popular support material for all generations of artists. This pays tribute to the fact that artistic styles have shifted severely over time, which is partially picked up by the media used to produce modern paintings. This characteristic feature of the more traditional European art seems to be factored into the demand for arts.²²

The analysis of cohorts of artists over time and geographical location shows that both follow a similar path, with peak ages first increasing, reaching a maximum for artists born between 1890 and 1909, and subsequently decreasing.

However, as the stylistic composition of each cohort varies greatly, we can only speculate on the impact the artistic approach has on peak ages. In order to shed more light on the role of conceptual advancements for the change in peak ages over time, we will now focus on the calculation of peak ages by artistic streams. This approach models the impact of artists' working methods on the timing of their best

²¹ Eighty-four percent of European paintings are oil paintings, whereas this is the case for only 46% of American paintings.

²² Interestingly, the coefficients on size are within the range of Galenson's and Weinberg's results (2000, 2001), despite the differences in the sample considered.

Table 7 Art movement specifications

Log (Price)			
Impressionism * Age	1.141 [0.300]***	Cubism * Age	0.626 [0.088]***
Impressionism * Age ²	−0.035 [0.010]***	Cubism * Age ²	−0.018 [0.003]***
Impressionism * Age ³	0.000 [0.000]***	Cubism * Age ³	0.000 [0.000]***
Impressionism * Age ⁴	0.000 [0.000]***	Cubism * Age ⁴	0.000 [0.000]***
Post-Impressionism * Age	−0.195 [0.177]	Surrealism * Age	0.531 [0.132]***
Post-Impressionism * Age ²	0.007 [0.006]	Surrealism * Age ²	−0.013 [0.004]***
Post-Impressionism * Age ³	0.000 [0.000]	Surrealism * Age ³	0.000 [0.000]**
Post-Impressionism * Age ⁴	0.000 [0.000]	Surrealism * Age ⁴	0.000 [0.000]*
Nabis * Age	0.801 [0.250]***	Abstract Expressionism * Age	0.718 [0.214]***
Nabis * Age ²	−0.031 [0.009]***	Abstract Expressionism * Age ²	−0.021 [0.006]***
Nabis * Age ³	0.000 [0.000]***	Abstract Expressionism * Age ³	0.000 [0.000]***
Nabis * Age ⁴	0.000 [0.000]***	Abstract Expressionism * Age ⁴	0.000 [0.000]***
Fauves * Age	0.746 [0.199]***	Art Informel * Age	0.878 [0.095]***
Fauves * Age ²	−0.027 [0.006]***	Art Informel * Age ²	−0.026 [0.003]***
Fauves * Age ³	0.000 [0.000]***	Art Informel * Age ³	0.000 [0.000]***
Fauves * Age ⁴	0.000 [0.000]***	Art Informel * Age ⁴	0.000 [0.000]***
Expressionism * Age	0.495 [0.082]***	Pop Art * Age	1.876 [0.294]***
Expressionism * Age ²	−0.014 [0.002]***	Pop Art * Age ²	−0.055 [0.010]***
Expressionism * Age ³	0.000 [0.000]***	Pop Art * Age ³	0.001 [0.000]***
Expressionism * Age ⁴	0.000 [0.000]***	Pop Art * Age ⁴	0.000 [0.000]***
Log (size)	0.615 [0.006]***		
Canvas	0.297 [0.014]***		
Oil	0.316 [0.018]***		
Artists fixed effects	Yes		
Year of sale dummy	Yes		
Observations	29,243		
R-squared	0.73		

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. Robust standard errors are in parantheses. Regressions are weighted by the inverse of the mean square error for each artist. The age polynomials for each art movement are jointly significant at the 1% level

work more explicitly; it is based on the proposition that artists who work within a similar artistic ideology are better comparable in their career patterns than cohorts of artists.

3.2 Artistic styles: career paths across modern art movements

In this section, an equivalent specification for each stylistic group is replicated. Ultimately, as these artistic streams can be ordered chronologically, this is but a variation of the cohort estimation with a focus on the working method and artistic culture inherent to each artistic style. The specification follows the same structure as

Table 8 Estimated peak ages for each art movement

	Art group's peak age	Cohort	Cohort peak age
Impressionism	32.2	1	23.5
Post-Impressionism	20.0	1	23.5
Nabis	23.0	1	23.5
Fauves	25.8	2	31.0
Expressionism	32.2	2	31.0
Cubism	32.9	2	31.0
Surrealism	37.8	3	39.4
Abstract Expressionism	30.3	3	39.4
Art Informel	33.8	4	30.0
Pop Art	32.6	4	30.0

Notes: Peak ages are estimated from the specification in Table 7

(1) in Sect. 3.1; again, each painting is weighted by the inverse of the mean square error for the respective artist and heteroskedasticity-robust standard errors are used.²³

$$\begin{aligned}
 \ln(\text{price})_{ij} = & \sum_{a=1}^{10} \left[\beta_1^a \text{age}_{ij} + \beta_2^a \text{age}_{ij}^2 + \beta_3^a \text{age}_{ij}^3 + \beta_4^a \text{age}_{ij}^4 \right] [\text{artmovement}_{ij} = a] \\
 & + \gamma_1 \text{canvas}_{ij} + \gamma_2 \ln(\text{size})_{ij} + \gamma_3 \text{oil} + \sum_{i=1}^{214} \alpha_i (\text{artist}_i = i) \tag{2} \\
 & + \sum_{y=1988}^{2007} \theta_y (\text{saleyear}_{ij} = y) + e_{ij}
 \end{aligned}$$

The results of this estimation are shown in Table 7. The resulting age at which the best work for each of the 10 stylistic groups was produced is reported in Table 8 along with the corresponding cohort and its peak. The general pattern of peak ages implies three groups of artists: those who peak very early in their careers in their early to mid-20s (the Nabis, Fauves, and Post-Impressionists),²⁴ those artists who peak in their early to mid-30s (the Impressionists, Abstract Expressionists, artists of Art Informel, the Expressionists, Cubists and Pop Artists), and the Surrealists, who experience their peaks the latest, namely, at an average age of 37.8. The difference in the implied peak ages between these groups is statistically significant at the 10% level or lower. These three groups will now be analysed in turn focusing on artistic technique and topical content.

²³ The results are similar when each artist receives the same weight and when an unweighted estimation is used. In addition, we obtain similar results when estimating separate regressions for each art movement.

²⁴ The peak age of the Post-Impressionists is only a lower bound as the estimation produces a corner solution due to insignificant coefficients on the age polynomial.

3.2.1 Peak ages for the different subgroups and their working methods

3.2.1.1 Group A: Career peak in the early to mid-20s: Post-Impressionists, Nabis and Fauves The group of ‘early peakers’ consists of the Post-Impressionists, the Nabis and the Fauves, all of whom peak in their early to mid-20s.²⁵ The Post-Impressionists do not have a significant age polynomial, hence their creative life cycle produces a corner solution for their peak age which might underestimate the ‘true’ peak somewhat. Despite the estimation outcome, the Post-Impressionists can be attributed to the group of ‘early peakers’. This is supported by the fact that ‘Post-Impressionism is not a matter of technique’ (Bell 1913, p.229) and hence an early peak seems credible. Furthermore, the Nabis, who represent a subgroup of Symbolism, which in turn is a major branch of Post-Impressionism, also peak early in their careers.

The Fauves, however, although active at around the same time, represent strong expressionistic tendencies in their work (Janson 1977). This style’s specialty is the density of brilliant colour and the ‘clearly articulated brushstroke’ (Millard 1976, p.580). All three subgroups emphasise ‘symbolic content’ (Grove Dictionary of Art 2008) and are rather alike in their working methods, as they vary the use of colour, rather than the concept of art or form explored in painting. Another notable characteristic is that they all originated in Paris, such that artists might have benefited from human capital spillovers in the cluster location, which would allow them to produce their best work earlier in their careers (see Hellmanzik 2009).

3.2.1.2 Group B: Career peak in the early to mid-30s: Impressionists, Expressionists, Cubists, Abstract Expressionists, artists of Art Informel and Pop Artists All art movements that peak in their early to mid-30s share a somewhat analytical approach to the arts and a unique innovative artistic concept.

The Impressionists broke with traditional realism by using patches of colour to display perceived subjects (see for example Janson 1977 and Venturi 1941). The relatively late peak in their careers might reflect the fact that they innovated the arts with this new concept, despite their traditional subject choice of landscapes and bourgeois free time activities (Venturi 1941, p.44). In addition, most Impressionists had received traditional art training, which might also explain their somewhat later peak age. However, the Impressionists’ peak age might be considered a lower bound, as many of the ‘old masters’ of Impressionism were born before the sampling period of this paper.²⁶

The Expressionists can be characterised by their ‘concentrated presentation of emotion sought within the artist’s consciousness—an insistence on feeling rather than the visualisation and reproduction of the external world’ (Schwabe 1918).²⁷

²⁵ As a robustness check for this very early peak age, individual peak ages for each artist were estimated. Also with this estimation method, the average peak age for the ‘early peakers’ is lower than the average for all other art movements.

²⁶ This is probably also the reason why Galenson and Weinberg (2001) find a much higher peak age for these artists. They find the peak age to be 46.6 for artists born 1820–1839 and 37.0 for those born 1840–1859

²⁷ Harris (1929) refers to this as the portrayal of the meaning of things or their essential nature.

Their subjects were often concerned with social problems, usually reflecting the stress of city life and the beginning of World War I. Although the Expressionists did not innovate methods drastically, their concern with provocative as well as symbolic and esoteric subjects is a thematic break from previous art forms, such as Impressionism, and might be a partial explanation for their later peak age.

Although their bloom period coincides with that of Expressionism, Cubist painters sought to innovate the visual arts conceptually. Cubism can be considered the first artistic style to change the concept of artistic forms entirely, as Cubists brought about abstraction in traditional subjects (Barr 1936) and were the first to include collages in paintings. They also revolutionised ‘the depiction of space, volume and mass’ by rejecting consistent perspective and solid form (Grove Dictionary of Art 2008). As such, they compose the first artistic movement to advance the arts in terms of concept as well as technique.

American Expressionism’s main contribution to the arts is the combination of almost pure abstraction and the intense use of colour, which reflects the ‘personalisation of emotion and expression’ (Levine 1971, p.23). Artists of their European counterpart, Art Informel, also worked mostly abstractly, however, they used ‘crude imagery and artless technique’ (Plante 1994, p.66) as well as a ‘concept of a phenomenological art practice cut off from history and psychology’ in order to rebel against ‘prewar artistic hierarchies’ (Plante 1994, p.68).

The innovation of Pop Art was its use of popular culture’s symbols and images combined with a technique that reflects the rise of mass production (Rosenblum 1964). This new approach of taking familiar items and replicating them to create what Lichtenstein refers to as ‘industrial paintings’ (Bann 1993, p.118) was a unique concept, offering a novel take on the analytical and perspective advances previously established.

Although the Expressionists are somewhat different as they mainly innovated in terms of content, all art movements whose artists reach their career peak in the early to mid-30s share an analytical approach to the arts, be it in terms of perspectives and application techniques or in terms of implicit social criticism.

3.2.1.3 Group C: Career peak in the late 30s: Surrealists The Surrealist group reaches its career peak, the latest of all streams examined here, at 37.8 years of age. They innovated art, both in terms of content and techniques used, namely, via their use of ‘transmutation [...] of dream and reality into a sort of absolute reality, or surreality’ (Breton 1924, pp. 15–16) and the development of ‘Automatism’.²⁸ These two advances reflect the Surrealists’ occupation with the human psyche and dreams, which required extensive ‘experimentation’ (Clancy 1949, p.272). The almost psycho-analytical content as well as the broad framework of this intellectual movement provides an explanation for the Surrealist group’s late peak age. Interestingly, the movement was international, rather than having its main base in one of the art centres of the world.

²⁸ In an automatic painting, the hand is allowed to move ‘randomly’ across the paper. By allowing chance into the creative process, painting is to a large extent free of rational control. Hence, the paintings produced may be the result of the subconscious (see Grove Dictionary of Art 2008).

3.2.2 Implications for creativity

Figures 3, 4, 5 and 6 display the creative life cycles for the stylistic groups analysed in the previous section. In order to analyse the peak ages obtained for the various art movements, three frameworks are considered. First, Galenson and Weinberg (2000, 2001) classify the career patterns of artists as either ‘conceptual’ or ‘experimental’. Conceptual artists produce their best works early in their career thanks to their careful planning and systematic approaches to their art works. Experimental artists, on the other hand, experience their career peaks later due to their constant search for perfection, which results in constant improvement of their works by means of a trial and error process.

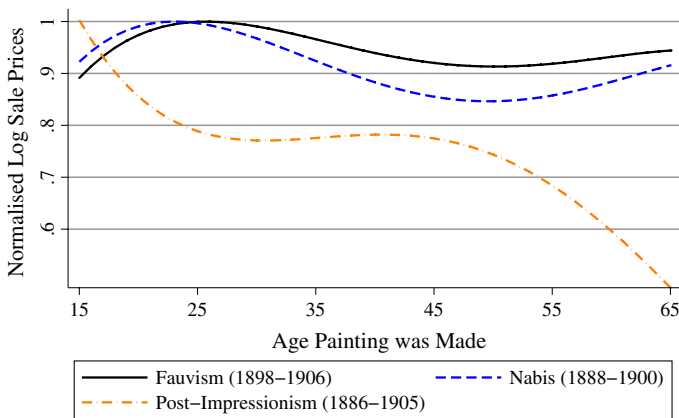


Fig. 3 Group 1—peak in the early to mid-20s. *Notes:* Age-price profiles were estimated using the respective interaction term in Table 7. Prices were normalised at the respective style maximum

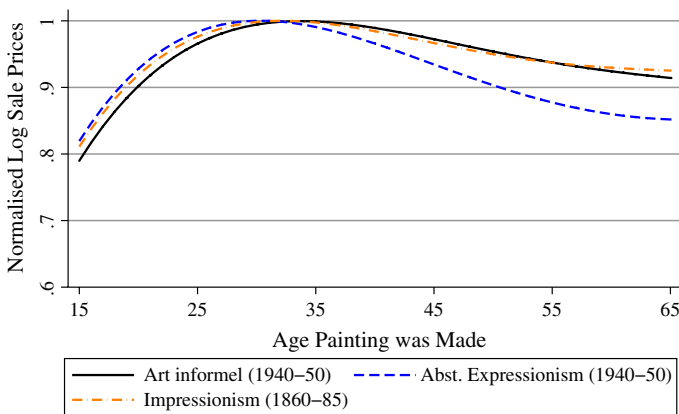


Fig. 4 Group 2—peak in the early to mid-30s. *Notes:* Age-price profiles were estimated using using the respective interaction term in Table 7. Prices were normalised at the respective style maximum

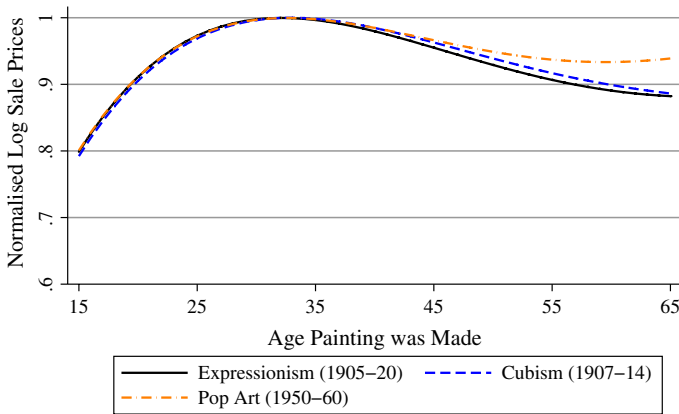


Fig. 5 Group 2 continued—peak in the early to mid-30s. *Notes:* Age-price profiles were estimated using the respective interaction term in Table 7. Prices were normalised at the respective style maximum



Fig. 6 Surrealism—peak at 38.1. *Notes:* Age-price profiles were estimated using the respective interaction term in Table 7. Prices were normalised at the respective style maximum

Second, Vasari’s (1578) framework involves two archetypical artistic innovation strategies: *disegno* referring to the design or the idea as being the invention—analogue to conceptual—and *colore*, where the perfection of artistic technique by means of practice is the contribution—analogue to experimental.

Third, Simonton’s model of creative productivity (1997) gives insights into the creative process, the two parameters being *ideation* and *elaboration*.²⁹ *Ideation* refers to the creation of an idea, based on the creative potential available to the creator, and *elaboration* is the process in which an idea is turned into a creative product. Applied to the previous frameworks, artistic innovations that are mainly conceptual (Vasari’s *disegno*) require high ideation rates, whereas artists who are

²⁹ In fact, Simonton’s model would be another interesting application of this sample of artists.

mainly experimental in their approach (Vasari's *colore*) focus mainly on the elaboration of their works.

Artists who are associated with one of the artistic styles of Group A display a career pattern with a very early peak age. It is striking that all these art movements originated in Europe around the turn of the century. In addition, they did not break from existing stylistic approaches to the arts, but rather made technical contributions and, hence, can be considered synthetic or perceptual in their approaches to the arts. Also, creative potential was still rather homogeneous at this early stage of the development of modern arts.

According to Galenson's and Weinberg's framework, the early peak age would imply that Post-Impressionists, Nabis and Fauves are conceptual innovators. However, their working methods reflect traces of what Galenson and Weinberg define to be experimental work (consistent with a late peak age), or what Vasari (1578) considers to be *colore*. Put differently, their contribution is in the elaboration rather than the creation of a novel art concept.

Groups B and C, on the other hand, peak relatively late in their careers. According to Simonton (1988), the more conceptual the innovation of an occupation—in this case of an art movement—the longer the period over which the style can be refined. All these art groups might be referred to as analytical and contributed ground-breaking ideas to the arts. Although these attributes fit in well with Galenson's and Weinberg's definition of 'conceptual', these art groups peak relatively late in their careers.

Within the frameworks of analysing creative innovations discussed above, Galenson and Weinberg link the fashion in which the creative contribution stands out to the age at which the career reaches its peak. They find that conceptual innovators reach their peaks early in their careers and that artists who innovate experimentally will peak at a later stage in their careers. However, from the analysis of peak ages of art movements, one might conclude that those art streams that produced what Galenson and Weinberg refer to as 'conceptual' innovations (and Vasari refers to as *disegno*) peak at much later stages. On the other hand, art streams that did not produce new ideas, but rather developed techniques (Vasari's *colore*) peak at a much earlier stage.

4 Cohorts and artistic styles: the development of peak ages over time

The analysis of peak ages using stylistic groups implies that there are three groups of artists. We can easily align the artistic styles chronologically in order to depict the development of the timing of their best works. This leaves us with five distinct groups: the Impressionists ('relatively late peakers'); the Post-Impressionists, the Nabis and the Fauves—all of whom experience their peaks at an early stage; the Expressionists and Cubists—with increasing peak ages; the Surrealists, who have the latest peak of all; and the postwar art movements—Abstract Expressionism, Art Informel and Pop Art—for whom the peak ages decrease again.

When ordering their peak ages chronologically, we see that over time, peak ages first increase and reach a maximum with the rise of the Surrealist movement and

decrease notably afterward.³⁰ The same pattern was obtained in the analysis based on cohorts, in Sect. 3.1, with the third cohort reaching its peak the latest.

This is not surprising, as the artistic styles produced by members of each cohort are a mere subsample of each cohort, as pointed out earlier. The latest peakers, the Surrealists for example, who are part of the third cohort, account for 34.4% of the artists in that cohort.³¹ However, this does not confirm the lower peak ages for later cohorts that Galenson and Weinberg (2000, 2001) find in their analyses of French and American painters, respectively.

When graphed, the creative life cycles obtained reflect an inverted U-shape in terms of peak ages over time, as shown in Figure 7. A simultaneous examination of the two estimation modes points out the similarities in the development of the creative life cycles over time:

- Artists born between 1850 and 1869, represented by the Post-Impressionists, the Fauves and the Nabis, peak in their early to mid-20s. The stylistic exceptions are the late Impressionists with a peak at an age of 32.2.
- For artists born in the second cohort, the peak age increases by 7.5 years to 31, reflected also in the higher peak ages of Expressionists and Cubists as a subsample of this cohort. The Fauves are the exception in the second cohort with a peak of 25.8 years.
- There is a similar shift of 8.4 years to a peak age in the late 30s for artists of the third cohort, as represented by the Surrealists and Abstract Expressionists. Interestingly, the peak age of the American subsample is estimated to be 35.2, while the main artistic style at that time—Abstract Expressionism—peaks much earlier at an age of 30.3.
- In the fourth cohort, the timing of the best work shifts back again to the early 30s, but less so for artists working in America (peak at an age of 33.4). This can be explained by the rather late peak of Pop Artists (32.6), who were mainly situated in the US.
- The last cohort of artists covers mainly Pop Artists. The cohort peaks at an age of about 20, while the stylistic peak is estimated to be at an age of 32.6. However, there is neither a significant amount of artists identified as ‘prominent’ in the European subsample, nor are the important art movements established yet.

The second cohort is the most diverse in terms of active artistic groups represented. In terms of their average birth years, the Fauves, Expressionists and Cubists are covered by this cohort. Due to its diversity, however, we might expect the cohort to be less precise in estimating the peak age for any single particular artistic group. Looking at the Fauves as a group, we find that the development of its age-price profile is entirely different from cohort 2, as shown in Fig. 8. However, for the Expressionists and Cubists—the larger groups—the cohort captures the

³⁰ The Impressionists can either be considered an outlier in this analysis or an artistic movement that is still more focused on a methodical innovation compared to classical art.

³¹ Eleven artists were identified as Surrealists out of the 32 artists who were classified to any stylistic group in this cohort.

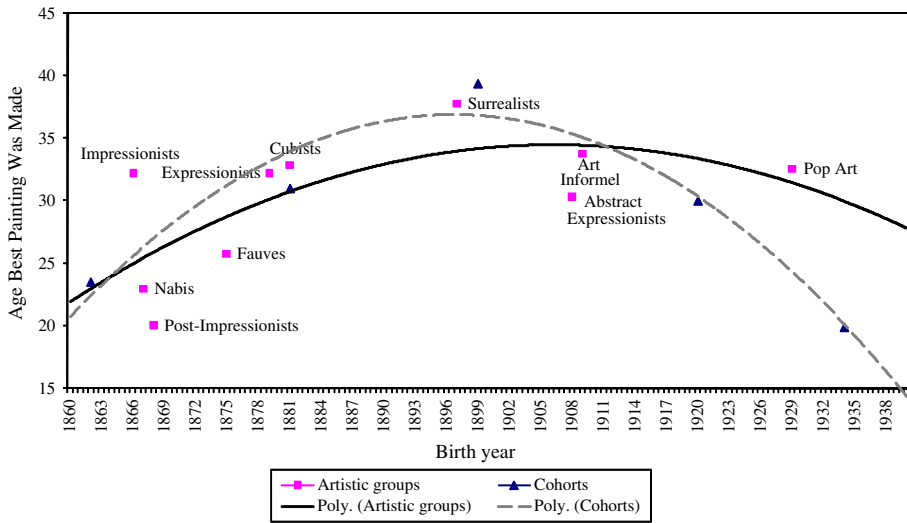


Fig. 7 Peak ages compared—Cohorts versus Artistic Styles

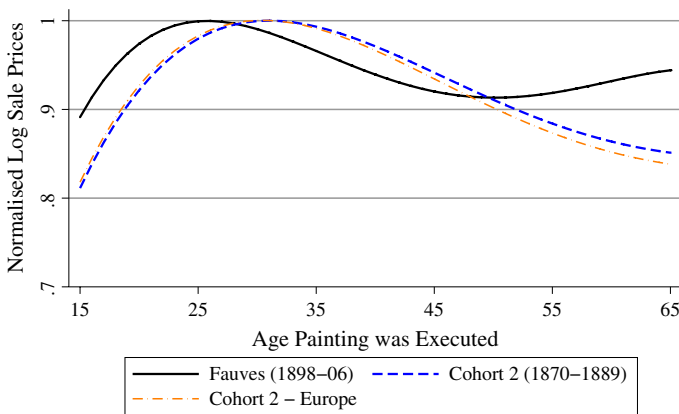


Fig. 8 Fauves versus Cohorts. Notes: Age-price profiles were estimated using specifications 1 and 2 in Table 5 and the respective interaction term in Table 7. Prices were normalised at the respective maximum

general career paths rather well, despite a shift to the right in the profile by 1.2 and 1.9 years, respectively (see Figs. 9 and 10).

The third cohort comprises only two art movements, the Surrealists and Abstract Expressionists. The career path of the Surrealist group is almost perfectly fitted by the cohort estimation, as depicted in Fig. 11; for the Abstract Expressionists, however, the career path is shifted to the left by 9.1 years and their age-price profile shows a faster post-peak decline than the corresponding cohort, though the American cohort is much closer than is the overall cohort specification (see Fig. 12).

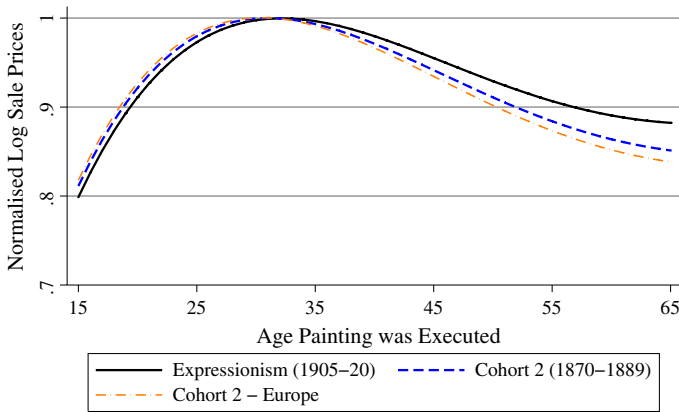


Fig. 9 Expressionism versus Cohorts. *Notes:* Age-price profiles were estimated using specifications 1 and 2 in Table 5 and the respective interaction term in Table 7. Prices were normalised at the respective maximum

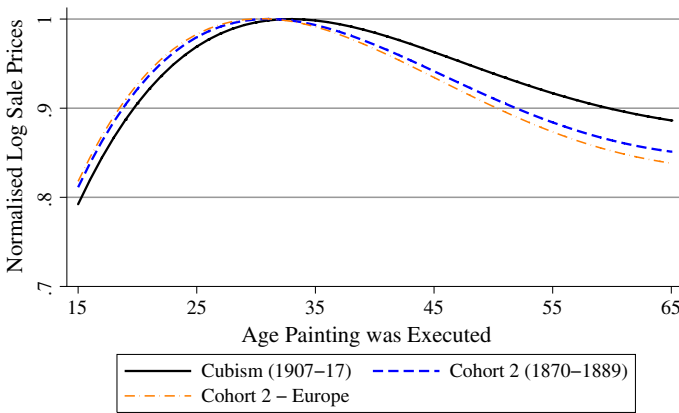


Fig. 10 Cubism versus Cohorts. *Notes:* Age-Price profiles were estimated using specifications 1 and 2 in Table 5 and the respective interaction term in Table 7. Prices were normalised at the respective maximum

This suggests that for stylistically more heterogeneous cohorts of artists, the cohort estimation along with generalisations about the artistic concept of a generation will be less precise. Therefore, Galenson’s and Weinberg’s assumption that cohorts represent a ‘conceptual generation’ of artists might be understating the diversity of artistic developments made by any single cohort of artists. This seems to be especially true of artists who were active around the turn of the twentieth century, the hour of birth of the modern arts and thus, a particularly productive time. This observation is especially important, as the results of Sect. 3 suggest that styles that made ground-breaking contributions to the arts—which Galenson and Weinberg would define as conceptual innovations—peak at a later stage and that peak ages first increase and then decrease again over the sample period.

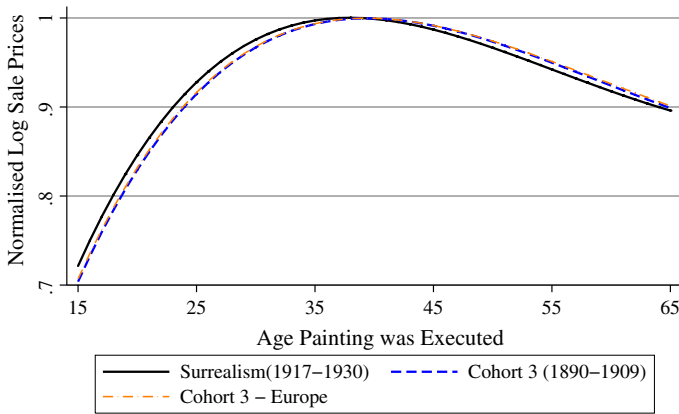


Fig. 11 Surrealism versus Cohorts. *Notes:* Age-price profiles were estimated using specifications 1 and 2 in Table 5 and the respective interaction term in Table 7. Prices were normalised at the respective maximum

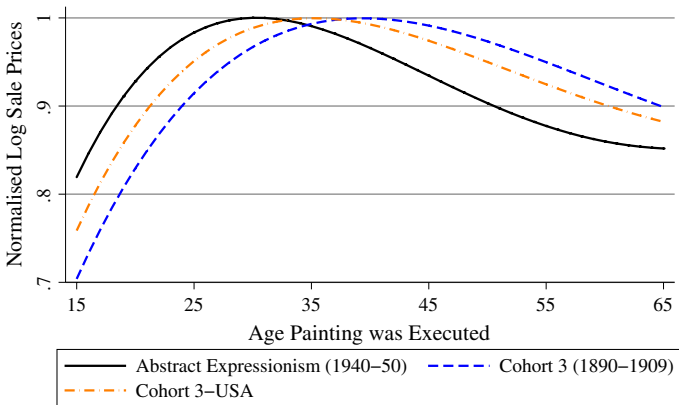


Fig. 12 Abstract Expressionism versus Cohorts. *Notes:* Age-Price profiles were estimated using specifications 1 and 3 in Table 5 and the respective interaction term in Table 7. Prices were normalised at the respective maximum

5 Conclusion

This study is based on a global sample of the 214 most prominent modern visual artists born between 1850 and 1945. Hence, it is possible to compare the careers of artists located in Europe and the US using two different methods. The first uses five cohorts of modern artists for the overall sample and the American and European subsamples. The other is based on the distinct artistic movements that originated in Europe or America.

We find that the cohorts of artists develop similarly in the USA and Europe, almost regardless of the amount and importance of innovations in the arts undertaken. Over time, the age at which the best work is produced varies

considerably: the artists' peak ages increase first, reach their maximum for artists born between 1890 and 1909, and then decrease again. This result differs from Galenson and Weinberg (2000, 2001), who find a linearly decreasing pattern for their French and American samples. However, this might be due to the differences in the sampling period and the broader geographic coverage of the data.

The study of artists' creative life cycles using pre-defined stylistic groups shows that there are three distinct career paths: very early career peaks in the early to mid-20s as represented by the Nabis, Fauves and Post-Impressionists, career peaks in the early to mid-30s as for Impressionists, Expressionists, Cubists, Pop Artists, Abstract Expressionists and Artists of Art Informel and a peak in the late 30s, which is only the case for surrealist artists, who experience their peaks the latest, at an average age of 37.8.

When comparing the estimation results obtained from the analysis of cohorts of artists and artistic styles, the resulting creative life cycles of modern artists show similar patterns over time. However, the more artistically diversified the cohort is, the larger the differences between estimation methods. This is underlined by the fact that every cohort, bar the third one, has a stylistic exception to its overall peak age. In light of this, the conception of artistic advances does not seem to be uniformly shared across the generation, which is in line with different peak ages for the stylistic groups represented within a generation of artists. This finding suggests that Galenson's and Weinberg's proposition that cohorts represent an artistic approach, which rests on the assumption that cohorts of artists are homogeneous in terms of styles, does not always hold. In addition, this study seems to suggest that artistic movements that further advanced artistic techniques rather than innovated in terms of the artistic concept peak much earlier in their careers.

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