

# A Session of Disciplinary 'Fusion' Exploring the Interaction of Time and Space in Modern Art

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**Abstract** Often met with suspicion, practices of 'fusion' between neighbouring disciplines simultaneously build on and reinforce complementarities between them. I argue that the key advantage of identifying and exploring such complementarities is the opportunity for improved understanding of the interaction of time and space in the history of art – i.e. how temporal tendencies unfold across geographical space. New digital sources of information on artistic careers, museum and personal collections or important sales make it possible to chart the mobility of people, artworks and concepts across time and space. A combination of computer algorithms, sociological methods and historical data provide opportunities to address substantive questions in the history of art, to identify patterns and resolve controversies. As an example of synergies in data collection and analysis between sociological and historical research, I analyse data on the students of Antoine Bourdelle. Results expose the interaction between centrality and two types of marginality, based on gender and the country of origin, and that between mobility of artists and the fragmentation of the field, as key factors in the acceleration of innovation at that time.

**Keywords** Time. Space. Methods. Mobility. Bourdelle. Gender. Modern art.

**Summary** 1 Introduction . – 2 Time . – 3 Space . – 4 Bourdelle's Workshop.



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## 1 Introduction

The debate between neighbouring disciplines can prove in equal measure intriguing and infuriating. Exposure to different methods and paradigms opens up new ways of thinking and seeing, but may also serve to emphasise invisible lines of division that undermine cross-disciplinary explorations. An indelible memory of mine is the awkwardness that enveloped me at an art history conference, when the panel discussion suddenly stopped, and forty pairs of eyes turned in my direction upon the question: "and what does THE Sociologist think"? The Sociologist had all the markings of an exotic animal on the red list of threatened species. If well-intentioned, the audience struggled to recognise as pertinent my efforts to discuss patterns over time and to extrapolate on the basis of individual cases.

That pertinence transpired more easily at another art history conference, dedicated to Gustav Vigeland, where I presented a report on the students of Antoine Bourdelle. Vigeland and Bourdelle have important aesthetic differences, but are also related, as both had studied with Rodin, before they developed an idiosyncratic style. Similarities and differences in career trajectories can be informative when analysed over time, helping to understand the reasons for the emergence of clusters in particular times and places, or why clusters tend to disintegrate and move somewhere else. Individual styles aggregate into such clusters, but are also a product of these clusters, reflecting complex trajectories of mobility that structure processes of competition, reproduction and differentiation in art. The positive response of the audience to my insistence on the centrality of mobility in Modern art and pertinence of quantitative methods encouraged a more systematic overview of the questions that animate the first issue of this journal - mechanisms of Fusion in the study of art history.

The classic definition in physics posits that a process of fusion occurs when two light atoms bond together (or fuse) to make a heavier one. The total mass of the new atom is less than that of the two that formed it. In order for the nuclei of two atoms to overcome the aversion to one another, high temperatures are required to rend the matter more malleable. In the process of fusion, some of the content of the two atoms is lost, but a qualitatively new entity is created. The metaphor of 'fusion' is appropriate to the context of interdisciplinary exchange, as there is naturally aversion to external influence and fear that, in opening up, something of the unique disciplinary tradition is inevitably lost. The premise of this paper is that more is to be gained. I argue that technological and methodological developments are contributing to a more malleable state of disciplines, favourable to mechanisms of 'fusion' between theoretical orientations, methods of inquiry and research agendas.

In contrast to our predecessors, we are increasingly capable of accessing massive digital data sets that can be analysed computationally to identify patterns and underlying associations, uncover career trajectories and cycles of innovation in the domain of art. Technologies are rarely unequivocal in their impact; they create new divisions, while helping to overcome established ones, such as those between uniqueness and generalizability or between case-based and variable-based methods in social science. If the application of Artificial Intelligence to Big Data can allow to recognise, for example, patterns in the diffusion of styles across countries or periods, it also requires application of contextual knowledge to make sense of the emerging patterns that do not lend themselves easily to interpretation. Practices of 'fusion' simultaneously build on and reinforce complementarities between disciplines, such as those featuring algorithms from computer science, sociological methods and historical data.

The key advantage of identifying and exploring such complementarities is the opportunity to achieve an improved understanding of the role of *time* and *space* in the history of art. A fundamental assumption in sociological scholarship is that the meaning of an action is comprehensible only when situated in social time and space - defined temporally, within sequences of events, and structurally, as a component in a relational configuration of actors (Abbott 1995). Scholarly accounts bring together structure and temporality by analysing relations between individual actions across time and space.

As a full-fledged social actor (Abbott 2016), time encompasses the complex ways in which historical events overlap with and succeed one another. To comprehend the dynamics of a field, we need to account for the changing rate of manifestation of its key characteristics, such as, for example, the number of resident artists or the multiplicity of styles in a specific location. Adopting a dynamic perspective means attributing a primordial role to mobility in the constitution of the artistic field and in the origination of novelty (Urry 2000; Abbott 2016). Attention in this perspective is directed to the mobilities of people, objects and images, and the consequences of these complex interdependencies for developments in the artistic field (Urry 2000, 2007; Joyeux-Prunel 2017).

Interrogations of space in social science are motivated by the basic understanding that space is not a simple container of topographical coordinates, but is constituted socially (Durkheim 1915) through interrelations, which are always under construction (Massey 2005). For Simmel (1997) space is indispensable for understanding social life. Human action produces meaningful space, such as in the spatial clustering of social relations or of artistic exchanges, which then reflects back on human action. To conceive of space relationally is to acknowledge the complexity of the interplay between individual actions and social structure (Fuller, Löw 2017). Scholarly accounts in this tradi-

tion tend to explore the ways in which individual developments, such as stylistic changes or career moves, are shaped by structural factors, such as the 'density' of artists or the level of competition between them (see Kaufman 2004). A different tradition analyses the geography of social space – the emergence of a core-periphery structure in artistic fields and the principles regulating the constitution of these fields and mobility between them (Bourdieu 1993; Collins 1998).<sup>1</sup>

In the next pages I demonstrate how the availability of new types of data and the possibilities provided by new quantitative methods can contribute to addressing a range of substantive questions in the history of art. I discuss these contributions as related to considerations of time and space, and use as an illustration of the proposed approach the analysis of data on the students of Antoine Bourdelle.

## 2 Time

There are multiple ways in which the influence of time on artistic developments can be modelled and studied. The utility of a temporal approach is most obvious when capturing the impact of rare events in the history of art, which exercise disproportionately large impact. That this impact is often spread over decades or centuries makes it necessary to adopt a different time frame to the one typically used in art history. Consider the development and then diffusion of oil painting techniques in the 15th and early 16th centuries. The introduction of oil paint was an innovation with far-reaching consequences, reorganising the process of picture making and redefining the social status of the artist. It was not a sudden discovery, but developed over a period of hundred years through the work of artists trying to adapt to changing styles and techniques (Meyer 1969).

It is surprising that such a crucial development has not received more attention in art history, which may be due to the relative obscurity to which technical issues are relegated in scholarship that is dominated by aesthetic matters (Meyer 1969).<sup>2</sup> Scholarly accounts explain the adoption and use of oil paint by individual artists, but this is only partly helpful in understanding the 'agentic' properties of oil paint (Gell 1998) – how oil paint triggered a wave of technical and stylistic innovations in the 16th century. As Flemish art became increasingly popular, the oil-based techniques diffused gradually throughout Europe. They were first adopted in the Southern

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<sup>1</sup> The core-periphery model has its own tradition in art history, especially in medieval and early modern history (e.g. Castelnuovo, Ginzburg 1979).

<sup>2</sup> However, there is a current of recent research on technical matters, both in art history (e.g. Dupré, Göttler 2017) and sociology (e.g. Sgourev 2020).

regions of the Italian peninsula, before reaching Venice around 1475 where the techniques were refined, and then diffused widely (Steinberg, Wylie 1990).

Oil paint created a powerful internal ('endogenous') dynamic of influence, differentiating between adopters and non-adopters. To understand this dynamic and tease out the intricate interplay between technological and cultural factors (e.g. Leonardi, Barley 2008) requires the aggregation of diverse data sources and mapping out of the trajectory of diffusion over time, as oil paint moved across countries and artists. An analysis of the rate of diffusion and adoption would enable us to better comprehend the extent to which oil paint impacted the productivity of artists and their proclivity for technical and stylistic innovation. The evidence in this regard remains largely anecdotal in nature (e.g. Steinberg, Wylie 1990; Sgourev 2020).

These observations pertain as well to another notable material development - the invention in 1841 of hermetically sealed, collapsible tin tubes for oil paint, offering unparalleled possibilities to record directly the fleeting effects of light and atmosphere by venturing outside the studio. The tin tubes contributed to changing the painter's habits, allowing to better preserve colours and facilitating the practice of outdoor painting (Tinterow, Loyrette 1994). The scholarly challenge is to position this development in a socio-historical perspective, understanding the ways in which a material factor served as a trigger for the congealment of a new artistic identity and as a 'focus' for the organization of artists with a shared identity of avant-garde craftsmen (Callen 2000, 2015).

A similar challenge is presented by one of the most famous 'exogenous' shocks in the history of art - Japan's involuntary and abrupt opening to trade with European countries in 1859, and the wide circulation in Europe of Japanese prints. The influence of these prints on the rise of Modern art is uncontested (e.g. Ives 1974), but the magnitude and nature of the influence leave much room for debate (Plaud-Dilhuit 2014). Was that influence predominantly direct in nature, as when Western artists borrowed elements or visual solutions from Japanese authors, or was it rather indirect, shifting attention to novel subjects or confirming emerging beliefs about the purpose of art, thus reinforcing the rejection of the precepts of academic art (Napier 2007)? To understand the nature and magnitude of the effect of an exogenous shock requires targeted comparisons of artists before and after the shock, between adopters and non-adopters or early and late adopters. It may be helpful to map out the networks of painters, writers, critics and collectors congregating at *Café Guerbois* around 1865, as social networks constituted a key agent of propagation of cultural influences. Other possibilities include investigating the sequences of adoption of Japanese visual elements by artists, the frequency with which visual elements appear in paintings over time or the aver-

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age duration of presence of oriental elements in the oeuvre of artists.

New research methods and data sources can bolster our capacity to differentiate between the roles of cultural, material and relational factors in the evolution of complex historical processes, such as Impressionism or Modern art. Similarly, they might help to tell apart endogenous and exogenous explanations with more precision. Consider the fundamental observation by Gary Tinterow:

Art history, particularly at the end of the 19th century, is the history of artists. While untold forces – economic, social, political and literary, doubtlessly influence the creation of any work of art, the most salient confrontations are those between an artist and the work of another artist. It is then that the one is challenged in-to activity by the other. (1987, 11)

This statement is notable for challenging the premises of much of historical and sociological scholarship, which tend to present Impressionism and the erosion of the Academic system as a function of cultural, political or economic developments (e.g. White H., White C. 1965), giving relatively short shrift to the endogenous social dynamism that Tinterow describes.

Endogenous behavioural models are receiving increasing attention in sociological research in the last two decades. The analytical focus in this perspective is on the internal workings of cultural processes (for an overview, see Kaufman 2004), investigating change independently of exogenous (i.e. relational, technological or material) factors. Studies attribute a key role to naturally evolving subdivisions that serve to differentiate between 'us' and 'them' (Lieberson 2000; Abbott 2001). For example, one such subdivision appeared in the second part of the 19th century, differentiating between those who identified with a craft tradition, employed 'material' techniques in outdoor sessions, and pursued sales outside the Salon system, and those who endorsed Academic conventions and exhibited 'polished' paintings at the Salons (Joyeux-Prunel 2015). As Tinterow suggests, underlying much of artistic life was an internal process, guided by simple behavioural rules of differentiation and contrast.

This process is also fundamental in the work of Michael Baxandall (1985, 1988), who conceives of the artistic field as a billiards table, featuring complex positional games. Each time an artist is influenced by another artist (s)he changes the configuration of the balls on the table, rewriting the history of art a little. Artists face a multitude of options from which they can choose their references, and the choice of references affects the type of problems they seek to address and the ways in which they address them (Baxandall 1985). By adding or removing references, artists modify their agenda and the priority attributed to conceptual and technical issues. Their reference

set, on its turn, shapes what artists view as relevant and important. The 'repositioning' of references in this manner facilitates (or precludes) the ability to see new things or to see old things in a new light.

This elegant model of endogenous influence presents acute challenges to any efforts to test it empirically. However, the increasing availability of digital data sources is making this task easier, as new information sources are enabling us to identify networks of references (whom an artist is paying attention to), the trajectories of influence (whom an artist is influencing) and sequences of mobility of artists in space and time. Analyses of these networks, trajectories and sequences facilitate the analysis of the mechanisms described by Tinterow (1987) and Baxandall (1985), allowing us to map out and study movements and historical periods by aggregating information from a multitude of case studies.

A particularly promising recent development is sequence analysis, capturing the sequences of personal and professional experiences over time and their impact on creative outcomes (e.g. Simonton 1997). These models assume interdependence between early choices/outcomes and later ones in one's career. The sequences are of two types - temporal sequences of unique events and sequences of events that repeat over time (Abbott 1995). Career trajectories feature elements that are common and unique; the analytical objective is to accurately reconstitute the combination of uniqueness and similarity that defines a trajectory. There are recognisable patterns to the way people pursue careers over time, but there is also an important distinction between a person's sequence of experiences, and the subjective sense that (s)he makes of those experiences (Anand, Peiperl, Arthur 2002).

Through algorithmic procedure, sequence analysis investigates the similarity among a set of trajectories by rearranging them into clusters of "sequential equivalence" (Han, Moen 1999). One can then categorize observed sequences to see whether certain sequences result in creative outcomes. A broad range of sequences can be examined, such as those of artists changing their style, techniques or affiliation with a movement or a gallery. We can use the method to study whether diverse stylistic trajectories pose an advantage or disadvantage for artists in terms of visibility and success. Are artists with erratic career histories more creative in their pursuits or at what career stage is one most likely to pursue original pathways? By analysing the sequence of works of an artist we can establish the point in a career when stylistic experiments are most probable or valuable. Through this approach, we can adumbrate trajectories of stylistic innovation and examine how these change across historical periods.

These methods complement traditional methods in art history by combining the specificity of historiography with the scientific abstraction of quantitative methods (Abbott 1995). A good example are recent efforts to align narratives with sequences. Traditional context-

tual methods can be a source of narrative constructs, derived from personal letters and archival documents, which are then used to corroborate and interrogate specific career sequences. Matching sequences with narratives in such a manner provides insights into the construction of artistic identities (Waltham-Smith 2015). Identities guide and simultaneously reflect trajectories of personal and professional experiences – this duality is a key characteristic of the sequence approach in social science (Formilan, Ferrian, Cattani 2020).

Modelling the multifarious impact of time on social and individual outcomes is one of the key challenges in social science (Abbott 2001). The combination of new digital sources containing ample information on artistic biographies and careers, museum and personal collections, and historical sales, make it increasingly possible to chart trajectories of movement of people, artworks and even concepts across time and space. Time is an essential ingredient in the constitution of space – dynamic processes of all kind sculpt the social structure of artistic fields.

### 3 Space

The social structure of a field is typically defined in terms of relations and of the density of relations within the boundaries of the field (e.g. Bourdieu 1993, Collins 1998). Artists can thus be identified as belonging to the core or the periphery of a field based on their position in networks of social relations.

A 'core-periphery' social structure is characterised by a hub of dense relationships at the core and by layers of dispersed relationships on the periphery. The core is the domain of 'star artists', with many relationships to other prominent artists, while the periphery is the habitat of the *hoi polloi*, with few relationships of this kind (Collins 1998). The core of the social structure provides better opportunities to access and combine external knowledge and ideas (e.g. Collins 1998; Burt 2004). However, those on the periphery have greater latitude to develop ideas or styles that challenge the status quo. Weaker embeddedness in the dominant culture enables these artists to cross boundaries and import ideas from external domains (Hargadon and Sutton 1997). The density of relations in a field or its fragmentation matter in this process. For example, the fragmentation of a field into clusters reduces social pressure for conformity (Friedkin 1998), increases competition and motivates individual pursuit of difference.

These concepts are useful in understanding how the creative process is influenced by social factors, such as the structure or change rate in a field (e.g. Teodoridis, Bikard, Vakili 2019). Given that artistic activity is principally composed of processes of imitation and differentiation (Tarde 1903), we can assume the existence of social thresh-



olds at which imitation turns to differentiation (Kaufman 2004). Established styles and paradigms within a field aggregate to a point where innovation becomes increasingly pursued by those seeking to differentiate themselves from competitors or predecessors. In this logic, competition spurs the individual desire for differentiation, which creates preconditions for stylistic schism – for artists to identify with opposing paradigms (Abbott 2001).

As an illustration, consider how the intensifying competition spurred innovation in early 20th century Paris. The number of artists at the Salon des Indépendants rose from 150 to approximately 1,000 between 1896 and 1910 (Bidou 1910). According to the critic Pierre Tournier (1910), the total number of exhibits at all salons in Paris in 1910 was 15,000, while Vauxcelles (1911) estimated that number at 17,000 in 1911. Census data indicate that the number of French describing themselves as artists increased from 22,500 to 35,500 between 1872 and 1906 (Charle 1990, 237). One of the key consequences of the intensifying competition and market saturation was the fragmentation of the art market, which facilitated the emergence of cliques of radical artists on the margins of the city, thereby accelerating the innovation rate (Sgourev 2013).

The availability of reliable estimates of the number of artists residing in a particular location or the number of artworks produced, can be used to establish the degree of competitive pressure and its change over time. This is a key motivation behind research initiatives, such as the *Artlas* project,<sup>3</sup> looking to create digital maps of galleries in late 19th century Paris using archival data. The analysis of these data can provide valuable insights into contested topics. Thus, Joyeux-Prunel (2015) asserts that the market demand for Impressionist art before the late 1880s was insufficient to justify interpretation of the style as responding to market demand (e.g. White H., White C. 1965). She contends that the rising prices of Impressionist art in the mid-1880s were primarily due to the unexpectedly successful entry of the US market by Durand-Ruel. This illustrates how archival data and its digital representation can be employed to shed new light on familiar historical developments.

Archival data can also be used to reconstitute the configuration of social relations underlying a movement or a field. The assumption in network scholarship is that ideas originate in exchanges and flow through relations (Collins 1998). The analytical focus is on how change in the social structure facilitates creative outcomes (e.g. Burt 2004; Sgourev 2013). Networks encompass not only relations between people, but also among people, objects and ideas (Latour 1999). Creative acts thus emanate from networks of cultural and material ele-

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<sup>3</sup> Additional information is available at <https://artlas.huma-num.fr/en/>.

ments (Godart, Seong, Phillips 2020).

New data sources and analytical methods can provide valuable insights into spatial aspects of the emergence of new configurations of cultural and material elements. A good illustration of how digital data and quantitative methods can illuminate questions of theoretical importance is the work of Elgammal and Saleh (2015). These authors developed a method to classify images by the visual concepts (*classemes*) they contain. These include objects, such as a house or a church, simple features, such as colour and texture, or complex features, such as walking or turning. This approach allows the development of an algorithm to analyse a picture by producing a list of *classemes* that define it. This list is then used to compare any picture against others, identifying paintings that are highly original compared to others. In this manner, art history is analysed as a network of interlinked paintings. The method identifies degrees of originality by establishing links between paintings over time, allowing to establish when certain patterns appear for the first time and how they will be elaborated in the future.

Applying this algorithm to 62,000 digital reproductions of paintings from the Wikiart dataset results in a 'time map' of innovation in art. The originality scores for the period 1850 to 1950 (see Elgammal, Saleh 2015, 14) attest that originality rises in the 1860s and 1870s, decreases in the next three decades, before exploding in the second decade of the 20th century. The authors identify the watershed year as 1912, when originality scores undergo a sudden increase, remaining consistently high thereafter. The originality of Picasso is confirmed, but what is particularly remarkable is that in the period after 1912, it is not Picasso, but Mondrian and Malevitch that display the highest scores. This provides evidence that the most radical artistic experiments in the wake of Cubism occurred not in Paris, but in more peripheral locations. A similar pattern emerges in the years following the rise of Impressionism, when the highest originality score is obtained not by a painter based in Paris, but by the *Scream* by Munch.

The patterns identified in this study are corroborated by recent work by art historians. Joyeux-Prunel (2015, 501) compiled a list of important international exhibitions of Modern art over the period 1910-1914. Her data confirm the shifting centre of gravity in art away from France and the identification of 1912 as a watershed year in Modern art. The alignment between results obtained with different methods reveals the potential synergies in employing mixed research methods in addressing historical questions. Creating maps featuring thousands of painters can lead to better understanding of the social structure of the field, the competitive pressure for differentiation at any particular time and the trajectories whereby ideas travelled across countries, schools and artists. These methods allow to address the fundamental question of the forms of intersection of time and space – how temporal trends unfold across geographical space.

As an example, Sgourev (forthcoming) interprets results from El-gammal and Saleh's analysis (2015) as evidence for a process of 'radicalization', whereby ideas originating from the core escalate on the periphery. A condition facilitating radicalization is the simultaneously increasing and decreasing social distance between the core and periphery, observed when the growing prominence of the core accelerates mobility and encourages the diffusion of ideas to the periphery.<sup>4</sup> This process contributes to the appearance of locations in the social structure that are exposed to ideas from the core, but are relieved of the pressure for conformity at the core. As these locations are marked by the collision of opposing cultural forces (Park 1928), they are conducive to idiosyncratic pursuits and the refusal of compromise. They tend to appear either at the periphery of central areas or at peripheral locations connected to the centre. The next section provides an account of one such location, using digital data and simple statistical methods to examine the intersection of time and space in Modern art, and to illustrate the usefulness of applying techniques of disciplinary 'fusion' in the study of art history.

#### **4 Bourdelle's Workshop**

The renowned French sculptor Antoine Bourdelle (1861-1929) attended the School of Fine Arts in Paris and worked in the studio of Alexandre Falguière. He entered the studio of Auguste Rodin in 1893 and maintained affiliation with it until 1908. He had a successful career as a sculptor, receiving notable commissions in France and abroad. But attention here is on his teaching activities, as he was recognised as one of the most important educators of the Modern age, championing the increasing autonomy of fine art from academic conventions.

His teaching style was unorthodox at the time, encouraging students' creativity and freedom, avoiding assertions of strict principles, and allowing students to pick and choose elements that may be useful in articulating an idiosyncratic style. In contrast to Academic teaching, he worked with his students in partnership, turning his studio into a place for aspiring artists to learn and practice. The sociological importance of his teaching practice was in serving as a medium for the diffusion of Modernist ideas and techniques to students from all over the world. His unorthodox teaching style attracted a different kind of student from that at the Academy. It reflected and rein-

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<sup>4</sup> There is considerable research in art history documenting the increasing salience of artistic mobility in the late 19th century and its contribution to the effervescent experimental scene in the first decades of the 20th century (e.g. Waller, Carter 2015; Baetens, Lyna 2019).

forced ongoing processes of differentiation and opposition in the cultural texture of early 20th century European art.

To better understand the nature of these processes and explore the underlying interplay of time and space, I use digital data collected by art historians on the students that attended one (or more) of his places of teaching: the studio at Rue du Maine (from 1890), the Institute Rodin (1900), the Academy of the Grande Chaumière (between 1909 et 1929), and the School of Design of the Gobelins factory (between 1920 and 1926). The data were compiled from several archives, from salon catalogues to artist dictionaries, online sources and personal exchanges with scholars and descendants of students.<sup>5</sup>

The data provide basic information (name, country of origin) on 455 students of Bourdelle. The country of origin data was almost complete and a few missing records were imputed based on the name. Gender was inferred from the name; in a few cases gender could not be ascertained and was coded as missing. Two indicators were created for personal communication with Bourdelle - whether a student sent him a letter or received one from him.

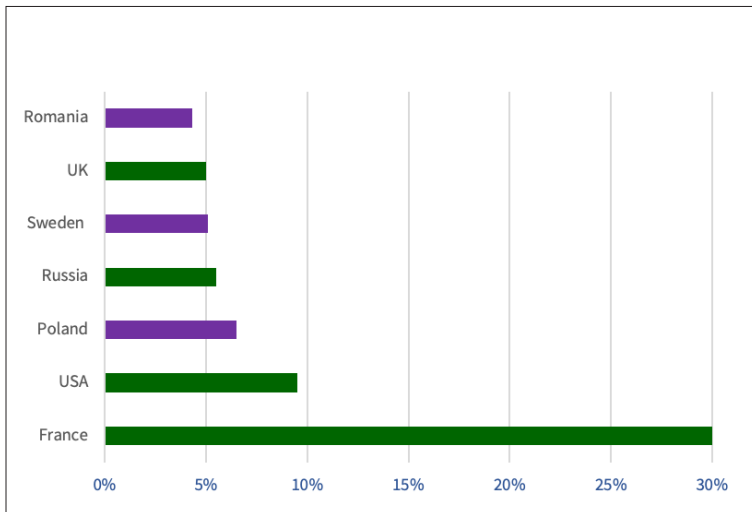


Figure 1 Composition of the student body of Bourdelle's workshop (by country of origin)

<sup>5</sup> Detailed description of the sources (and the data themselves) can be obtained at: <http://www.bourdelle.paris.fr/fr/antoine-bourdelle/repertoire-des-eleves-de-bourdelle>.

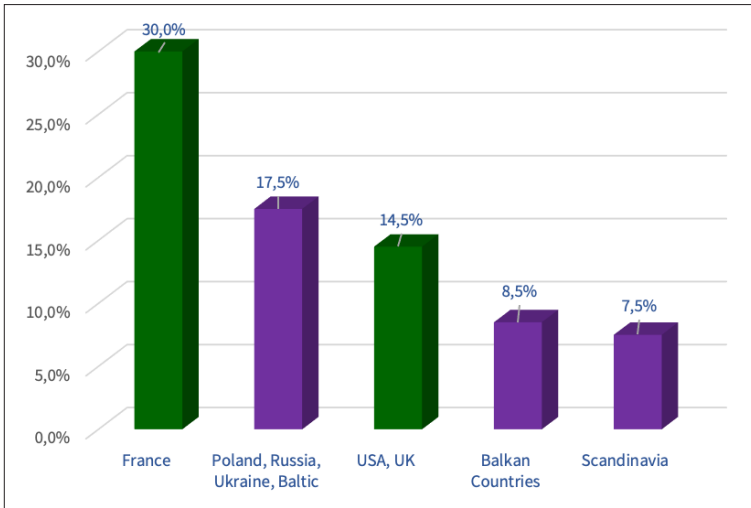


Figure 2 Composition of the student body of Bourdelle's workshop (by region of origin)

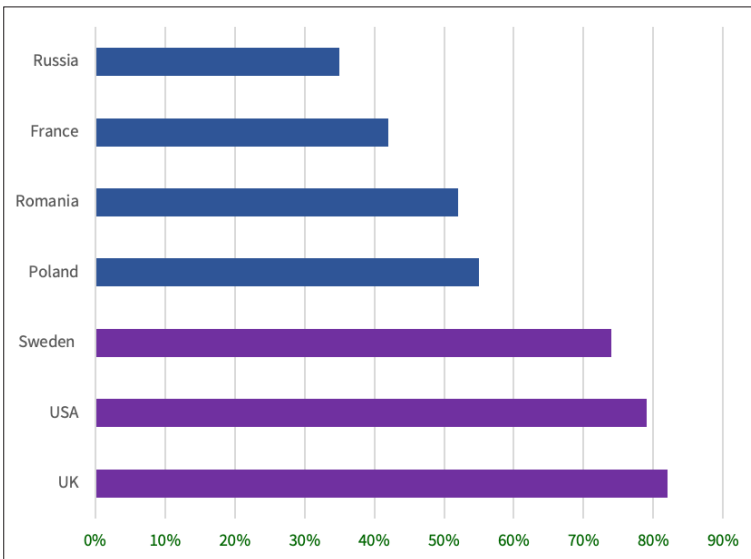


Figure 3 Proportion of female students in Bourdelle's workshop (by country of origin)

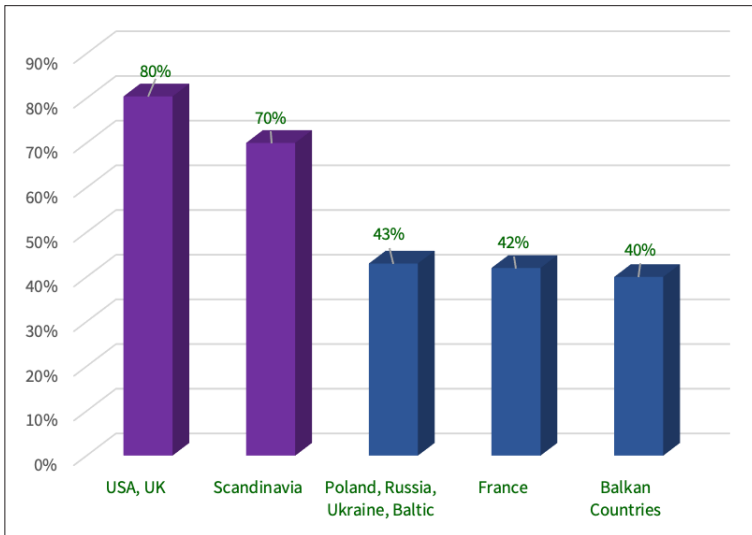


Figure 4 Proportion of female students in Bourdelle's workshop (by region of origin)

The most important finding in the analysis of the profile of students is the emergence of two types of marginality. The first type is based on the country of origin. Remarkably, 70% of the students were non-French, with a large proportion coming from countries on the periphery of the art world: Poland, Ukraine, Sweden or Romania [fig. 1]. When aggregated by region [fig. 2], about 18% of students came from the region including Russia, Poland, Ukraine and the Baltic countries. About 15% hailed from the UK and US, with a bit lower proportions originating in Scandinavia and the Balkan region. Notable for their underrepresentation are Germany and Austria (relative to the country size).

The second marginality type is based on gender. Research in both art history and sociology is paying increasing attention to how female artists in the 19th and early 20th century sought to overcome structural obstacles to accessing artistic education. The emergence of independent spaces, such as private schools in Paris, were primordial in allowing women exposure to training in a setting where they could learn alongside male artists. The proportion of female students in Bourdelle's workshop (47%) was significantly greater than in the Academy, testifying that the private schools provided an opportunity to women to further their artistic training. If we take the proportion of French female students as a reference point (43%) we can observe that three countries boast double that proportion: 82% of British, 79% of American and 74% of Swedish students were female

(see [fig. 3](#)). These elevated numbers imply a mobility trajectory for artistically-oriented women from relatively affluent families in the UK, the US and Sweden. The distribution by region is presented on [fig. 4](#).

The student body constituted a social network, as many maintained contact with each other and with Bourdelle upon the termination of their studies. This network was an active instrument of communication, as suggested by the finding that 22.4 % had some form of exchange with Bourdelle. Unsurprisingly, the network was more valuable to women. Only 17% of male students, but 28% of female students maintained communication with Bourdelle. A regression analysis confirms that it was more likely for a female student to exchange with Bourdelle than a male student ( $p=.007$ ). The highest probability for exchange with their teacher is observed for Romanian and Czech (female) students.

The collection of such data can be useful not only to historical, but also sociological research. The revealed pattern of dual marginality confirms observations by art historians on mobility in early 20th century. For example, Röstorp (2014) disputes the popular theory that Scandinavian artists left France after the Universal exhibition of 1889, arguing that there were even more such artists in Paris during the late period than in the 1880s. The overrepresentation of Swedish women in the dataset (as compared to the expected number based on the size of the country) lends credence to Röstorp's argument that many Swedish female artists moved to France in early 20th century, because of their desire for emancipation from family constraints or academic conventions by pursuing a career in art. A combination of factors was the driving force of enhanced mobility - female artists had already had access to the Academy of Fine Arts in Sweden since 1864, whereas their French colleagues were not allowed until 1897. However, very few women were accepted as members of the Swedish Federation of artists. Having received rigorous formal training, but lacking opportunities for career advancement, female artists from Sweden were likely to look for such opportunities in France, where they had better working conditions, access to museums, available studios and opportunities to exhibit (Röstorp 2017).

These observations apply as well to female artists from the United Kingdom or United States, as revealed in the workshop data. Consider Reynolds' (2000) account of how Scottish female artists of the 1900 generation crossed multiple symbolic barriers by deciding to pursue a career in Paris. Private schools were more attractive than academic venues, as they were flexible and innovative in their teaching methods. Having had received formal training back home, expatriate women were better prepared and more receptive to the new methods than their male counterparts (Reynolds 2000).

The results of the analysis attest to another mechanism through which private schools allowed female artists to overcome career bar-

riers – access to social networks. A key sociological observation is that women do not have the same access to career-enhancing networks as men (Kanter 1977; Ibarra 1992) and that social networks are instrumental in reducing gender inequality by providing relational or cultural capital (Ibarra 1992, 1993). That female students were significantly more likely to maintain communication with Bourdelle than male students is in full agreement with sociological expectations.

Another way in which the results confirm sociological research on networks is related to the composition of the student body. It is well-established that 'egocentric' social networks (featuring the students of a painter or a sculptor) develop through a dual process, reflecting the personal preferences of the person at the core of the network (i.e. Bourdelle) and the self-selection of students, responding to the preferences of Bourdelle. The relative overrepresentation of Polish and Czech students in the workshop (relative to country size) and underrepresentation of German and Austrian students may be partly due to Bourdelle's personal affinity toward Poland<sup>6</sup> that is likely to have encouraged Czech and Polish students to attend his workshop and German or Austrian students to look elsewhere. Such mechanisms of interplay between preferences and self-selection are common in social networks.

Albeit limited in scope, the workshop data highlight possible synergies between sociological and historical research, and provides a rare opportunity to explore the relationships between centrality and marginality and that between time and space. What confirmed Paris as the capital of the art world in the early 20th century was the influx of artists from all over the world and the appearance of places, such as Bourdelle's workshop, where academic conventions were relaxed or abolished. These places embody the interplay between centrality and marginality, as the increasing salience of Paris fostered mobility from peripheral regions, as attested by the data.

Bridging the core and periphery of the field in this manner, places of this kind are essential in understanding the complex mechanisms responsible for the acceleration of the innovation rate in the early 20th century. Numerous factors affect the innovation rate at any time, but a key factor for its acceleration was the interaction of social structure and mobility. The rising prominence of Paris encouraged the mobility of artists from peripheral locations, tempted by opportunities for career advancement and exposure to new ideas (Joyeux-Prunel 2015). This mobility on its turn reinforced the fragmentation of the social structure, as new locations appeared on the periphery of

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<sup>6</sup> Bourdelle's most famous work is probably his monument to the Polish hero Mickiewicz in Paris. For details on how his teaching contributed to the social organisation of Polish students in Paris, see Grabska 1996.



core regions, conducive to processes of experimentation. This echoes historical accounts of the interaction of fragmentation and mobility in accounting for the unparalleled economic growth in Western Europe in the 18th century. As Mokyr (2012) argues, fragmentation in the form of multiple competing states encouraged competition and innovation in science and technology, curtailing the abilities of states to control the mobility of scientists across countries. Along similar lines, a continent-wide market for ideas emerged in early 20th century Europe through the mobility of artists.

The Bourdelle workshop represents a notable component of this complex, dynamic process. His dismissal of academic conventions in teaching seemed provocative at the time, but the dismissal only mattered because there already was a critical mass of mostly international students for whom the alternatives to academic training were meaningful and attractive. Research on such forms of interplay and the endogenous process of innovation reinforced require collaboration across disciplinary lines, using diverse methods and data sources. Practices of 'fusion' in science do not mean imposition of one logic or tradition over another, but increasing awareness of developments in other disciplines, and pursuit of synergies in data collection and analysis. New technologies, data sources and methods are making it possible to identify tendencies in innovation over time, sequences of career moves and trajectories of artists, artworks and ideas across time and space. There are good examples of scholars seizing these opportunities – such as the research of Beatrice Joyeux-Prunel (2015, 2017) or Hans van Migroet's projects combining art history, law, economics and sociology.<sup>7</sup> Something on which sociologists and art historians tend to agree is that we need to make our accounts as interesting to and representative of the larger culture around us as possible, without sacrificing scientific rigour (Abbott 2001).

## Bibliography

- Abbott, A. (1995). "Sequence Analysis: New Methods for Old Ideas". *Annual Review of Sociology*, 21, 93-113. <https://doi.org/10.1146/annurev.so.21.080195.000521>.
- Abbott, A. (2001). *Time Matters: On Theory and Method*. Chicago: University of Chicago Press.
- Abbott, A. (2016). *Processual Sociology*. Chicago: University of Chicago Press.
- Anand, N; Peiperl, M.; Michael, A. (2002). "Introducing Career Creativity." Peiperl, M.; Michael, A.; Anand, N. (eds), *Career Creativity. Explorations in the Remaking of Work*. Oxford: Oxford University Press, 1-11.

<sup>7</sup> Additional information is available at <https://www.dukedalmi.org/about/>.

- Baetens, J.D.; Lyna, D. (eds) (2019). *Art Crossing Borders: The Internationalisation of the Art Market in the Age of Nation States, 1750-1914*. Amsterdam: Brill. <https://doi.org/10.1163/9789004291997>.
- Baxandall, M. (1985). *Patterns of Intention: On the Historical Explanation of Pictures*. New Haven: Yale University Press.
- Baxandall, M. (1988). *Painting and Experience in Fifteenth Century Italy: A Primer in the Social History of Pictorial Style*. New York: Oxford University Press.
- Bidou, H. (1910). "Les Salons de 1910". *Gazette des Beaux-Arts*, May, 47.
- Bourdieu, P. (1993). *The Field of Cultural Production: Essays on Art and Literature*. New York: Columbia University Press.
- Burt, R. (2004). "Structural Holes and Good Ideas". *American Journal of Sociology*, 110(2), 349-99.
- Callen, A. (2000). *The Art of Impressionism: Painting Technique and the Making of Modernity*. New Haven: Yale University Press.
- Callen, A. (2015). *The Work of Art: Plein Air Painting and Artistic Identity in Nineteenth-Century France*. London: Reaktion Books.
- Castelnuovo, E.; Ginzburg, C. (1979). *Centro e Periferia, in Storia dell'Arte*. Torino: Einaudi.
- Charle, C. (1990). *Naissance des 'intellectuels': 1880-1900*. Paris: Minuit.
- Collins, R. (1998). *The Sociology of Philosophies: A Global Theory of Intellectual Change*. Harvard: Belknap Press.
- Durkheim, E. (1915). *The Elementary Forms of the Religious Life: A Study in Religious Sociology*. London: George Allen and Unwin Ltd.
- Dupré, S.; Göttler, C. (eds) (2017). *Knowledge and Discernment in the Early Modern Arts*. Abingdon: Routledge.
- Elgammal, A.; Saleh, B. (2015). *Quantifying Creativity in Art Networks*. Working Paper available at <http://arxiv.org/abs/1506.00711>.
- Formilan, G.; Ferriani, S.; Cattani, G. (2020). "A Methodological Essay on the Application of Social Sequence Analysis to the Study of Creative Trajectories". Dörfler, V.; Stierand, M. (eds), *Handbook of Research Methods on Creativity*. Cheltenham: Edward Elgar Publishing, 329-50. <https://doi.org/10.4337/9781786439659.00034>.
- Friedkin, N. (1998). *A Structural Theory of Social Influence*. New York: Cambridge University Press.
- Fuller, M.; Löw, M. (2017). "Introduction: An Invitation to Spatial Sociology". *Current Sociology*, 65(4), 469-91. <https://doi.org/10.1177%2F0011392117697461>.
- Gell, A. (1998). *Art and Agency: An Anthropological Theory*. New York: Oxford University Press.
- Godart, F.; Seong, S.; Phillips, D. (2020). "The Sociology of Creativity: Elements, Structures, and Audiences". *Annual Review of Sociology*, 46, 489-510. <https://doi.org/10.1146/annurev-soc-121919-054833>.
- Grabska, E. (1996). *Autour de Bourdelle: Paris et les artistes polonais, 1900-1918*. Paris: Editions des musées musées de la Ville de Paris.
- Han, S.-K.; Moen, P. (1999). "Clocking Out: Temporal Patterning of Retirement". *American Journal of Sociology*, 105(1), 191-236. <https://doi.org/10.1086/210271>.
- Hargadon, A.; Sutton, R. (1997). "Technology Brokering and Innovation in a Product Development Firm". *Administrative Science Quarterly*, 42, 716-49. <https://doi.org/10.2307/2393655>.

- Ibarra, H. (1992). "Homophily and Differential Returns: Sex Differences in Network Structure and Access in an Advertising Firm". *Administrative Science Quarterly*, 37(3), 422. <https://doi.org/10.2307/2393451>.
- Ibarra, H. (1993). "Personal Networks of Women and Minorities in Management: A Conceptual Framework". *Academy of Management Review*, 18(1), 56-87. <https://doi.org/10.5465/amr.1993.3997507>.
- Ives, C.F. (1974). *Japan The Great Wave: The Influence of Japanese Woodcuts on French Prints*. New York: Metropolitan Museum of Art.
- Joyeux-Prunel, B. (2015). *Les Avant-gardes Artistiques 1848-1918. Une Histoire Transnationale*. Paris: Editions Gallimard. <https://doi.org/10.4000/Lectures.20443>.
- Joyeux-Prunel, B. (2017). "Circulation and the Art Market". *Journal for Art Market Studies*, 1(2), 1-19.
- Kanter, R. (1977). *Men and Women of the Corporation*. New York: Basic Books.
- Kaufman, J. (2004). "Endogenous Explanation in the Sociology of Culture". *Annual Review of Sociology*, 30, 335-57. <https://doi.org/10.1146/annurev.soc.30.012703.110608>.
- Latour, B. (1999). *Pandora's Hope: Essays on the Reality of Science Studies*. Cambridge (MA): Harvard University Press.
- Leonardi, P.; Barley, S. (2008). "Materiality and Change: Challenges to Building Better Theory About Technology and Organizing". *Information and Organization*, 18, 159-76. <https://doi.org/10.1016/j.infoandorg.2008.03.001>.
- Lieberson, S. (2000). *A Matter of Taste: How Names, Fashions and Culture Change*. New Haven: Yale University Press.
- Massey, D. (2005). *For Space*. London: SAGE.
- Meyer, R. (1969). *A Dictionary of Art Terms and Techniques*. Springfield: Crowell.
- Mokyr, J. (2012). *The Enlightened Economy: An Economic History of Britain 1700-1850*. New Haven: Yale University Press.
- Napier, S. (2007). *From Impressionism to Anime*. New York: Palgrave Macmillan.
- Park, R. (1928). "Human Migration and the Marginal Man". *American Journal of Sociology*, 33(6), 892.
- Plaud-Dilhuit, P. (éd.) (2014). *Territoires du Japonisme*. Rennes: Presses Universitaires de Rennes.
- Reynolds, S. (2000). "Running Away to Paris: Expatriate Women Artists of the 1900 Generation, from Scotland and Points South". *Women's History Review*, 9(2), 327-44.
- Röstorp, V. (2014). *Le Mythe de Retour: Les artistes scandinaves en France de 1889 à 1908*. Stockholm: Stockholms Universitets förlag.
- Sgourev, S.V. (2013). "How Paris Gave Rise to Cubism (and Picasso): Ambiguity and Fragmentation in Radical Innovation". *Organization Science*, 24(6), 1601-17. <https://doi.org/10.1287/orsc.1120.0819>.
- Sgourev, S.V. (2020). "The Alchemy of Painting: How the Technology of Oil Paint Transmuted Art". Pedersen, J.; Slavich, B.; Khaire, M. (eds), *Technology and Creativity*. London: Palgrave Macmillan, 37-62. [https://doi.org/10.1007/978-3-030-17566-5\\_3](https://doi.org/10.1007/978-3-030-17566-5_3).
- Sgourev, S.V. (forthcoming). "Inside Out: When Ideas From the Core Are Radicalized on the Periphery". *Research in the Sociology of Organizations*.
- Simmel, G. (1997). *The Sociology of Space. Simmel on Culture*. Frisby David; Featherstone Mike (ed). London: SAGE, 137-170.

- Simonton, D. (1997). "Creative Productivity: A Predictive and Explanatory Model of Career Trajectories and Landmarks". *Psychological Review*, 104(1), 66-89. <https://doi.org/10.1037/0033-295x.104.1.66>.
- Steinberg, A.; Wylie, J. (1990). "Counterfeiting Nature: Artistic Innovation and Cultural Crisis in Renaissance Venice". *Comparative Studies in Society and History*, 32(1), 54-88, <https://doi.org/10.1017/S0010417500016339>.
- Tarde, G. [1890] (1903). *The Laws of Imitation*. New York: Henry Holt Co.
- Teodoridis, F.; Bikard, M.; Vakili, K. (2019). "Creativity at the Knowledge Frontier: The Impact of Specialization in Fast- and Slow-paced Domains". *Administrative Science Quarterly*, 64, 894-927. <https://doi.org/10.1177%2F0001839218793384>.
- Tinterow, G. (1987). *Modern Europe*, vol. 8. New York: The Metropolitan Museum of Art.
- Tinterow, G.; Loyrette, H. (1994). *Impressionism*. New York: Metropolitan Museum of Art.
- Tournier, P. (1910). *Les Salons d'Automne*. Pan, 3, Article 11.
- Urry, J. (2000). *Sociology Beyond Societies: Mobilities for the Twenty-First Century*. London: Routledge.
- Urry, J. (2007). *Mobilities*. Cambridge: Polity.
- Vauxcelles, L. (1911). "Les Salons de 1911". *Touche-à-Tout*, 5, 443-4.
- Waller, S.; Carter, K. (eds) (2015). *Foreign Artists and Communities in Modern Paris, 1870-1914: Strangers in Paradise*. Ashgate Publishing.
- Waltham-Smith, N. (2015). "Sequence". Rehding, A.; Rings, S. (eds), *The Oxford Handbook of Critical Concepts in Music Theory*. Oxford University Press, 577-601. <https://doi.org/10.1093/oxfordhb/9780190454746.013.11>.
- White, H.; White, C. (1965). *Canvases and Careers: Institutional Change in the French Painting World*. Chicago: University of Chicago Press.