

**“From Dreams and Visions and Things  
Not Known”: Technique and Process in  
David Smith’s Drawings.**

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## **ABSTRACT**

For the American sculptor, David Smith (1906–1965), drawing was a language to replace words. It was the subconscious immediacy of drawing that allowed formal concepts to take shape during the laborious process of welding steel. In the 1950s, Smith's sculptural output increased dramatically in both scale and quantity. At the same time, his drawings acquired a separate identity, largely independent of his sculpture, yet these drawings, and indeed much of Smith graphic process, have to date not been studied in depth from a technical perspective.

Utilising the technical study as its mode of inquiry, this thesis investigates the complex tacit knowledge present in Smith's work, particularly as it exists in the relationship between the practice of drawing and the practice of sculpture, and applies it to the understanding of his oeuvre. Unravelling this tacit or hidden knowledge reveals that Smith attached much significance to materials. More pertinently perhaps, this approach prompts a hypothesis that argues for a simultaneous and synergistic material relationship between sculptural and drawing in Smith's practice. The elucidation of the tacit within Smith's work when framed within recent understanding of the importance of tactile perception in experiencing works of art reveals that Smith may have used materials that both perceptually and physically extended drawing into three dimensions and further, that these materials often had resonance with materials used in his sculpture.

Studying the technical aspects of Smith's process inevitably provides a framework for discussion on durability, damage and authenticity in his work. Smith's extensive investigation into materials - both industrial and artistic – is discussed as a function of his self-identity not as artist, but rather as industrial worker, with a pragmatic interest in the use of durable materials in his work, both graphic and sculptural. The fact that a significant number of Smith's painted sculptures and drawings have aged poorly is therefore difficult to reconcile. It raises questions about the true durability of his media, why they have deteriorated and, more importantly, how an understanding of the tacit, and of technique and process might be crucial for decisions made for their conservation.

In this context the deterioration of a substantial number of Smith's iconic drawings from the 1950s is discussed in juxtaposition with the now notorious decision in the early 1970s to completely remove badly deteriorated paint from a number of his unfinished sculptures

by the then Executors of Smith's estate, ostensibly to preserve the integrity of his work. That alteration has occurred in both drawing and sculpture in Smith's work is highly significant, given Smith's lack of demarcation between the disciplines. It provides a base for discussion on the meaning of intent, damage and restoration in Smith's work and suggests that even small changes in surface texture, gloss or colour might irrevocably alter our perception of it.

The results of the investigation provide several important observations: Firstly, that there is a considerable tacit dimension to Smith's graphic work not previously considered in studies of his practice and that in understanding this it becomes clear that Smith used drawing in a more complex and vital manner than previously considered. Secondly, that Smith's drawings were informed to a great extent by both three-dimensionality and by the materials he chose, that tactility and notions concerning the haptic perception of objects might provide insight into Smith's work, and that this can be applied equally to drawing as much as sculpture. Thirdly, that Smith's ideological stance as an industrial worker profoundly affected his process and the materials choices he made, and finally, that change in Smith's works whether the result of deterioration or deliberate intervention might profoundly alter perception and understanding of such nuanced work.



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## **AUTHOR'S DECLARATION**

During the period of registered study in which this thesis was prepared, the author has not been registered for any other academic award or qualification.

The material included in this thesis has not been submitted wholly or in part for any academic award or qualification other than that for which it is now submitted.

Richard Mulholland

May 2009.





**FIG. 1:** David Smith, 1906-1965

## INTRODUCTION

The artist is not a mere mechanic of methods or of theories. In the physical construction of his work, the tools of technique are subservient to the excitement of the inner eye. Inspiration must precede technical means ... Can those who are subject to the meaning of that word ever comprehend it or pass its meaning to others? All we really know are the brief feelings of fear or elation when something seems to have occurred in our work. Sometimes even a kind of terror when we have discovered something that we know existed somewhere, but that we only see now for the first time.<sup>2</sup>

For the painter, Jimmy Ernst, writing in 1955, artists' technique existed in passive service to inspiration. To be familiar with technical means was therefore a prerequisite and, once known, technique must easily fall to the hand when required. Similarly, the American sculptor David Smith (1906-1965) understood, as most artists do, that technical procedures must be so well-absorbed that control is subconscious, so innate that process proceeds freely and becomes 'second nature', and that the mind's occupation in developing concept or vision is not hindered by simple technical concerns. This is articulated clearly by David Smith many times in his statements and writing. However, the importance of understanding and articulating the complex tacit knowledge involved in the creation of artists' work ("the technical means"), that elusive knowledge which is often unstated by the artist, has only been fully realised in recent years. The unravelling of tacit or embedded knowledge provides an understanding of how an artist arrived at his/her final work and therefore enables greater insight into the artist's choices, direction and intent - conscious or otherwise. As Whiteley has perceptively observed, understanding the tacit begins to challenge the rather simplistic notion of the artist as creative genius, of great works of art being created by something that lies beyond the world of base technical methods.<sup>3</sup> However, where artists' minds may be occupied in the creation of concept, his/her arsenal of techniques is often based on both conscious experimentation and choice

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<sup>2</sup> Jimmy Ernst quoted in J. Ernst and Daniel Shapiro, 'The Artist – Technician or Humanist?', College Art Journal, vol.15, no.1, Autumn, 1955: 51-54.

<sup>3</sup> Nigel Whiteley, 'Seeing What, How and Why: The Art News Series 1953-58', Journal of Visual Arts Practice, vol.6, no. 3, Dec. 2007: 215-228.

and responses to fortuitous accident. Why and how these were utilised is the basis for the following discussion.

For David Smith, sculpture and drawing had been interchangeable since Cubism. A natural relationship existed between the drawn line and the line formed in three-dimensional space; both were elements of one concept. He stated in 1955: "In metal, I do not think volume is necessary. It can be suggested by line ... I think of line as symbolic volume. I take it for granted that when you see a circle, you know it is a sphere."<sup>4</sup> This was as true of his drawings as it was of his welded sculpture. Smith's work was intimately associated with his identity. In the same year in a lecture on drawing, he highlighted the importance of a discipline that he considered the most truthful means of asserting the identity and vision of the artist: "Drawing ... is a quickly recognised key to personality ... the pureness of statement, the honesty of expression is laid bare in a black and white answer of what he stands for, how strong his conviction, or how weak."<sup>5</sup> David Smith's sensibility therefore cannot be understood without reference to an understanding of the importance drawing played in the evolution of his work.

The Harvard Art Museum owns the largest collection of David Smith's work outside of the artist's Estate. This collection includes fifty-nine painting, drawings, sculptures and photographs, and highlights Smith's work from the 1950s to the early 1960s. The Museum also has a long and important history as an institution that promoted, and continues to promote the technical study of works of art. On examining a number of drawings from this collection in 2003, I was able to demonstrate that Smith's use of medium in drawing was considerably more eclectic than previously documented in his statements and in the published literature on his work.<sup>6</sup> Furthermore, this experimentation with media was noted to have increased particularly during the mature phase of his career from 1950 until his death in 1965. David Smith is known to have been somewhat experimental in drawing in his use of the quasi-tempera mixture of egg-yolk and black ink, and also perhaps in his use of commercial aerosol spray paint for the stencil works that he made from 1957-1965.

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<sup>4</sup> David Smith, Answers to Questions, Tulane University, Mar. 21, 1955, quoted in Margaret Haggerty, David Smith: A Painter's Approach to Sculpture, MA Thesis, University of Maryland, 1968, 1.

<sup>5</sup> David Smith, Lecture on Drawing, Tulane University, Mar. 21, 1955, rep. in Garnett McCoy, David Smith (New York: Praeger, 1973) 119.

<sup>6</sup> Richard Mulholland, Looking at David Smith's Drawing Media, Project Report, Straus Center for Conservation and Technical Studies, Harvard Art Museum, 2002.

Indeed, he was possibly the first artist to make use of this medium.<sup>7</sup> However, outside of this knowledge considerably less is known and understood about his experimentation in drawing and painting than it is regarding his more widely exhibited steel sculptural works. To date, this had not been the subject of a major study, and it is this gap in knowledge that my research sought to address.

In my initial study, as noted above, in many cases I was able to demonstrate that Smith's use of media in drawing was extremely eclectic, and had not been discussed in any previous publication. It became apparent after some examination that Smith used many media simultaneously on paper, experimenting with new and traditional artists' media, and with recently developed synthetic paints. In fact, as I will demonstrate in Chapter Two below, many of these new media were taken up by Smith almost as soon as they became commercially available to artists. Not only does this offer interesting insight into Smith's process, but it has vital practical importance for conservation treatment of these drawings. I note in Chapter two the visual similarity between, for example, Smith's drawings in black egg ink, and those in black acrylic emulsion paint. Where ink and egg are relatively stable to solvents typically used in the conservation of drawings, acrylic emulsion paints can be irreversibly damaged.<sup>8</sup> My examination further revealed that the intentional adulteration and manipulation in some of Smith's drawing and painting imparted an appearance to certain drawings that resonated with the textural and reflective surfaces of many of his welded steel and iron sculptures. The 2003 study therefore clearly highlighted the need for further and more extensive investigation toward an understanding of how and why Smith employed such methods in his work.

Although aspects of texture in Smith's work have been discussed in some of the literature, it has not been explored extensively.<sup>9</sup> I noted that recent interest in the tactile perception

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<sup>7</sup> Smith wrote that he made 200-300 drawings a year in "Chinese ink and egg-yolk". David Smith, Lecture to Students, Portland Oregon, March 23, 1953, David Smith Papers, AAA, NDSmith 5, F1089. A later photograph of Smith's studio shows the artist and a number of cans of commercial spray paints.

<sup>8</sup> See Ormsby et al., Tate AXA Art Modern Paints Project: Evaluating the Effects of Cleaning Acrylic Paintings: <[http://www.tate.org.uk/research/tateresearch/majorprojects/conservation\\_modernpaints](http://www.tate.org.uk/research/tateresearch/majorprojects/conservation_modernpaints)>. Ormsby et al. have demonstrated that acrylic emulsions can swell and partially dissolve in aromatic hydrocarbons, alcohols and acetone; the latter two solvents particularly are utilised frequently in the conservation of works on paper. Furthermore, high pH aqueous solutions (above 6.0-6.5), used as a matter of course in many paper conservation treatments, were also found to cause significant swelling.

<sup>9</sup> For example, Karen Wilkin, David Smith: Two Into Three Dimensions (Miami Beach: Grassfield, 2000).

of sculpture could contribute much to the discussion of Smith's work as both sculptor and draftsman.<sup>10</sup> The textural adulteration of some of Smith's drawing media for example, may represent material evidence for the continuing dialogue that existed between drawing and sculpture in his practice, and to his assertion that, in his concept, there was no demarcation between the two. This is an intriguing addition to the current perception of Smith's oeuvre, and one that I intend to explore in the following Chapters.

Smith's appropriation of factory methods and materials and the development of an industrial mode in his studio process arguably reflected his identity as an artist as much as the work he produced. Anticipating the fabricated sculpture of 1970s Minimalism, this ideology also reflected a desire, common to artists who had lived through the 1930s, to utilise materials that were both high-quality and durable. This was as true for drawing as much as it was for sculpture. It is evidenced as much by Smith's use of high quality hand-made papers and extensive investigation into the properties of artists' materials, as it is by his adoption of durable commercial and industrial paints to protect and enhance the surfaces of his sculpture. This ideology appears to have been largely engendered during Smith's participation in several New Deal art projects in the 1930s and, as I will demonstrate, with his membership of the left-wing Artists' Union. These experiences helped to foster an identification with the working man, and a consequent pride in quality and durable materials.

As Harriet Standeven has demonstrated however, in the discourse between conservation and modern synthetic paints, the term 'durable' can be highly relative.<sup>11</sup> Commercial and industrial paints and coatings were formulated to be extremely durable in the short-term, but not necessarily to possess the extended longevity one associates with artists' paint. This naturally has great significance for the preservation of artwork created with such materials. In both drawing and sculpture, David Smith persisted in an obsessive search to use materials that could be used innately and tools from which he could expect perfection and precision so that the technical procedures and knowledge could "flow so freely that

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<sup>10</sup> See for example; Rebecca Fortnum and Chris Smith. 'The Problem of Documenting Fine Art Practices and Processes', *Journal of Visual Arts Practice*, vol.6. no.3, 2007, 167-174, and Nigel Whiteley, 'Seeing What, How and Why: The Art News Series 1953-58', *Journal of Visual Arts Practice*, vol.6. no.3, 2007, 215-219.

<sup>11</sup> Harriet Standeven, *The Historical And Technical Development Of Gloss Housepaints, with Reference to Their Use by Twentieth-Century Artists*, PhD Thesis, Royal College Of Art, London, 2004: 12-13.

they in no way interfere with the mind's vision or art concept."<sup>12</sup> Despite this concern however, many of the painted coatings that Smith used on his sculpture have since deteriorated. A number of drawings from the 1950s and 1960s - ostensibly in the durable media of tempera (egg-ink) and alkyd paint have also deteriorated, exhibiting a disfiguring white surface efflorescence that has become an increasing concern for those institutions holding his work.

Deterioration in both sculpture and drawing prompts discussion of the consequences of visual and physical alteration in Smith's work. The aforementioned efflorescence in certain of Smith's drawings has not been investigated to date, yet is increasingly prevalent in several collections, and is naturally is of some concern to those custodians holding such works. This deterioration may be contextualized by the restoration/alteration of a small number of Smith's sculptures after his death, allegedly carried out due to both deteriorating paint and in a misjudged attempt to restore Smith's original intent. Although often cited, this incident has surprisingly not been interrogated in detail from a conservation perspective. That alteration has occurred in both drawing and sculpture is highly significant, given Smith's lack of demarcation between the disciplines. They provide a base for discussion on the meaning of intent, damage and restoration in an artist's work where even a small change in surface texture, gloss or colour might irreversibly alter that artist's intent. Such discussions on conservation can only be informed by a thorough understanding of both the physical properties of the materials used by Smith, and the philosophical framework within which they were created.

It might be noted here that a possible danger of any technical approach to Smith's oeuvre may be that in dealing in a positivist fashion only with observable phenomena, we dispense with those intangible observations related to the perception and experience of the work. Our understanding of the complexities of authenticity for understanding works of art is discussed frequently in today's discourse on conservation, and it is understood that all things are not demonstrable through technical investigation alone. David Smith's attention to nuanced detail in his drawings, as I will discuss in the following Chapters, is rarely acknowledged yet is arguably integral to the holistic perception of his body of work. Interference in even the smallest way was, as I shall demonstrate, unacceptable for

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<sup>12</sup> David Smith, 'Design for Progress – Cockfight', Statement c.1947, McCoy, 1973: 60.

Smith. However such intervention becomes necessary where works have deteriorated to the point of intervention. In creating a technical study of David Smith's medium, in unravelling the tacit knowledge that informed the practical creation of his work, and in understanding the significance of the choices that he made for the physical materials used for this work this study intends to inform our understanding of the life and work of a complex artist.

### **Current State of Research**

Although much has been written on Smith's work from a critical point of view, there has to date been no published technical study of his drawings.<sup>13</sup> Recent technical studies on the work of artists of the Abstract Expressionist generation have naturally been dominated by painting. Carol Mancusi-Ungaro in particular has published significant work on Mark Rothko and also on the techniques of Cy Twombly, Barnett Newman and Jackson Pollock.<sup>14</sup> Willem de Kooning's painting techniques have been investigated by Susan Lake, who has also contributed much to the technical history of Jackson Pollock,<sup>15</sup> and the materials and techniques used by Jacob Lawrence are discussed in-depth by Elizabeth Steele.<sup>16</sup> However, there remains little published technical research on either works on paper or sculpture from the 1940s to 1960s.<sup>17</sup> Indeed Abstract Expressionist sculpture - often considered the poorer cousin of painting - has largely been overlooked in the extant history of the period, mentioned in few works since Lisa Phillips's 1984 study of New

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<sup>13</sup> Some recent examples of note are; Brenson, Michael. 'David Smith: Freedom and Myth', Sculpture, vol. 25, no. 1, Jan./Feb. 2006: 25-29, Consuelo Ciscar et al. David Smith: Dibujante - Entre Eros Y Tanatos, (Valencià: IVAM, 2004), Karen Wilkin, 'David Smith, A Sculptor Draws', Master Drawings, vol.40, no.1, Spring, 2002: 43-56, and Wilkin, 2000.

<sup>14</sup> See essays in: Jeffrey Weiss, Mark Rothko, (New Haven: Yale, 2000), Carol Mancusi-Ungaro and David Anfam, Mark Rothko: The Chapel Commission (Houston. 1996) and Carol Mancusi-Ungaro, 'Jackson Pollock: Response as Dialogue', Jackson Pollock: New Approaches, (New York: Museum of Modern Art, 1999), 'A Certain Infantile Thing', Cy Twombly (New York, 2002) and 'Barnett Newman's Pilgrimage in Paint', Reconsidering Barnett Newman, ed. Melissa Ho (New Haven: Yale University Press, 2002) 67-81.

<sup>15</sup> Susan Lake, 'A Technical Investigation of Willem de Kooning's Paintings from the 1960s and 1970s', Conference Papers, ICOM-CC, (Lyon, 1999) 381-385.

<sup>16</sup> Elizabeth Steele, 'The Materials and Techniques of Jacob Lawrence', Over The Line: The Art And Life Of Jacob Lawrence eds. P. Nesbit and M. Dubois (Seattle: University of Washington Press, 2000) 247-267.

<sup>17</sup> Although Lisa Messinger, Abstract Expressionist Works on Paper (New York: Metropolitan Museum of Art, 1993) provides a satisfying commentary on a selection of works on paper from one museum's collection.

York School sculpture.<sup>18</sup>

Sources of information on artists' studio technique are varied. Many artists of the generation that formed what was loosely called the New York School and the generation that succeeded them died without leaving first hand information related to their studio practice or intent for the future of their work. Others, such as Robert Motherwell, Cy Twombly and Jasper Johns have provided useful technical information through interviews with conservators and curators.<sup>19</sup> Of those artists who died, in many cases assistants who worked directly with them have provided important technical information. For example, Mark Rothko's assistant, Ray Kelly provided invaluable information on Rothko's painting techniques during the restoration of the Rothko Chapel paintings at Houston.<sup>20</sup> David Smith died in 1965 in an automobile accident, leaving only scant information on his media and technique. However, Margaret Haggerty and Stanley Marcus, researching Smith's work shortly after his death, were able independently to interview Smith's assistant, Leon Pratt. Much of it has never been published, and it remains fairly inaccessible.<sup>21</sup> Some of the technical information provided by Pratt was included in Marcus's subsequent publication, but there remains a considerable amount that was not included, which is highly relevant for any discussion on Smith's working process. It is important to note however, that invaluable as Pratt's testimony is, much of the extant information relates to Smith's later work. Furthermore, he assisted Smith in making sculpture, so his testimony lacks any reference to drawing or painting.

It is clear that David Smith had a sophisticated grasp of artists' techniques, and of the materials of both painting and sculpture, but there has been little discussion of these aspects of Smith's process, and almost none regarding his eclectic use of media in

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<sup>18</sup> Lisa Phillips, The Third Dimension: Sculpture of the New York School (New York: Whitney Museum of American Art, 1984).

<sup>19</sup> See for example, Betty Fiske and Rita Albertson, Interview with Robert Motherwell, Greenwich Connecticut, 11 Dec. 1980, transcript, The Dedalus Foundation, New York, and The Artists' Documentation Project at the Center for the Technical Study of Modern Art, Harvard Art Museum and Whitney Museum of American Art, New York.

<sup>20</sup> Mancusi-Ungaro, 1996.

<sup>21</sup> S.E. Marcus, The Working Methods of David Smith, PhD Thesis, Columbia University, 1972 and Haggerty, 1968.



drawing, or on aspects of the preservation of his work.<sup>22</sup> An exception is Albert Marshall's article on Smith's sculptural surfaces, which provides a well-researched analytical discussion on the paints and coatings that Smith used in his later sculptures.<sup>23</sup> Marshall's work on synthetic media found on Smith's painted sculptures informs my parallel discussion of the synthetic media found in his drawings and paintings media in Chapter Two. Furthermore, although it is widely accepted that Smith was amongst the first artists to apply a truly industrial ideology to his workshop practice, there is little discussion on how this ideology was reflected in his choice of materials in painting and drawing. This matter forms the basis of the discussion in Chapter Three.

In drawing, the only extant work that discusses David Smith's technique in detail is an unpublished manuscript dating from the early 1970s in the archive of the Harvard Art Museum.<sup>24</sup> However, the conclusions are based on examination of thirty three drawings in the Harvard collection, and were formed solely by sight observation and superficial examination. My research corrects many of the inaccuracies that are contained in this work.

It is fortunate that a considerable amount of information on technique can be obtained through Smith's statements and writing. Although he was reticent about discussing meaning in his work, he left an extensive collection of letters, lecture notes, sketchbooks, notebooks, interview transcripts, and business records from which a great deal of technical information can be extracted. Smith's papers were collated and catalogued by Garnett McCoy shortly after his death and are held on microfilm at the Archives of American Art, Smithsonian Institution, Washington D.C..<sup>25</sup> McCoy's 1973 publication contains the major statements, letters, lecture transcripts and interviews given by Smith, and remains an important reference for any scholarship on the artist. Additionally, a comprehensive collection of statements by Smith on drawing collated and published by Jed Morse in 2005

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<sup>22</sup> An article on the conservation of one of Smith's drawings by Antoinette Owen discusses some generic aspects of his works on paper, but contains little concerning his technique. Antoinette Owen, 'Conservation and Curatorial Changes to David Smith's Drawing, "Untitled"', Modern Works, Modern Problems, ed. Alison Richmond, Conference Proceedings, (London, Institute of Paper Conservation, 1994), 100-105.

<sup>23</sup> Albert Marshall, 'A Study of the Surfaces of David Smith's Sculpture', Studies in the History of Art: Conservation Research 1995, National Gallery of Art, Washington D.C. vol. 51, 1995: 87-108.

<sup>24</sup> Meira Perry, David Smith's Drawing Media, Unpublished Report, Harvard Art Museum, 1973.

<sup>25</sup> Garnett McCoy, David Smith, (New York: Praeger, 1973).

provide an insight into the regard that Smith had for drawing.<sup>26</sup>

These, however, represent only a small part of the Smith archive.<sup>27</sup> While parts of these papers have been published elsewhere, archival material related to technique, often in Smith's studio notebooks and sketchbooks, remains largely unpublished.<sup>28</sup> A part of the Smith archive that has not been discussed to date is the significant collection of business records and receipts. These provide a valuable insight into the materials used by the artist and the choices he made; they are of immense value for technical research. The extant records contain many gaps, and there is little information for the period prior to 1957. Furthermore, where commercial products are listed, they tend to be encountered in generic form, making identification difficult. However, what remains constitutes a valuable resource for the following discussion.

Information relating to Smith's practice is also found in the collected papers of Dorothy Dehner, Smith's first wife.<sup>29</sup> However, Dehner left Bolton Landing in 1950, and although the renewed correspondence in the last years of Smith's life, Dehner was not present during the period under discussion here. By far the most important sources of information for Smith's studio technique are two articles published at either end of the 1950s. Elaine de Kooning's 1951 article, 'David Smith Makes a Sculpture' for Art News (and Smith's extensive notes for the article) are an illuminating insight into his daily studio technique and process at the beginning of a significant change in his style and output.<sup>30</sup> Similarly, Smith's own article for Arts Magazine, 'Notes on My Work', published in 1960, consists of a series of annotated photographs by Smith of his studio and of work in progress.<sup>31</sup> Studying the differences in Smith's discussion of technique and process in these two

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<sup>26</sup> Jed Morse, ed. 'Statements on Drawing', Steven Nash and Candida Smith, David Smith: Sculpture and Drawing, (Dallas: Nasher Sculpture Center, 2005) 153-161.

<sup>27</sup> Archival material was consulted where possible in its original form at the David Smith Estate and other archives in New York and elsewhere, and on microfilm at the Archives of American Art (AAA) in New York. For the purposes of this thesis, citation of original archival material is referred to as "David Smith Estate", and citation of microfilmed material as "AAA", followed by Microfilm reel and frame number.

<sup>28</sup> Other works of note that include statements by Smith not published in McCoy are: Gene Baro, 'Some Late Words from David Smith', Art International 9, Oct. 1965: 47-51, and Cleve Gray, David Smith by David Smith: Sculpture And Writings (New York: Thames And Hudson, 1988).

<sup>29</sup> Dehner's papers are also held at the Archives of American Art: AAA, Dorothy Dehner Papers, Smithsonian Institution, Washington D.C.

<sup>30</sup> Elaine de Kooning, 'David Smith Makes a Sculpture', Art News 50, 1951: 38-41. Smith's 'Notes for David Smith Makes a Sculpture' are reprinted in McCoy, 1973: 73-77.

<sup>31</sup> David Smith, 'Notes on my Work', Arts, February, 1960: 44-49.

articles provides an illuminating insight into the evolution of Smith's studio practice over the decade of the 1950s, and this is discussed in detail in Chapter Three. However, though the two articles offer a highly valuable information for understanding Smith's studio process in general, they do not greatly inform our understanding of Smith's drawing and painting process.

Elaboration on these works on technique is found in two important publications by Stanley Marcus and E.A. Carmean, who remain the only writers to date that have dealt specifically with Smith's studio procedure.<sup>32</sup> Of these, Marcus, writing relatively soon after Smith's death, is arguably the more valuable since his account is based on first hand information from Smith's assistant, Leon Pratt, and others who worked with Smith. Again both works concentrate on sculpture. Similarly, Paula Wizotski has contributed a great deal to the understanding of Smith's industrial studio ideology and political life in the 1930s, but there is yet to be a serious discussion on how this related to his choice of materials within this industrial mode.<sup>33</sup>

The collector Lois Orswell provides an insight into Smith's life in the late 1950s and 1960s.<sup>34</sup> Her correspondence with Smith and her collection of works by the artist, donated to the Harvard Art Museum in 1994 are, in particular, an important source of information on Smith's attitude to drawing and painting. In her correspondence with Smith, and with curators at the museum, Orswell highlights the artist's profound interest in drawing and painting, and furthermore that it was an enduring disappointment to Smith that his entire oeuvre was not appreciated.<sup>35</sup> Although the standard perception of Smith as a sculptor who occasionally made paintings and drawings began to be addressed in exhibition as early as 1979, Smith's work in other media continues to be seen very much as an adjunct

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<sup>32</sup> Both Stanley Marcus, *David Smith, The Sculptor and his Work*, (London: Cornell University Press, 1983) and E.A. Carmean, *David Smith*, (Washington D.C: National Gallery of Art, 1982) contain chapters devoted to Smith's working methods. The genesis of Marcus' book was his PhD thesis, (Marcus, 1972) which contains considerably more information on Smith's materials and methods, and includes an unpublished interview with Smith's assistant, Leon Pratt. Much of the technical detail contained in this thesis was eliminated from his 1983 publication.

<sup>33</sup> Paula Wisotzki, 'Artist and Worker: The Labour of David Smith', *Oxford Art Journal*, vol.28, no.3, 2005: 347-370, and 'Strategic Shifts: David Smith's China Medal Commission', *Oxford Art Journal*, vol.17, no.2: 1994: 63-77.

<sup>34</sup> Much of Orswell's correspondence with Smith and notes relating to her personal and professional relationship with the artist were published in: Marjorie Cohn and Sarah Kianovsky, eds. *Lois Orswell, David Smith and Modern Art*, Harvard Art Museum, New Haven: Yale University Press, 2002).

<sup>35</sup> Lois Orswell, letter to Hilton Kramer, 'Letters', *New Criterion* vol.8, no.9, 1990: 78.

to his sculpture.<sup>36</sup>

Invaluable to the understanding of Smith's studio process is the considerable collection of studio photographs held at the David Smith Estate taken by Smith and others. Drawing was a somewhat intimate activity for Smith, largely taking place in a separate drawing studio that formed part of his house and in the evenings after long days working on sculpture. It is unsurprising therefore that there are few photographs of Smith working on painting and drawing. Dan Budnik's photographs of Smith at work in his sculpture studio are particularly valuable to the understanding of the artist and his working process (see Figure 2). Budnik began photographing Smith at work in 1962 and captured much of his studio process; he also recorded the personal relationship between the artist, his studio and the significance of the landscape that surrounded him at Bolton Landing, New York. Furthermore, Budnik's photographs of the sculptures in Smith's fields at Bolton Landing taken during his lifetime were instrumental in identifying alterations and changes that occurred in several sculptures in the 1970s.<sup>37</sup>

Similarly, Alexander Liberman's photographs of Smith's studio as it was left on his death are important in identifying materials used by Smith (see Figure 3). Ugo Mulas's photographs of Smith's sculpture in his fields at Bolton Landing are similarly useful, and his photographs of the artist at work in Italy at the abandoned Italsider Steel factories in Voltri provide an invaluable record of the prolific month that Smith spent working for Festival of the Two Worlds in Spoleto, Italy in 1964.<sup>38</sup> Smith also photographed his own works obsessively, and these offer an insight into how he wished his sculptures to be

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<sup>36</sup> Recent exhibitions that have begun to challenge this and have shown Smith's paintings, drawings, photographs and reliefs include; David Smith: Object and Image: Small Paintings 1954-1958 (Los Angeles: Margo Leavin Gallery, 2007), David Smith: The Last Nudes (New York: Gagosian Gallery, 2001), David Smith: The Sprays (New York: Gagosian Gallery, 2008), David Smith: Photographs 1931-1965 (New York: Matthew Marks Gallery, 1998) and David Smith: Two Into Three Dimensions (Miami Beach: Douglas F. Cooley Memorial Art Gallery, 2000).

<sup>37</sup> A significant selection of Budnik's photographs of Smith were published in: Seeing David Smith: Photographs by Dan Budnik (New York: Knoedler & Company, 2006). Budnik's photographs were used by Rosalind Krauss to demonstrate that alterations had taken place in the painted surfaces of a number of Smith's sculptures in Rosalind Krauss, 'Changing The Work Of David Smith', Art In America, vol. 62 no.5, 1974: 30-3, which is discussed in detail in Chapter Four.

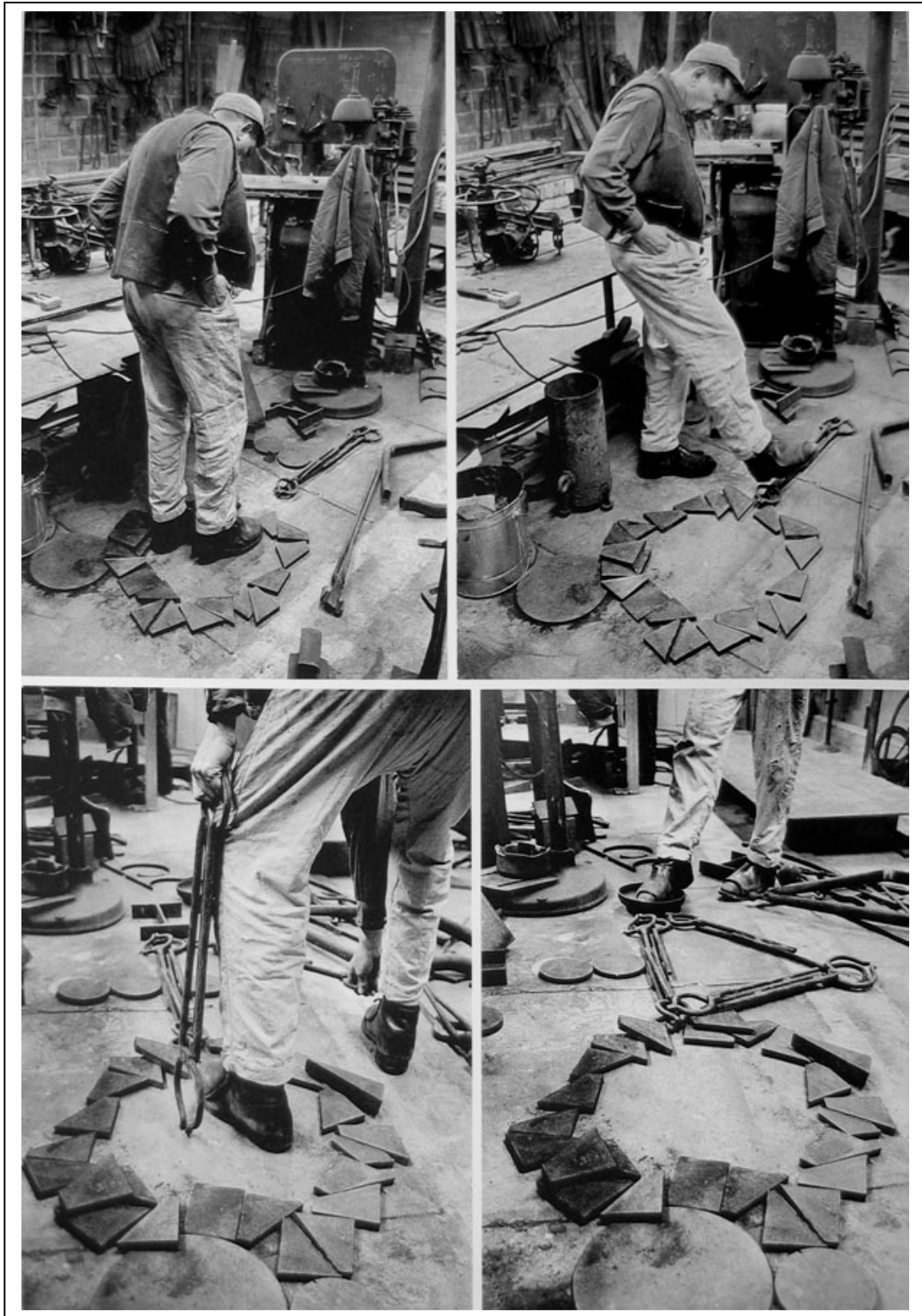
<sup>38</sup> Alexander Liberman's photographs of Smith's studio were taken after his death, and were intended to contribute to a book on American artist's studios titled, Nine Americans. Although this was not published, the photographs remain in the collection of the David Smith Estate. Similarly Ugo Mulas's photographs are kept at the Estate, though a significant number were published in: Carmen Gimenez, ed. David Smith con Fotografías de Ugo Mulas (Valencià: Centre Julio González , IVAM, 1996).

viewed. Although they are largely in black and white, these photographs of both sculptures and drawings provide an accurate record of the original appearance of the works, and are vital for making conservation and restoration decisions. In fact, this has become relevant in recent years, where a number of Smith's works have deteriorated to the point of intervention.

Critical writing on Smith has largely concentrated on his sculpture. The critic, Clement Greenberg was the most significant and perceptive early commentator on Smith's work.<sup>39</sup> He observed that: "David Smith is thirty-six. If he is able to maintain the level set in the work he has already done ... he has the chance of becoming one of the greatest of all

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<sup>39</sup> See for example Clement Greenberg, 'David Smith', Art in America, vol. 44, no. 4, Winter 1956-1957: 30-34 and 'The New Sculpture' in Art And Culture: Critical Essays, (Boston: Beacon Press, 1965):139-146.



**FIG. 2:** Smith Working on Voltri-Bolton X, Bolton Landing, 1962.  
Photo. Dan Budnik



**FIG. 3:** Alexander Liberman, David Smith's Studio at Bolton Landing, 1964

American sculptors.”<sup>40</sup> Greenberg observed the significance of drawing in Smith’s work as early as 1943, noting that, “It is obvious that Smith aims at effects closer to drawing than to sculpture.”<sup>41</sup> However, he had little interest in the artist’s drawings and paintings themselves, and felt that the value of Smith’s sculpture was, in contrast to contemporaneous sculpture, its clarity of line and lack of overt decoration or surface nuance; this notion will become significant in my discussion of alteration in Smith’s work in Chapter Four. Furthermore, Greenberg believed that, although Smith’s gift was considerable, his weakness lay in the tendency to “overwork a piece of sculpture, to act unconsideredly (sic) on every impulse, and explore every idea to its limits.”<sup>42</sup> Greenberg’s status as commentator on Smith’s work however, has been somewhat tarnished in recent years due to his negligent actions as Executor of the Smith Estate (1965-1979) combined with more recent criticism of his dogmatic and reductive formalist ideology.<sup>43</sup>

Hilton Kramer published a great deal of significant work on Smith during and after his lifetime, and wrote about Smith’s drawings and paintings as early as 1962.<sup>44</sup> However, Rosalind Krauss, a former student of Greenberg, has been the most consistent writer on Smith’s sculpture. She wrote the first published monograph on Smith in 1972, and composed a Catalogue Raisonné of his sculpture in 1977.<sup>45</sup> These brought significant

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<sup>40</sup> Clement Greenberg, ‘Review: American Sculpture of Our Time’ The Nation, 23 Jan. 1943, 140-141.

<sup>41</sup> Greenberg, 1943: 141.

<sup>42</sup> Greenberg, 1956-1957:32. When Greenberg republished this in his collected critical essays in 1961, he edited the text in several places. The resultant tone is perhaps less critical than the original. In this case “to overwork a piece of sculpture ...” (1956) is replaced by: “... to multiply details, explore every idea to its limits and act unconsideredly on every impulse.” Clement Greenberg, ‘David Smith’, Art and Culture: Critical Essays (Boston: Beacon Press, 1961) 203.

<sup>43</sup> Greenberg’s actions as Executor of David Smith’s Estate, and his deliberate stripping of a number of Smith’s sculptures were strongly informed by these critical notions, and are discussed in Chapter Four.

<sup>44</sup> See for example: Hilton Kramer, ‘The Sculpture of David Smith’, Arts, Feb. 1960: 22-41, or ‘David Smith’s New Work’, Arts, 38, Mar. 1964: 24-27, or his tribute to Smith: ‘Greatest of All American Artists’, New York Times Sunday Magazine, Feb. 16, 1969: 40-54: 59-62. Kramer’s ‘David Smith: Stencils for Sculpture’, Art in America, vol. 50, Winter, 1962: 32-43 is one of the first published work on Smith’s drawings, although it deals specifically with the spray paintings/drawings produced from 1957-1965.

<sup>45</sup> Rosalind Kraus, Terminal Iron Works: The Sculpture of David Smith (Cambridge: MIT Press, 1971), and The Sculpture of David Smith: A Catalogue Raisonné (New York: Garland, 1977). Krauss, together with Michael Fried and Jane Harrison Cone, all of whom later became influential critics, were in Greenberg’s 1961-1962 Harvard University Graduate Seminar. Their early work was heavily influenced by Greenberg’s Wofflinian approach. (Ellen Landau, Reading Abstract Expressionism: Context and Criticism (New Haven, Yale University Press, 2005) 96. Jane Harrison Cone was also an early commentator on Smith’s work writing an introduction for the retrospective exhibition catalogue, David Smith 1906-65: A Retrospective Exhibition (Cambridge: Harvard University Press, 1966).



attention to the artist's work, and Krauss's illustrated Catalogue Raisonné remains the most useful source for the artists' sculptural work.<sup>46</sup> Krauss was also perhaps the first critic to point out the pictorial qualities of Smith's sculpture, and its ability to present multiple perceptual viewpoints. However, she did not pursue the relationship between painting, drawing and sculpture in his work. In fact, though Krauss has recently written extensively on Smith's photography, she appears to have had little interest in his paintings or drawings; this aspect of the artist's oeuvre is largely ignored in her criticism.<sup>47</sup>

Since critical attention has focussed on representing Smith as one of the great sculptors of the twentieth century, the fact that he worked in many media simultaneously has largely been underrepresented in publication until relatively recently. Perhaps illustrative of this fact was a recent centennial exhibition at the Guggenheim Museum, New York, David Smith: A Centennial (2006). The Centennial provided perhaps the most extensive survey of Smith's sculpture to date. However, it included only a small number of drawings - largely those that were related directly to the sculptures - and no paintings or reliefs, which were a significant part of Smith's oeuvre. The associated catalogue provides a comprehensive Chronology, Bibliography and Exhibition History, representing a highly valuable overview of Smith's life and career.<sup>48</sup> However, although there are extensively-researched annotations on the 122 sculptures included, there is only a short checklist for the included drawings.

It is only in recent years that critical attention has focussed on Smith's work in other media and how they related to his process.<sup>49</sup> Although Smith exhibited his drawings as

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<sup>46</sup> Although the catalogue was comprehensive in 1977, it is now somewhat outdated and is missing a number of works that have since come to light. A revised Catalogue Raisonné project is ongoing at the David Smith Estate. I have relied on the records of the Estate to supplement the Krauss catalogue for the purposes of this thesis.

<sup>47</sup> See Lois Orswell's description of Krauss's 1966 visit to her house to study Smith's sculpture, in Cohn and Kianovsky, 2002: 142-3. Orswell had a particular dislike for the scholarship of Krauss and mentioned this episode as exemplar of the lack of interest scholars showed in Smith's drawings at the time. Krauss's essays on Smith's photography are available in: Joan Pachner, ed. David Smith: Photographs 1931-1965 (New York: Matthew Marks Gallery, 1998), and 'A Photo a Day: Recording the Work of David Smith', David Smith: A Centennial, Carmen Gimenez, ed. (New York: Guggenheim Museum, 2006) 11-17.

<sup>48</sup> Bénédicte Ajac and Nat Trotman 'Chronology', Sarah Kianovsky, 'Exhibition History' and 'Bibliography', Gimenez, ed. 2006: 387, 419, 433.

<sup>49</sup> See in particular Eleanor Green's essay in David Smith: Works on Paper (Los Angeles: Margo Leavin Gallery, 1990) and Karen Wilkin, David Smith: A Sculptor Draws, Master Drawings, vol. 40, no.1, Spring 2002: 43-55. Wilkin also discusses Smith's relief sculptures in Wilkin, 2000.

early as 1947 and continued to do so throughout his life,<sup>50</sup> the first major exhibition to bring attention to his graphic works was David Smith: The Drawings at the Whitney Museum of American Art in 1979.<sup>51</sup> Prior to this, this extensive body of work was relatively unknown. This was followed by Karen Wilkin's exhibition, David Smith: The Formative Years in 1981, which was likely the first to discuss the complex relationship between drawing and sculpture in Smith's work.<sup>52</sup> However, it was probably Miranda McClintick's exhibition at the Hirshhorn Museum and Sculpture Garden, David Smith: Painter, Sculptor, Draftsman in 1982, that provided a much wider perspective on Smith's work by including a considerable collection of Smith's paintings and drawings.<sup>53</sup>

Karen Wilkin has probably contributed the most to critical discussion of the relationship between drawings and sculpture in Smith's oeuvre. She has acknowledged that Smith's drawings were, second to his sculpture, the most inventive part of his oeuvre. Wilkin has also highlighted the false perception of flatness obtained by the viewer due to the manner in which Smith's works were (and are) photographed, and that in contrast they are often informed by their relationship to touch. She is undoubtedly correct in her assertion that Smith used paint and patina to clarify and enhance the structure in many of his sculptures, but she stops short of describing how Smith achieved this, and how the haptic notions she observed in Smith's sculptural surfaces are also present in many of his drawings.<sup>54</sup> Touch is present in our interaction with all objects, and is of obvious value to the study of our perception of sculpture, yet surprisingly little has been written on touch and sculpture, particularly relating to sculpture in the modern period.<sup>55</sup> Haptic notions are particularly relevant to the relationship between Smith's painted sculpture and his drawings and form an important part of my discussion below.

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<sup>50</sup> Sculpture and Drawings by David Smith, Skidmore College, Saratoga Springs, New York, February 4-25, 1947.

<sup>51</sup> Paul Cummings, David Smith : The Drawings (New York: Whitney Museum Of American Art, 1979).

<sup>52</sup> Karen Wilkin, David Smith : The Formative Years, Sculptures and Drawings from the 1930's and 1940s (Alberta: Edmonton Art Gallery, 1981).

<sup>53</sup> Edward Fry and Miranda McClintick, David Smith, Painter, Sculptor, Draftsman, Hirshhorn Museum and Sculpture Garden, Washington D.C., Braziller, New York, 1982, and Karen Wilkin, David Smith, New York: Abbeville Press, 1984).

<sup>54</sup> Wilkin, 2000: 35.

<sup>55</sup> Recent exceptions are: Mark Paterson, The Senses of Touch: Haptics, Affects and Technologies (London: Berg, 2007), G.E. Johnson, 'Touch, Tactility and the Reception of Sculpture in Early Modern Italy', A Companion to Art Theory, Paul Smith and Carolyn Wilde, eds. (Oxford: Blackwell, 2002) 61-75, and papers given at the symposium: Sculpture and Touch, Courtauld Institute of Art Research Forum, London, 16-17 May 2008.

The remaining material exists in a wealth of short exhibition catalogue essays, many of which are currently out of print, and difficult to obtain. An essay by Smith's second wife, Jean Freas is notable for its personal reflections on Smith's drawing during early 1950s.<sup>56</sup> A particularly selective group in the catalogue of an exhibition at The Margo Levin Gallery, and a personal selection by the sculptor, Alain Kirilli are also of note.<sup>57</sup> All three studies provide insight into the sheer volume and complexity of the nuanced drawing styles that Smith employed over his four-decade career. However, few writers discuss materials and technique, outside of a cursory mention of the textural nature of Smith's use of egg and ink (the identification of which is often erroneous), or the relevance of Smith's use of industrial spray paint, often simply referred to as 'enamel'. Similarly, the Gagorian exhibition, David Smith: Personage has drawn attention to Smith's relationships between sculpture and drawings as related to figuration in his work to which I add a technical dimension in Chapter Two.<sup>58</sup> Smith's later sprayed stencil drawings, although often exhibited, are not discussed in terms of the evolution of the spray technique. The large body of sprayed stencil drawings and paintings that Smith made between 1957 and 1965 were discussed in 1962 by Hilton Kramer. They have been frequently exhibited since Smith's death, largely in conjunction with sculpture. It was not until 1985 that the "Sprays" were the subject of an exhibition themselves. An essay in the accompanying catalogue discussed Smith's sprayed paintings and drawings and their relationship to sculpture, but did not elaborate on the important evolution of the spray technique, and its relationship with sculptural process.<sup>59</sup> An accurate technical discussion on the evolution of the spray technique was not published until 2008.<sup>60</sup>

David Smith used synthetic paints extensively both in his drawings and on the surfaces of his sculpture. The most significant contribution to the history of modern paints has been

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<sup>56</sup> Jean Freas, 'Living with David Smith' in: David Smith, Drawings of the Fifties (London: Anthony d'Offay Gallery, 1989) 3-16.

<sup>57</sup> David Smith: Drawings from 1957 (Los Angeles: Margo Leavin Gallery, 2000) and Dessins De David Smith, 1906-1965 : Un Choix D'Alain Kirilli (Paris: Ecole Nationale Supérieure Des Beaux-Arts, 2003).

<sup>58</sup> See: Alex Potts, 'Personage', David Smith: Personage (New York and London: Gagorian Gallery, 2006).

<sup>59</sup> W. Ameringer, essay in David Smith: Sprays From Bolton Landing, (London: Anthony d'Offay Gallery, 1985).

<sup>60</sup> Peter Stevens, 'Sprays: The Absent Object', in David Smith: Sprays (New York: Gagorian Gallery, 2008).

made by Tom Learner and Jo Crook.<sup>61</sup> The effect of treatment on artists' acrylic paints have also been investigated extensively by Tom Learner, Elizabeth Jablonski and Bronwyn Ormsby.<sup>62</sup> The history of artists' use of commercial gloss paints in the twentieth century has been published by Harriet Standeven.<sup>63</sup> These works have naturally concentrated on modern synthetic media used on canvas. However, there is little material on how acrylic, alkyd and other synthetic media behave on paper, and how these works might respond to typical conservation treatments. As I demonstrate in Chapter Four, alkyd paints on Smith's works on paper have aged in a radically different manner to the same media used on prepared canvas, and as noted above, efflorescence has formed on several works in both alkyd and egg-ink on paper. Studies on efflorescence formation on ethnographic objects and traditional modern paintings are available, though these have yet to offer a standard hypothesis for the phenomenon.<sup>64</sup>

## Methodology

The methodological approach to the following study uses principles from art historical discourse, from recent study of tacit knowledge in artists' processes, from theories regarding the importance of haptic sensations in the perception of sculpture and painting, and from recent approaches to object-based research in conservation and technical study. These principles were used to inform a discussion on the often-complex process used by David Smith as a sculptor, painter and draftsman. The thesis was developed over three

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<sup>61</sup> Jo Crook and Tom Learner, *The Impact Of Modern Paints* (New York: Watson-Guptill 2000). See also: Tom Learner, *Analysis Of Modern Paints* (Los Angeles: Getty Conservation Institute, 2005), Tom Learner, 'A Review of Synthetic Binding Media in Twentieth Century Paints', *The Conservator* 24, United Kingdom Institute for Conservation, 2000, and Tom Learner, 'The Analysis of Synthetic Paints by Pyrolysis-Gas Chromatography-Mass Spectrometry (PyGCMS)', *Studies in Conservation*, 46, International Institute for Historic and Artistic Works, 2001, 225-241.

<sup>62</sup> For example: Bronwyn Ormsby et al. 'Wet-cleaning Acrylic Emulsion Paint Films: An Evaluation of Physical, Chemical and Optical Changes.' *Modern Paints Uncovered* (Los Angeles: Tate Modern and Getty Conservation Institute, 2007) 187-198, and Elizabeth Jablonski et al. 'Conservation Concerns for Acrylic Emulsion Paints', *Reviews in Conservation*, no.4, International Institute for Conservation of Historic and Artistic Works, 2003, 3-13. An extensive investigation into the cleaning of acrylic paints was carried out from 2006-2009 at Tate under the Tate AXA Art Modern Paints Project.

<sup>63</sup> Harriet Standeven, 'Cover the World: A History of the Manufacture of Household Gloss Paints in Britain and the United States from the 1930s to the 1950s', *Modern Paints Uncovered* (Los Angeles: Tate Modern and Getty Conservation Institute, 2007) and Harriet Standeven, 'The Development of Decorative Gloss Paints in Britain and the United States c.1910-1960', *Journal of the American Institute for Conservation* (JAIC), vol. 45, 2006, 51-65.

<sup>64</sup> An extensive review of current literature and hypotheses on efflorescence on works of art is found in Chapter Four.

years, and was the result of the author's construction of a successful collaboration between the David Smith Estate and the Harvard University Art Museum in 2005, enabling access to Smith's work, appropriate permissions to sample original works to be obtained, and securing the necessary scientific and analytical support required for the identification of Smith's materials. Sheer volume of drawings, some four thousand in number, precluded the ability to examine Smith's entire body of graphic work. However, examining a significant and selective number of works in the collection of the Estate and elsewhere was possible over a four year period from 2006-2009.<sup>65</sup> Media analysis is a time-consuming activity requiring significant time for the analysis itself and considerably more for interpretation of the data. The limited time available for analysis of media samples at The Straus Center for Conservation and Technical Studies at Harvard University Art Museum naturally precluded the analysis of all works examined. Thus, a careful selection of works that would yield the most informative data toward further understanding of Smith's process was necessary. In the case of the following study, some 60 media samples were analysed over a four year period, of which 54 yielded useful results.

It is important to note that the aims of this study were not to create a purely technical or analytical study, although these tools have been utilised to inform the research. There is considerable risk associated with the creation of a significant technical study of an artist's work. Not least is the representation of such research as a list of technical or analytical data. The conservation literature has much to offer research into art of the modern period and is often invaluable in contributing to understanding artists' work. However, in general it rarely penetrates into the deeper significance of its results to the process and oeuvre of the artist. The field of technical art history has benefited from a number of recent works that have utilised the tools of conservation and technical study to provide a platform for investigation into artistic process.<sup>66</sup> Indeed, David Bomford has noted that technical art history's particular achievement may lie in its concern with such processes:

Technical art history concerns itself with all the processes for making art, and the technical and documentary means by which we throw light on those processes. It is principally concerned with the physical materials and

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<sup>65</sup> See list of works examined in Appendix C.

<sup>66</sup> Representative examples are; Pia Gottschaller, *Palermo: Inside His Images*, PhD Thesis, (Munich: Technische Univeritat, 2003); Mancusi-Ungaro, 1996; Steele, 2000.

structures of works of art and how they are prepared, used, combined and manipulated – but (and this is what makes technical art history so intellectually satisfying) it also interests itself in how an artist arrived at the finished – or, indeed unfinished work. It charts the stages of invention, development, realization, elaboration and revision: in short, it is a route into – it is our access to - the heart of the artist’s intentions and changing ambitions.<sup>67</sup>

Bomford’s stress on the charting the stages of invention also serves to differentiate this approach from what has been, until recently, an emphasis on an empirical approach to the identification artists’ use of materials and technique. Investigation into artists’ process or into the tacit, unspoken knowledge contained in artists’ process can also serve as prompt for further discussion, evidenced by recent work by a number of scholars. Anthea Callen for example, has used Monet’s privileging of colour over drawing to prompt discussion on the feminine principle in Monet’s landscape. Jan Marontate has discussed socio-political aspects related to the introduction of new synthetic paints in the 1930s, and Margaret Holben-Ellis has related Jackson Pollock’s preference for continuous drawing media (such as ballpoint pen) in his works on paper directly to his choice of paints and painting technique in his large canvases.<sup>68</sup>

The methodological approach for this study was considerably informed by a desire to elucidate the tacit, or unspoken knowledge in Smith’s process. Nigel Whiteley has commented on the importance of tacit understanding in artists’ work in relation to a series of remarkable occasional articles written throughout the 1950s in the American journal Art News. Between 1951 and 1958, these articles provided a well-documented insight into the tacit dimension in the studio practice of American painters and sculptors.<sup>69</sup> The

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<sup>67</sup> David Bomford, Forbes Prize Lecture, International Institute of Conservation, 2009.

<sup>68</sup> Anthea Callen, ‘Technique and Gender: Landscape, Ideology and the Art of Monet in the 1890s’, in Steven Adams and Anna Gruetzner-Robins, eds. Gendering Landscape Art (Manchester: Manchester University Press, 2000) 26-45, Jan Marontate, ‘Technical Innovation and Modernist Ideologies: Commercial and Artistic Conjunctions in the Appropriation of New Painting Media’, Journal of Arts Management, Law and Society, vol.25, no.2, Summer, 1995, 93-109, Margaret Holben-Ellis, ‘Materials, Tools And “Technics”’: Works On Paper By Jackson Pollock’, No Limits, Just Edges’: Jackson Pollock: Paintings On Paper, (Berlin: Deutche Guggenheim, 2005) 126-137.

<sup>69</sup> For an overview, see Nigel Whiteley, ‘Seeing What, How and Why: The Art News Series, 1953-58’, Journal of Visual Arts Practice, vol.6, no.3, Dec. 2007, 215-228.

interviewers were often established artists or critics themselves, in most cases known to their subjects, and included important art world figures such as Elaine de Kooning, Thomas B. Hess, Frank O' Hara, Irving Sandler and Fairfield Porter. The subjects of the '... Paints a Picture' series included Willem de Kooning, Jackson Pollock, Adolph Gottlieb, Richard Diebenkorn, Joan Mitchell, and Ben Shahn. Similarly, the '... Makes a Sculpture' series included Richard Lippold, Herbert Ferber, and David Smith. These articles provided an insight into the artists' studio, eschewing the clichéd romanticism of portraying the artist as solitary genius, and concentrated on technical matters, description of the artists' studio space, use of materials and, crucially, on the artist's process in creating a particular work. The series helped to demystify the practice of the artists of the period, often seemingly impenetrable to the outsider. It provided an insight into both the artist's technical procedure, thoughts, interpretation, and the creative process, often by interviewing the artist while he or she was creating a work. In its concentration on description, analysis, interpretation and evaluation, as Whitely has observed, the series "articulated the tacit in a way rarely found in discussions on artists today."<sup>70</sup>

Surprisingly, this approach has only recently been (re)applied to the study of visual art. However, the use of tacit knowledge in creative procedures was first posited in Michael Polanyi's 1967 work, The Tacit Dimension, where the author defined the tacit as simply "the study of human skills and skill acquisition". In Polanyi's text, creative acts are charged with strong personal feelings, and creativity is partially informed by hunches and guesses that are part of an exploratory act. The creative act is a part of the process of discovering truth, but doing so using a form of knowledge that cannot necessarily be stated in propositional or formal terms. Polanyi saw this pre-logical phase of creativity as markedly separate from explicit knowledge.

Tacit knowledge therefore is used where skilful performance of any task relies on a set of rules that are not known in the truest sense to the person following them.

Methodologically, the tacit approach followed in this study is undeniably close to the approach used in the technical studies of artists' work. However, where information on materials and technique is often readily obtainable from technical examination, analytical study, artists' writing and interviews, there are severe limitations in relying on such

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<sup>70</sup> Whitely, 2007: 216.

evidence to obtain an indication of true process - even through evidence gained through the artist's own (often-edited) voice. The complexities of what we can term 'process' are not readily or easily explainable by the commentator or even by the creator, but the articulation of the tacit in artists' work can at least provide a useful prompt for further discussion, but might also provide the possibility of new perspectives on individual works and of the artist's oeuvre as a whole.

Explicit knowledge is naturally privileged over the elusive subconsciously-employed skills of the craftsman, and this is further complicated by a long art historical tradition of connoisseurship that stressed an immediate emotional response to the work itself, eschewing a perceived mundanity in discussing technique. The technical study, which sprang from late 19<sup>th</sup> Positivism, and gained popularity in the early 20<sup>th</sup> century interest in lost techniques, demanded an understanding of artist's materials and techniques, but the relationship between this scientific thought and the more emotive process of the artist, has received little study; arguably less so in studies of modern and contemporary art. The tacit is difficult and unwieldy to articulate, and it often requires a speculative approach, yet it is extremely valuable in acquiring new perspectives on artists' process.

With this in mind, in the following chapters I will focus on the relationship that exists between Smith's ideology as contained in his written testimony and the tacit aspects of his studio practice. In this way, the discussion illuminates the understanding of Smith as an artist, rather than reducing his work to a series of scientific data, list of identified materials and empirical observation. As a caveat, the over-reliance of circumstantial technical evidence and analytical results can lead to a false or over-interpretative reading of an artist's intent, if such a thing can be truly articulated. Although my approach to Smith's working process is by nature speculative, the discussion of my observations will contribute significantly to current thinking about Smith as an artist.

As noted above, the relationship between sculpture and touch; more importantly, the tactile, or haptic/kinaesthetic sensations in the perception of Smith's work are only briefly touched upon in the extant literature. Utilising haptic perception theory provides a useful framework for the understanding of Smith's embodied gesture in ink, paint or steel and our interaction with it. Furthermore it is useful in looking at Smith's use of texture in his work, whether physical or perceived. This approach is much informed by Merleau-Ponty's



Phenomenology of Perception and the importance of perceiving touch when viewing real objects. Sculpture is the natural venue for discussion on perceptions of touch and kinaesthetics. However, my discussion on Smith is also framed by recent studies by Paterson and Shiff that relate similar sensations to the perception of the physicality of paintings.<sup>71</sup>

The haptic sensation refers to the study of the sensation of touch. It encompasses the concept of Proprioception, the perception of the position, state and movement of the body and limbs in space. Since physical perception includes a number of discrete sensations in itself, Proprioception can include kinaesthesia (the sensation of movement of the limbs, muscles, tendons and joints of the body) and tactility (the cutaneous sensations of touch). These perceptions are synaesthetic. In other words, when we perceive an object visually, we also perceive the physical sensations that are associated with its touch, and also the sensations involved in its creation. For example, one cannot view a classic drip painting by Jackson Pollock without sensing the physicality of its creation in one's own body. Smith was certainly aware of this principle in praxis, if not in theory, and many of his drawings are imbued with a similar physicality.

The technical methodology employed during the following research primarily involved the examination and analysis of some 120 of Smith's works on paper, several paintings on canvas and Masonite, and a number of sculptures from various collections in the United States.<sup>72</sup> Empirical observations were recorded, and instrumental analysis was performed in a number of cases where clarity was needed in the positive identification of media used in Smith's drawings. Media samples were analysed at The Straus Center for Conservation and Technical Studies, Harvard Art Museum, between 2003 and 2008 using Gas Chromatography/Mass Spectrometry (GCMS), Pyrolysis Gas Chromatography/Mass Spectrometry (PyGCMS), Fourier Transform Infrared Spectroscopy (FTIR) and X-ray

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<sup>71</sup> Richard Shiff, 'Constructing Physicality', Art Journal, vol.50, no.1, Spring, 1991, 42-47 and Mark Paterson, The Senses of Touch: Haptics, Affects and Technologies, (London: Berg, 2007).

<sup>72</sup> See Appendix C. The largest and most representative collections of Smith's drawings outside of the Estate, are held at The Harvard Art Museum. Other significant collections are held at The Metropolitan Museum of Art, New York, The Whitney Museum of American Art, New York, The Museum of Modern Art, New York, and the National Gallery of Art, Washington D.C. However the vast majority of Smith's drawings are held by the David Smith Estate. This collection forms the basis of my study.

Fluorescence Spectroscopy (XRF), where appropriate.<sup>73</sup> These data were interpreted in the context of Smith's sporadic, yet informative statements on technique and materials, personal interviews with members of Smith's Estate, artists and conservators familiar with welded and painted sculpture, and with information obtained from the history of artists' and industrial paints through industrial literature and personal correspondence with those working in such industries.

My selection of the period 1950-1965 was chosen for a number of reasons: In 1950, Smith consciously began to move away from drawings that were based largely on Surrealist imagery, Cubist-inspired planar forms and drawings that were studies for sculpture, toward an independent autographic and calligraphic style. This change happened concurrently with an important shift in the scale and style of his sculptural work, which echoed his graphic work in space in its lyrical and linear articulated forms. Secondly, having largely used traditional drawing media for the first two decades of his career, Smith began to experiment with new media more frequently after 1950. In 1952 he developed a medium consisting of black drawing ink mixed with egg-yolk used alone or in combination with other materials. These materials created subtle nuance in his drawing that reflected a similar tendency observed on the surfaces of his sculpture. He also began to make frequent use of synthetic media, both artistic and industrial, in his drawings. From 1957 to 1965 he developed entirely new techniques for drawing and painting, making use of aerosol spray paints and stencils to create works that engaged intimately with sculpture.

Technical information is typically ignored in discussions on artists' papers, and although Smith's business papers and receipts are by no means complete, I was able to obtain considerable information from what is extant. Particularly this exercise relies on knowledge of the history of both artists' and industrial materials. My own experience was supplemented through consultation with the Paint Research Library and through often frustrating correspondence with paint companies. Harriet Standeven has discussed the difficulties in obtaining even the most basic proprietary information from paint companies, and this largely reflected my own experience in researching David Smith's

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<sup>73</sup> Unless otherwise noted, all analytical work was carried out by the author and Dr. Narayan Khandekar, Senior Conservation Scientist, Straus Center for Conservation and Technical Studies, Harvard Art Museum, Cambridge, Massachusetts. Analytical protocols are available in Appendix B, and analytical results in the survey of drawings in Appendix C. All analytical data is stored electronically at the Analytical Laboratory at The Straus Center at Harvard Art Museum.

industrial paints.<sup>74</sup> Many of the industrial archives belonging to these companies have been destroyed or lost. Those that remain are often inaccessible, and manufacturers remain highly reticent to release any information, even on long-obsolete formulations. I was able to obtain some generic information from ex-employees, archivists or those who worked in the industry in the 1950s and 1960s. Additionally, I relied on patents issued during the period for paints and coatings. The United States Patent Office's online database of patents issued from 1795 to the present was a useful resource. Despite the vast number of patents issued for synthetic paints and coatings over the 1950s and 1960s, many of which never saw manufacture, I was able to obtain an overall impression of research into paint formulations that existed at the time.<sup>75</sup>

Much of the technical information on Smith's life was obtained through existing archives, available in their original form at the David Smith Estate or in microfilmed form at the Archives of American Art offices in New York and Washington D.C.. Interviews and discussion with individuals familiar with Smith and his work were fundamental to my research. Particularly crucial to my methodology were discussions with Peter Stevens, Executive Director of the David Smith Estate, who has intimate knowledge of Smith's work, who filled many of the technical gaps present in the literature, and was able to provide testimony for the conservation policies adopted by the Estate since 1979. Similarly Smith's friend, the historian and writer, Irving Sandler, was able to provide some insight into the artist's thoughts and work.

### **Structure of the Thesis**

The thesis is structured around four aspects that are intended to articulate the tacit in Smith's work, provide an understanding of his material choice, and discuss issues relating to the preservation of the work:

In Chapter One, "David Smith: Drawing in Three Dimensions", I provide the biographical context in which the subsequent discussion can be viewed. I introduce the concept of Smith's process as a sculptor and draftsman, and outline David Smith's beginnings as a painter. The Chapter also draws attention to the influence of the artist and teacher Kimon

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<sup>74</sup> Standeven, 2004: 12-13.

<sup>75</sup> United States Patent Office, 30 Sept. 2008 <<http://patft.uspto.gov/>>. A more comprehensive search engine that allows searching for specific chemicals is available at the independent Freepatentsonline, 30. Sept, 2008 <<http://www.freepatentsonline.com/search.html>>.

Nicolaides on Smith's development as a draftsman and argues that process in Smith's drawings is strongly related to concerns observed in sculptors' drawings in general.

In Chapter Two, "Drawing/Sculpture: Sculpture/Drawing," I discuss the increasing convergence of relationships in drawing and sculpture as reflected in Smith's materials during the 1950s. I also discuss the evolution of Smith's drawing technique through the 1950s and early 1960s as evidence of the drawing/sculpture dialectic in his work, and demonstrate that as his confidence with sculptural techniques increased, he became considerably more conversant and experimental with his drawing media. I eliminate the myth that David Smith used only egg-ink for his calligraphic works of the mid and late 1950s, and identify the synthetic media that he experimented with at the same time. I posit that Smith's experiments with sprayed media occurred several years prior to his discovery of the aerosol spray can, and that discussion on tactility in Smith's work identifies for the first time that the textural additions that Smith made to his drawing media refer obliquely to his process. Finally, I argue based on study of the tacit in Smith's work, that haptic notions related to the perception of sculpture may be particularly valid for understanding Smith's drawings, and can justify his extension of drawing into three dimensions.

In Chapter Three, I discuss Smith's interest in durable and quality materials in his work in the context of his adoption of industrial ideals to his workshop practice. I elaborate on the meaning of tempera, (an arbitrary term often used erroneously), and its ostensibly durable properties, and discuss how Smith's use of tempera and industrial paints were deeply ingrained in his sense of artistic identity. Taking as my starting point Paula Wisotski's research regarding Smith's politicisation in the 1930s, I relate Smith's working process and choice of materials in painting and drawing to his appropriation of an industrial ideology in his studio practice. Furthermore, I elaborate on the period Smith spent researching artists' materials for the Public Works Art Project and experiences at the Works Progress Administration – a period that is often mentioned in the literature as an important phase in his subsequent development, yet has not been extensively discussed. I develop this knowledge in Chapter Three and demonstrate that the research carried out into tempera and oil paints for mural painting, informed Smith's choice of materials for the remainder of his career, and furthermore facilitated his return to tempera in the form of egg-ink in 1952.

In Chapter Four, “Alteration and Intent in Smith’s Sculpture and Drawings,” I expand the discussion on tacit understanding of Smith’s process, and demonstrate how the technical research outlined in the previous chapters can reveal much of what we might understand of Smith’s intention. Building on the discussion in Chapter Three, I discuss the fact that despite Smith’s interest in durable materials, many of his works in both drawing and sculpture have aged in unexpected ways. I argue that a profound understanding of the materials Smith used can also be used to provide important context for intervention when aging and damage significantly alters our perception of the work.

I investigate the possible causes and consequences of disfiguring efflorescence that has formed on a significant number of Smith’s drawings, and argue that in Smith’s case, such efflorescence is a highly complex combination of physical and chemical interactions, likely exacerbated by inadequate storage in the years after his death. Chapter Four also discusses the various hypotheses given for formation of efflorescence, and relates them to the phenomena observed in Smith’s drawings. These issues raise questions about the true durability of Smith’s media, why they have deteriorated, and how an understanding of the tacit in Smith’s work might be crucial for decisions made for their conservation. In this context, current discussion on identifying an approach to the deterioration of Smith’s iconic drawings from the 1950s based on sound understanding of his process is juxtaposed with the decision in the 1970s - also ostensibly to redress or preserve artistic intent - to remove deteriorated paint from a number of his unfinished sculptures by the then Executors of Smith’s estate.

## **CHAPTER ONE: David Smith: Drawing in Three Dimensions**

Almost single-handedly, David Smith changed the nature of sculpture in America, giving it a passion, a seriousness – and an identity – it did not have before.<sup>1</sup>

There are few who would refute Michael Brenson's claim that David Smith changed the very nature of sculpture in America. Smith brought to sculpture a new formal language, building on earlier achievements in welded steel by Pablo Picasso and Julio González certainly, but ultimately carrying them further toward a uniquely American form of expression. However, Smith also brought a new material language to American sculpture, employing the methods and materials – even the ideology of industry, creating works that could be as free as the gestural drawing that was so much a part of his identity, bringing lyricism to industrial metal, and in the process, removing sculpture from its monumental, monolithic heritage. The significance of David Smith's sculptural achievement has largely outshone that of his work in painting and drawing, although it is integral to the perception of his work that he saw no demarcation between his work in two and three dimensions. The novel methods and materials that he brought to drawing are no less significant than those of his sculpture, and confirm that he saw little difference between the two.

It can be stated clearly, that Smith was, as Irving Sandler has put it “a thirties artist,” and as such belonged by generation and by association to the disparate group of New York Abstract Expressionist painters.<sup>2</sup> As those artists had, Smith had lived through the Depression, the Works Progress Administration and the witnessed the rise of Fascism in Europe. The events of the 1930s informed much of Smith's political ideology both then and throughout his life. By extension the leftist ideas much voiced by artists' unions at the time also informed his appropriation of the methods and materials of industry in his work, expressed also in his unlikely use of industrial materials in drawing. Smith's drawings were inextricably linked to his sculpture, part of what he called his workstream. They were works that were both intimately related to his sculpture and independent works in themselves.

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<sup>1</sup> Michael Brenson, 'An American Sculptor', in David Smith 1906-1965 (Valencia: Centro Julio González, 1996) 307.

<sup>2</sup> Irving Sandler, interview with the author, 27 June, 2007.

In this chapter I will provide a context for subsequent discussion on Smith's drawing media by briefly discussing Smith's career. This is intended to provide the reader with a familiarity with Smith's life and work before the more introspective examination of his drawing techniques is presented. Smith's early experiences clearly influenced his use of materials throughout his career and, as I discuss below, his brief training with the artist Kimon Nicolaides at the Art Students League in the late 1920s may have contributed a great deal to his subsequent practice in drawing. Additionally, I will highlight some commonalities found in twentieth-century sculptors' drawings as they relate to Smith's work, and demonstrate that for most sculptors, and particularly David Smith, drawing is both a separate discipline, existing outside of planning or design for a future work in three dimensions, and an intimate part of developing concept in the sculptural process.

### **1.1: David Smith, "The Work is My Identity": A Life**

David Smith was born in Decatur, Indiana in 1906, in the middle of the automobile boom. An early interest in art led him to enrol on a correspondence course at the Cleveland Art School (1923-24), and subsequently at Ohio University (1924-25). He was later to recall these early art school experiences as a time of frustration, citing as a reason the institutional lack of practical art instruction. Of greater significance to his developing ideology as an artist was in 1925, when he spent the summer working as a frame assembly riveter and spot welder in a Studebaker factory at South Bend, Indiana. Although this was an experience he tended to over-emphasize later as part of a somewhat illusory industrial heritage that led him inexorably to adopt of the welding torch for sculpture, he was able to make a connection between art and industry that clearly resonated with his practical need to create works of art.<sup>3</sup> The early exposure to Fordist factory production and a kinship with the working man became an important part of Smith's process, ultimately expressed in the construction of a studio according to an industrial model, and in the almost assembly line production of works toward the end of his life. Consolidating this factory experience during the war years, he worked at the American Locomotive Works from 1942-1944. Again citing the industrial rather than artistic heritage of this work and the

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<sup>3</sup> This is the basis of Smith's self-myth that he had been a factory worker before he knew what art was. As noted above, he had rather more experience in white-collar positions during the 1920s. The summer at South Bend was in fact the only welding experience that Smith had prior to Terminal Iron Works in Brooklyn and The American Locomotive Works during the war years.

pragmatic attitude to its production, he wrote in 1947 that “arc welding is ... the most desirable method of joining metal – here in sculpture – just as it was when I welded tanks, destroyers, and locomotives at the American Locomotive Works.”<sup>4</sup>

In fact, Smith had rather more success in white-collar positions in the 1920s. He moved to Washington D.C. in 1926 to take up a position with the Morris Plan Bank, taking art and literature classes in the evenings at George Washington University. At the end of the year, he moved to New York to work for a subsidiary of the Bank. Living in the same building was Dorothy Dehner an artist who was studying at the Art Students League. Dehner introduced Smith to the League and he began to take classes with Richard Lahey, Homer Boss and Allen Lewis in 1926. These experiences, as I will demonstrate in the next chapters, were instrumental in forming his subsequent approach to both drawing and sculpture, which was largely that of a painter.

In Lahey’s class he drew from life models, a practice that he would return to in the early 1960s in his large series nude paintings created with dripped alkyd paint. Lewis taught classes in etching and relief printing, a practice which Smith continued throughout his life, albeit largely unrecognised, and in Boss’s class, he drew from sculptural casts.<sup>5</sup>

The Art Students League was notable for its lack of interest in abstract art, and teaching generally tended toward a traditionalist, academic approach.<sup>6</sup> There were, however, notable exceptions. Specifically seeking instruction in avant-garde painting, he took classes from the painter John Sloan from 1927 to 1928, who Smith later acknowledged as his introduction to the Cubist principles in art making that were to inform the majority of his work in both two and three dimensions. Indeed Sloan had written in The Gist of Art that “every student should paint simple solids; that is spheres, cubes, cylinders and cones – the artist forms concepts of what he has observed in nature.”<sup>7</sup> Although this approach was endemic to the work of many Abstract Expressionist artists, it is observed rather more literally in Smith, as he developed these cubist principles into literal space, carrying much

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<sup>4</sup> David Smith, ‘Design for Progress – Cockfight’, statement, 1947. McCoy, 1973: 60.

<sup>5</sup> A short 1987 publication includes the entirety of Smith’s prints: Alexandra Schwartz, David Smith: The Prints, Catalogue Raisonné (New York: Pace Prints, 1987).

<sup>6</sup> Hilton Kramer, ‘A League of Their Own’, Art And Antique vol. 28 no.10, Nov. 2005, 126.

<sup>7</sup> John Sloan, Gist of Art: Principles and Practices Expounded in the Classroom and Studio 1939 (New York, Dover, 1977) 12.



further what his precursors – Picasso and González – had achieved in sculpture at the beginning of the century.

Perhaps the most profound influence on Smith's development of a sculptural approach to painting and drawing was the Czech modernist painter, Jan Matulka. Matulka was a former pupil of Hans Hofmann who taught both Smith and Dehner at the Art Students League from 1929 to 1930; they both continued to study with him privately after he left the League until 1931. Matulka was ostensibly a drawing tutor, but recognising his modernist pedigree, the artists in his class began to bring their paintings to him for critique. Dorothy Dehner stated in 1967 that he was the most progressive teacher at the League, and that later Dehner and Smith spoke of organising an exhibition of the artist's work. Smith, acknowledging his influence to the painter on many occasions during his career, specifically drew attention to the fact that his progress toward sculpture came specifically out of his work with Matulka in the study of textures and planes.<sup>8</sup> Matulka also encouraged his students (who also included the artists Edgar Levy, Irene Rice Pereira and Burgoyne Diller) to enliven their paint with sand, paint scrapings, pumice, gravel and other materials. Early paintings by Smith show that he followed this trend, mixing sand into several early paintings on canvas, and ultimately pursuing this towards an end that resulted in thick painted reliefs on canvas that were more sculpture than painting.

These works (see Figure 4) were essentially constructions on canvas that dealt, as Smith's drawings also did at this point, primarily with shallow relief space and planes. Although they are often considered transitional works, he continued to make reliefs throughout his life. Although they are an important precursor to Smith's transition to entirely free-standing sculpture, they are also highly significant for Smith's subsequent development of technique in drawing. The textural nature of these painted relief works was obviously something that Smith engaged with in the 1930s, yet he returned to textured paint later in his career, drawing attention to the relationship between drawing and sculpture, specifically adding texture to his drawing media, rather than his works on canvas or panel.

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<sup>8</sup> David Smith in a self penned Chronology of his life until 1947, compiled c.1950 in Cleve Gray, David Smith by David Smith: Sculpture And Writings (New York: Thames And Hudson, 1988) 25.



**FIG. 4:** David Smith Untitled (Relief with Bones), 1956

**FIG. 5:** David Smith, Saw Head, 1933

Ideas about the textural quality of paint were of course not new. Picasso and Braque had brought texture to painting with the introduction of collage to the modernist canon. However, under Matulka's influence, Smith began to add material from his quotidian domestic and artistic life, an early reflection perhaps of his axiom that the work produced must reflect his identity. Dorothy Dehner reflected on this aspect of the work carried out during their period studying under Matulka: "We mixed cement with our paint, and even small pebbles, and David used to experiment with coffee grounds or anything that was around the house."<sup>9</sup> Similarly, John Graham, with whom Smith and Dehner were closely associated during this period, also encouraged the use of textured paint. Graham's influential System and Dialectic of Art published in 1937 encapsulated the issues facing abstract artists at the time.<sup>10</sup> Graham stressed the importance of automatic drawing for releasing unconscious psychic content, and of the sensuous qualities of the materials of painting themselves. As Dehner recalls, "the importance of the edge was something that Graham spoke about constantly. He stressed the necessity of keeping the paint alive. He wanted his painting to evoke mystery and excitement and to produce emotional overtones."<sup>11</sup> These early experiments with texture certainly influenced Smith to take his work in the direction of sculpture. However, as I demonstrate in Chapter Two, he engaged with texture in a very different manner when he began to use it in his drawing during the 1950s. At that point, as I shall argue, the identification of the materials he used suggests strongly that he actively sought associations with his studio process in sculpture.

The Autumn of 1933 represented a major shift in Smith's work. Having been introduced to Picasso and González's welded steel works in a 1929 edition of the French periodical, Cahiers D'Art by Graham, he realized for the first time that he could combine his knowledge of welding picked up during the summer of 1925 at Studebaker with the making of art. He purchased an oxy-acetylene welder, and proceeded to experiment with welding steel and iron in his apartment in Brooklyn. Smith produced three 'Heads' in iron

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<sup>9</sup> Dorothy Dehner, Interview with Margaret Haggerty, 1967, Haggerty, 1968: 25.

<sup>10</sup> John Graham, System and Dialectics of Art 1937 (New York: Delphic Studios, 1937).

<sup>11</sup> Dorothy Dehner, 'John Graham: A Memoir', Leonardo 2, 1969: 287-293.

in 1933, strongly suggesting the influence of González (see Figure 5). These early works are likely to have been the first welded steel sculptures in America.<sup>12</sup>

Steel was a material that held profound associations for Smith; at the same time a material associated with American industry and progress, and a material that dealt with a much darker reality. He wrote in 1952:

The material called iron or steel I hold in high respect. What it can do in arriving at a form economically, no other material can do. The metal itself possesses little art history. What associations it does possess are those of this century: power, structure, movement, progress, suspension, destruction, brutality.<sup>13</sup>

The unique physical properties of steel became an important factor in Smith's studio process. Its ability to be fashioned according to concept with precision and speed as easily as fluid paint was integral to his prolific output and his ability to make produce works in a constant stream. He was able to realise a continuous flow of concepts in three dimensions at a considerable rate, or as Harrison-Cone has suggested, taking a single idea or theme and developing and exploring that theme by means of a series of closely-related sculptures.<sup>14</sup>

Smith realized the importance of adopting the methods and materials of industry in his work, and saw himself as a pioneer in developing a new sculptural language. He wrote in 1952:

American machine techniques and European Cubist tradition, both of this century are accountable for the new freedom in sculpture making. Sculpture is no longer limited to the slow carving of marble and long process of bronze. Here I am talking about direct metal construction, contrary to the carving away technique of classical sculpture, the new

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<sup>12</sup> These were Agricola Head, Chain Head and Saw Head, 1933. In addition to creating the first welded sculpture in America, Smith could also claim to have made the first arc-welded sculpture to have been purchased by an American Museum (c.1940s). 'Design for Progress – Cockfight' in McCoy, 1973: 60.

<sup>13</sup> David Smith, 'The New Sculpture', Symposium, Museum of Modern Art New York, 1952. McCoy, 1973: 84.

<sup>14</sup> Jane Harrison Cone, David Smith 1906-65: A Retrospective Exhibition (Cambridge: Harvard University Press, 1966) 1-2.

method is to assemble the whole by adding its unit parts...is also an industrial concept, the basis of automobile and machine assembly in the steel process.<sup>15</sup>

This interest in the industrial led him to Terminal Iron Works, a foundry in Brooklyn where he could rent space in 1934. Here, he was able to learn metalworking techniques outside of an artistic environment, enabling fruitful experimentation and more importantly perhaps, access to scrap material. The period was influential in his later adoption of an industrial mode of working, realizing that his work was more closely allied with that of the factory worker, than the artist. Writing in 1959, Smith recalled: “any technique or material I needed, I could learn it from one of the habitués, and often got donated material besides.”<sup>16</sup> This association, as I will demonstrate in Chapter Three, was profoundly influential for Smith’s practice. When he moved his studio permanently to Bolton Landing, New York in 1940 he immediately adopted the name Terminal Iron Works - the original having been closed some years prior - a name that he felt reflected his work, and was a reaction to the prevailing notion of the artist’s studio which was perhaps too pretentious for the kind of work that he produced.<sup>17</sup> Smith wrote in 1950: “This new studio I built I had christened The Terminal Iron Works – partly because of the change in my particular type of sculpture required a factory more than an atelier.”<sup>18</sup>

By 1935, Smith was firmly establishing his identity as a sculptor. His approach continued to be strongly informed by painting and vice versa. He stated in 1964: ‘I belong with painters in a sense, and all my early friends were painters ... I never conceived of myself as anything other than a painter because my work came straight through the raised surface.’<sup>19</sup> However, by the same token, Smith felt that his work in drawing and painting was closely allied with sculpture, and that this approach was part of an enduring dialogue between painting, drawing and sculpture. This is perhaps evidenced further by a letter that

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<sup>15</sup> David Smith, Speech, Radio Station WNYC, New York, Dec. 30, 1952, AAA: NDSmith R4 F363.

<sup>16</sup> David Smith, Letter to Emmanuel Navaretta, 1959, McCoy, 1973: 208.

<sup>17</sup> Although according to Dorothy Dehner, taking the name Terminal Iron Works enabled Smith to establish credit and purchase materials more easily.

<sup>18</sup> David Smith, ‘Chronology’, c.1950. Gray, 1988: 31.

<sup>19</sup> Interview with David Sylvester, London: BBC, 1961, pub. in *Living Arts*, April, 1964: rep. McCoy, 1973: 167-175.

Smith wrote to the painter Jean Xceron in 1956 where Smith stated, “I can paint and I thus know myself better. But I paint or draw as a sculptor.”<sup>20</sup>

To support himself and Dehner, from 1942-1944 Smith worked in a factory assembling locomotives and M7 tanks at the American Locomotive Works, Schenectady, New York. This entitled him to join the United Steelworkers of America Local 2054. This industrial affiliation was worn with great pride. Smith signed his most politicised works, the cast bronze Medals for Dishonor (1937-1940) with the Greek word for ‘blacksmith’, symbolically asserting, according to Miranda McClintick, the fact that his political beliefs were those of the common labourer rather than the artist.<sup>21</sup> As Paula Wisotski has accurately observed, by making explicit these associations, Smith was stating clearly that he was “utilizing workers methods and materials, but simply producing a different product.”<sup>22</sup>

This industrial mode of working also meant that Smith demanded quality from his materials. In drawing, he used high quality handmade papers, often imported and expensive for an artist who sold little sculpture at the time. The papers made up for the fact that purchasing steel in the quantities that he required was impossible without a larger income. Jean Freas recalls that “David took pride in good paper, and had no patience with artists who bought less than the best. In part the quality was solace for the fact that he could not afford steel large enough to make the sculpture he dreamed of.”<sup>23</sup> Smith also took enormous interest in the properties of pigment and paint. This interest began during his role as Technical Director of Mural Projects in 1934 at the Public Works Art Project (PWAP), one of several New Deal art projects developed in the 1930s. Smith clearly took an interest that was beyond that of simply fulfilling his job description. He purchased a

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<sup>20</sup> David Smith, letter to Jean Xceron, 7 Feb. 1956, McCoy, 1973:206.

<sup>21</sup> Miranda McClintick, David Smith, (Washington D.C: Hirshhorn Museum and Sculpture Garden, 1979 ) 13.

<sup>22</sup> Paula Wisotzki, ‘Artist and Worker: The Labour of David Smith’, Oxford Art Journal vol.28, no.3, 2005: 362.

<sup>23</sup> Freas, 1989: 7. Smith’s use of hand-made paper is a subject that has not been addressed and requires further research. He used a wide variety of linen and cotton rag papers which cannot be adequately listed here, but include several sheets of English handmade ‘FJ Head’ laid papers from Hayle Mill (Barcham Green), and large sheets of white Arches Rive and Fabriano wove. The papers used for works cited in this study are listed in Appendix B.

large collection of technical publications, and carried out independent research on the properties of casein and egg tempera paints, varnishes and oils. He carried out research for Ralph Mayer and the College Art Association on artists' materials, kept pigment slides to study microscopically, and studied the properties of commercial oil paints. This considerable effort informed his own choice of materials in painting and drawing, from which he demanded permanence and quality. The approach was also considerably informed by his experiences in the Artists Union, whose Marxist agenda actively encouraged artists to create works of excellence using only high quality materials and craftsmanship in order to identify their creative work with that of the working man.<sup>24</sup>

In 1940, Smith and Dehner moved permanently to Bolton Landing, 200 miles from New York City in the Adirondack mountains. The landscape became an integral part of Smith's work. After 1956 much of his sculpture was displayed and stored outside in the fields, where the light formed part of the animated surface of many of his works, literally reflecting the landscape and sky of the Adirondack Mountains that surrounding them (see Figure 6). This need to surround himself with his work recalls Hans Namuth's photographs of Pollock in his studio. While Pollock's need to surround himself with his work was arguably for the purpose of engaging "in a constant visual dialogue with his origins and achievements", for Smith there was a deeper meaning.<sup>25</sup> His work was his "identity made physically manifest."<sup>26</sup> According to Robert Motherwell, the sculpture in the Bolton Landing fields reflected "an ineffable desire to see [Smith's] humanness related to exterior reality."<sup>27</sup> There was also a practical requirement – Smith's sculptures had become sizeable by this point and storage space was limited both at his studio and in the gallery of his dealer. The necessity of protecting his works from the harsh New York weather led him to investigate coatings and paint that would be of sufficient durability to withstand the elements.

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<sup>24</sup> This is discussed in Chapter Three.

<sup>25</sup> Francis V. O'Connor, 'Hans Namuth's Photographs of Jackson Pollock as Art Historical Documentation', *Art Journal*, vol. 39, no.1, Autumn, 1979: 48.

<sup>26</sup> Candida Smith, 'The Fields of David Smith', in *The Fields of David Smith* (New York: Storm King Arts Center, 1998) 17.

<sup>27</sup> Robert Motherwell, *Art in America*, Jan.-Feb. 1966: 37.



**FIG. 6:** David Smith at Bolton Landing, 1963



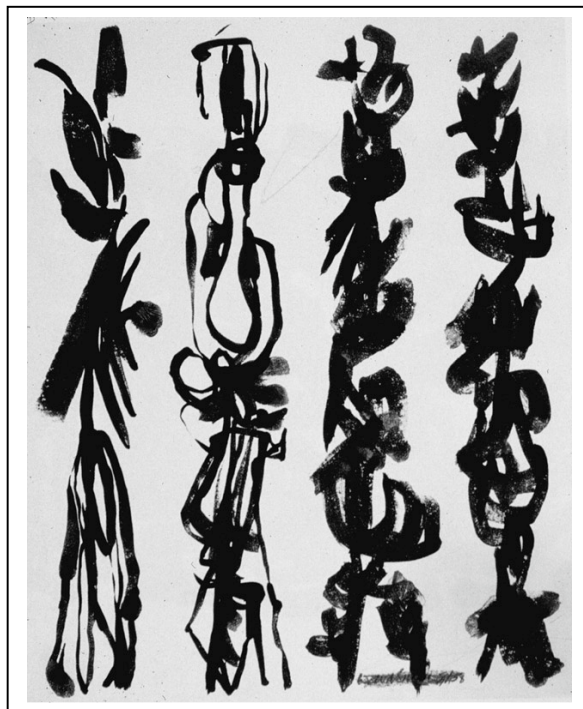


FIG. 7: David Smith Untitled, 1959

FIG. 8: David Smith, Untitled, 1958

In 1950, Smith received the first of two Guggenheim Fellowships. This enabled him to work full-time on his sculpture for the first time, and as a result his work increased dramatically in quantity and scale. He broke away from the symbolism of earlier works and began to concentrate on other themes, more improvised in steel rather than worked out in drawing. He was extremely prolific during the ten years from 1950-60, producing 250 sculptures, and many thousands of drawings. He began to work more from the spontaneous juxtaposition of found objects and spontaneous expressions discovered through his drawings. His drawings, which became more lyrical and calligraphic, were executed in several media, not least his own mixture of black ink and egg-yolk (see Figures 7 and 8).

In the 1960s Smith's work in all media increased again dramatically in scale. His reputation was consolidated in a number of high profile solo and group exhibitions, including a retrospective at The Museum of Modern Art in 1957 and a position as U.S representative at the 24<sup>th</sup> Venice Biennale 1958.<sup>28</sup> He produced works in large series simultaneously, including the Zigs, Circles, Voltri-Boltons, Wagons and Cubis, and began to make more work in stainless steel. His Cubis, constructed of large cubic, and cylindrical forms in stainless steel, were burnished with a steel grinder, intended to be exhibited outdoors to take on "the color of the sky, in the late afternoon sun ... the colors of nature."<sup>29</sup> These works, which were begun in 1961 and continued until his death in 1965, would be the series that would in many senses define Smith's career in later years.

In addition, the painting of sculpture, which was one of the central pre-occupations of Smith's career, was increasingly exploited in the 1960s. This change in direction in the use of brightly coloured and often gestural paint had not been seen in his work to such an extent prior to this, although many of his sculptures were wholly or partially painted.<sup>30</sup> Smith also made increasing use of synthetic industrial paints, which he felt were the most practical material for protecting steel outdoors.

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<sup>28</sup> David Smith: Sculptures, Drawings, Paintings: 1932-1957, exhibition, The Museum of Modern Art, New York, Sept. to Oct. 1957, and XXIX Biennale di Venezia, exhibition, U.S. Representation: Lipton, Rothko, Smith and Tobey, June-October 1958.

<sup>29</sup> David Smith, Interview with Thomas B. Hess, 1964, in McCoy 1973, 183-4.

<sup>30</sup> See: William Rubin, Painted Steel: The Late Work of David Smith (London: Gagosian Gallery, 1998).

In 1962, Smith was invited to take part in the Festival of Two Worlds at Spoleto in Italy organised by Giovanni Carrandente, and including the sculptors Lynn Chadwick and Alexander Calder. He was given thirty days and access to five disused steel factories near Genoa to produce two sculptures. Setting up a studio in one of these at Voltri, Smith abandoned his original plan to make stainless steel works and, influenced by the “beauties of the forge shop, parts dropped, partly forged, cooled now, but stopped in progress,” created possibly the most monumental achievements of his career - creating twenty seven sculptures in thirty days.<sup>31</sup> At the end of the Festival, enamoured of the steel machine parts and tools he found at the Voltri Factory, Smith shipped several tons home to Bolton Landing. Much of this material was used for the series of sculptures entitled Voltri-Bolton and Voltron made toward the end of 1962.

These were radically different from the Cubi sculptures, a series that Smith worked on concurrently, but which expressed a more monumental aesthetic that he had, in fact, reacted against in his formative years. The work carried out at Voltri seems to have been a way for Smith to work with both contradiction and continuation: “Sometimes I work in what people call lines or drawing. Sometimes I need big strong cubic shapes. Sometimes I need total disrespect for the material and paint it as if it were a building.”<sup>32</sup>

Concurrent to the Cubi series, Smith began to produce a number of both drawings and paintings on canvas using synthetic spray paint and stencils (see Figure 9). Smith referred to these as ‘think pieces’,<sup>33</sup> and they were amongst the earliest use of the aerosol medium in art. The move away from earlier ink drawings towards this more formal spray technique may have been somewhat influenced by photograms of earlier artists such as Christian Schad, Man Ray and Moholy-Nagy, and from primitive rock paintings. But the technique was largely brought about by the sculptural process itself, as discussed in depth in Chapter Two, where sparks from the welding torch left a ghost image of the sculpture in process laid on the whitewashed floor of the studio.

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<sup>31</sup> David Smith, Report on Voltri, 1962 in McCoy, 1973, 158.

<sup>32</sup> Smith, 1964, McCoy 1973, 181.

<sup>33</sup> Hilton Kramer, ‘David Smith: Stencils for Sculpture’, Art in America, Winter, 1962: 42.



FIG. 9: David Smith, Untitled, 1959

Transforming this part of sculptural process into drawing and painting, Smith made several hundred of these works from 1957 until his death in 1965.

The Cubis (see Figure 10) have been held as perhaps the greatest sculptural achievement of Smith's career. They were closest to his desire to create sculpture of truly monumental scale, many of them standing more than ten feet tall. Ironically, in this most monumental and monolithic of sculpture, Smith's identity as an expressive draftsman was arguably stated more clearly than at any other moment in his career. It is reflected literally in the shimmering strokes left by the passage of the grinder on the smooth stainless steel surfaces of these works, but it is also expressed strongly in the series of representational linear dripped Nudes painted from the human figure that Smith made at the same moment.

It is one of the interesting ironies of Smith's career that in the last three years of his life, just as he was being celebrated for reaching new heights in communicating the abstract, formal qualities of his sculpture, he began to make this large series of figurative nudes on both canvas and paper in ink and alkyd enamel paints. The nudes were painted from informal photographs he took of models who posed for him at his house, never painted from life. They were painted in black alkyd enamel dripped and poured onto the support using an ear syringe, rather in the manner of Jackson Pollock. Although the departure from drawing and painting seems unequivocal here, the need to fix his models on film before painting may be seen in relation to the Cubi sculptures, many of which are evocative of upright or reclining figures, but also have the character of impossible structures – steel boxes and cones, thrown up and almost photographically frozen in the air.

David Smith was appointed to the National Council of Arts by President Johnson in 1965. In May 23rd of the same year, he was killed as a result of an automobile accident near Bennington, Vermont, leaving close to 700 sculptures, and several thousand drawings and paintings. Smith's life was intimately connected to his work, and this was expressed explicitly in drawing. The drawings that he created between 1952 and 1965 were, as discussed above, the works in which he radically experimented with media. To fully understand this particular connection between drawing and sculpture, it is necessary to consider these in context.



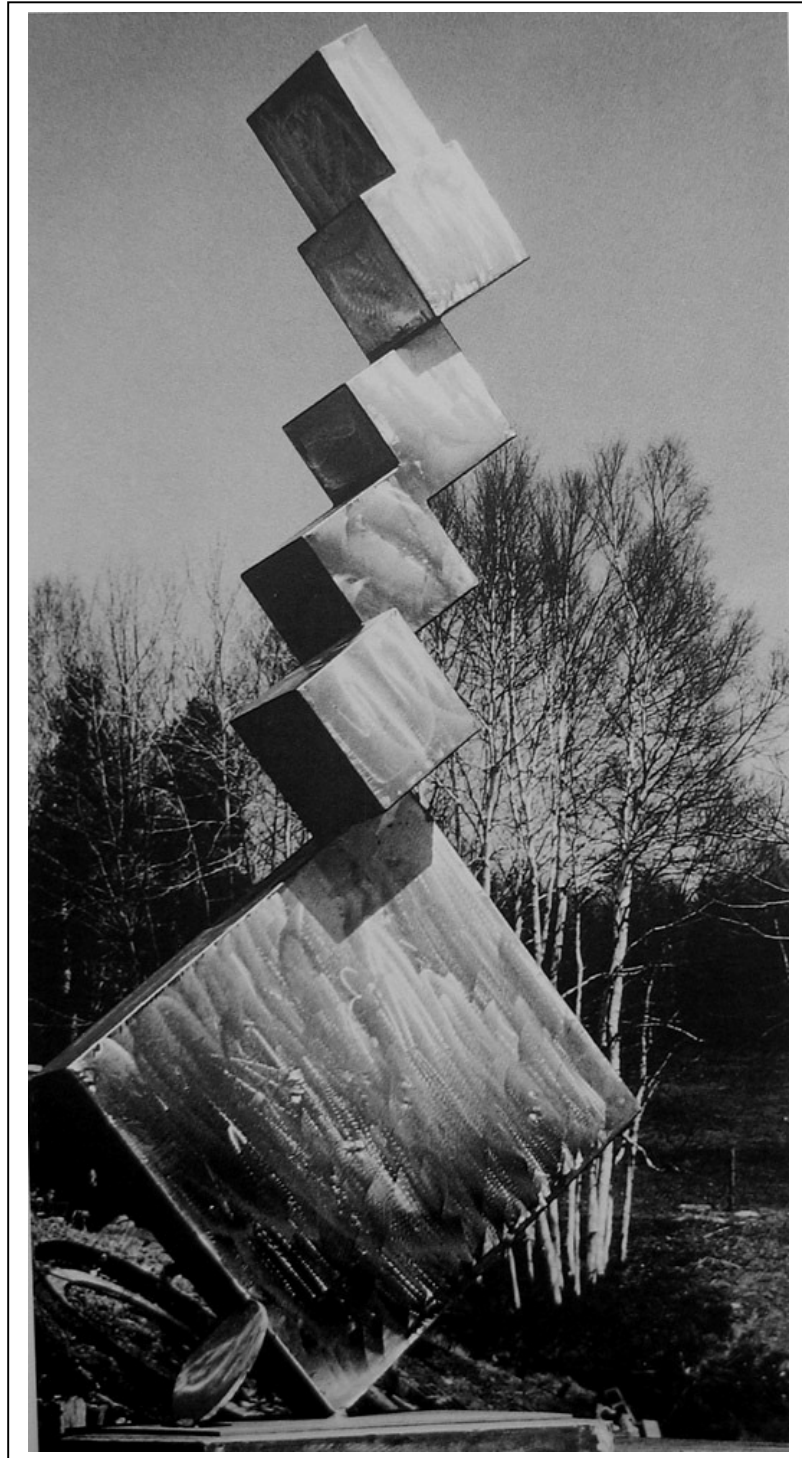


FIG. 10: David Smith, Cubi I, 1963

## 1.2: “The Life Force of the Artist”: David Smith and Sculptors’ Drawings

The contemporary artist, Tania Kovats recently observed that for the artist, drawing is akin to breathing - a primary function in his/her existence. In her mind, experience and thought are inhaled into the lungs of consciousness and drawing is exhaled on to the page.<sup>34</sup> Michael Craig- Martin, an artist who has also written extensively on drawing, has observed that the characteristics that we often prize in the art of today were always present in the ‘secondary art’ of drawing. For Craig-Martin, these include:

Spontaneity, creative speculation, experimentation, directness, simplicity, abbreviation, expressiveness, immediacy, personal vision, technical diversity, modesty of means, rawness, fragmentation, discontinuity, unfinishedness and open-endedness.<sup>35</sup>

This list of characteristics might easily be applied to the entire body of David Smith’s graphic output. Smith had an innate understanding of the need to draw in order to maintain the creative impetus – particularly as a sculptor, whose works were inevitably slow to take realization. He felt strongly about drawing, bemoaned its underappreciated status, and understood, like Kovats, that it was “the life-force of the artist”.<sup>36</sup> Drawing was a vital part of David Smith’s working practice and identity, so much so, that he saw little difference between drawing and sculpture. Smith’s friend, the art critic, Irving Sandler understood that drawing was the means by which Smith could mark his daily existence and vehemently assert his position as an artist. He states that even when Smith made sculpture, he was drawing:

Drawing was absolutely central. Even the procedure of making a sculpture was essentially drawing because he would lay it out on the floor of course, he could move it around, and he said that much himself...The other thing is, that unlike the painters, Smith was constantly drawing, I mean he once told me that as a *professional* artist

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<sup>34</sup> Tania Kovats, ‘Traces of Thought and Intimacy’, in Tania Kovats ed. The Drawing Book (London: Black Dog Publishing, 2006) 9.

<sup>35</sup> Michael Craig-Martin, Drawing the Line: Reappraising Drawing, Past and Present (London: South Bank Centre, 1995) 9-10.

<sup>36</sup> David Smith ‘Drawing’ Lecture, Tulane University, 1955 in McCoy, 1973: 137.

... he insisted on making one drawing a day. And you'll notice, as I'm sure you have, that some of his drawings are actually dated by the day.<sup>37</sup>

Smith came to drawing early, studying cartooning at the Cleveland Art School in 1921. However, it is likely that his experiences at the Art Students League provided him with the inspiration and knowledge to create large and expressive works on paper that were imbued with physicality and the self. Textual media and relief painting in Smith's work came through the influence of Matulka and Graham. However, Smith's early exposure to expressive drawing technique was likely through classes he took with Kimon Nicolaides. Nicolaides expressed the importance of gesture in drawing, but also demanded that students make drawings every day, a practice that Smith adhered to throughout his life. Nicolaides's book, The Natural Way to Draw, was published in 1941 and contains an insight into his theoretical and practical approach to drawing.<sup>38</sup> This publication, and Nicolaides's approach to drawing contains many parallels in Smith's own approach to drawing.

Nicolaides advocated that students draw for fifteen minutes every day, using that day's experience to prompt response, much in the manner that Smith would do in the 1950s. Furthermore, Nicolaides stressed the importance of gestural drawings, where movement and feeling were to be captured before any objective rendering. He stated: "The forms are in the act of changing. Gesture is movement in space. To be able to see gesture, you must be able to feel it in your own body."<sup>39</sup> In this case his ideas were clearly close to Smith's projection of bodily gesture into his work, consolidated later by his reading of translations of antique Japanese painting manuals, and discussed below. Smith's innate understanding of these haptic qualities in drawing is discussed in detail in Chapter Two, but the kinaesthetic notion of sensing the tactile and dynamic qualities of the object represented were ultimately expressed in Smith's work in his drawings of the 1950s, where expression, gesture and tactility became an integral part of his aesthetic in drawing.

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<sup>37</sup> Irving Sandler, interview with the author, 27 June, 2007.

<sup>38</sup> Kimon Nicolaides, The Natural Way to Draw: A Working Plan for Art Study, 1941 (London: Andre Deutch Ltd. 1993).

<sup>39</sup> Nicolaides, 1993:15.



Smith's complex experimentation in drawing media is also reflected in Nicolaides's writings. Nicolaides claimed that when an artist is developing his technique, his work is largely controlled by the medium, yet later, when he finds the medium and technique that is best suited to his method of working, he develops a style and process that is entirely personal. The artist however, does not change his technique consciously. Rather, he changes his attitude to form, colour and life, and the technique changes by itself.<sup>40</sup> Smith understood innately that progress had been made by those artists who refused to submit themselves to a particular medium; this is certainly evidenced by the sheer variety and complexity of the materials used in both drawing and sculpture, discussed below.

Although Nicolaides's ideas were entirely academic, perhaps in opposition to those of the avant-garde painter, Matulka, Smith appears to have appropriated techniques and ideas from both. Particularly, Nicolaides's classes may have inspired Smith's use of Surrealist-inspired techniques of free-associative or automatic drawing and perhaps more importantly, the expression of the self into the work. Dorothy Dehner, who was also a student of Nicolaides recalls: "I don't think he consciously taught a surrealist automatic type of drawing, but I think that attitude could very well have gotten into the student's work via Nicolaides's 'method'. He certainly did stress the projection of the self into drawings."<sup>41</sup> This was undeniably an important aspect of Smith's drawing process.

Even Smith's understanding of the essential mark-making on paper has resonance with Nicolaides's writing. There is obvious resonance between Nicolaides's statement from the 1940s; "A line has no character by itself... is it short or is it long? You cannot say until you put another line of different length beside it",<sup>42</sup> and Smith's 1955 statement; "Simply stated, the line is a personal choice line. The first stroke demands another in compliment, the second may demand a third in opposition, and the approach continues, each stroke more free because confidence is built with effort."<sup>43</sup>

Nicolaides's rather academic, yet influential approach to drawing provides an interesting context from which to view Smith's subsequent development in drawing. However,

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<sup>40</sup> Nicolaides, 1993:100.

<sup>41</sup> Dorothy Dehner, letter to Margaret Haggerty, 6 Sept. 1967 quoted in Haggerty, 1968: 15.

<sup>42</sup> Nicolaides, 1993: 174.

<sup>43</sup> Smith, 1955, McCoy, 1973: 137.

Smith's use of draftsmanship as a sculptor has yet to be discussed in context of the concept of the sculptor's drawing. Although it is a large and complex subject, it is worth exploring briefly this aspect of process and tacit knowledge in Smith's work in the context of work by other sculptors.

### **1.3: Sculptors' Drawings**

How a motif is placed on a sheet of paper is the initial exploration of how it will inhabit space, yet sculptors' drawings in the modern period are rarely related to the actual sculptural work by the artists involved.<sup>44</sup> Sculptors often use drawing to both prompt response and create independent works. Gerlinde Gabriel suggests that "if sculpture can be said to have a physical body then sculptors' drawings are at its nerve ends...a way of exorcising ideas and energies that might otherwise interfere with the making of sculpture."<sup>45</sup>

Drawing possesses an importance and vitality for sculptors that arguably is less so for painters. Particularly this is so in the art of the modern period, in works where representation was subsumed by formal and expressive qualities. In drawing, sculptors may create intricate plans to be developed subsequently into sculptural form, or they use drawing as an act or exercise to prompt ideas. In other cases, the drawing encapsulates the entire concept and the workflow continues without expression in sculptural form.

What many sculptors have in common, however, is the use of drawing as a means to explore other possibilities in a more efficient and fluid manner. Auguste Rodin, for example, drew obsessively. His late drawings did not precede sculpture, but ran in parallel something echoed in Smith. Rodin created endless quick sketches of his models, trying to fix poses, shapes, motifs. His purpose was not to create a masterpiece each day, but to 'engage in the habitual in order to keep open the option of an accidental discovery.'<sup>46</sup>

This kind of mental exercise can be seen also in the sketchbooks of Henry Moore, where multiple quick sketches are drawn out over many pages. It is also seen in Moore's

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<sup>44</sup> Tony Godfrey, 'Seedcorn and Thunderbolts, Drawings by Sculptors', essay in: The Body of Drawing: Drawings by Sculptors, The South Bank Center, London, 1993, 15.

<sup>45</sup> Gerlinde Gabriel, 'Selector's Preface' in The Body of Drawing: Drawings by Sculptors (London: The South Bank Centre, 1993) 6.

<sup>46</sup> Catherine Lampert, Rodin, Arts Council of Great Britain, London 1986, 159.

underground shelter drawings in wax resist – a particularly sculptural medium – which began as an independent activity, and eventually became a profound influence on his sculpture. His sculpture from 1944 onwards included the figures, and drapery prevalent in the clothes and blankets of the subway sleepers, and became an expressive feature of his sculptural work afterward. Moore stated that “drawing is a means of finding your way about things, and a way of experiencing, more quickly than sculpture allows, certain tryouts and attempts.”<sup>47</sup>

Barbara Hepworth also makes a link between drawing and sculpture. Like Smith she understood the kinaesthetic aspects that are present in drawing: “I rarely draw what I see – I draw what I feel in my body. Sculpture is a three-dimensional projection of primitive feeling.”<sup>48</sup> Hepworth’s drawings are also subtly suggestive of her sculptural materials themselves, an aspect of Smith’s work that is discussed in Chapter Two. For example, she made drawings of surgeons at work using a fine pencil on paper board coated with white oil paint, which was rubbed down as the drawing proceeded. Hepworth’s technique in this case created a beautifully striated surface that recalls the combed stone of many of her sculptures. The incised lines of the pencil echo the marks of a chisel on stone. They are, like the wax-resist drawings of Henry Moore, sculptural methods of drawing.

Other sculptors refer to their process in works on paper in several interesting ways. Lee Bontecou, for example made soot drawings using the smoke emitted from her acetylene torch with the oxygen turned down. Contemporary artist, Rachel Whiteread, an artist who makes use of plaster in her sculptural works, made drawings with white correction fluid, which has a chalky dry consistency related to plaster. David Hare, a contemporary of David Smith, also spoke of the potential of body reference inherent in the use of diverse material,<sup>49</sup> and contemporary British sculptor, David Nash stated that:

My drawings are not necessarily preliminary drawings for sculpture or projects but a way of relating to the source of the material and space I

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<sup>47</sup> Henry Moore, quoted in David Sylvester, ed. Henry Moore: Sculptures and Drawings 1921-1948 (np: London, 1957) xix.

<sup>48</sup> Barbara Hepworth, ‘A Sculptor’s Landscape’, Barbara Hepworth: Drawings from a Sculptor’s Landscape, Coy Adams and MacKay, London, 1966, 11.

<sup>49</sup> Quoted in E.C Goosen, R. Goldwater and I. Sandler, Ferber, Hare, Lassaw: Three American Sculptors (New York: Grove Press, 1959) 15.

use for making sculpture. Some are made at the time of a chance ‘find’, some by deliberately going out at a particular time of year, the ground in winter, a tree in bud, or flower. Where possible, the material of the place is used to make the drawings – earth, leaves or grass rubbed into the paper, sometimes charcoal from a fire.<sup>50</sup>

For later artists, particularly after the advent of Process Art in the 1970s, the material relationship between works on paper and sculptural was more explicit. Materials became figuratively and physically more fluid between the two disciplines, and referral to significant aspects of the artist’s life and work often occurred explicitly in works on paper – a clear suggestion, perhaps, of the intimate physical/kinaesthetic relationship between the drawing and sculpting. From the late 1960s, a fascination with fluid or chaotic material was also observed in drawing. Joseph Beuys, for example, drew on paper with a solution he termed *braunkreuz* – a solution of brown oil, rust preventative and hare’s blood, that related specifically to his personal mythology. Contemporary British artist, Susan Stockwell uses significant materials in her work. Her map of the world, Ten Country (2000), is created using stitched stained tea bags, referring specifically to both the British obsession with tea and Britain’s colonial past.

Similarly, Richard Long’s use of river mud to create works on paper in his hand made books, Nile: Papers of River Mud, or indeed in many of his mud drawings on paper, such as Africa Footprint (1986), refer directly to his land-based work which consists largely of recording walks in a number of environments. The explicit relationship between the record of physical presence in Long’s work whether by text, photograph or direct intervention in the landscape itself is also expressed in his works on paper in which the materials used mimetically represent his transient landscape work. Another artist that has spoken of the importance of material relationships is Colombian sculptor, Doris Salcedo, represented in Tate Modern’s Unilever installation series in 2007. Salcedo states clearly how important these material references are; “I found the possibility of integrating my political awareness

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<sup>50</sup> Quoted in Tony Knipe, ed. Drawing in Air, An Exhibition of Sculptor’s Drawings 1882-1982. (Sunderland: Sunderland Arts Centre, 1983) np.

into my sculpture. I discovered how materials have the capacity to convey specific meanings.”<sup>51</sup>

The work of British sculptor, Antony Gormley, is concerned with the human body, its relationship to the world and its position as a vessel for transformation. His sculptural works are intimately connected to the body, and are typically cast from his own body. He is also aware of the transformative power of drawings and the media used to create them, understanding that drawing too is intimately connected to the body. Gormley has noted that for primitive cultures drawings were imbued with magical properties, and were made using bodily materials such as blood and semen. A distinctive feature of Antony Gormley’s drawings is the process itself. He pits the materials of drawing against the symbolic structures of his imagination, connecting the theme of origin with the embodiment of an idea unfolding on the paper. Discussing these aspects, he noted the significance of his materials on paper in 2002:

It is important to me that the substances I use are not taken for granted, and lamp black, bone black, casein, linseed oil, milk, semen, blood, coffee, chicory, earth, shellac, varnish all come with their own qualities, extracted from the body of the earth, from the body of plants, or from living bodies. In their reactivation, these are not innocent parties.<sup>52</sup>

While their concerns are radically different, David Smith and Antony Gormley have in common the great respect for the sensuousness and significance of materials, particularly in drawing. This is arguably observed in Smith’s inclusion of metal particles and dry red pigments in his work, materials intended to add texture, but that also reflect many aspects observed in his sculptural process. The advent of Process Art in the 1970s and the work of artists such as Eva Hesse and Robert Morris have led to the increasing convergence of sculpture and drawing. It has also prompted significant changes in the expressive use of materials. What is interesting is that these materials continue to refer to sculptural process or aspects of the life of the artist in a similar manner to the earlier works of the Abstract

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<sup>51</sup> Doris Salcedo quoted in: Charlotte Higgins, ‘The Tale of the Artist, the Excavator and the Mysterious Trench in Tate Modern’s Floor’, [The Guardian](#), Saturday 6 Oct. , 2007, 3.

<sup>52</sup> Antony Gormley quoted in: [Antony Gormley: Drawing](#) (London: The British Museum, 2002) 6.

Expressionist generation. Naturally the ideals and references of contemporary artists are profoundly different, and the intention here is not to apply an overly-interpretive reading of the significance of Smith's use of materials and its relationship to later artists that would be both anachronistic and out of context. However, the similarities observed in the role of drawings in sculptors' process serves to contextualise concerns in Smith's own process. One can speculate that a deeply felt respect for and an understanding of the sensual power of materials were subsumed both consciously and subconsciously in Smith's work, and becomes more apparent as these materials are identified. The next Chapter will specifically address the identification of these materials in Smith's drawings, and elaborate how these can inform our understanding of the importance of the drawing process, their relationship with sculpture and the significance of materials themselves.

## **CHAPTER TWO: Drawing/Sculpture:Sculpture/Drawing: The Material Dialectic in Smith's Work**

I make no separate division for the cause of sculpture from painting. The material use of a dimension, instead of an indicated dimension changes no method of conception. The difference in technical pursuit does not change the mind's reaction to form. Accent on any difference is the prerogative of the layman.<sup>1</sup>

Smith's protean output in the 1950s set in stone his reputation as a prolific and industrious worker in all media. With an increasingly autographic style came a repeated rhetoric regarding the fusion of drawing and sculpture in his work, which manifested itself as parallel shifts in both media stylistically and materially. With a developing vocabulary in working form in steel, increasingly informed by Constructivist principles, Smith also began to use media on paper and canvas that suited the same aesthetic framework imposed by his sculpture.<sup>2</sup> These experiments enabled Smith to achieve a variety of nuance and effect in works on paper, and obtain subtleties of saturation, reflectance, viscosity and sheen that were prompted by forms observed in his sculpture, landscape and daily life. These drawings were finished works, rather than sculptural studies. They often represented single, partial or multiple ideas for further investigation to be explored in either drawing or sculpture.

The physicality and gesture in Smith's drawings illustrates the continual dialogue between his drawing and sculpture, and the placing of echoes of his presence in the creation of the work. He observed that "if a sculpture could be a line drawing, then speculate that a line drawing removed from its paper bond and viewed from the side would be a beautiful

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<sup>1</sup> David Smith, undated typescript, David Smith Estate, Box 27: Miscellaneous Writings.

<sup>2</sup> Smith used the terms painting and drawing interchangeably for his works on paper in ink, oils, tempera, gouache and oil paint. He stated in 1960 on a self-penned list of drawings to be sent to the Everett Ellen Gallery in Los Angeles, that they were to be described "as drawings or paintings. Probably tempera paintings is correct". For the purposes of clarity, I will use the term drawing, to describe any work executed on a paper substrate, and painting where referring to any works painted on a canvas or panel support.

thing.”<sup>3</sup> This is firmly reflected in the media that he used in drawing, which often suggests the extension of drawing into three dimensions. Furthermore, the materials that Smith used appear in certain cases to refer directly to the sculptural process itself. I am aware of the possibility of anachronistic speculation or even over-conceptualisation of these findings. However, in Smith’s case, the inclusion of materials related to sculpture might simply reflect his absorption of contemporary ideals of the New York School painters regarding the initiation of ideas through unconscious experimentation with medium and the integration of elements from the quotidian life of the artist into his work. For most writers, Smith’s drawing is analysed in terms of its formal relationship with his sculpture, the placement of brush strokes in space or the resonance of the mark. As discussed above, literature on Smith has highlighted some aspects of the textural nature of Smith’s ink media and his obsession with the surfaces of his later sculpture with paint and other effects, but little attention has been paid to the intricacy of the surfaces of his sculpture in the 1950s, and even less so to its material relationship with drawing.<sup>4</sup>

In this Chapter I will discuss the increasing convergence of relationships in drawing and sculpture as reflected in Smith’s materials during the 1950s, and his thoughts on drawing as liberation from the unwieldy process of making steel sculpture. The Chapter will discuss the evolution of Smith’s drawing technique through the 1950s and early 1960s as evidence of the drawing/sculpture dialectic, and demonstrate that as his confidence with sculptural techniques increased so he became considerably more conversant and experimental with his drawing media. Although largely ignored during Smith’s lifetime, recent criticism has drawn some attention to the subtle nuances of Smith’s sculptural surfaces.<sup>5</sup> My discussion on tactility in Smith’s work identifies for the first time a similar tendency in the subtle nuancing of his drawing with textural additions. I argue that these often refer, albeit obliquely and subconsciously, to his process. Further, I will demonstrate that these textural additions allow haptic notions related to the perception of sculpture to be applied to Smith’s drawings.

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<sup>3</sup> Quoted in Krauss, 1977: 59-60.

<sup>4</sup> See for example Karen Wilkin, David Smith: Two Into Three Dimensions (Miami Beach: Grassfield Press, 2000).

<sup>5</sup> See for example: William Rubin, Painted Steel: the late work of David Smith (New York: Gagosian Gallery, 1998) and Cummings, 1979.



It is generally considered that Smith's drawings in the 1950s are dominated by the use of his invented egg-ink medium. Although he used this medium extensively, it is clear that Smith often adulterated and experimented with this medium. It is necessary therefore to begin to interrogate this by exploring Smith's decision to use egg-yolk, and the myth that surrounds it.

### **2.1: "Eggs, Milk and Beer": Ink Drawings 1950-65**

As David Smith stated clearly in a lecture to students in 1953, the medium he used for his drawings was a mixture of "Chinese ink and egg-yolk".<sup>6</sup> Much writing on Smith has thus been based on an assumption that Smith only used this egg-ink for his calligraphic drawings in the 1950s. Analytical investigation of a significant number of Smith's drawings by the author demonstrated that while the majority of his black ink drawings on paper from 1952 typically contained egg, there were a large number of works that were in other media, and furthermore that the egg-ink was adulterated in many cases with other substances.<sup>7</sup> This is observed in the variety of surface effects, texture, reflectance and nuance that are represented in the drawings, and suggests that Smith's drawing medium was manipulated differently for each work in order to achieve specific effects.

Myth and misinterpretation in understanding artists' idiosyncratic use of materials in the twentieth century is widespread, and often demonstrated to be based on false assumptions. For example, Susan Lake has demonstrated that the widespread assumption that Willem de Kooning had mixed mayonnaise into his paints was false.<sup>8</sup> He simply had mixed his

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<sup>6</sup> David Smith, Lecture to Students, Portland Oregon, March 23, 1953, AAA, NDSmith R5, F1089. In his lecture, Smith also stated in the lecture that he typically made 300-400 drawings a year in this medium. Though Smith was undeniably prolific, it is unlikely that he ever averaged this many drawings a year. 1957 was his most productive year, and he produced around 300 drawings, but he did not approach a total of 400 in any year. The statement seems to correspond to other aspects of Smith's self mythology as artist/worker and his considerable pride in his prolific output.

<sup>7</sup> See Appendix C. 125 works were surveyed over a period of five years from 2003 to 2008. Analytical investigation was carried out on 60 works. A notebook entry from 1962 also suggests that Smith was using egg-yolk well into the 1960s. (Notebook 49, 1962, David Smith Estate, Box 10a) Dorothy Dehner similarly referred to this as Smith's "beer and egg period", and that the egg provided gloss and body to the ink. She notes that Smith discussed this with her on a visit to Bolton Landing in 1958. It is difficult analytically to isolate the components of beer in a mixture that includes significant amounts of carbohydrate medium as is the case with drawing ink, and there is no mention elsewhere of Smith's mixing beer into his ink, but it is feasible to speculate that he did, given the unusual effects observed in several of his ink drawings.

<sup>8</sup> Susan Lake, 'A Technical Investigation of Willem de Kooning's Paintings From The 1960s And 1970s', Conference Proceedings, ICOM Committee For Conservation, 12th Annual Meeting, Lyon, France, 381-385.

paint to the consistency of mayonnaise. Similarly, Jackson Pollock's use of nitrocellulose paints as characteristic of his classic drip paintings can be traced to an assumption made by Robert Goodnough in his Art News article, 'Pollock Paints a Picture', and photographs showing cans of Duco in his studio accompanying the article, which he erroneously assumed to be the nitrocellulose-based industrial automobile enamel.<sup>9</sup> More recent technical studies showed that Pollock's use of paint was more sophisticated and varied, and that his first dripped works in 1947 and 1948 were largely carried out using mixtures of diluted artist oil paints, oleo-resinous house paints and alkyds. By 1949, just prior to Goodnough's article, he had in fact begun to use Duco, which was at that point based on an oil-modified alkyd vehicle and not nitrocellulose.<sup>10</sup>

To suggest that all works in black medium were executed with egg-ink belies both the variety and technical virtuosity of Smith's drawing technique, which was as visionary as his use of materials in sculpture. He used egg white and ink in several drawings, and his own description of his medium ran from "egg tempera", "ink tempera", "egg and ink" to simply "tempera", which also referred to the water-based paint used together with ink in certain drawings.<sup>11</sup> Indeed in a letter to Wells Barnett in 1952, Smith confirmed that at this point, he used casein instead of egg-yolk as a thickening agent for his ink.<sup>12</sup> The author's analysis seems to suggest that he continued to do this sporadically in drawings over the 1950s, particularly prevalent in 1954. Casein was identified on several occasions, both (presumably) as commercial casein tempera paint, and as casein resin mixed directly into

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<sup>9</sup> Robert Goodnough, 'Pollock Paints a Picture', Art News 50, 1951: 38-41, 60-61..

<sup>10</sup> See: Susan Lake. et al. 'A Technical Investigation of Paints Used by Jackson Pollock in his Drip or Poured Paintings', Preprints, Modern Art, New Museums (Bilbao: IIC, 2004, 137-141), and Carol Mancusi-Ungaro, 'Jackson Pollock: Response as Dialogue' Jackson Pollock: New Approaches, Pepe Karmel and Kirk Varnedoe, eds. (New York: Museum of Modern Art, 1999) 117-152. DuPont did in fact introduce an alkyd-modified nitrocellulose interior paint in 1926 based on its automobile enamel, but its properties did not lend themselves to interior brushing paint, and it was a commercial failure. This paint was quickly replaced with one based on an oleo-resinous vehicle, also sold as Duco, which was used until the 1930s. By the time Jackson Pollock was using Duco paints, its formulation had changed again, this time based on an oil-modified alkyd vehicle. See: Harriet Standeven, The Historical And Technical Development Of Gloss Housepaints, With Reference To Their Use By Twentieth Century Artists, PhD Thesis, Royal College Of Art, London, 2004.107, 146

<sup>11</sup> Letter from Otto Gerson Gallery, 1959, David Smith Estate, Box 27.

<sup>12</sup> David Smith, letter to Wells Barnett, Mar. 23, 1952, AAA, David Smith Papers, NDSmith R4, F1095.

the ink itself. This is observed, for example in a drawing from 1954, ΔΣ10/24/54 (73.54.87).<sup>13</sup>

The mixing of egg into a water-based medium is essentially the same process as making traditional egg tempera paint. The egg acts as binder for ground pigment, and allows aqueous and oelific components to exist together by means of an emulsifying agent (lecithin). This may be as close to a generic definition of tempera as is possible, given the large number of painting media to which the term has been applied. Traditional recipes involve the mixture of egg-yolk, water and pigment. For many artists, an egg-oil emulsion (tempera grassa) provided beneficial working properties that were more related to oil paint. Similarly, casein was substituted or added to the egg tempera, or gum Arabic was added to create a gum tempera that according to Ralph Mayer was preferable for painting in impasto.<sup>14</sup> Smith's mixture was similar to gum tempera, and was composed of a mixture of egg-yolk, egg white or whole egg with commercial Pelikan Chinese black waterproof drawing ink.

Pelikan drawing ink was manufactured in Germany, and was popular together with the American Higgins ink brand and the English Winsor and Newton inks. During the 1950s, Pelikan ink was based on a mixture of finely ground carbon black pigment, water, shellac and German glue known as Hautleim, an animal-skin glue.<sup>15</sup> The addition of glue in this case is perhaps unusual. It was certainly not part of Winsor and Newton ink formulations at the time. It may have imparted a quality to the German ink that Smith favoured over others. Based on his business receipts, he appears to have used Pelikan ink exclusively during the 1950s.

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<sup>13</sup> See DS29, Appendix C. David Smith describes this drawing in a loan list, as "casein and ink". Whereas several works described as such were found to be in black ink with additional commercial casein tempera in white or colour, in this case it appears that the casein resin was directly mixed into the ink to provide texture. The drawing also contains added inorganic particulate matter (See 2.6 below). Therefore, the casein may have functioned as a stronger binder for this particulate/textural material, where the thinner ink medium would not have provided sufficient adhesion.

<sup>14</sup> Ralph Mayer, The Artist's Handbook of Materials and Technique (New York: Viking, 1940) 277.

<sup>15</sup> Bianca Ammann, Pelikan Vertiebsgesellschaft, email to the author, 25 Sept. 2006. Winsor and Newton inks were formulated using only shellac as a binder for coloured inks, shellac and gum Arabic for black ink, and gum Arabic only for gold and silver inks. Alun Foster, Winsor and Newton, email to the author, 26 Sept. 2006. Drawing ink is differentiated from writing ink typically in its use of pigment instead of dye, and the fact that it is waterproof when it dries, a function of the shellac and glue in this case.

This addition of egg occurred at the same time as a momentous change in Smith's working procedure. It added body and texture to the ink, and provided a range of surface qualities from a thick waxy sheen that resembled encaustic to a thin liquid wash.<sup>16</sup> Smith's manner of working in series on larger sheets of paper and at a much-increased output level after 1950, demanded a medium that possessed adequate handling properties and a fast drying time. Many of the media that he used on paper (casein temperas, gouache, egg-ink, synthetic paints) possessed this fast drying quality and were able to somewhat replicate qualities normally associated with oil painting (such as thick impasto), but could dry in a matter of hours.<sup>17</sup> The decade 1950-1960 witnessed initial experiments in these media develop into an entirely new language and confidence in draftsmanship in Smith's work.

## **2.2. Drawings: 1950-1960: "Multiplying the Associations"**

1950 was a landmark year for Smith's work, and there was a marked transition that was evident in both drawing and sculpture simultaneously. He won a John Simon Guggenheim Memorial Foundation Fellowship, renewed for a second year in 1951, which immediately freed him from having to supplement his income extensively from other sources. This enabled him to work on a much grander scale, and purchase stock and equipment that would facilitate his studio practice for the remainder of his career. His experience as a welder during the war, and connection to the industrial world began to converge with his art practice. His drawing, similarly began to converge with his sculpture, so that as his sculpture moved toward a more graphic form, so his drawings became more free and gestural. It is likely that contemporaneous events also influenced this stylistic change. Certainly Smith would undoubtedly have seen both Jackson Pollock's first exhibition of dripped paintings at the Betty Parsons Gallery in 1948, and Giacometti's landmark exhibition of sculptures, drawings and paintings at Pierre Matisse Gallery: the first time his works had been seen in New York. The implied movement in Giacometti's attenuated

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<sup>16</sup> Smith appears to have enjoyed the physical effects caused by the greasy quality that egg imparted to the ink. In a notebook entry from 1962, he reflects: "I grease my mediums with egg-yolks – it puts paint on balls, translucens [sic] the opaqueness." *Notebook 49*, 1962, David Smith Estate, Box 10a, 49-50. Smith also used encaustic frequently to paint and protect his early sculptures.

<sup>17</sup> It is likely also that Smith's regard paper may have led him away from working in oils, which have a lengthy drying time, and can cause leaching and darkening on a paper support. He continued to use tube oil paint on works on canvas and on Masonite panel, but these could be stored vertically to dry, whereas drawings were typically dried horizontally. Smith's use of quality papers says much about his practice and warrants further research.

forms, and in his violently gestural drawings, together with Pollock's new and inventive use of paint could not fail to have had a profound effect on the sculptor.<sup>18</sup>

The volume of work that came out of Smith's studio from 1950 onwards demonstrate that ideas came fluid and fast, and had to be captured. Working to the fullest extent of his ability was both necessity and ultimate satisfaction, and in the process concepts could form that could take him in new directions. He stated in a letter to the artist Edgar Levy that his work was at least a year behind the number of conceptions that he had in both thought and drawing:

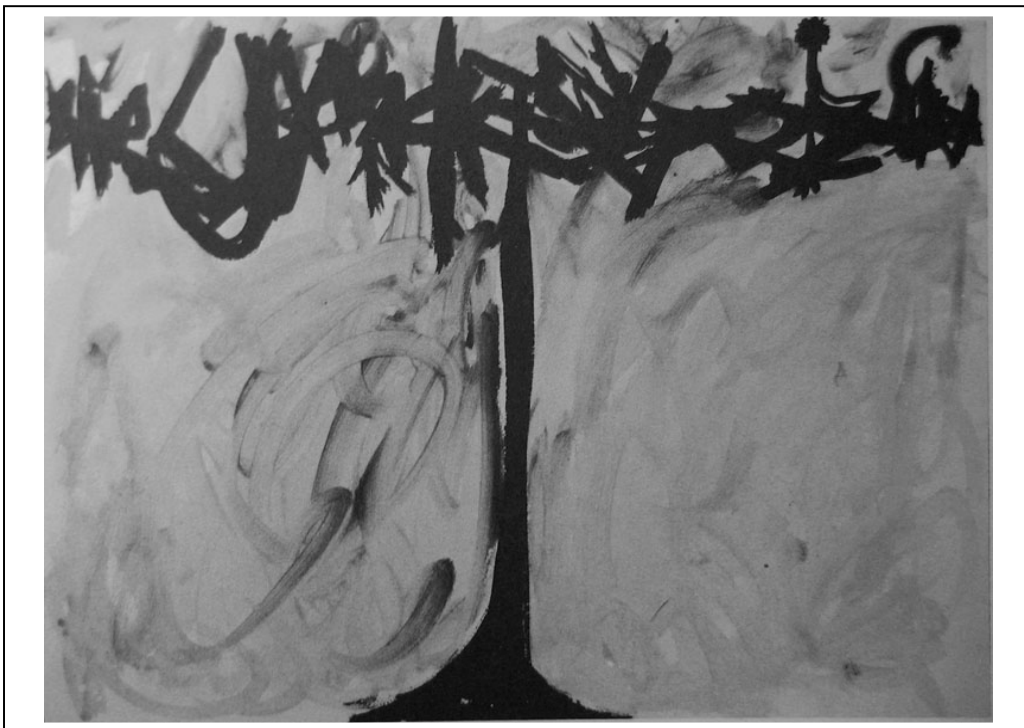
The more I work, the more it flows... Sometimes, while I'm working on one piece I get a conception for a wholly new and different one...I've quickly drawn a new one, different but suggested in a thought process which somehow took place during the manual work of the other.<sup>19</sup>

In the 1940s, Smith's drawings were often studies or ideas for sculptures, based largely on planes and the muted colours of Cubist painting and executed on small sheets of paper in gouache, commercial tempera or black drawing ink (see Figure 11). The marked transition that occurred in both drawing and sculpture at the same moment came in 1950. Both became more linear and expressive, and he began to leave behind the complex symbolism that had characterised his sculpture in the previous two decades. His work in steel became more free and rhythmic, less volumetric, more abstract, yet still conforming to recognisable shapes. Conceptually, he moved away from the metaphysical content that was seen in the work of other sculptors of the New York school, and drawing and sculpture began to converge in his work.

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<sup>18</sup> Smith knew and associated with Pollock in the 1950s, though they were not close friends. Jean Freas mentions that Pollock and Lee Krasner visited Bolton Landing in the early 1950s, and that Smith considered Pollock the greatest contemporary American painter. (Freas, 1988: 12-13). In 1950, Smith would no doubt have been aware of Robert Goodnough's Art News article on Pollock's technique, with photographs of the painter at work by Rudolf Burckhardt and Hans Namuth, since it was published only four months before Elaine de Kooning's article on Smith's technique for the same series. (Goodnough, 1951 and de Kooning, 1951). The influence of Giacometti's Palace at 3am is seen clearly in Smith's Interior (1937) and Interior for Exterior (1939).

<sup>19</sup> David Smith, letter to Edgar Levy, September 1, 1945, McCoy, 1973: 196.



**FIG. 11:** David Smith Untitled, 1934 (Whitney Museum of American Art)

**FIG. 12:** David Smith, Untitled (Fish) 1950

The sculptures of the 1940s began to move away from works based on overlapping planes of the 1930s, and towards works that were of greater disparity, social comment, and expressive of Smith's personal symbolism. He made use of table-top tableaux in works such as Home of the Welder (1945) or Reliquary House (1945), surrealist nightmarish bird/skeletal forms in Jurassic Bird, (1945) or The Royal Bird (1947-8), and linear work that retained a strong reference to Picasso and Giacometti such as Interior for Exterior (1939). In 1950, Smith began to make frequent use of open space in his sculpture, producing works such as Song of the Landscape (1950), The Cathedral (1950) and Star Cage (1950). At the same time in drawing he began to make bold use of ink and paint in works that were generated in ideas for sculpture, but were not the strongly modelled and worked-up sculptor's drawings of the previous years.

In the early part of the 1950, Smith still made use of the muted earth colours and chalky greys and purples of the early drawings for sculpture, but two transitional works: Untitled (1950) and Untitled (1950) (Figure 12), that predate his classic early 1950s sculpture, such as Hudson River Landscape (1951) or The Fish (1950-51), indicate a the beginnings of a change in direction and technique.<sup>20</sup>

Both works are solidly recognisable as drawings of sculpture, yet the gestural use of ink and paint enable them to be read equally as independent drawings. The use of white gouache surrounding the black ink form in these works served to create and diminish the solidity of the form depicted and highlight its existence in space. Compared to Smith's drawings of the 1930s and 1940s, which often used muted tones for a rather academic suggestion of background, the forms in these works, though anchored to the bottom of the page, are considerably more painterly. As Smith's drawing style became more spontaneous and less concerned with suggesting forms existing in actual space, he used ink and paint to suggest the existence of transparency and lightness in an imaginative sculptural space; this would find ultimate expression in the lyrical calligraphs of the mid and late 1950s, and in the floating forms in space of the sprayed stencil works produced after 1957. However, his sense of forms existing in space is also expressed strongly in the

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<sup>20</sup> Smith rarely titled his drawings and paintings. Where he did, they were often simply labelled with the date and his signature, or using the Greek monogram of his initials ( $\Delta\Sigma$ ). Unless otherwise stated, all works by Smith cited in this research belong to the collection of the David Smith Estate. For the purposes of clarity, untitled drawings from the Estate are followed by their date and Estate catalogue number. Untitled works from other collections are followed by the institution and accession number, where available.

photographs he took of his sculpture. In spite of protestations by his dealer, Marian Willard, who insisted that publication photographs be taken against a neutral background, Smith preferred to include elements of landscape in the background, perhaps in order to stress the physicality of the work and its existence as both a frontal 'drawing in space' and a real object in real space.

In both of the 1950 drawings mentioned above, the background is painted while the ink is still wet, picking up black ink and allowing it to bleed into the white. This technique recalls contemporary paintings by Willem de Kooning and Jackson Pollock reflecting an engagement with paint and ink that had begun in the 1930s, and which occupied Smith in painting and drawing throughout his career.<sup>21</sup> The lack of a bold edge or bordering line immediately suggests gesture and movement, where the edge of a form or object is brought back and forth into focus. The effect in Smith's works is the diminishing of a resolution of hard edges of the forms in the works, which are clearly depictions of sculpture since both have a central column and a base. The white paint and the gestural handling of the brush in these examples provide a blurred sense of push and pull tensions dissolving the otherwise sharp linear elements in the drawing, and the elimination of a sense of where the object exists in space. The mergence of two and three dimensionalities is implied in the creation of a traditional black ink diagrammatic form that is blurred with painterly gesture. Similarly, in several ink works during the 1950s, Smith often painted in black ink, picking up hints of white or coloured tube oil or gouache/tempera in the brush stroke to heighten and manipulate the black line. In many cases these paints were red or blue, recalling the subtractive primary colours of Neo-Plasticism and Constructivism, the

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<sup>21</sup> The concept of using fortuitous accident from the painting process to suggest a response which could then be explored consciously in further works is illustrative of the technique of many Abstract Expressionist painters. Its use in David Smith's work forms an important part of his technique in drawing and is discussed at length below. Willem de Kooning's *Woman I* (1950-51) demonstrates the painter's practice of picking up the charcoal underdrawing with thin washes of oil and incorporating it into the painting, a practice that Sally Yard has called "wilful pentimenti" [Sally Yard, *Willem de Kooning* (Michigan: Rizzoli, 1997) 34]. It is likely that this initially accidental discovery prompted de Kooning to respond by deliberately adding powdered charcoal to his paints in, for example, *Special Delivery* (1948). This is discussed further in Lake, 1999: 87-89. Robert Motherwell similarly describes the importance of adding nuance to his white paint in *Reconciliation Elegy* (1979) by the picking up of charcoal and red chalk from the underdrawing, in Robert Motherwell et al. *Reconciliation Elegy: A Journal of Collaboration* (New York: Rizzoli, 1980). Though charcoal and underdrawing were not part of David Smith's vocabulary in either painting or drawing in the 1950s and 1960s, a similar tendency is found in his painting wet in wet in both paintings and drawings, particularly with white paint. This is especially noticeable in his small Masonite oil paintings [see for example, *David Smith: Object and Image: Small Paintings 1954-1958* (Los Angeles, Margo Leavin Gallery, 2007)] and in his synthetic media drawings, which are discussed in 2.3 below.



colours Smith favoured for many of his painted sculptures and most significantly for this study, the red and blue dry pigments that Smith added to his black ink throughout the 1950s.<sup>22</sup>

Many of these transition drawings appear to be based on ideas for sculpture, anchored as they are to the bottom of the paper sheet by even the most abstract sense of a base. However, in 1952 and 1953, Smith moved toward works that were decentralised in their arrangement, more expressive, and more related to Chinese and Japanese calligraphic formalities. Although he continued to make bold use of colour in his drawings throughout the 1950s, strong black architectonic forms began to feature increasingly in his work after 1952. In many ways, this attraction to the expressive potential of black and white motifs was echoed by Arshile Gorky, Adolph Gottlieb, Jackson Pollock and Franz Kline, who all experimented with black and white forms in the late 1940s and early 1950s.

Lawrence Alloway observed that this trend toward black and white painting was at the centre of a post-war desire to “invest abstract art with a momentous subject”, though this was applied specifically to painting.<sup>23</sup> Smith certainly shared these ideals, but in his work there was the added suggestion of representing an implied third dimension, and working in a way that could liberate him from the heaviness and physical reality of steel. Active participation in creating these drawings allowed him to carry out work in a constant flow - a manner of working that allowed formal concepts to form and merge on the page and in his mind without the labour and the necessity of connecting heavy metal elements by welding or other means.

Smith seems to have been fully aware that drawing was the means by which one could free oneself from gravitational tethers: he wrote that,

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<sup>22</sup> Black oil and reddish pink paint (possibly casein tempera) are cited in Antoinette Owen, ‘Conservation and Curatorial Changes to David Smith’s Drawing, “Untitled”’ ed. Richmond, Alison, Modern Works, Modern Problems, Conference Proceedings (London: Institute of Paper Conservation, 1994) 101. Smith’s practice of adding blue and red pigment particles into his drawing ink is discussed below.

<sup>23</sup> Lawrence Alloway, ‘Sign and Surface: Notes on Black and White Painting in New York’, Quadrum, vol. 9, 1960: 50. Smith’s explicit sympathy with these post-war ideals is expressed in a rhetoric that is similar to that of de Kooning and Pollock, who both made statements regarding the American abstract painter’s desire to relate his work to the fast moving modern world. Smith for example, wrote in March 1950: “I believe my time is the most important in the world – that the art of my time is the most important art...” Statement, New York Herald and Tribune Symposium, in McCoy, 1973: 63.

Gravitation is the only logical factor a sculptor has to contend with. The parts can't float as in painting, but must be tied together. Because these parts are necessarily more controlled by gravitation than by aesthetic factors, I draw a lot. I want to be free from this logic when I can.<sup>24</sup>

Working on large sheets of hand made paper, and with larger gestures, he explored this ideology in creating works that only hinted at some kind of future three dimensional reality, and often related back to sculptures previously made, shifting from the black ink and flat and chalky gouache and tempera paints, to the thicker and more viscous egg-ink. The egg-ink allowed him to experiment with textural effects that would have been impossible using drawing ink alone, and enabled him to achieve deep and nuanced blacks, which would have been impossible using gouache and tempera.<sup>25</sup> Perhaps more importantly however, it gave him the ability to bring gestural effects that could be achieved in oil paint within the psychological realm of drawing on paper.

This textural use of ink is examined below. However, contiguous allusion to sculptural form can be observed in drawings that Smith created at the same time as a series of forged sculptures that he had made in 1955, probably Smith's most radically reduced and abstract images.<sup>26</sup> These single thin flat upright forms in steel resemble foremost the upright single black brush strokes in a series of drawings that Smith began in 1952. The forging sculptures represent drawing's most simple element – the first stroke of the brush, and when one understands Smith's relationship to drawing, and the almost spiritual significance he placed on the single brush stroke, these single upright forms imply drawing in a very powerful way:

Simply stated, the line is a personal-choice line. The first stroke demands another in complement, the second may demand the third in opposition, and the approach continues, each stroke more free because confidence is built with effort. If the interest in this line gesture making

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<sup>24</sup> Selden Rodman, *Conversations with Artists* (New York: Capricorn, 1957) 129.

<sup>25</sup> Carol Mancusi-Ungaro has observed that the similar manipulation of medium in black paints by Mark Rothko in his paintings for the Rothko Chapel in Texas afforded the painter a variety of blacks different in translucency, viscosity, reflectance and sheen. Mancusi-Ungaro, 2002: 69.

<sup>26</sup> Karen Wilkin, 2002: 53. The Forgings were made by fabricators in Pittsburgh to order from drawings by Smith. McCoy, 1973: 185.

is sustained, and the freedom of the act developed, realization to almost any answer can be attained.<sup>27</sup>

Writing on Smith has correctly identified that the single stroke drawings made in the 1950s relate directly to the Forgings sculptures, and to Smith's relating of mark-making on paper to his method of constructing steel sculpture which involved arranging sculptural elements on the ground prior to welding.<sup>28</sup> However, there is arguably an additional technical relationship that has not been discussed, and that relates the drawings to the sculpture in a physical sense. Studying the textural and painterly effects that Smith brought to the drawings permits an additional mode of thinking about these drawing/sculpture relationships. These relationships are what mark Smith's drawings out from those of many other sculptors, and it is only in the careful study of the materials that he used that one can elucidate them.

For example, some of the most abstracted forms in this series consist of single brush strokes, yet the lack of vigour in the strokes demands a slow and mannered approach, less gestural than much of his other brush work. Where Smith paused along the stroke, and exerted downward pressure on the brush, the viscous ink exhibited a puckering effect that nuances the stroke in a way that unadulterated drawing ink could not. This may relate to the process that Smith used in creating the Forging sculptures. Forging is by nature working with steel in a semi-molten state, which is then hammered into shape. In several of Smith's Forgings, steel slugs are hammered into the semi-molten steel form, which cause visual interruptions in the otherwise smooth surface, and relate to the similar visual interruptions observed in the brushed ink drawings. The effect is also observed later in the thick, paste-like coloured oils painted in 1957 that relate figuratively to the Forgings.

Other figural upright works embrace the liquidity of the ink, utilising the chance effect of dripped or poured ink. Where in some Abstract Expressionist paintings, the casual drip might be said to suggest the process of painting and the verticality of the easel, others (such as Pollock's classic drip paintings, 1946-51) draw attention to a lack of verticality, in the absence of vertical drips. This appears to have been a technique that Smith

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<sup>27</sup> David Smith, 'Lecture on Drawing', Sophie Newcomb College, Tulane University, 1955, in McCoy, 1973: 137.

<sup>28</sup> This has largely been articulated by Karen Wilkin (Wilkin, 2002: 54) and Alex Potts (Potts, 2006: 13-15).

associated strongly with drawing rather than painting however. His paintings of the period are typically carried out in a thick paste-like oil, often on rigid Masonite panels. The thickness of the oils and the rigidity of the panel suggest that liquidity was a property more associated with a flexible support.<sup>29</sup>

The random and chance effects caused by the path of pooled ink as it travelled across the paper substrate in one or several directions demonstrate that Smith approached these drawing from various angles. In Untitled (1956: 1974.151), for example, drips travel towards both the left and right margins, showing that Smith consciously turned the page in one direction and then another. This manipulation of the paper is an added step in the process of drawing, which is typically carried out horizontally. As with painting, the travel of the drip emphasises the verticality of the physical work on paper, yet the changes in directionality permit a more complex reading of the work both as image on paper, and as physical paper object. Perhaps one can understand this process partially in relation to the constructed nature of Smith's sculptures, and their reading as a "series of fronts".<sup>30</sup> It also recalls Matisse's paper cut outs, and is a technique that is arguably only available to drawing.<sup>31</sup> Paper can be picked up and turned allowing drips to fall and run from several angles, and although the same can be said for canvas, it is typically rigid and unwieldy.<sup>32</sup> There is a tactile engagement with paper that does not exist (traditionally) with canvas. More importantly, there is a significant difference in that the variety of texture, absorbency, softness, and tone are an intimate part of the work in whatever medium is used, rather than forming a support in the traditional sense of canvas or wooden panel.

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<sup>29</sup> The exception in painting is the large series of Nudes that Smith created in the early 1960s, which were created with liquid black alkyd paint on prepared canvas. However, these were made on unstretched canvases and the technique was more associated with drawing. The Nudes are discussed in detail below.

<sup>30</sup> Krauss, 1971: 14.

<sup>31</sup> Smith's drawing style is clearly informed by Matisse's lyrical drawings, but he also made use of the cut out collage technique in an undated collage on paper that utilised the paint swatches from an automobile paint chart to create a sculptural study. This has resonances with his use of automobile paint on later works, discussed below. Jean Freas relates an anecdote that when Smith was in hospital for a minor operation in the 1950s, he asked for a bottle of the antiseptic solution, Gentian Violet to make drawings. (Freas, 1988: 6). These aspects reinforce the sense that Smith was an artist who used objects related to his immediate environment, and also whatever was at hand in order to create work or prompt ideas.

<sup>32</sup> The exception is obviously in flexible unstretched canvas, as observed in the works of Pollock or particularly Morris Louis, and discussed below. As mentioned, David Smith made use of unstretched canvas in his series of Nude paintings (1963-65).

Having discussed this tactile engagement with paper, it is worth interrogating it further in the context of sculpture. There is a relationship in the manner in which forms interact in the process of both making sculpture and drawings. Working on the floor from above, Smith arranged the steel elements together on painted white rectangles on the floor, or when he ran out of studio space, on large sheets of white painted steel outdoors.<sup>33</sup> These elements were welded into place and the sculpture hoisted upright into position. In doing so, Smith might discover new relationships within the work, and would sometimes determine a different orientation for the work.<sup>34</sup> In drawing, such movement of the paper that allowed drips to run and connect isolated figural forms resulted in interactions and connections that could not have been found using conscious brushwork. These interactions are something that Smith clearly desired in both media. In the ink drawing ΔΣ 3/14/55 M (1955), drips are carefully controlled by manipulation of the paper to run toward both left and right margins, connecting the strong upright figural forms, and permitting a view of the work as both isolated figural forms, and an all-over composition, at the same time drawing attention to the ambiguous orientation in the drawing. The process of moving the support to control the flow of paint is perhaps most intimately associated with the paintings of Morris Louis, particularly the 'Stripes' and 'Unfurls'.<sup>35</sup> Louis's canvases were often attached to the top edge of their stretcher so as to allow manipulation of the loosely held canvas, to control the flow of paint in certain directions. The fondness for the drip, however, and its association with orientation and process was shared by other painters, including Robert Motherwell, who felt that the vertical drip immediately conveyed to the viewer the sense of the artist's path in creating the piece in that specific orientation – a technique, accidental or otherwise, that provided a glimpse into the process of the painter:

I got it on the floor and then I rocked it for maybe an hour so that the drips would go just so far. If it dripped too far, it would have been uninteresting. Again it's the great advantage of acrylics because they dry

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<sup>33</sup> This process is clearly seen in Smith's photographs published in his 'Notes on my Work' from 1960: Smith, 1960: 47, 48, and is further described by Carmean and Baro: Carmean, 1982: 25, Baro, 1965: 42.

<sup>34</sup> Carmean, 1982: 27.

<sup>35</sup> See Glenn Alan Gates et al.. 'Reproducing Morris Louis Paintings to Evaluate Conservation Strategies', Conference Papers, ICOM Committee for Conservation, 14<sup>th</sup> Triennial Meeting, The Hague, Sept. 2005: 329-334.

so fast. If it had been oil, I could have rocked it for a year before it set, since it was black.<sup>36</sup>

This resonates with the understanding that Smith gained from reading about Japanese and Chinese brush painting. He expressed his interpretation of these ideas in his own words as early as 1952, noting that in Eastern ink painting “if drops fall, they become attributes or relationships. Similarly if the brush flows dry into hair marks, such may be greater in energy having at least a natural quality not to be reworked, being sufficient in intent to convey the stronger content.”<sup>37</sup> However, the methods used also seem to echo the multiple associative views that Smith liked to impose on his sculpture, observed in many photographs that Smith took, purposefully placing individual sculptures in an ambiguous arrangement, allowing a play of forms and relationships that prevented individual works being immediately recognisable. These photographs, like drawings, surely contributed to the new associations that could allow concepts to form that could be explored in other sculptures.

The photographs, Voltri Boltions in Snow (1962), for example, appear to reflect a desire to see sculptures both individually, and in terms of their relationship to each other. Alternatively, photographs Smith took of the nine Forging sculptures have the essential nature of drawings. The photograph Untitled (1955) of a group of Forgings is taken from a low angle, eliminating all background detail and is taken against a starkly bare and white sky. However, the works are not seen in silhouette - as his work is often read. The surfaces of the sculptures are carefully exposed in the photograph, so as to pick up their varied surface textures. The photograph also emphasises the fact that each Forging may be read as a unique work, but also as one sculptural form, as the angle of the photograph all but eliminates the individual bases of the works, and they appear as if lined up on one base. Similarly in drawing, many of the strokes are individual, but the presence of connecting drips, and the fact that they are bound within the borders of the paper sheet, immediately enables one to be read simultaneously as both group and as individual.

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<sup>36</sup> Robert Motherwell, quoted in Fiske and Albertson, 1980: 17.

<sup>37</sup> David Smith, Notes for “The New Sculpture”, Symposium, Museum of Modern Art, New York, Feb. 1952, AAA, NDSmith, R4, F358-359.

Untitled (1953: 73.53.130) (Figure 13 and 14) demonstrates another aspect of the structural use of paper.<sup>38</sup> The soft Japanese paper used in this and several other works in the early 1950s, allowed specific effects related to its absorbency and translucency. With oblique reference to landscape, the drawing is composed of a linear composition in fluid black ink on the bottom half of the sheet, and a similar composition of dithered blue strokes at the top. Though not immediately obvious, blue ink patterns are deliberately painted on the reverse of the paper, allowing strike-through to the front to create unresolved forms. Thus, the linear abstractions at the bottom half of the sheet appear more focussed and hard-edged in opposition to the upper half of the sheet where the patterns are dithered and translucent. The action of lifting the paper and continuing the work on the verso is one that resonates with both utilising chance effects, and de-emphasizing the two-dimensionality of the paper object. It is an effect that links Smith firmly with Abstract Expressionism.

Although fully realised in the arsenal of techniques used by the New York School artists during the 1950s, and in Surrealist automatic drawing techniques, the use of chance effects through patterns formed by liquid medium on paper on paper was probably introduced in Alexander Cozens' 1759 treatise An Essay to Facilitate the Inventing of Landscape, Intended for Students of the Arts.<sup>39</sup> Cozens suggested a technique for landscape painting, whereby random blots of black water colour or ink could be applied to the paper support, and from this beginning, the artist would produce work, in response to the landscape in front of him. His technique in turn may have been influenced to a certain extent by writings by Leonardo Da Vinci, who encouraged students to concentrate on stains, spots on the wall, and on patterns on stones to see how they might resemble landscapes, battles or figures in action. However, Cozens developed the technique into a considerable treatise

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<sup>38</sup> See DS21, Appendix C.

<sup>39</sup> Alexander Cozens published his theory again in more detail in 1785 under the title, A New Method for Assisting the Invention in Drawing Original Compositions of Landscapes. Charles Cramer, 'Alexander Cozens New Method: The Blot as General Nature', The Art Bulletin, vol.79, no.1, March 1997: 112-129.



FIG. 13: David Smith, Untitled, 1953, showing drawing made in response to the strike-through of media applied to the verso.

FIG. 14: David Smith, Untitled, 1953 verso, showing application of blue ink.



on relating one's work to landscape painting on paper.<sup>40</sup> Charles Cramer has discussed the epistemological impact of Cozens' theories, which were to resonate with Romantic, and Academic painting, and reappear later as a precursor to Surrealism and Abstract Expressionism. However Cramer does not relate these ideas to individual artists' works.<sup>41</sup> David Smith's frequent insistence in the 1950s on the creation of unity relationships in sculpture and drawing through chance, and his engagement with the landscape that surrounded him corresponds directly to Cozens' ideas. Although not used extensively in his work, the bleed-through technique, and the use of chance effects in Untitled (1953), relates to a similar tendency in the work of artists who were contemporaneous to Smith. Similarly, the drawings of Herbert Ferber made active use of bleed-through on paper. Of Smith's associates in sculpture, Ferber's drawings are more calligraphic and singular than those of, for example, James Rosati, Ibram Lassaw, David Hare or Theodore Roszak, whose work on paper is more related to sculptural works.<sup>42</sup> While Ferber's sculpture never had the same proclivity toward lyricism as Smith's, his calligraphic drawings in the 1950s also demonstrate the influence of Japanese art and are clearly separate works, although they bear close resemblance to the spiked forms in his sculpture. Ferber's drawings and their relationship to sculpture have not, to my knowledge been discussed in the literature, yet they correspond in a number of ways to the shared aesthetic of the New York School, and contribute much to this discussion on David Smith.

In a number of drawings, Herbert Ferber makes use, like Smith, of the chance effect of strike-through of ink on absorbent paper. A recent examination of two of Ferber's calligraphs by the author (1150.69 and 1151.69, both 1959, Museum of Modern Art, New York) found that in these cases, his process was to coat the verso of the paper sheet in black ink. This would allow random amorphous patterns to emerge on the front. He would

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<sup>40</sup> Leonardo da Vinci, Paris MS. A, Folio 102V (BN 2038 Folio 22V), quoted in Carmen Bambach, Leonardo da Vinci: Master Draftsman (New Haven: Yale University Press, 2003) 36.

<sup>41</sup> Cramer, 1997: 112-129.

<sup>42</sup> Joan Pachner has pointed out that relative comparisons between Smith and other sculptors virtually stops short after Picasso and González. (Joan Pachner, 'Theodore Roszak and David Smith: A Question of Balance', Arts, February, 1984: 102-114). This may have been due to Greenberg's championing of Smith in the 1950's at the expense of other sculptors who he felt had succumbed to biomorphism, and whose work lacked formalist purity. (see for example: Greenberg, 1956: 30).

then paint the calligraphic form in the same ink, responding to the ambiguous forms caused by the strike-through. In some cases, it appears that there was a third stage in the process. The calligraphic form was painted on the verso, then obliterated with ink painted over the entire verso. Where the original form was painted, the double layer of ink prevented the second layer penetrating, thus causing a ghost image of the initial calligraph to form on the front (see Figures 15 and 16). Ferber then turned the paper over, and painted over the ghost form in black ink. This extraordinarily complex process permits two immediate observations pertinent to the study of both Ferber and Smith's work. Ferber, like Smith saw working on paper partially as a Constructivist activity. Secondly, the use of random and chance effects in drawing for the two sculptors demonstrates their affinity with the painters of their own generation as observed in the works of Pollock and Brooks.

As early as 1952, it is clear that David Smith began to utilise chance imagery and his surroundings, and respond with ideas for two and three dimensional form. For example, in an essay for the journal Arts and Architecture, Smith described the genesis of one of his most important sculptures from this transition period, Hudson River Landscape (1952). (Figure 17) The description demonstrates both the intimate relationship between drawing and sculpture, and the engagement between ink on paper, and form in three dimensions:

Hudson River Landscape started from drawings made on a train between Albany and Poughkeepsie. A synthesis of drawings from ten trips, going and coming over this seventy-five-mile stretch. On this basis I started a drawing for a sculpture. As I began, I shook a quart bottle of India ink. It flew over my hand, it looked like my landscape. I placed my hand on the paper, and from the image this left, I travelled with the landscape to other landscapes and their objectives, with additions, deductions, directives which flashed past too fast to tabulate but whose elements are in the finished sculpture. No part is diminished reality. The total is a unity of symbolized reality, which to my mind is far greater reality than the river scene.

Is my work Hudson River Landscape, the Hudson River, or is it the travel, the vision, the ink spot? Or does it matter? The sculpture exists on its own. It is the entity. The name is an affectionate designation of the point prior to travel. My objective was not these words or the Hudson

River, but to create the existence of a sculpture. Your response may not travel down the Hudson River, but it may travel on any river, or on a higher level.<sup>43</sup>

Much of what this illuminating passage demonstrates is that Smith worked in an arena that utilized all sensual information for making art, and all techniques that were at his disposal to work toward a final goal which was both an entity in itself, and a composition of component parts that could be perceived immediately by the viewer. The formal relationships in Hudson River Landscape then, were built up in a kind of psychological collage in Smith's mind over several journeys, and the generic sense of all journeys, creating sympathetic and opposing forces which manifested themselves ultimately in the open linear form of the sculpture.

Furthermore, these notions of transparency and opposing forces in Smith's sculpture rely on the subtle overlay of forms that produce associations, rhythm and movement. Ann Gibson has observed that Hudson River Landscape refers to an Ortegian view of transparency where the object has a double function.<sup>44</sup> In this view, the relationship of background to form in Smith's sculpture, as it is with paper and ink, conforms to Ortega's phenomenological view that on observing a transparent object such as glass, our gaze penetrates to objects beyond, but at the same time sees it as glass, an object in itself, and in this sense it is opaque – existing in a double condition.<sup>45</sup> In Smith's work therefore, one observes the composition as a line drawing against the background of space, but simultaneously it is perceived in terms of its material - steel. Similarly, Michael Brenson has observed that in Smith's sculpture, the whole consists of parts that are related, but are nevertheless compartmentalised, and “while asserting the integrity and simultaneity of different perspectives, the discrete points of view thwart any expectation of a whole in which all parts fuse into a stable and coherent totality.”<sup>46</sup> Smith had an innate

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<sup>43</sup> David Smith, 'The Language is Image', Arts and Architecture, Feb. 1952, in McCoy 1973, 81.

<sup>44</sup> Ann Gibson, 'The Rhetoric of Abstract Expressionism', in Abstract Expressionism: The Critical Developments (London: Thames and Hudson, 1987) 76.

<sup>45</sup> Jose Ortega y Gasset, 'An essay in Aesthetics by Way of a Preface' (1914), Phenomenology and Art, (New York: Norton, 1975) 139-40.

<sup>46</sup> Michael Brenson, 'David Smith: Freedom and Myth', Sculpture, vol. 25, no. 1, Jan./Feb. 2006: 29.



FIG. 15: Herbert Ferber, Calligraph, 1959 (Museum of Modern Art)



**FIG. 16:** Herbert Ferber, Calligraph, 1959.  
Verso, showing application of black ink to impart mottled bleed-through to the front, and tracing of second calligraph on verso.

understanding of this sense of part and whole and began to develop this further as he became more confident with techniques and experiment with new media in the 1950s. In a paper given at a symposium for The Museum of Modern Art in 1952, he articulated his view clearly: “In vision, the overlay of shapes seen through each other not only permits each shape to retain its individual intent, but in juxtaposition highly multiplies the associations of the new and more complex unity.”<sup>47</sup> It is clear then that Smith’s drawings contain similar detailed and overall views achieved in part through utilising his medium in different ways. Smith’s desire was to achieve a kind of non-intuitive understanding of the work, and these multiple perspectives establish, according to Brenson, Smith’s “aversion to knowledge that relied on the step-by-step, linear, analysis that is a staple of scientific method.”<sup>48</sup>

This appears to be in keeping with perceptual notions applied to Jackson Pollock’s paintings. Donald Judd, for example, observed that Jackson Pollock’s work achieved “generality by establishing an extreme polarity between the simple immediate perception of paint and canvas ... and the complexity and overtones of his imagery and articulated structure.”<sup>49</sup> Pollock could therefore create the perception of an all-over image in his classic drip paintings without obscuring the disparate paint marks. In this model, the parts in a composition by Pollock do not combine to create a coherent whole. Rather, as Richard Shiff has observed, the whole and part are encountered as different entities, and the viewer’s attention is focussed on every element of the work, including its totality.<sup>50</sup> Shiff’s observation is well-founded and might be equally applied to Smith’s work in sculpture, given the artist’s concentration on open delineation of form and dialogue between coherent totality and the relationship of parts to the whole.

However, in a similar manner to Pollock, Smith use of drawing media in the early 1950s appears to have allowed him both to create sculpture in response to free floating brushwork on paper, and to use these images as part of a collective eidetic memory of forms that could result in further work in drawing, painting, sculpture or in any

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<sup>47</sup> David Smith, “The New Sculpture”, 1952 in McCoy, 1973: 83-84.

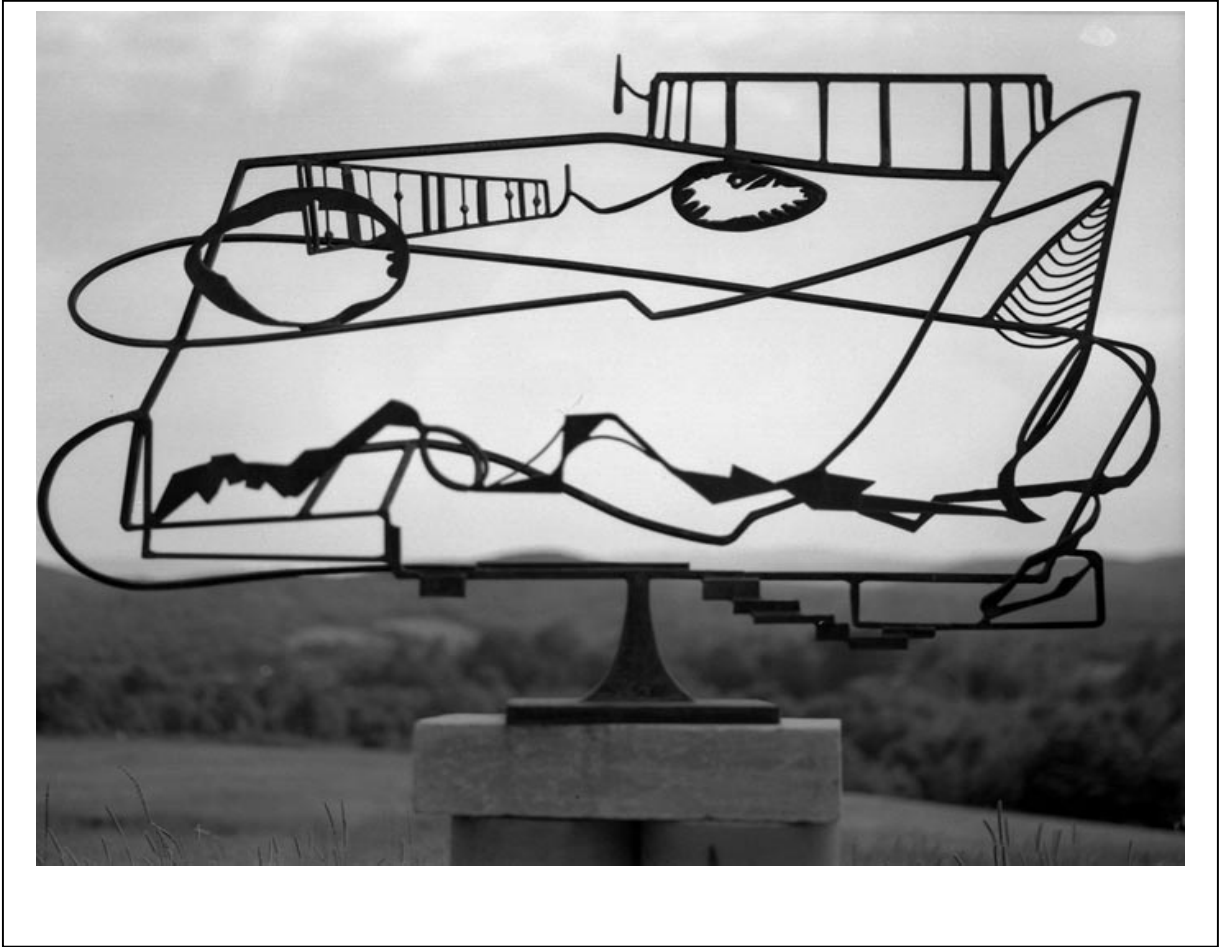
<sup>48</sup> Brenson, 2006: 29.

<sup>49</sup> Donald Judd, ‘In the Galleries: Helen Frankenthaler’ (1960) in Donald Judd, Complete Writings, 1959-1975 (Halifax: Nova Scotia College of Art and Design, 1975) 13.

<sup>50</sup> Richard Shiff, ‘Judd Through Oldenburg’, Tate Papers, Autumn (London: Tate Gallery, 2004) 3.

combination of the three. Likewise, Smith's drawings can arguably be viewed together as a variety of phenomena: as coherent image reflecting figure, landscape or quasi-recognisable forms, as individual marks on paper, and the opposing and sympathetic forces in the relationships between them, and as the paper object as an entity in itself. These perceptual associations and their particular relationship to the mergence of sculpture, painting and drawing in Smith's work were enhanced in many ways by Smith's adoption of synthetic paints into his drawing media beginning in the mid-1950s.





**FIG. 17:** David Smith Hudson River Landscape, 1952  
(Whitney Museum of American Art)



### 2.3. Drawings, 1956-62: Synthetic Media

In 1956, David Smith wrote to Helen Frankenthaler, “this has been my best year”.<sup>51</sup> It was a year that marked several important landmarks in his work and career, while at the same time expanding his vocabulary of technique through experimentation with new media. He had begun to make more sales, and in the same year, The Museum of Modern Art mounted its first retrospective of his sculpture. Smith also received critical acclaim in Clement Greenberg’s article for the popular Art in America magazine, which showcased his work alongside other noted American sculptors such as Alexander Calder, Seymour Lipton, Richard Lippold, David Hare and Theodore Roszak.<sup>52</sup> It was the beginning of another period of increased production and creative fervour in sculpture, and in drawing Smith made the largest body of ink drawings in his career in 1957 and at the same time completely embraced the free calligraphic gestural work of Chinese and Japanese brush painting that had been more restrained in the early years of the 1950s.<sup>53</sup> After 1956, he began to work more frequently in series, and on several works at the same time. He moved toward a truly industrial mode of working, and it was also at this moment of creative energy that Smith began to use synthetic media more frequently in his drawings, as a supplement and occasional replacement for the black egg-ink. He began to make more frequent use of infusing his media with textural materials such as steel particles and dry pigment. These additions likely referred directly to his beginnings as a painter, when he added sand and other material to his oil paints. Although it is generally known that Smith added substances to his drawing and painting media on occasion, this research represents the first to positively characterise and identify these materials. The textural additions to Smith’s media are discussed below.<sup>54</sup> They added nuance and physicality to the drawings,

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<sup>51</sup> David Smith, letter to Helen Frankenthaler, August, 1956, AAA NDSmith RD, F299.

<sup>52</sup> Clement Greenberg, ‘David Smith’, Art in America, Vol. 44, no. 4, Winter 1956-1957: 30-34. The issue was a special Sculpture Annual. Although Smith had a fairly low opinion of Art in America, he specifically referred to the importance of the article, the high profile of the magazine and the writers involved (Greenberg, James Johnson Sweeney and Andrew Carnduff Ritchie), in the Frankenthaler letter (AAA, NDSmith RD F299).

<sup>53</sup> There are at least 304 drawings dating from 1957 in the collection of the David Smith Estate. A number of these drawings in black egg-ink were exhibited in the exhibition David Smith: Drawings from 1957, at the Margo Levin Gallery, Los Angeles, 2000.

<sup>54</sup> For example Untitled, 1930 (75.30.88).

but they also appear to have certain material associations with his sculptural practice that cannot be ignored. His engagement with these new media was partially borne out of their practical working properties, but largely out of a desire to challenge the definition of drawing, prompting responses in sculpture or vice versa. Most notably this is observed in his sprayed drawings that he began to create at the same time.

In 1957, Smith developed an entirely new language in drawing using aerosol spray paint, stencils of torn paper, detritus from his house and studio, metal parts and other objects. This expressionistic style and increased use of synthetic media may also have been prompted by the premature death of Jackson Pollock in August of 1956, whose work Smith clearly admired, and whose death he felt deeply.<sup>55</sup> Smith began to make more nuanced use of paint on sculpture, and develop an expressionistic burnishing on the surface of his stainless steel works, which marked the beginning of the nascent style that would eventually lead to the reflective and animated surfaces of the Cubis.<sup>56</sup>

The casein tempera paints that Smith had continued to use throughout the early years of the 1950s, and particularly in a number of drawings from 1954, began to be phased out in favour of more work in thicker black and coloured egg-ink.<sup>57</sup> Smith also appears to have experimented with adjusting the lustre and gloss of his ink by mixing egg white instead of yolk in several drawings: this provided a significant shift from the rich and greasy yolk ink medium to a more matte black.<sup>58</sup> As Smith worked more in series with his sculptural work after 1956, he began also to make series of drawings on paper exploring similar ideas, often in different media. After 1956, Smith also began to add textural elements to

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<sup>55</sup> Dorothy Dehner states that although Smith claimed to have made drip paintings some time before Pollock, he felt strongly that Pollock had carried it far ahead of him. Letter to Margaret Haggarty, 29 Sept. 1967, AAA, Dorothy Dehner Papers, R796, F639. In a postcard sent to Clement Greenberg, Smith discusses his shock and sadness on hearing of Pollock's death.

<sup>56</sup> Pollock's influence on Smith has not been widely discussed, although many authors allude to it. See for example: Brooks Adams, 'Last Nudes', David Smith: The Last Nudes (New York: Gagosian Gallery, 1990) 1-8, Hannelore Kersting, 'David Smith: The Paintings and Drawings', David Smith: Sculpture and Drawings, Jörn Merkert (Munich: Prestel-Verlag, 1986) 99-106, and a small comparative exhibition of the early works of the two artists in Jeremy Lewison, 'Notes', Jackson Pollock: David Smith: Paintings and Sculptures from the 1930s and 1940s (New York: Washburn Gallery 2001). However, these works lack any direct interrogation of the similarities of the artists' techniques.

<sup>57</sup> See prevalence of casein in drawings examined from 1954 in DS26 to DS35, Appendix C.

<sup>58</sup> Smith lists the drawings 5-4-58 and 5-5-58 (1958) as "Chinese ink and egg white" (list of drawings found in Notebook, uncatalogued, David Smith Estate) and 2-7-prov 1956 (1956) as "brown, nat., egg white, casein, sepia ink". (list of drawings found in Sketchbook 51, 1955, David Smith Estate, Box 10a).

his drawing media with increasing regularity. Metallic particles appear to have been added Smith's ink as early as 1952 - for example, Untitled (1952) (73.52.44), and Untitled (1953) (73.53.130) - but they appear frequently after 1955.<sup>59</sup> Additionally, red and blue dry pigments were added to his ink with some regularity from 1956 - for example in Untitled (1956) (73.56.63) - until at least 1960 - for example, Untitled (1960) (73.60.163).<sup>60</sup> These added materials, as I discuss later in this Chapter, were not simply studio accident or contamination, but were intentional additions designed to impart both texture and animation to the drawing media, but which also carry strong associative resonance with the materials used concurrently on sculpture.

Smith appears to have experimented with synthetic paints widely in 1956 and 1957. He used Bocour Magna acrylic paints (poly (n-butyl methacrylate)), albeit some years after they became available to artists.<sup>61</sup> Smith received a letter from Leonard Bocour, Magna, in 1957 inviting him to try new "perfected" Magna plastic artist paint which were described as being "made with the finest artists' pigments, ground in specially prepared plastic vehicle ... more brilliant than oil, dry fast and are permanent."<sup>62</sup> A 1961 invoice from Bocour shows that Smith ordered Magna paint in bulk, ordering some 171 four-inch tubes of colour in all four Bocour series, and twelve larger six inch tubes of white. Smith also purchased all of the cadmium range, a pigment that he was particularly fond of and employed in much of his painted sculpture. He purchased a significant amount of black Magna (twenty-four tubes) suggesting that he intended to use it in drawing in conjunction with, or as a replacement for black egg-ink.<sup>63</sup>

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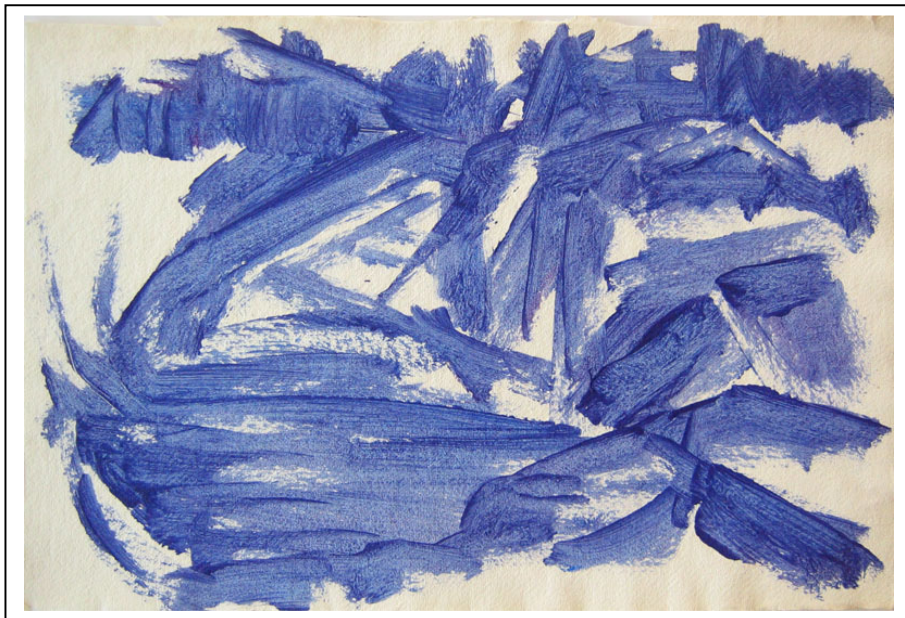
<sup>59</sup> See DS8 and DS21, Appendix C.

<sup>60</sup> See DS41 and DS111, Appendix C.

<sup>61</sup> Bocour's Magna paints were introduced in 1949, and were based on an n-butyl methacrylate polymer manufactured as Paraloid F-10 by Rohm and Haas. They were largely developed as a faster drying replacement for oils, and were quickly taken up by a new generation of painters who developed the technique of dilute stained fields of colour, where thin paint was applied directly to unprimed canvas. In 1953, Clement Greenberg, Kenneth Noland and Morris Louis visited Helen Frankenthaler's studio in Greenwich, Connecticut, and witnessed her painting Mountains and Sea in Magna on unprimed canvas. This was the impetus for both Noland and Louis who subsequently used the technique in their own paintings. Smith knew Louis well, and Greenberg, Noland and Frankenthaler were amongst Smith's closest friends in 1956. Given Smith's continued interest in the qualities of paint itself, it is very likely that they exchanged information.

<sup>62</sup> Letter from Leonard Bocour, 18 Oct. 1957, David Smith Estate, Box 24, Business Correspondence and Receipts.

<sup>63</sup> Order form, Bocour paints, 29 June, 1961. David Smith Estate, Box 24. Smith also ordered a substantial quantity of Bocour Holiday Artist Oils, and Bocour Bellini Studio Oils. It is probable, given his interest in the properties and quality of paint (discussed in Chapter three) that Smith appreciated the handmade quality.



**FIG. 18:** Box of Bocour Magna tube pants found in David Smith's studio at Bolton Landing, 2008.

**FIG. 19:** David Smith, Untitled, 1956, painted in blue Magna.

The Black acrylic on paper could be applied thickly, and had a fast drying time in a similar manner to the egg-ink. Magna was marketed by Bocour as an alternative to oil with superior drying time and flexibility: qualities that Smith had previously attempted to achieve with the egg-ink. Furthermore, the high pigment concentration and hand-made quality may have appealed to Smith's desire for high quality paint.

Smith's Untitled (1956) (73.56.63) in a blue and purple acrylic medium on paper, strongly resembles the lustrous greasy egg-ink (Figure 19).<sup>64</sup> The presence of large amounts of butyl methacrylate in the medium confirms that it was likely to have been Bocour Magna acrylic paint. Smith also seems to have used artists' acrylic emulsion paints, but to a lesser degree. Ethyl acrylate (EA) and (poly) methyl methacrylate (MMA) were found in substantial quantities in the drawing ΔΣ80-12-57 (1957) (73.57.217).<sup>65</sup> p(EA/MMA) resins were used largely in acrylic emulsion paints, which were introduced in the form of Liquitex by Permanent Pigments in 1955-56, and therefore it would appear that in both cases Smith experimented with new artists' paints as they became available.<sup>66</sup> From the author's analysis, it appears that in most cases, Smith used synthetic resins more for his coloured work, rather than for black, although there are several examples of black ink drawings made in acrylic, for example Untitled (1958) (73.58.209).<sup>67</sup>

The author discovered several tubes of partially used Magna in Smith's studio (Figure 18), and a number of jars of Bocour oil paints, but there was no trace of Liquitex paints or other acrylic emulsion. It is possible that Smith abandoned his experiments with acrylic emulsions for a number of reasons. It is clear that while Smith enjoyed the various tensions between matte, gloss and lustre that could be achieved with his egg-ink, acrylic emulsions may have been too matte for his work. Robert Motherwell, for example stated that Liquitex's color range was limited, "but they were inexpensive, good colours and they only made permanent colours. Liquitex as we know it now when it's mixed with water behaves like gouache. It's opaque and chalky."<sup>68</sup> Additionally, Smith drawing ΔΣ80-12-57 (1957) (73.57.217: Figure 21) in black and white acrylic emulsion suffers from a curious leaching effect where the white is painted directly over wet black paint. Red dye

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<sup>64</sup> DS41, Appendix C.

<sup>65</sup> DS47, Appendix C.

<sup>66</sup> See "The History of Liquitex Acrylic Art Materials", <<http://www.liquitex.com/aboutliquitex/history>>

<sup>67</sup> DS78, Appendix C.

<sup>68</sup> Fiske and Albertson, 1980: 1.

from the black has leached into the white, suggesting that the black was in fact a mixture of dyes and not pigment. On discovering this, Smith may have decided that the paint was not of sufficient quality for his work. Some years earlier he had, for example, criticised commercially available oil paints for their lack of quality and adulteration with dyes.<sup>69</sup>

However, artists often favoured the new acrylic paints for their fast-drying properties, particularly when compared to oil, and it is certain that matching the fast drying nature of his egg-ink tempera medium would have been attractive to Smith. The Magna acrylics could provide good working properties and intense pigment-rich blacks, but it is unlikely that they imparted the variety of effects achievable with the egg-ink.<sup>70</sup> Robert Motherwell expressed similar views, and felt that the liquidity and drip of paint emphasized the tactile reality that paint was a “frozen liquid”.<sup>71</sup> It is clear from studying Smith’s drawings that with the exception of a few works in oil paint, the property that is common to all his media was their ability to dry fast. Given Smith’s working process where, as he noted to Edgar Levy, he might find concepts in one work that were “suggested in a thought process which somehow took place during the manual work of the other”, a fast drying medium would have been a requirement.<sup>72</sup>

Three works from December 1957 (Figures 20-22) demonstrate that as Smith began to increasingly work in series in sculpture, he could explore the similar ideas in series of drawings, utilizing a variety of media and effects simultaneously. ΔΣDS80-12-57 (1957)

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<sup>69</sup> David Smith, ‘Review of The Materials of the Artist by Max Doerner’, Art Front, Jan. 1935: 6. Smith had also found from his own experiments that the Osborn tube oil paints available in the 1930s were of poor quality. Letter to Edgar Levy, nd. AAA, NDSmith, RE1, F33: Edgar Levy and Lucille Corcos Correspondence. Smith’s extensive investigations into the properties of his paints is examined in detail in Chapter Three.

<sup>70</sup> Smith mentions the egg-ink again in a reflective note on drawing in notebook from 1962 at a time when his attention was very much directed toward making spray stencil drawings. His description of the egg-ink: “it puts paint on balls – translucens (sic) the opaqueness”, suggests that it had particular characteristics that were unlikely to be replicated by acrylic paints.

<sup>71</sup> Fiske and Albertson, 1980: 5.

<sup>72</sup> Letter to Edgar Levy, Sept. 1, 1945, McCoy, 1973: 196. Smith seems to have been interested in the drying properties of commercial paints. Product information he received from Aster Paints regarding their Chysolithe 20<sup>th</sup> Century oil paints highlights the fast drying nature of these new oils was such that they could be varnished almost immediately after painting. Smith was clearly interested in this particular property as he made a note in pencil beside the except: “a few hours after canvas has been finished – not 6 months as in the case of ordinary oil paint!”. There is no evidence that Smith went on to order these paints, but his interest in fast drying properties is certainly highlighted here. Chysolithe 20<sup>th</sup> Century Oil Paints, Product Information Sheet, R.J. Maradon, Brooklyn, Agent for Aster-France, undated, c. 1940, David Smith Estate, Box 24, Business Papers.



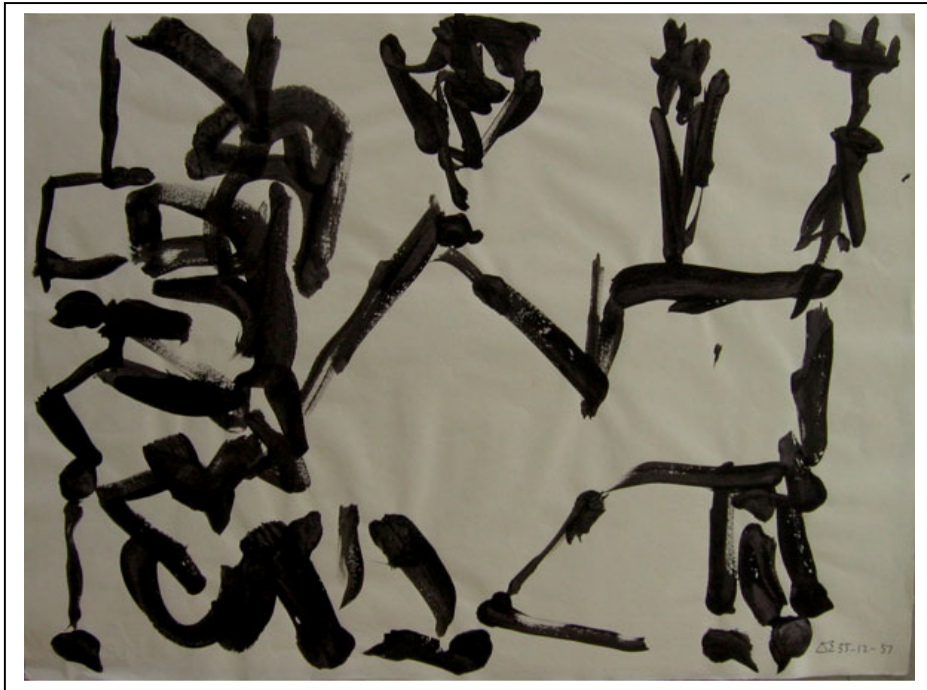


FIG. 20: David Smith ΔΣ55-12-57, 1957

FIG. 21: David Smith, ΔΣDS80-12-57, 1957



FIG. 22: David Smith ΔΣ82-12-57, 1957



(73.57.217), ΔΣ82-12-57 (73.57.219) and ΔΣ55-12-57 (73.57.197) (See Figures 20 to 22) illustrate the point. All painted on the same hard-sized 'Japan' paper, and denoted with serial signatures.<sup>73</sup> The numerical system indicates that there are at least 82 works in the same series. However, the variety of effects suggest that Smith was exploring a similar form but in a variety of media. The earlier drawing ΔΣ55-12-57, is a relatively simple black form in ink on paper, but contains metal particles added to the ink.<sup>74</sup> By number 80 in the series, the form is still recognisable, but has been further abstracted and changed, and in this case is painted in black and white acrylic paint.<sup>75</sup> The black paint is matte and lacks the lustre of the egg-ink. The white paint is similarly matte and as noted earlier, is again used to negate or correct parts of the black form. Number 82 is a further adaptation of the black form. However, in this case, Smith used a mixture of water-based media and a poly (vinyl acetate) (PVA) to create a mottled purple.

This mottled quality was exploited frequently in Smith's drawings throughout the 1950s and it is suggestive of the painted mottled quality of many of his sculptural surfaces.<sup>76</sup> Particularly in 1957, Smith used this PVA solution/ink mixture to achieve the effect. (Figure 22). Although rarely exhibited, these drawings are found consistently throughout the 1950s until at least 1962, (although not in large numbers), and to date they have not been identified or studied. They make use of the immiscibility of oil or solvent-based paints and a water-based medium, usually ink. There are examples of blue and black marbled ink as early as 1952, for example, Untitled (1952) (73.52.63) and Untitled (1952)

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<sup>73</sup> Smith often used this, and similar hand-made, crisp gelatine-sized paper in 1957 and 1958. Its hard sizing meant that the ink/paint remained on the surface more than it would have on the more absorbent watercolour papers. Though the watermark at bottom right corner states 'JAPAN', it is not true 'Japan' paper, which was a thin transparent, absorbent printer's paper popular in France in the late nineteenth century. Smith's paper was so named probably for its smooth finish. See DS47-DS49, Appendix C.

<sup>74</sup> These additions are discussed below.

<sup>75</sup> This appears to be an early acrylic emulsion paint. Since artists' acrylic emulsions were introduced in 1956, the date of the work is significant and demonstrates that Smith began to experiment with acrylic emulsion almost immediately after it was introduced. The leaching of the red colour from the black is also suggestive of the poor quality of early artists' acrylic emulsions, as noted by Robert Motherwell. See: Fiske and Alberson, 1980: 5.)

<sup>76</sup> Smith appears to have used oil-modified alkyd paints for this mottled effect in drawings as early as 1952. Untitled, 1952 (73.52.57) is an immiscible combination of blue, red and magenta ink/paints. Analysis demonstrated that the red and magenta were likely inks, but that the blue was a short-oil alkyd (DS12, Appendix C). Alkyd resins are the reaction product of an oil or fatty acid, polyol(s) and polyacids. These polymers are mixed in solvents and can cure by reaction with oxygen or amino based crosslinking resins to form tough, durable films. The proportion of oil contributes to its properties, and alkyd resins are normally referred to by their oil "length". Short oil alkyds are typically used in industrial applications, where long oil alkyds are used for domestic applications.

(73.52.57), which are both created in blue or blue and red ink possibly mixed with a solvent borne medium.<sup>77</sup> Also in 1955, an intentional mixture of tube oil paint directly painted into the black ink in one work creates a similar effect (Figure 23). After 1956, however, this mottled effect appears with increasing regularity in Smith's drawings. Untitled (Voltri 5), 1962 and Untitled (Voltri 2) (1962, Private Collection, California, USA) make use of tube oil paint, added directly into the wet ink. Although rarely discussed, there are striking parallels between these drawings and the mottled effect of naturally aged iron and steel in much of Smith's sculpture (particularly the Voltri series as the reference in the titles of the drawings implies: see Figures 24 and 25), in the gestural painted sculptural surfaces made after 1956, and the mottled quality of earlier surface treatments (see Figures 26 to 28).

In 1957, Smith also produced a series of works on paper in which he mixed a vinyl-based solution with a purple or black ink, which also imparted a similar marbled effect. The media analysed in the Estate drawing: ΔΣ82-12-57 (73.57.219), and also a drawing from the Harvard Art Museum: Untitled (1966.16), were found both to contain PVA.<sup>78</sup> This does not explain the immiscible nature of the media however, since PVA is largely encountered as a water-based emulsion and easily forms a homogeneous mixture with ink. The answer may be found in cross sections taken in 1993 from paint from the sculptures; Zig III (1961), Zig V, (1961), and Circle III, (1962, National Gallery of Art, Washington D.C.). These demonstrated that at this point, Smith used a yellow/green etch primer which contained a solvent-based poly (vinyl) compounds.<sup>79</sup> Smith's papers confirm that he purchased Tuf-On Pri-met P-70 wash primer in 1962 from Brooklyn Varnish

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<sup>77</sup> DS11 and DS12, Appendix C.

<sup>78</sup> See DS48 and DS55, Appendix C. FTIR spectra provided convincing matches for PVA. PyGCMS results for 1966.16 showed that it contained benzene and methyl acrylic acid. Tom Learner has demonstrated that benzene and ethanoic acid are the principle pyrolysis products for PVA emulsions and solutions. The lack of ethanoic acid in the case of 1966.16 may be explained by the fact that pyrolysis can eliminate the ethanoic acid, producing benzene from "rearrangement reactions along the polyene backbone" of the PVA. Tom Learner, 'The Analysis of Synthetic Paints by Pyrolysis-Gas Chromatography Mass-Spectrometry (PyGC-MS)', Studies in Conservation, vol. 46, no.4: 234.

<sup>79</sup> The primer was found by Py-GC/MS to be largely vinyl butyral resin, chromate pigment and phosphoric acid, a typical etch primer designed to protect metal surfaces. Christopher Maines, 'Analytical Report', National Gallery of Art, Washington D.C, 12 November 1992: in Marshall, 1995: 97-99.

Manufacturing Company, and a product brochure states that the P70 was “a zinc chromate wash primer developed for ship bottoms and compounded with polyvinylbutyral resin”.<sup>80</sup>

Leon Pratt confirms that Smith used the P70 and enjoyed both its colour and its practical working properties, particularly the fact that top layers of paint could be burnt off without blistering the undercoat.<sup>81</sup>

It is clear also from Pratt’s testimony that Smith often left the yellow primer as the final coat, apparently fond of its yellow colour. However, since Pratt states that the P70 was used from 1962 onwards, as a replacement for a multi-layered coating of zinc white, it is unlikely that it was the vinyl component in these drawings. Furthermore, Christopher Maines’s analysis of Sentinel I (National Gallery of Art) from 1956 showed no trace of the butyral resin in the primer layers.<sup>82</sup>

PVA emulsions were available to artists at the beginning of the 1950s, but solvent-borne PVA solutions were introduced as early as the 1930s. PVA paints had a short-lived presence on the market in the 1940s, when Borden Co. introduced “Polymer Tempera” artists’ paints which were based on PVA emulsion.<sup>83</sup> Several artists mixed their own paints using dry pigment and PVA emulsions, as a kind of precursor to acrylic emulsion paints which were to arrive in the late 1950s. Amongst these was the painter, Sidney Nolan, who began to use PVA in 1957, the same year as the series of drawings by Smith. Nolan’s description of the resin, that “there was a point at which it bubbled and hardened, and you couldn’t use it anymore; it was like lava”,<sup>84</sup> may correspond to a similar effect observed in Smith’s ΔΣ82-12-57 (1957), whose purple medium has a similarly bubbled and crusty surface.<sup>85</sup> Furthermore, Kenneth Noland stated that he obtained dry pigments directly from David Smith with the intention of mixing them with Elmer’s glue, an early

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<sup>80</sup> Tuf-On Pri-Met P70, Product Information Brochure, David Smith Estate, Box 22, Business Receipts.

<sup>81</sup> Leon Pratt, Interview with Stanley Marcus, 11 July, 1970, in Marcus, 1972, Appendix 9: 226-228.

<sup>82</sup> Marshall, 1995: 95, 98. It appears that in 1956, Smith’s sculpture surfaces were largely prepared with zinc chromate and red lead oxide primers, followed by alkyd paints.

<sup>83</sup> Although as Crook and Learner discuss, problems with the dispersion of the pigment meant that they did not achieve wide usage by artists. Jo Crook and Tom Learner, Modern Paints (London: Tate Gallery, 2000) 22.

<sup>84</sup> Noland in conversation with Noel Barber, 1964, quoted in Crook and Learner, 2000, 24.

<sup>85</sup> DS 48, Appendix C.

PVA emulsion.<sup>86</sup> Since Smith and Noland were close, and clearly exchanged technical and conceptual methods, it is reasonable to suggest that these PVA drawings may have been made in response to Noland's own experimentation, or vice versa.<sup>87</sup>

With these expressive, gestural, mottled drawings, it is easy to find a resonance with the expressive surfaces of many of Smith's sculptural works. As early as 1933, Smith was using paint and patination to animate the surface of iron and steel. The base or neck of Saw Head (1933) (See Figure 5), created using found iron and steel implements is painted in a liquid red wash, which enhances the rust colour of the naked iron. The paint is applied in areas in a dry brush manner, allowing the raised parts of the uneven surface to pick up the paint, and the lower areas to remain unpainted. Smith's inventive and expressive use of chemical patinas on his sculptural surfaces also recall similar gestural effects in both painting and drawing. (See Figures 25 to 28). Whereas patinas were used traditionally to protect metals or impart an overall colour or tone, Smith often used them in a similar manner as paint, to highlight forms, and activate the surface.<sup>88</sup> In many instances, the presence of these patinated surfaces resembles and resonates with the mottled surfaces of oxidised or phosphated iron, an element with which Smith had a profound relationship. In his notes from the month at the Italsider factory in Voltri, Smith wrote affectionately about the scrap iron and steel that he discovered there, and would subsequently use in his Voltri series. (Figures 24 and 25).<sup>89</sup>

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<sup>86</sup> Noland in videotaped interview with Carol Mancusi-Ungaro and Leni Potoff at the Museum of Fine Arts Houston, 12 Nov. 1993, quoted in Crook and Learner, 2000, 24. Noland states that it was cheap to experiment with Elmer's glue as a medium because it was available by the gallon. Although there are no extant receipts for 1957, Smith's receipts show that he purchased a gallon of Elmer's glue in 1959. Receipt, J.E.Sawyer & Co., Ltd. 10 June, 1959, David Smith Estate, Box 21

<sup>87</sup> Smith became close friends with Noland in the 1950s, and Noland's influence can be seen in the painted Circle sculptures (for example, Circles Interrupted, 1961) that Smith created in 1961-62, partially in response to Noland's Target paintings produced in the late 1950s and early 1960s.

<sup>88</sup> Smith's attachment to colour on sculpture was demonstrated in publication as early as 1940, where he demonstrated his knowledge of surface treatments for metals in an article for Architectural Record. Arguing that "contemporary sculpture has made timid use of colour", Smith discussed chemical treatments, sprayed metals, vitreous enamelling, and electroplating as means for articulating a new sculptural language, and demonstrating his extensive knowledge of materials. David Smith, 'Sculpture: Art Forms in Architecture – New Techniques Affect Both', Architectural Record, Vol. 88, October 1940, 77-80. Rep. in McCoy, 1973: 44-48.

<sup>89</sup> David Smith, 'Notes from Voltri', in McCoy, 1973: 156-157.



FIG. 23: David Smith Untitled, 1955, with detail showing mottled red medium.





**FIG. 24:** David Smith Voltri VII, 1962, (National Gallery of Art, Washington D.C)  
Detail showing surface mottling.



**FIG. 25:** David Smith Voltri IV, 1962 (Kröller Museum, Otterlo)  
Detail showing surface mottling.



**FIG. 26:** David Smith Home of the Welder, 1945, (Tate Gallery, London)

**FIG. 27:** David Smith, Home of the Welder, 1945. Detail showing surface treatment.





**FIG. 28:** David Smith Big Rooster, 1945 (Hirshhorn Museum and Sculpture Garden, Washington D.C)  
Detail showing surface treatment.

In Home of the Welder (1945) (Figures 26 and 27), for example, a mottled patina is applied selectively to the upright flat of the interior wall. It is also possible that it was applied and then selectively wiped away. Similarly, the paint on Aerial Construction (1936), shows a comparable effect in the circular brush strokes on the flatter planes. The yellow chemical patina applied to the selective areas on the surface of Big Rooster (1945) (Figure 28), highlights the applied steel forms on the back of the central form, and again in The Letter (1950), mottled yellow paint is used to animate the surface or exaggerate subtle differences in colour and surface.<sup>90</sup> Likewise, streaky washes are exploited in Structure of Arches (1939) which is plated with copper and cadmium, but retains its wash-applied patina.

Similarly, the complex surface treatments and patina of The Cathedral (1950), were described in detail in 1951 by Elaine de Kooning, who noted the attention that Smith paid to the finishing and surfacing of his work:

For the subtle blonde tones of The Cathedral, his method was more tentative. Dissolving splotches of rust, Smith coated the different metals of the piece with a phosphoric acid, mixing small amounts of cadmium powder with it to produce deposits which varied from the golden patina on the steps to the mottled whitish pink of the twisted column, all falling into a unified range of shimmering elusive tones.<sup>91</sup>

A similar method was used in several of the Voltri and Voltri-Boltions created using abandoned parts, tools and scrap steel from the Italsider factory in Voltri during Smith's month at the Festival of the Two Worlds in Spoleto, Italy. After the majority of the rust scale was ground off, the iron oxide that remained was dissolved with phosphoric acid, and used almost like paint and then lacquered, preserving the rusted colour.<sup>92</sup> In the

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<sup>90</sup> Smith's idiosyncratic use of patinas in his work is rarely mentioned in the literature, and is worthy of further research. His notebooks contain several recipes for coloured patinas for metal. A notebook from 1933-45 for example shows recipes for six patinas: Green, (Ammonium Chloride, Copper acetate), Apple Green (Sodium chloride, ammonia and vinegar), Blue-green (Sodium thiosulphate and iron nitrate), Brown (ammonia, potassium sulphate and barium sulphate) and "Antique" (ammonia and clay).

<sup>91</sup> de Kooning, 1951: 40-41. The patinated surface of The Cathedral, as described by Elaine de Kooning has since been lost and the sculpture has been repainted a uniform brown colour. Its silver welds however, remain visible. It is discussed further in Chapter Four.

<sup>92</sup> Phosphating dissolves rust and leaves a thin layer of iron phosphate on the surface of the steel, which protects it from the elements. According to Smith in his notes on the Voltri sculptures (1962), this technique was used for all except Voltri X which was painted with red lead paint. McCoy, 1973: 163.

majority of cases Smith has made use of the deteriorated rusted surface, but even here, the steel resembles the effects seen in the mottled drawings. Similarly de Kooning's testimony that Smith added dry pigment to the phosphoric acid is reflected in his use of the same pigment in many drawings throughout the 1950s, discussed below. Even in some painted works like Pillar of Sunday (1945), Smith allowed the textural nature of the mottled steel to come through the paint, whereas others, such as 24 Greek Ys (1950), possess a uniformly smooth painted surface. Although even in this case, the cadmium yellow paint in 24 Greek Ys was adulterated further with aluminium powder. This imparted a metallic quality to the flat paint and created tension between the denial of the materiality of the metal by using paint, and the enhancing of associations with metal by the addition of the aluminium.<sup>93</sup>

The exploitation of immiscible media on paper, whether consciously or not, enabled Smith to reinterpret these sculptural surfaces in a similar way that the use of patina and rust solvent could be used in a painterly manner on the surface of steel sculpture, and in this Smith could “multiply the associations” for both drawing and sculpture.<sup>94</sup> In the late 1950s, these paints and patinas were replaced almost entirely with industrial and commercial alkyd paints and other synthetic resins. Although these were arguably used in a similar manner to the streaked and mottled patinated and painted surfaces of his earlier work, they also led to new and interesting responses in drawing.

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<sup>93</sup> It is possible that Smith used a sample of No. 606 standard unpolished aluminium powder which was sent to him after an enquiry to The Aluminium Company of America, just two years before the creation of 24 Greek Ys for an unspecified purpose. Interestingly the company produced the powder as a means for treating concrete for cutting building costs. Letter from F.P Stanier, Aluminium Company of America to David Smith, 27 Sept. 1948. David Smith Estate, Box 24.

<sup>94</sup> McCoy, 1973: 84.



FIG. 29: David Smith Untitled (Nude), 1964

## 2.4: The Nudes

As discussed above, Smith began to use alkyd paints in his drawings as early as 1952. However, he appears to have had a resurgence of interest in it after 1959. Alkyd was identified in the drawing, Untitled (1959, Harvard Art Museum: 1974.158) for example.<sup>95</sup> Certainly by 1956, Smith was painting his sculptures in alkyd paint, and very likely before this time.<sup>96</sup> In 1963, Smith began to make a large series of figurative Nude drawings on both paper and canvas in black alkyd paint (and occasionally black ink) applied with an ear syringe (Figure 29).<sup>97</sup> The paper works are typically on large thick watercolour sheets and were largely made during 1963. The series is relatively small, and consists of only six works known to the author; Smith appears to have completely abandoned paper for canvas after 1963. The works on paper are without exception in poor condition and suffer from extensive efflorescence, cracking, loss of media and staining.

It is possible that after experimenting on paper, Smith decided that primed canvas would represent a more durable support.<sup>98</sup> The Nude paintings on canvas are indeed in excellent condition, and analytical results confirm that the alkyd media was the same on both paper and drawing (a long-oil decorative alkyd paint), so it is unlikely that the alkyd paint itself caused significant problems, although as discussed in chapter Four, alkyds are susceptible to efflorescence due to their oil component. It is possible that the paper may have

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<sup>95</sup> DS90, Appendix C.

<sup>96</sup> The final paint coat on Sentinel I (1956, Hirshhorn Museum and Sculpture Garden) was determined by Maines to be an alkyd. (Marshall, 1995: 95.) Marshall observes that these results can of course be misleading by the fact that many of Smith's sculptures were repainted in alkyd paint by restorers, particularly where the sculptures were exhibited frequently outdoors, and paint had deteriorated. For example, Agricola I, (Hirshhorn Museum and Sculpture Garden) was repainted in 1988 and again in 1994 due to the deterioration of the alkyd paint which had become chalked on both occasions. (Albert Marshall, email to the author, Sept. 2008.) As noted, there is a lack of receipts prior to 1959 in Smith's archive, but it can be said with certainty that by 1960, Smith was purchasing large amounts of various types of alkyd. (Receipts, David Smith Estate, Box 21 and 22).

<sup>97</sup> Documentary evidence suggests that these works were carried out using DuPont Dulux alkyd paint. In a series of photographs taken of Smith's painting studio after his death by Alexander Liberman, a number of paint cans with DuPont Dulux labels are visible on several tables together with brushes and paintings in the background. Alexander Liberman, Dave Smith's Studio at Bolton Landing, 1964, David Smith Estate.

<sup>98</sup> The author examined six Nudes on paper from 1963, all of which suffered from the same problem. The oil component of alkyd paint can also leach from the edges of the paint into the absorbent paper in a similar manner to tube oil paint, and this is observed on all Nude drawings on paper. It is possible that this occurred early in the life of these drawings, and given Smith's obvious regard for the strong contrast of the black alkyd paint against the white prepared canvas, it is possible that these issues contributed to his abandoning paper as a support in favour of the more sturdy canvas.

absorbed much of the oil in the alkyd medium leading to brittleness and delaminating of the media. However, many of Smith's works on paper were stored in poor conditions from the time of his death to the reorganisation of the David Smith Estate in the late 1970s, and it is possible that this storage has led to problems specifically for the works on paper. The paintings, of which there are several hundred, were begun in 1964, and were made on loose, gesso-primed canvas, which replicated the flexible quality of paper. The canvas could therefore be manipulated like paper to control the drip and run of the paint where desired. When he had completed a large enough quantity, Smith sent the paintings for stretching onto LeBron stretchers,<sup>99</sup> demonstrating the tendency for Smith to outsource aspects of his work that became more prevalent in the 1960s, and discussed in Chapter Three.<sup>100</sup>

The Nudes have largely been ignored in David Smith's exhibition history, yet they preoccupied him for several years at the end of his life.<sup>101</sup> They represent a definitive return to figure drawing that recalls his early training with Kimon Nicolaides, an artist who stressed the "gesture drawing" to capture the figure, and the studies he made from Barbara Morgan's photographs of the dancer, Martha Graham in the 1930s and 1940s. Created at the moment when he was making some of his most formal abstract work in steel, the Nudes arguably contributed to a reaction against what Kosme Brañano called "a puritanical formalist revisionism which for years has censured the sculptor's figurative dimension as a sign of weakness."<sup>102</sup> This is perhaps illustrated further in the lack of

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<sup>99</sup> LeBron Stretchers were made by LeBron Brothers inc. and were created by James LeBron, an art handler and installer, who became specialised in the handling of the increasingly large format paintings that were being created in the 1960s. His clients included Frank Stella, Morris Louis and Jules Olitski. At the request of a conservator at The Museum of Modern Art, Lebron developed a stretcher that improved on the traditional wooden key device that had been used since the Renaissance. The LeBron Stretcher incorporated Tite-joint fasteners used by cabinet makers to create perfectly flush joints, and which possessed great strength. See: Margalit Fox, 'James LeBron, A Wizard at Moving Art Dies at 76', New York Times, March 31, 2005.

<sup>100</sup> Smith stated in a letter to Robert Motherwell and Helen Frankenthaler in 1964, that he had shipped 100 canvases to LeBron. (Smith, Letter to Helen Frankenthaler and Robert Motherwell, May 30<sup>th</sup>, 1964, AAA NDSmith D, F371). This outsourcing of Smith's work was typical of his development of an industrial studio practice in the 1960s, which is discussed in depth in Chapter Three.

<sup>101</sup> Although the Nudes were exhibited along with other work as early as 1964 (Marlborough-Gerson Gallery, New York) they were not seen again in exhibition until 1982 at the Hirshhorn exhibition of sculptures and paintings (McClintick, 1983). The Gagosian Gallery's 2001 exhibition, David Smith: The Last Nudes, was the first to exhibit a significant number (approximately 25) of the paintings as a group. This brought to public attention the sheer variety and virtuosity of Smith's painting.

<sup>102</sup> Kosme Brañano, 'David Smith Ink, Mark, and Expression' in: David Smith: Dibujante. Entre Eros y Thanatos Valencia: Centro Julio González, IVAM, 2004) 16,17.

interest shown in these paintings in the years following Smith's death. The Nudes, which formed a significant part of Smith's oeuvre, reflected a figurative dimension to his work that was in opposition to the prevailing formalist view of the work of Smith and other artists of the New York School and were largely ignored until the early 1980s.<sup>103</sup>

The technique itself is a direct evolution of an earlier method used by Jackson Pollock, who had died almost ten years before. Smith associated with Pollock in the early 1950s, at the time when Pollock was making his more figural black enamel paintings (1951-52), which according to Lee Krasner, were made using sticks, dried up brushes and turkey basters.<sup>104</sup> It is unthinkable that Smith and Pollock did not discuss painting technique when he and Krasner visited Bolton Landing in 1951, but according to Dorothy Dehner, Smith had already arrived at the technique before encountering Pollock's dripped paintings.<sup>105</sup> Smith's Nudes were of a much smaller scale than Pollock's black paintings however, and it is probable that the larger turkey baster would not have afforded him the precise control over paint delivery that he required. The ear syringes (Figure 30) were a tool that facilitated the production of a continuous unbroken line that was not possible using the drip from a brush or stick. The syringe has a bulb which could hold enough medium for a long continuous passage, perhaps even enough for an entire painting, and a long tube that could facilitate precision. In this way Smith could work from above, as one would in drawing, and gently pour the paint from the syringe in a manner much more like the traditional pen and ink of academic Nude drawings, yet which could apply emphatic squirts of paint when necessary.<sup>106</sup> Furthermore, Pollock's use of the dripped alkyd was much more visceral and physical than Smith's which, despite all of the critical rhetoric regarding its gesture and action in application, was more of a contemplative act. Smith worked on his Nude studies indirectly from photographs that he took of live posed models, a step removed from the traditional

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<sup>103</sup> Of course in Smith's case, this was largely the province of Clement Greenberg, the most influential and dominant critic of the period, and who was one of three executors responsible for Smith's Estate from Smith's death in 1965 until 1979. Greenberg stressed formal aspects of Smith's sculpture above all other considerations, and largely rejected the importance of Smith's paintings and sculpture. This aspect of Smith's legacy is discussed further in Chapter Four.

<sup>104</sup> Lee Krasner quoted in Ben Helleri, *Jackson Pollock's Black Enamel Paintings* (New York: Gagolian Gallery, 1990) 5.

<sup>105</sup> Dorothy Dehner, letter to Margaret Haggerty, Sept. 29, 1967, AAA, Dorothy Dehner papers, Roll 796, Correspondence.

<sup>106</sup> Lee Krasner states that Pollock similarly used the basters "like a fountain pen." Helleri, 1990: 5.





**FIG. 30:** Ear syringes found in David Smith's studio at Bolton Landing.

**FIG. 31:** Metal parts used for sprayed stencil works found in Smith's studio at Bolton Landing.



Nude sketch. This enabled him to use the static quality of the photograph and the eidetic memory image of the model to combine and form other associations that could be expressed in paint and reflect both stasis and movement.<sup>107</sup>

It is likely that having to work flat either on the floor or, more likely, given the average size of the canvases, on the large tables that he had set up in his painting studio enhanced the associations with drawing.<sup>108</sup> Brooks Adams states that Smith's use of enamel for these drawings conveys a "low relief sculptural presence" in its pooling and congealing on the canvas.<sup>109</sup> Where this may be true for many of Smith's drawing media, it is precisely the lack of relief or texture in the alkyd medium that gives it the working properties desired by artists. Alkyds are used in industry typically because they result in an even, blemish-free finish. They can on occasion be applied with a certain amount of impasto, but this tends to cause undesirable shrinkage and cracking effects.<sup>110</sup> In this instance, the balance is weighed in favour of practicality. Drawing in ink cannot take place on gessoed canvas, the alkyd medium proved unsuccessful on paper for these works, and the slow drying time of oil paint precluded that medium. Smith understood industrial paints from a worker's point of view.

## **2.5: Spray Stencil Drawings, 1957-1964**

In 1957, David Smith almost abandoned ink drawing in favour of drawings on paper and on canvas using spray paint and stencils. This occurred simultaneously with a preoccupation with larger volumetric forms in stainless steel, begun in 1957, and eventually evolving into the twenty-eight sculptures forming the Cubi series. These works were created on small sheets of paper, and often large narrow canvases using metal parts (Figure 31), paper cut-outs, watermelon rinds, and various other found and appropriated objects used as stencils and that came from aspects of Smith's daily life and work. Smith

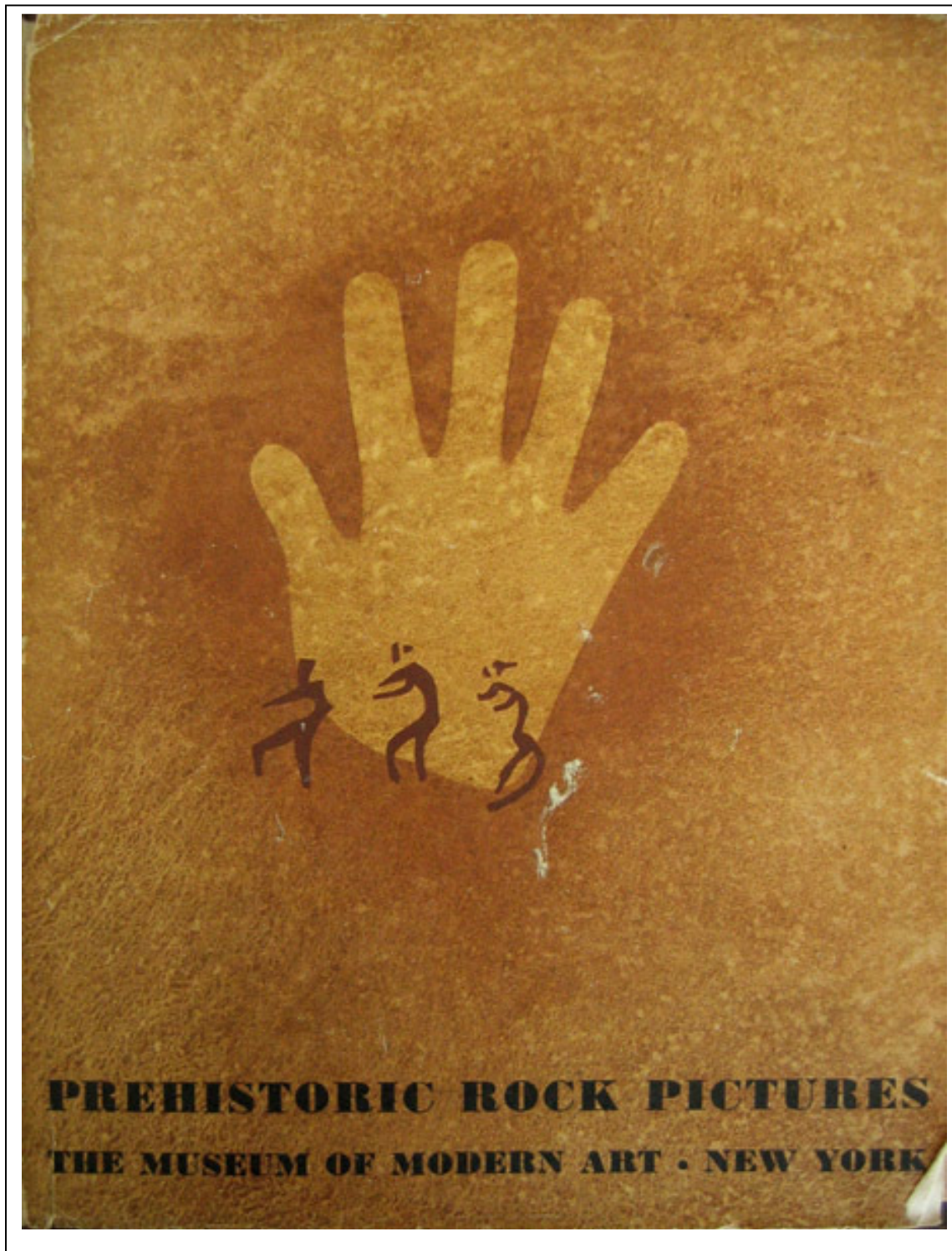
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<sup>107</sup> Alain Kirili has observed that the violence and sexual aggression often associated with Smith's Nudes is overplayed by critics, and that they are more musical, and lyrical, offering "an atmosphere of sensuality and relaxation". Alain Kirilli, 'David Smith: The Cult of the Solar Nude', Sculpture, May/June, 1994: 32.

<sup>108</sup> Alexander Liberman's photographs from 1965, show several long wooden benches in Smith's painting studio. These benches still exist at Bolton Landing.

<sup>109</sup> Adams, 2000: 3.

<sup>110</sup> This has been observed by the author in several alkyd works on paper, including Cocktail Party (1962) by Antonio Saura. (Metropolitan Museum of Art). The efflorescence in Saura's alkyd works on paper is discussed in Chapter Four.



**FIG. 32:** Cover of Prehistoric Rock Pictures, exhibition catalogue, Museum of Modern Art, New York, 1937. Found in David Smith's library at Bolton Landing.

created several photograms in the 1930s, ostensibly influenced by the similar works by Moholy-Nagy and Man Ray, and this may have prompted his return to making similar images. Smith was also certainly aware of the practice of prehistoric cave painters, who placed a hand against the wall and blew dry earth pigments from their mouths in order to leave a ghost image of the hand. His library contained several books on primitive art. In particular, on a visit to Smith's Bolton Landing studio, the author discovered an exhibition catalogue from a 1937 Museum of Modern Art Primitive Cave Art exhibition, the printed cover of which displays a classic example of the prehistoric hand print (Figure 32). This practice would have appealed to Smith at a number of levels. Firstly, his profound connection to his work, and to leaving the trace of the artist hand, was something he spoke of often. Secondly, the physicality of the process, the kinaesthetic sense of the presence of the artist's hand would have been of interest to an artist who wanted to make bodily gestures on paper reflect his physical size. Finally perhaps, the nature of the red/yellow earth pigments used by the prehistoric artist, an iron oxide compound with the same chemical composition as rust had profound metaphorical significance to Smith's work in steel. Indeed, as I will discuss below, Smith added dry red pigments to his black egg ink on several occasions.

Further still however, and perhaps the most significant source for these sprayed works was in Smith's workshop practice, which enabled him to truly bring sculptural process into drawing. Certainly by 1960, Smith's practice was to paint white rectangles on the floor of his studio or on metal palettes for the purpose of arranging the steel elements of his sculptures on the floor (Figure 33). When these were spot welded into place and the sculpture raised to the vertical, the scorch marks, molten metal and black carbon residues from the welding process left a negative image of the sculpture on the white paint on the floor, and leaving a ghost image in white of the sculpture. These images were transferred by Smith back into painting and drawing, just as the painted images prompted a response in sculpture.

The paintings and drawings were referred to by Smith as "think pieces" or "starting off points".<sup>111</sup> The technique itself was not known until 1960, when Smith published his article in Arts Magazine in 1960. He annotated the photographs with his own notes and

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<sup>111</sup> Kramer, 1962: 33.

wrote that “after welding, sparks, molten balls and arc flares leave images in negative white and burnt trceries: these become nature.”<sup>112</sup> (Figure 34). The photographs also show Smith’s garage floor (“always seems to be in use”) painted with ten white rectangles of various dimensions, upon which metal parts were arranged to be tack-welded into sculpture at a later stage. Similar arrangements of metal parts were placed on white-painted steel palettes outside Smith’s studio which E.A Carmean has significantly referred to as “sculptor’s paper.”<sup>113</sup> These photographs of sculptural arrangements are juxtaposed with another photograph of the floor of Smith’s drawing studio, where at least twenty-five calligraphic black ink drawings have been left to dry. That he included this photograph of his prolific output of drawings is a testament to the regard that he had for his drawings. He noted on the photograph: “to average a drawing for every day I live: some form of identity”, emphasising the fact that both drawing and sculpture were part of his daily working schedule, and that life and work were inseparable.

It is possible that these trceries of the welding process prompted responses not only in the stencil drawings but also in others. While the photograph shows the charred white paint and parts of the ghost images left by the sculpture that could be transferred conceptually to stencil and spray, it also shows trails of dotted lines caused by arc flares and the burning caused by minute spots of molten steel that dropped along the line of the weld as it was taking place. These trceries appear to have been replicated in at least two drawings 10-6-55 (1974.147, Harvard Art Museum: Figure 35) and the similar Untitled, 1956 (73.56.28) in which the ink appears to have been applied to paper using a stick or the end of a brush handle. In these cases the line is interrupted due to the lack of any reservoir of ink, and skips where the judder of the stick occurs as it is dragged over the paper leaving a trail of dots of ink that strongly resemble the effect observed in the Arts Magazine photograph.

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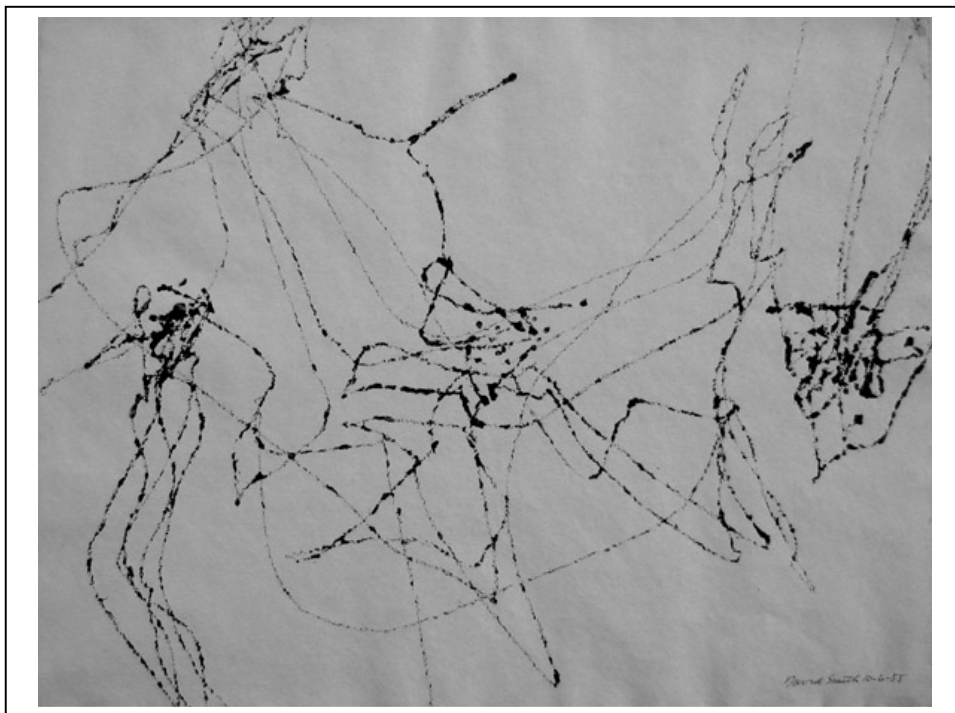
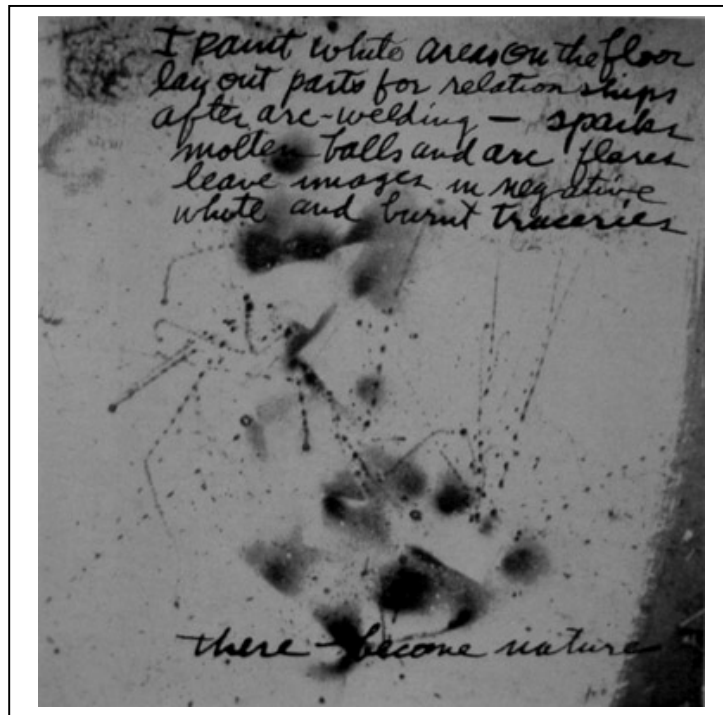
<sup>112</sup> David Smith, 1960: 49.

<sup>113</sup> Carmean, 1982: 49.



FIG. 33: Annotated photographs from David Smith's article, 'Notes on my Work' (*Arts*, 1960) showing sculpture elements laid out on painted metal palettes outside his studio (above), and on painted rectangles on his garage floor (below).





**FIG. 34:** Annotated photographs from David Smith's article, 'Notes on my Work' (Arts, 1960) showing burnt tracers from arc welding on white-painted floor.

**FIG. 35:** David Smith, Untitled, 1955 (Harvard Art Museum)

Smith used aerosol spray paint to create the majority of his sprayed stencil works. This was possibly the first use of the technology by an artist; aerosol spray paint was a relatively recent invention when David Smith began to use it. The first paint to be delivered by aerosol in a can was invented in 1949 by Edward Seymour of Seymour of Sycamore, Illinois and was initially made specifically for aluminium radiator paint, though the can was based on earlier designs for insecticides and deodorisers that had been introduced as early as 1927. There are a variety of different brands of spray paint visible in a photograph taken of Smith in his drawing studio around 1962, including what appear to be Krylon paints. Krylon introduced a clear acrylic spray fixative in 1948 that became popular with artists, and later began to make spray paints specifically for artists and decorators. Acrylic resins have been identified in Smith spray drawings, particularly in the metallic colours. However analytical results also demonstrate that most spray paint was based on a mixture of resins. This is confirmed by Craig Swafford of Seymour of Sycamore, who states that at the time, acrylic resins were simply too expensive to be used alone in spray paints.<sup>114</sup> Seymour spray paints typically used a combination of chain-stopped alkyd and nitrocellulose resins in their spray paints in the 1950s and 1960s.<sup>115</sup>

As Peter Stevens has observed, Smith likely found the aerosol can to be a useful tool, since it could be used in one hand, like a brush.<sup>116</sup> A possible antecedent to the synthetic spray paintings is a drawing made in 1952 (73.52.33 Figures 36 and 37), in which Smith used black tube oils and a sprayed textural background in a rusty orange watercolour or ink.<sup>117</sup> Both the liquidity and the shape of the spatter in the sprayed medium are consistent with a traditional mouth sprayer, and several mouth sprayers were discovered by the

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<sup>114</sup> Craig Swafford, Regulatory Affairs, Seymour of Sycamore, email to the author, 26 November 2008. Seymour largely produced paint for hardware distributors, whereas Krylon was directed firmly toward the artist/designer market. Smith's receipts show only a few of his spray paint purchases, but these tend to have been from automobile and hardware suppliers. Krylon (whose paints are visible in the studio photograph), was purchased by Sherwin Williams Company in 1991. The company was not able to provide proprietary information regarding their spray paint formulations for the 1950s and 60s. Though Krylon's "plastic spray" fixative was undoubtedly the first acrylic spray paint, the acrylic would have been present in a very dilute form, and given the expense of acrylic resins at the time, it is likely that Krylon colour aerosol spray paint employed a mixture of acrylic and other resins. Acrylic is very stable and may have been preferred for novelty finishes such as the metallic and fluorescent spray paints.

<sup>115</sup> Chain-stopped alkyds are used in place of conventional short oil alkyds, and modified with an acid (typically benzoic acid) which stops the polymerization or chain extension process. The hardness of the benzoic acid molecule gives the alkyd resin a faster and tack-free drying time.

<sup>116</sup> Stevens, 2008: 100.

<sup>117</sup> DS6, Appendix C.

author on a visit to Bolton Landing in 2006. It appears that Smith sprayed the paint over several hard edged stencils and then delineated the edges of the negative space left by the stencils with black oil paint applied directly from the tube. Similarly, the creep of spray paint under the edge of the stencil whilst the paint was still wet is exploited in this early drawing, as it is in the later synthetic spray paints. This is caused either by spraying at different angles and allowing medium to flow under the stencil edge by force, or simply allowing the surface tension of the medium to effect an unresolved edge by removing the stencil while the medium is still wet. The resemblance of the drawing to the prehistoric hand image discussed above must also be noted, since the yellow/orange mottled watercolour used in spray form certainly recalls the image from the cave wall from the MOMA exhibition catalogue (Figure 32). Indeed, Smith received the catalogue as a gift from a friend in 1951 only a year prior to making this drawing, so it is not unlikely that it had some influence in this early experimentation with the sprayed medium.

Smith's experiments using a mouth-sprayer and stencils were seemingly abandoned after this work, and there do not appear to be any further works made in this manner, until the arrival of the synthetic spray drawings in 1957. There are several possible explanations. Firstly, it is likely that Smith favoured the effect of sprayed medium, but did not particularly like the technique. Delivery of paint from a mouth sprayer is by nature awkward and unwieldy. Since one end of the L-shaped device is constantly in the mouth; the other in a vessel of medium, physical movement and expressive application naturally limited. The technique seems overly awkward when one recalls the physicality in the free and gestural marks made on paper by Smith in his more typical 1950s drawings. Secondly, the method required working vertically or at least at an acute angle to the horizontal, since the sprayer had to maintain contact with the liquid and not spill. This was against Smith's normal working procedure (for both drawing and sculpture) which was largely viewed and executed from above and created on the horizontal plane. One can speculate that the advent of the spray can meant that a return to the favoured aesthetic of this earlier experiment was possible, albeit with a more simple and versatile tool that could be used expressively at any angle, create a variety of effects, and might enable more natural movement of the body.





FIG. 36: David Smith, Untitled, 1952

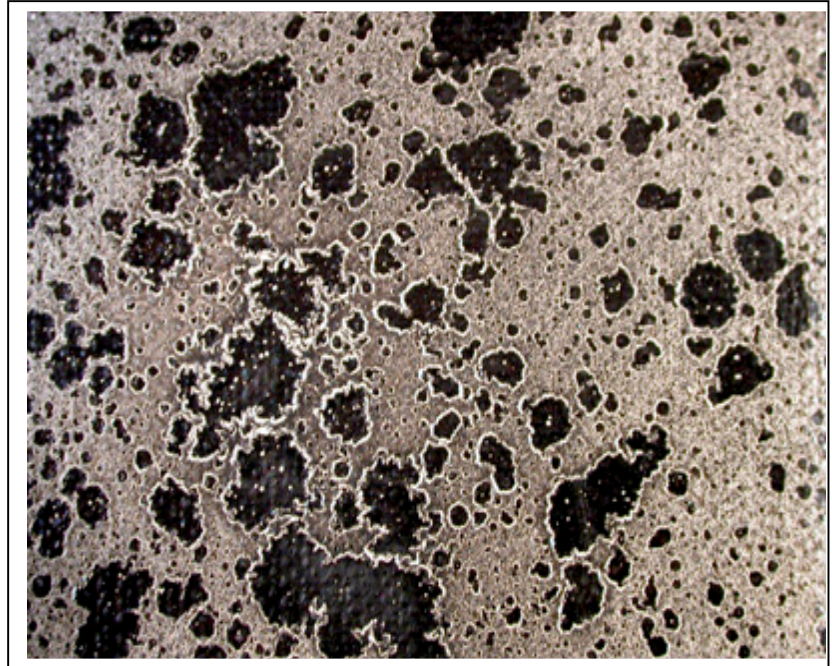
FIG. 37: David Smith, Untitled, 1952, detail showing stencil and sprayed paint.

At the same time, Smith also used white spray paint to partially negate aspects of several of his egg-ink drawings. This appears to have been a satisfactory replacement for the white gouache and tempera paints that he had previously used. He appears to have enjoyed the transparent effect that could be achieved with the spray paint, neither completely negating the form, nor allowing it to be entirely resolved. In a similar manner to the earlier works, the white paint is used to create a tension and impart dimensionality to the strong black forms of the ink by only partially negating it. Untitled, 1958, (1974.149.8, Harvard Art Museums) demonstrates that Smith used a white spray paint ostensibly to eliminate the black ink at the left side of the drawing and enhance the calligraphic feel of the central form. However, close inspection reveals more nuanced use of the spray paint. A series of concentrated spray applications, where the can is held close to the paper completely obscures the black ink. This is combined with more subtle lighter modelling along the edges of the forms. At the top left, it is evident that Smith applied some form of stencil or mask to allow a sharper delineation of the edge. The overall effect is to cause a series of push and pull tensions and movement within the picture plane, demonstrating Smith's subtlety in using the technique.

Another work, Untitled (1957, Harvard Art Museum, 1994.28, Figures 38 and 39) in spray paint on canvas demonstrates a technical discovery that is echoed in many of Jackson Pollock's works. The painting is one of a series of early sprayed works in which the negative space of the stencils is almost entirely repainted with white paint.<sup>118</sup> In this case, the paint does not perform the same function of the white oils and temperas that are applied with a brush to the white spaces of other drawings, but is used in a more painterly manner. The initial application of spray paint in a matte (flat) black paint was enhanced by a gloss black spatter from the aerosol into the still wet matte paint. The solvent in the gloss black partially displaces the flat black paint underneath and exposes the white ground of the canvas, leaving a kind of halo effect around the gloss spatters. The effect was likely achieved by accident by Smith, but it is also observed in a number of Jackson Pollock's

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<sup>118</sup> The large coloured spray paintings, Island in Alaska (1959) and Main Pribilof (1959) are similar examples. It appears that these paintings, only loosely based on stencils, were replaced by more hard-edged stencil forms on canvas, and both hard-edged and amorphous forms on paper after 1960.



**FIG. 38 (left):** David Smith, Untitled, 1957 (Harvard Art Museum)

**FIG. 39 (right):** David Smith, Untitled, 1957. Detail showing displacement of matte black with gloss black spray paint.



paintings for example Number 11A, Black, White and Grey, (1948). Carol Mancusi-Ungaro successfully replicated Pollock's technique in 1999, by pouring solvent enamel paints over each other while still wet. She noted that for displacement to occur, the two media were required to be of the same type.

However, analysis determined that the two spray paints used by Smith in this instance were not the same medium. While the gloss black spray paint was clearly an oil-modified alkyd, the matte black was likely to be a nitrocellulose-based paint.<sup>119</sup> Since both paints were solvent-based, it is likely that the solvent from the alkyd paint simply displaced the nitrocellulose underneath, since nitrocellulose remains soluble in certain solvents after it dries.<sup>120</sup> However, A.G. Armour et al. offer another hypothesis. When a nitrocellulose paint is applied, the wet film is in a turbulent motion as a result of the evaporation of the solvent and from non-uniform surface tension.<sup>121</sup> The no-flow point of nitrocellulose – that is, the point at which the increasing viscosity of a drying liquid reaches the point where solids (ie. pigment) in the system can no longer move freely – is around 30-40% solids. Therefore 60-65% of the drying mechanism involves shrinkage. The solids in an alkyd system reach a no-flow point much later, at around 80% or more. In other words, an alkyd system can stay liquid for longer than a nitrocellulose system, and there is considerably less shrinkage involved in the drying of an alkyd system. This is a desirable property that helps increase the concentration of pigment. These drying differentials and motion may have been responsible for the displaced effect of the black paints on Smith's painting.

David Smith sold very few of his sprayed works in his lifetime, though they were often given to friends and those who had also bought his sculpture. He clearly felt that collectors should understand his work in its entirety. Smith gave or sold several spray paintings and drawings to the collector Lois Orswell, which included both Untitled (1957) discussed

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<sup>119</sup> The presence of phthalic anhydride and 18:0 and 16:0 fatty acids (identified by GCMS) in the gloss black confirms that it is as an oil-modified alkyd paint. However, the matte black showed no signs of phthalic anhydride or fatty acids, but contained dimethyl phthalate, a common plasticizer for nitrocellulose paints. It must be mentioned here also that nitrocellulose and alkyd resins were often used together in paint formulations, making accurate identification difficult. See DS56, Appendix C.

<sup>120</sup> This, in fact, was a central reason for its replacement with alkyd and acrylic formulations in automobile finishes, since petrol spillages were found to soften and redissolve nitrocellulose paint finishes.

<sup>121</sup> Armour et al. 'Sixty Years of Automotive Coatings From Lacquers to Oligomers' Organic Coatings: Their Origin and Development, eds. R.B. Seymour and H.F. Mark, eds. (New York: Elsevier, 1989) 39.

above, and Untitled (1959) (1994.26, Harvard Art Museum).<sup>122</sup> Untitled (1959) is painted in a colour scheme atypical of Smith's later spray paintings. Green, orange, black and silver acrylic and alkyd spray paints were used over a number of hard-edged stencils.<sup>123</sup> In this case, the apparent flatness of the spray painted surface is interrupted by the presence of a granular material deliberately added to the black paint. (Figure 40)

Although there is some anecdotal evidence that Smith added textural materials to his drawings, prior to this research, it has not been discussed in any publications; the materials themselves have to date not been positively identified. Smith clearly added both metal particles and dry pigment to many of his works (for example, Untitled 1952, 72.52.5, and 73.52.39) as is discussed below. However, in this case, the additions were identified under magnification as minute glass spheres deliberately mixed into the black spray paint as it dried (Figure 41). The spheres impart a textural quality observable in many of Smith's ink drawings to which particulate matter has been added, and are particularly noticeable given the flat, smooth nature of the alkyd and acrylic spray paints. The painting is, however, unique. Smith did not use these spheres for either drawing or painting in any other works to the author's knowledge.<sup>124</sup>

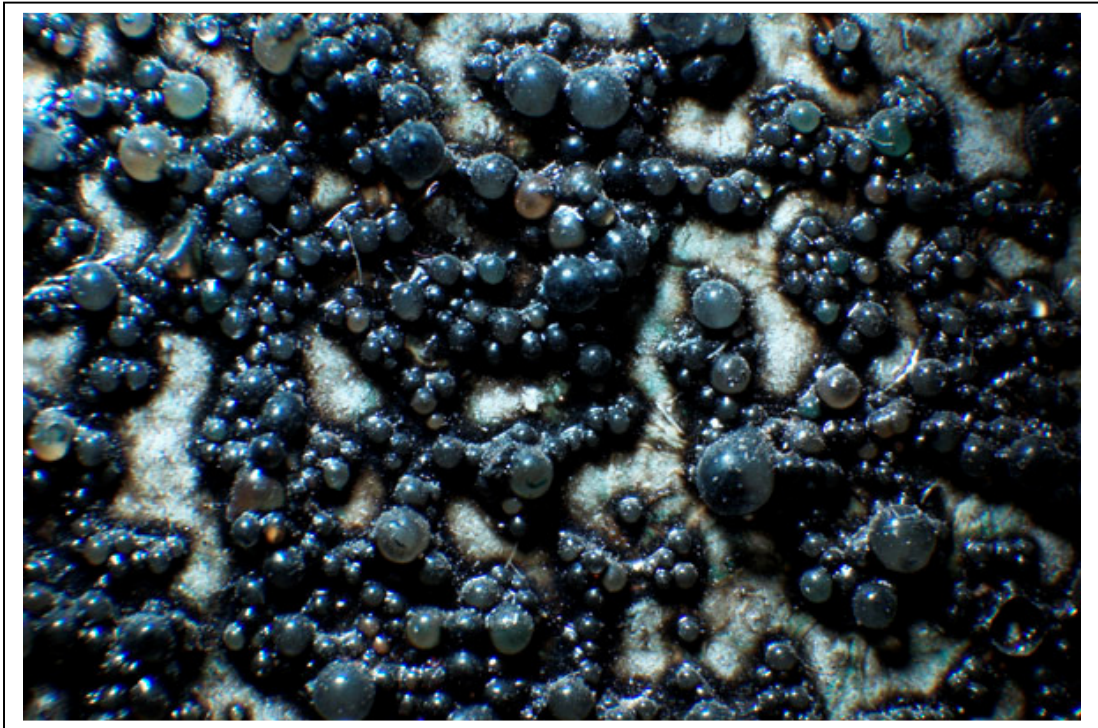
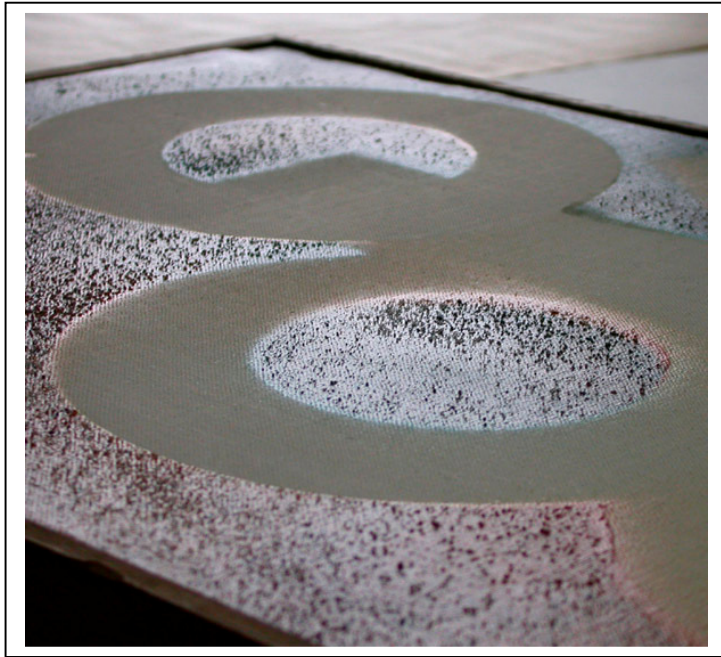
It is possible that Smith's addition of this material was intended to impart reflective qualities to the work. These glass spheres are used in the manufacture of high-reflectance paint and road signs. They are also used in industry as a less abrasive alternative to "sand blasting" for the removal of rust scale from iron and steel. Smith may have been aware of the substance through his industrial experiences working at American Locomotive Company in Schenectady, New York (1942-44), or from his brief summer as welder at Studebaker Automobile factory in 1925. Under microscopic examination, the spheres are

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<sup>122</sup> Lois Orswell was a friend of Smith's and a major collector of his work. The deposit and subsequent donation of the entirety of her Smith collection to Harvard Art Museum in 1994 resulted in the Museum now holding the largest collection of Smith's work outside of the artist's estate. Orswell's correspondence with David Smith is a fascinating insight into Smith's character in his most productive period and is published in part in Marjorie B. Cohn, Lois Orswell, David Smith and Modern Art, Harvard Art Museum (New Haven: Yale University Press, 2002).

<sup>123</sup> The black, green and orange paint were identified by FTIR as alkyd or alkyd/nitrocellulose, but the silver was identified as an acrylic. See DS91, Appendix C.

<sup>124</sup> Peter Stevens was also consulted, and stated that to his knowledge there were no other sprayed works in the Estate's collection that exhibited a similar textural surface quality.



**FIG. 40:** David Smith, Untitled, 1957 (Harvard Art Museum). Detail showing surface texture.

**FIG. 41:** David Smith, Untitled, 1957. Microphotograph (x400) showing glass beads.

coated in a thin dust layer. At the time of painting however, the addition of the spheres would likely have provided a light reflecting sparkle to the black paint; a quality that is observed clearly in the metallic particles added to his black ink drawings. It seems likely however that Smith was also alluding to his interest in surface reflection in his burnished stainless steel sculptures, created in the same period.

The gestural burnishing on the surface of the Cubis provided the illusion of additional depth in the same way that paint had in earlier works. The stainless steel surface of the Cubis however, did not require a protective coating, and Smith was free to experiment with an electric polishing disc to create the same illusory painterly effect that he had achieved using paint and patina in earlier works.<sup>125</sup> Smith clearly articulated that this was his intention, stating that the Cubis were “conceived for bright light, preferably the sun, to develop the illusion of surface and depth”.<sup>126</sup> Indeed, the quality of reflected light on these works was so treasured by Smith that he actively engaged with it in the perception of the Cubis. Smith’s interest in optical effect and reflectance is perhaps demonstrated in an anecdote from the sculptor, George Rickey. Rickey states that Smith enjoyed the play of the afternoon sun on the surfaces of the Cubi sculptures. However, at night Smith often sat on his porch shining a torch over the surfaces of the Cubis standing in his fields, allowing the play of light to animate the surface against the negative space of the darkness.<sup>127</sup>

The glass beads are not found in other sprayed works by Smith to date. However, he regularly made use of particulate metal in his ink drawings, and as noted by Rickey, the effect of light appears to have interested him throughout the 1950s. In the author’s survey of Smith’s drawings, sixteen were found to have metal (steel) particle inclusions.<sup>128</sup> Smith appears to have used the technique sporadically in drawing throughout the 1950s, and there are examples of ink drawings in each year from 1952 to 1958. It is interesting that no metal particle inclusions were found by the author in drawings after 1958, just as Smith

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<sup>125</sup> However, it should be stated that Smith did not attach great significance to the embodiment of the artist’s gesture and touch in these works (as noted in Chapter Three and Four). His assistant, Leon Pratt was allowed to carry out some of this burnishing work, though Smith clearly provided the final touches. Leon Pratt, interview with Margaret Haggarty, 11, 12 July, 1967. Haggarty, 1968: 87.

<sup>126</sup> David Smith quoted in Baro, 1964: 49.

<sup>127</sup> Albert Marshall, email to the author, August, 2008.

<sup>128</sup> Steel was positively identified in several samples by XRF. See for example, DS40 (73.56.61), Appendix C.

began to concentrate more on the Cubis.<sup>129</sup> It is possible Smith simply spent more time on spray painted drawings in which he could use metallic paints to impart ideas of reflectance related to the Cubis. The glass beads in the early 1959 spray painting discussed in the previous paragraphs may then have been an abandoned experiment that marked an end to the inclusion of these metallic reflecting materials in painting and drawing as his style in drawings moved in a new direction.

As discussed above, the spray paintings, Untitled (1959) and Untitled (1959) are atypical of the body of sprayed work that Smith made between 1957-65, in their experimental use of paint and texture. They are relatively early works in the sprayed technique: the former was created in the same year that he began experimenting with spray paint, and the latter only two years afterward. Both demonstrate his desire to fully explore a technique sometimes in one, or sometimes in many works until the concept was sufficiently expressed.<sup>130</sup> As discussed above they may be viewed as abandoned experiments.

However, given the close relationship that Smith had with Orswell, it is likely that he was sufficiently pleased with the paintings to choose to offer them to her. If they were simply abandoned experiments, it is more likely that they would have stayed in his possession. Furthermore, the addition of textural material to a paint that is designed to be as flat and smooth as possible illustrates an interesting dialectic between the perceptual and physical manner in which Smith played with three-dimensionality in his work, and is one that is worthy of further exploration.

## **2.6: Texture, Tactility and Touch in David Smith's Drawings and Sculpture**

Writing on Smith has made little of the textural nature of his paints, outside of a reference to the viscosity of his egg-ink medium in drawing or to Smith's relief works on canvas.<sup>131</sup> As I will discuss below Smith's work in sculpture and drawing corresponds to ideas of the haptic, kinaesthetic and proprioceptive perceptions of his work. In defiance of the

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<sup>129</sup> Although red and blue pigment inclusions were found on ink drawings as late as 1960, as discussed below.

<sup>130</sup> Smith noted, for example, on a 1960 photograph of a series that included the sculptures 5 1/2 (1956, Harvard Art Museum) and Four Units Equal (1956): "Since 1956, unities of square tanks of block forms have possessed my consciousness ... probably it will take 12 to 20 more before I'm through." David Smith, 1960: 46.

<sup>131</sup> An exception would be Wilkin, 2000, which discusses Smith's reliefs in detail as an intermediary between drawing and sculpture, and the textural effect of paint on Smith's sculptures.



prevailing Greenbergian reductive formalist view that has been applied to his sculpture, the textural nature of his media in drawing allows Smith's drawings, like many of his sculptures to be seen from both an intimate and distant point of view.

David Smith's painting and sculpture may be viewed in terms of its haptic association. Surprisingly, aspects of tactility and touch have only recently been applied to perceptual studies of sculpture.<sup>132</sup> This is unusual since the physicality of materials present themselves more readily to the viewer in sculpture than in painting. What has been written has tended toward traditional (figurative) sculpture and its relationship with embodied perception, and there has been scant mention of twentieth-century sculpture. Although it is not the purpose of this study to interrogate aesthetic and perceptual theory, it is concerned with touch in several ways (texture and tactility in Smith's drawing and sculpture, the importance of the artist's hand in the interpretation of Smith's work, and the removal of traces of the artist's touch discussed in Chapter Four). Therefore, the following will attempt to extend discussion on the drawing/sculpture relationship in Smith's work in terms of haptic experience.

Ideas about kinaesthetic responses to objects are extraordinarily complex and are not yet fully understood. Perception, it seems, may be largely synaesthetic.<sup>133</sup> In other words, as one visualises, one senses touch, volume, tactility simultaneously. If this is true then there must be a haptic dimension to painted works in addition to sculpture, although this is difficult to perceive in traditional, illusionistic works. In the flatness of painting there is a scopic distance in viewing, whereas in sculpture there is a physical involvement with the space that both the viewer and the object inhabits. Bernard Berenson has discussed tactile values in Renaissance painting, but it was the eighteenth-century theorist Johann Herder who understood the centrality of touch in the appreciation of sculpture.<sup>134</sup> Herder's discussion of the perception of sculpture was entirely related to the haptic senses, stating

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<sup>132</sup> Diaconu notes for example that contemporary aesthetics have largely ignored touch, because it is a sensation that deals with ephemeral and transitory stimuli. It could be argued that tactile qualities may also be "seen" and therefore be encompassed in visual perception when one perceives a work of art. Mădălina Diaconu, 'Reflections on an Aesthetics of Touch, Smell and Taste', *Contemporary Aesthetics*, vol.4, 2006, section 5.

<sup>133</sup> Paul Schilder, *The Image and Appearance of the Human Body: Studies in the Constructive Energies of the Psyche* (New York: International Universities Press, 1950) 38-39.

<sup>134</sup> Johann Gottfried Herder, *Sculpture: Some Observations on Shape and Form from Pygmalion's Creative Dream*, (1778), trans. Jason Gaiger (Chicago: University of Chicago Press, 2002).

that, “almost without wishing it, our sense of touch is drawn toward every pliant curve and every delicate form.”<sup>135</sup> This predicted in many ways later writers’ work in the area; that of Herbert Read and Maurice Merleau-Ponty for example. Read, a theorist whose work Smith appreciated, argued in 1956 that only through tactile sensations could sculpture achieve its unique aesthetic values. Read posited that this was achieved through three factors: a sensation of tactility of the surface, the sensation of volume as denoted by the plane surfaces, and a feeling of the mass and ponderability of the object.<sup>136</sup>

What is interesting for Smith’s work on paper is that these sensations are *tactile associations*, rather than actual physical engagement with the object in question. The physical presence of objects is expressed through what Mark Paterson calls the “sensory appeal of texture and form.”<sup>137</sup> Paterson relates this to Merleau-Ponty’s synaesthetic theory of perception. That is, when one sees physical objects, “one sees the hardness and brittleness of glass ... one sees the springiness of steel, the ductility of red-hot steel, the hardness of the plane blade, the softness of shavings ... the fluidity of water and the viscosity of syrup.”<sup>138</sup> What Paterson and others have pointed out then, is that sculptural elements encountered by the eye as a collage of contours, shapes and textures are primarily associated in the mind with the *memory* of actual tactile experiences. As he points out, “A quotidian relation of touch, kinaesthesia and memory through the body is called upon in the aesthetic encounter with painting, sculpture and architecture alike.”<sup>139</sup>

Paterson further notes that sculpture is the paradigmatic tactile art form. Although abstract painting has long been held as an optical phenomenon, recent studies have allowed these works also to be viewed in a manner that can be described as haptic. Opticality implies distance, whereas hapticality implies close, intimate viewing. Recent studies of Jackson Pollock’s work have been informed by this notion, and have allowed an alternative view to the prevailing gestalt, overall, optical reading of his works that was also promoted

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<sup>135</sup> Herder, 2002: 91.

<sup>136</sup> Herbert Read, *The Art of Sculpture* (New Jersey: Princeton University Press, 1956), 228.

<sup>137</sup> Mark Paterson, *The Senses of Touch: Haptics, Affects and Technologies*, (London: Berg, 2007) 94.

<sup>138</sup> Maurice Merleau-Ponty, *Phenomenology of Perception: An Introduction*, trans. Colin Smith (London: Routledge, 2002) 267.

<sup>139</sup> Paterson, 2007: 94.

through Greenberg's reading of his work.<sup>140</sup> Similarly, the rheological properties of Smith's egg-ink provided the means to record the trace of the action of his brush. This in itself is both record of the artist's presence, but also confirms the physicality of the paint/medium. Richard Shiff is surely correct in his observation that the brushstroke in abstract painting is a technique concerned with affirming painting's physicality, and furthermore that it is "as capable as sculpture of conveying material resistance to the touch."<sup>141</sup> Textural painting possesses weight, thickness and density, and in this sense, as Shiff notes, painting as much as sculpture can be the vehicle for what he terms "metonymic exchange" - a connection between the artist's/viewer's physicality and the constructed physicality of the painted surface.<sup>142</sup>

These theories have some resonance with Smith's own sense of the physical involvement in drawing in particular. He stated in 1960:

I wish somebody had taught me to draw in proportion to my own size, to draw as freely and easily with the same movements as I dressed myself with, or that I ate with, or worked with in the factory. Instead I was required to use a little brush, a little pencil, to work on a little area, which put me in the position of knitting – not exactly my forte...I think that the first thing that I should have been taught was to work on great big paper, big sizes, to utilise my natural movements...<sup>143</sup>

Though dissatisfied with the formal art training he received in the early 1920s before he arrived in New York, it is clear that movement and gesture in drawing were as vital as they were in the physicality of making sculpture. As noted in Chapter One, Nicolaides, Smith's drawing teacher at the Art Students League, also stressed the importance of kinaesthetic understanding in what he termed the "gesture drawing" (long before the Harold Rosenberg had discussed action in the work of the Abstract Expressionist painters). Nicolaides stated that "the forms are in the act of changing. Gesture is

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<sup>140</sup> For example, Jim Coddington, 'No Chaos Damn it', ed. Kirk Varnadoe and Pepe Karmel, Jackson Pollock: New Approaches (New York: Museum of Modern Art, 1999) 101-117 and Shiff, 2004: 3.

<sup>141</sup> Richard Shiff, 'Constructing Physicality', Art Journal, vol.50, no.1, Spring, 1991: 44.

<sup>142</sup> Shiff, 1991:43.

<sup>143</sup> David Smith, 'Memories to Myself', Speech, 5 May, 1960, in McCoy, 1973: 149.

movement in space. To be able to see gesture, you must be able to feel it in your own body.”<sup>144</sup>

Furthermore, it is clear that kinaesthetic aspects of Chinese and Japanese brush painting were also attractive to Smith, yet what he took from his reading was not an appreciation of the formal attributes of the painting, but the elements of its technique. In a series of translated texts on painting that he owned, he discovered that some treatise demanded physicality from the brushstroke. Smith recalled his reading of the treatises in a lecture stressing that for the brushstroke to contain power, that it should begin outside the paper continue through the drawing space, and project beyond, so that “the included part possesses both the power of origin and projection.”<sup>145</sup> There is a kinaesthetic awareness in this type of Japanese painting. The treatise also suggested that in representing an object with hardness or strength in the real world, the painter must invoke a similar sentiment of strength in painting it. The stroke that could be physically felt through the artist’s system could then be transmitted into the brushstroke. There is a kinaesthetic response in this understanding that relates to Merleau-Ponty’s phenomenological view, noted above. Smith’s physicality, so much a part of his sculpture process wielding and welding heavy steel and iron into drawings in space, could therefore also be transmuted into his drawings.

As noted in Chapter One, the physical act of drawing seems to be an important part of the sculptor’s process. The sculptor, Barbara Hepworth also makes a link between drawing and physicality. She stated in 1966, “I rarely draw what I see – I draw what I feel in my body. Sculpture is a three-dimensional projection of primitive feeling”<sup>146</sup> Hepworth’s use of medium in drawing similarly relates to her sculpture. She used a heavy oil paint base, which she scraped, rubbed and gouged with pencil lines. In process, this is similar to Henry Moore’s frequent use of the wax resist process in drawing; both are techniques that recall carving in stone. Both techniques resonate with physicality and stress the relationship between drawing (as a verb) and sculpture-making.

Given this sculptural attitude to drawing, it is particularly interesting that in the 1950s, Smith made extensive use of tactile media not in painting - a medium in which he had

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<sup>144</sup> Nicolaidis, 1941: 14-16.

<sup>145</sup> David Smith, “The New Sculpture”, McCoy, 1973: 83.

<sup>146</sup> Barbara Hepworth, ‘A Sculptor’s Landscape’, Barbara Hepworth: Drawings from a Sculptor’s Landscape (London:Coy Adams and MacKay, 1966) 11.

been encouraged to experiment with texture - but in drawing, a medium traditionally associated with flatness.<sup>147</sup> Furthermore, the media he used in his drawings are media traditionally associated with flatness, subsequently manipulated into three dimensions, perhaps, as Smith suggested, “a drawing pulled up from the page”.<sup>148</sup>

Enamel paint in particular is associated with flat uniformly smooth surfaces on metal or wood. However, in utilising the aerosol spray can, Smith discovered (long before the graffiti artist did) that the aerosol’s valve could be made to stutter and create blotches of paint in addition to a fine mist. These are the equivalent of textural interruptions in the visual field in other drawings. They catch the eye in a similar manner, and are intended to impart reflection and texture to the works. Similarly, the ghost images that were left after the application of the spray paint function to remind the viewer of the physical presence of the object. One can feel the heaviness of the hard-edged steel objects placed on the paper, and the lighter, dithered properties of the paper stencils. This assists our perception of these forms being the remnants of real objects that exist in space. That Smith included actual textural material in one sprayed work certainly suggests that this dialogue between real and imagined physicalities was something he was concerned with. Both aspects of the sprayed work demonstrate Smith’s intention to bring three-dimensionality into two dimensional space.

Similarly, the viscosity of the egg-ink medium enabled Smith to communicate his presence in drawing as much as in painting. In sculpture, the heaviness of the steel, the incongruity of it being suspended almost weightless in space, and particularly its polishing, painting and grinding allow us to appreciate the actual process of its creation; it brings us into contact with what F. D. Martin has called “the palpating tangibility of our witness of things.”<sup>149</sup> Smith stated in 1952, “My student period was only involved with painting. The painting developed into raised levels from the canvas. Gradually the canvas became the base, and the painting was a sculpture. I have never recognised any separation

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<sup>147</sup> Although Smith’s oil paintings from the period are often painted in a thick impasto on Masonite, for example, Untitled, 1957 (75.57.051) or Untitled, 1956 (75.56.010), none of the works examined exhibited the textural additions identified in the drawings.

<sup>148</sup> Smith, quoted in Krauss, 1977: 59-60.

<sup>149</sup> F. David Martin, Sculpture and Enlivened Space: Aesthetics and History (Lexington: University of Kentucky Press, 1981) 78-79.

except one element of dimension.”<sup>150</sup> In 1953 he stated that he found it “impossible to conceive two dimensions.”<sup>151</sup> It is clear that an obsession with an ambiguous three dimensionality in drawing continued throughout his career, beginning in the experimental 1930s but particularly relevant as his work in both disciplines began to converge in the 1950s.

Far more explicit in this discussion of texture and tactility in Smith’s work are the many textural additions that he made to his drawing media. The exact identification of actual textural material added to Smith’s drawings of the 1950s and 1960s has not been discussed in the literature to date, and this research represents the first work to be carried out in the area. Smith added materials to his ink media throughout the 1950s and in the early 1960s, and often these additions are almost impossible to discern. The only mention of deliberate textural additions to Smith’s drawings in the literature is in a letter by Dorothy Dehner who alluded to their existence in 1967:

His ‘beer and egg’ period was after I left, but he told me about it when I visited the farm in 1958. The egg gave gloss and body to the ink. I don’t know what the beer did. I have a drawing of his (about 1957-58) that obviously had some foreign substance mixed within the ink. The ink is already coming away from the paper.<sup>152</sup>

Often these foreign substances took the form of dry pigment or metal particles. Contamination from the sculpture studio provides a plausible explanation for the presence of metal particles in the drawing ink, and the idea of appropriating studio accident into one’s work is seen in several paintings by Pollock. Carol Mancusi-Ungaro for example, has noted that vertical drips observed in Pollock’s One: Number 31 (1950, Museum of Modern Art, New York) were incongruous with his technique of painting on the floor. She posits that these drips may have been the result of accidental splashes from another

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<sup>150</sup> McCoy, 1973: 82.

<sup>151</sup> AAA, NDSmith, R4, F490.

<sup>152</sup> Dorothy Dehner, letter to Margaret T. Haggarty, 1967, AAA, Dorothy Dehner Papers, R796, F796. Although it has not been identified by the author, it is possible that Smith did mix beer into his inks. There are several examples of inks that have unusual and unidentified admixtures, and further analytical work is required in this area. Haggarty also makes reference to the fact that Smith mixed stale beer into his ink. However, she likely obtained the information from her communications with Dehner in 1967. Haggarty, 1968: 73.

painting, Autumn Rhythm (1950, Metropolitan Museum of Art, New York), which Pollock painted on the floor while One hung drying on the wall.<sup>153</sup> However, Smith's drawing studio was in a separate location some distance from his sculpture studio, which was placed at the entrance to his property close to the road so that the large deliveries of steel and heavy machinery could be facilitated. Furthermore, in notes for Elaine de Kooning's Art News article in 1951, Smith described his typical daily schedule in which he worked on sculpture until ten o'clock in the evening, then cleaned up his studio, went back to the house, had a bath, and then made drawings until two in the morning.<sup>154</sup> Contamination of steel dust from one studio to the other and in such quantity would therefore be unlikely. Furthermore, in the study carried out by the author, it is clear that the metal particles and red and blue pigments were added only to certain media, and are often present in one work of a series and not the others.<sup>155</sup>

It can be presumed therefore that the metal particles were mixed directly into the ink intentionally by Smith himself, likely to impart reflective qualities to the ink. Smith was clearly interested in surface and depth characteristics in his sculpture; he was also interested in qualities of heaviness and lightness in his often gravity-defying works, making full use of the strength of welding to hold up almost impossible structures in metal. It is possible that the metal particles, and indeed the glass beads mentioned above, provided the correct balance of surface and depth that Smith desired for certain drawings to nuance the heaviness of the black ink and to provide a certain reflectance that referred directly to metal working.

Although the Cubis were begun in the late 1950s, Smith made use of reflection in his sculpture much earlier. In 1950, he had used silver for elements of The Cathedral, and also in Timeless Clock and additional stainless steel elements left unpainted in Star Cage (1950). Describing Smith's sculptures, Elizabeth McCausland observed that, "by their use of metallic colour, they create an esthetic tension between the hard non-human material

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<sup>153</sup> Carol Mancusi-Ungaro, 'Material and Immaterial Surface: The Paintings of Rothko', Mark Rothko, National Gallery of Art, ed. Jeffrey Weiss, (New Haven: Yale University Press, 1998) 287.

<sup>154</sup> 'Notes for David Smith Makes a Sculpture', McCoy, 1973: 75-76.

<sup>155</sup> For example, Untitled, 1956 (1974.144, Harvard Art Museum) contains red and blue dry pigment and metal particles, whereas Untitled C-4-1956 (73.56.56), a work in the same series painted contains no particulate additions.

steel and the sensuous relief of the rusts, roses, silvers, dark grays and blacks.”<sup>156</sup>

Furthermore, reflectance might also relate to suggestions of the tactile. Robert Motherwell, discussing the grinder marks on the surface of Smith’s Cubis observed in 1982: “I think that the reflective thing is also connected with the desire to have a touch on the surface. You know after all, painters were admired for their touch.”<sup>157</sup>

The properties of silver as a material were also interesting to Smith. He had made his first silver sculpture in 1953 and had written about it as early as 1939:

Silver – its power to reflect light for ordinary wavelengths exceeds that of practically all other metals – quite stable, is not oxidised on exposure to air, but readily tarnished by hydrogen sulphide in industrial atmospheres... can be protected by lacquer outside or stand easily in an air-conditioned building.<sup>158</sup>

Smith’s apparent regard for silver, and his interest in its reflective qualities may have informed its use in sculptures like The Cathedral (1950) where it was used for aesthetic effect highlighting the welds in the work. It is, however, an unusual metal to add to steel, and Smith described its presence in the sculpture as a “sly humour.”<sup>159</sup>

Although not frequently encountered, red and blue dry pigment added to Smith’s drawing ink is also found throughout the 1950s. It is present as early as 1952 and as late as 1960. Red and blue pigments are found added together with metal particles in several works, for example, Untitled, 1952, 73.52.15, but also on their own, for example, Untitled, 1960, 73.60.183. The inclusions, unlike the metallic particles, are often almost impossible to see with the eye and typically require microscopic magnification to be viewed.

The reason for the additions is not immediately obvious. Black ink has traditionally been tempered with blues and reds so as to warm or cool the tone. However, in Smith’s case, the pigments are not homogeneously mixed into the ink, and do not impart significant tonal shift to the black ink. They are present rather as physical textural matter.

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<sup>156</sup> Elizabeth McCausland, ‘David Smith’s Abstract Sculptures in Metal’, Springfield Sunday Union and Republican, Mar. 31, 1940, 6.

<sup>157</sup> Robert Motherwell, transcript of interview for David Smith: Steel into Sculpture, VHS, dir. Jay Freund, Cort Productions, 1982, The Dedalus Foundation.

<sup>158</sup> Sketchbook 6C, 1939, David Smith Estate.

<sup>159</sup> de Kooning, 1951. As discussed earlier, much of the detail has been lost since the sculpture was painted.



The answer may be found perhaps in the expression of Smith's private symbolism. When Thomas Hess observed that much of Smith's work was invested with private meaning in a 1964 interview, Smith replied that he deliberately looked for private meanings in all art, and suggested that his work could be conceived so as to invite both distanced and intimate perception.<sup>160</sup> The choice of red and blue specifically is interesting, and they are colours that consistently appear in his sculptural work. Even in the most graphical of Smith's works, intimate details may be found that correspond to this view. For example, it is only on close examination of Australia, (1951), that one discovers that it is coated with a fine spray of red and blue paint. This is not randomly applied, but added carefully, accentuating areas of form, and rarely noticed, except when the work is examined closely. They appear on the back of elements the sculpture, thereby challenging the conservative frontal viewpoint associated with much Smith's work. The painted surface of Australia is in fact mentioned only once in the literature, by William Rubin, where he mistakes the red and blue droplets for purple:

In this instance, Smith sprayed some exceedingly fine purple droplets into the brown, perhaps to further enhance a flickering metal illusion. As he mentioned to this author, it was often necessary to paint all or part of such pieces in order to visually unify them, more specifically to obliterate eye-popping patches or residues left by the grinding or welding.<sup>161</sup>

This subtle enhancement and animation of the surface of sculpture with paint seems to have been echoed in several ways in Smith's drawing. Perhaps this "flickering metal illusion" was repeated by Smith in drawings which he felt required subtle adjustments. These red and blue pigment additions to his drawing ink may have simply served the same function as the similar red and blue paint spots in Australia, to heighten and extend relationships and unities within the work.

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<sup>160</sup> Thomas B. Hess, Interview with David Smith, June 1964, McCoy, 1973: 180.

<sup>161</sup> William Rubin, Essay in Painted Steel: The Late Work of David Smith (New York: Gagosian Gallery, 1998) 10.

An association worth exploring is the relationship of the earth red pigments added by Smith, and the surfaces of steel and iron sculptures.<sup>162</sup> Red pigment particles appear in more examples of drawings than blue pigment alone or both pigments together. The pigment is, like the metal particles or glass beads discussed above, rarely visible to the eye. However an exception is Untitled (1960, 73.60.163) where Smith has added a substantial quantity of red pigment to his black ink (Figures 42 and 43).<sup>163</sup> This provides an almost chalk-like quality to the medium which smudges readily.

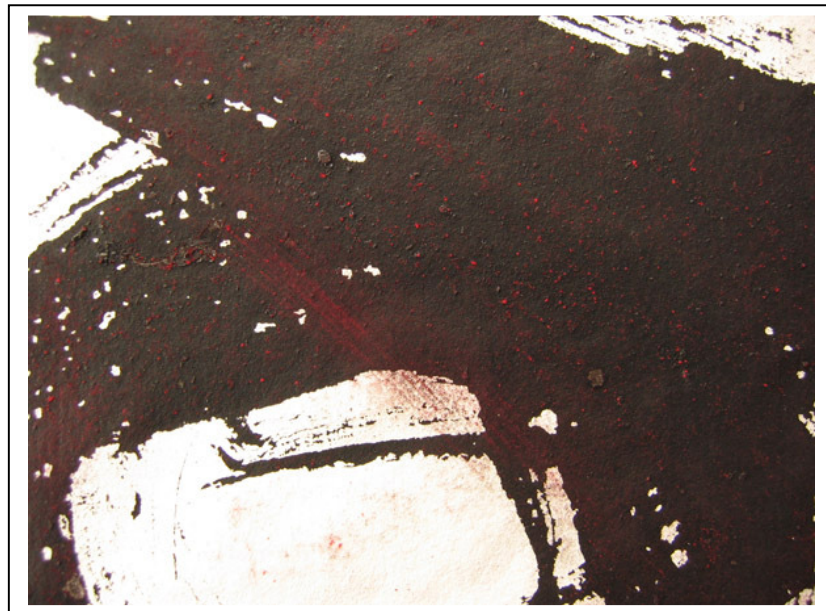
Smith appears to have had a particular interest in red pigments, and in particular, the iron oxide earth reds. He mounted several pigments on microscope slides in 1934 to study their aging properties. Of the fourteen slides, nine are (iron oxide) earth pigments. The fact that the majority of these pigments were iron oxide, and that of these, seven are red/brown pigments strongly points to a link between the pigments added to the egg-ink in the drawings and Smith's interest in the properties of iron and steel. At least one sample of red pigment analysed by the author was identified as an iron oxide red, such as Untitled, (1956, Harvard Art Museum), while iron was identified in particulate additions for several others.

Smith held steel in great regard for its tensile strength and its ability to be worked and coloured. The metaphorical associations of rust, which is of course a form of iron oxide, were powerful to him, and he made use of it often in his sculpture. Much of his sculpture in the 1930s and 1940s included found objects in iron or steel - often detritus from industry and manufacture - including his first welded sculptures. He understood that rust could be an aesthetic tool, to colour and highlight form, not simply an unwanted degradation product. In fact, such was his association with rust that it added to the complex arguments over alterations to the surfaces of some of his later painted sculptures discussed in Chapter Four. Overall, however, he clearly had a strong feeling for iron oxide as a finish for his sculpture. Highlighting the versatility of steel as a medium, he wrote that one of the freedoms of working in steel was that there were no preconceived aesthetic traditions for it as there were, for example, with marble or bronze. Steel could act as a base for metal deposition, paint, or its own natural oxide, the molecule of which, as

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<sup>162</sup> Smith used both steel and cast iron in his welded sculpture. Steel may be termed as any number of alloys of iron containing carbon (typically 0.1-1.7%) and small quantities of other elements including chromium, nickel, manganese and phosphorous.

<sup>163</sup> DS111, Appendix C.



**FIG. 42:** David Smith, Untitled, 1960

**FIG. 43:** David Smith, Untitled, 1960. Detail showing added red pigment.

Smith understood it, “is only one oxygen atom less than the artistic range of iron oxides.”<sup>164</sup>

Figuratively rust is the factor that illustrates death, decay and the passage of time, and the inclusion of red paint in sculpture and red pigment in his ink may obliquely refer to these metaphorical details, discussed several times in his writing. For example Smith stated in 1964: “The red of rust has a higher value to me than its antiquity relationship. It is the metal of terra rasa, ochre, Indian red, the Mars group etc. It is the order of time – natural destruction, oxidation.”<sup>165</sup> Joan Pachner acknowledges that the use of rusted steel and iron elements in Smith’s sculpture allude to both past use and regeneration.<sup>166</sup> In a similar way, the landscape artist, Robert Smithson suggested that rust evoked our fear of disuse, inactivity, entropy and ruin, yet he understood, as Smith did, that there was no reason that rust should not be as appreciated for its aesthetic qualities as steel. He posited,

Why steel is valued over rust is a technological value, not an artistic one  
... Steel is a hard tough metal, suggesting the permanence of  
technological values ... yet the more I think about steel itself, devoid of  
technological refinements, the more rust becomes the fundamental  
property of steel.<sup>167</sup>

Smith often discussed rust in his sculptural work. There are hints that red paint in drawings related to rust in sculpture in some of Smith’s writing. In a letter of 1950, Smith wrote:

The preliminary working drawing was made in red paint and included  
six small sketches with a more or less final one in pen and ink. The  
drawing has notes relating to my procedure and to the final finish which

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<sup>164</sup> Smith, 1951, McCoy, 1973:73.

<sup>165</sup> Gray, 1988: 46. Although *terra rasa* may suggest its literal meaning of ‘essential earth’, it is more likely, given the context, that Smith meant *terra rosa* here, and that *rasa* is a mistake in the original text or in the transcript. Terra rosa is a red clay formed by weathering of limestone. Where it lies above the water table, oxidation of iron oxides occurs in the clay resulting in the red-orange earth characteristic of for example, regions in Spain and Australia.

<sup>166</sup> Joan Pachner, ‘David Smith: The Formative Years’, *Arts*, vol.56, June, 1982, 61.

<sup>167</sup> Robert Smithson, ‘A Sedimentation of the Mind’ *Artforum*, September, 1968, rep. *The Writings of Robert Smithson*, ed. Nancy Holt (New York: New York University Press, 1979) 82-91.

I had eventually intended after the piece rusted, and carried the notation.... 'red rust and grease'<sup>168</sup>

Furthermore, in a list of works for a catalogue of an intended retrospective at the Willard Gallery in 1951, Smith listed several sculptures as “steel and red oxide”, “steel and yellow rust”, “Steel and red rust” and “steel and encaustic” indicating the importance of highlighting rust as part of the sculpture’s form.<sup>169</sup> In relation to the sculpture, Agricola IV (1952), he stated in 1956, “I like the color of rust, and make much of my work for that finish.”<sup>170</sup> Smith also spoke of the material significance of the addition of minute quantities of gold to rusted sculpture, a metaphorically precious substance in an otherwise decaying material: “Every once in a while, when I make a big rusty iron thing, I bore a little hole in it and add some gold, just for the hell of it. I don’t think anybody sees it. That tickles me a little.”<sup>171</sup> These ideas of hidden meanings, temporality and dread were articulated by Smith in 1964, where he also noted the strong sense of memory that rust can instil in the viewer.<sup>172</sup>

That rust evoked memory recalls Smith’s interest in eidetic memory, which, as Smith saw it was the primary function of creating shape in primitive art, and therefore in his own work. He believed memory was key to drawing, and that to draw was “to liberate the act of drawing to the vision of memory”.<sup>173</sup> The principle of eidetic memory in the perception of his works is similar to suggestions made by Kilpatrick in 1951, that perception of objects include past experience as well as immediate mental and physical responses, and further that this perception is entirely different from one person to the next.<sup>174</sup> Furthermore, the psychologist, Richard Gregory, has recently demonstrated that our perception of objects is much more concerned with stored knowledge than visual

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<sup>168</sup> David Smith, letter to Mr. Slusser, c. Spring, 1950, David Smith Estate, Box 2, Correspondence 1950.

<sup>169</sup> David Smith, letter and statement to Willard Gallery, 1951, AAA, Marian Willard Papers, Correspondence File on David Smith, R 986, F801.

<sup>170</sup> David Smith, letter to Mr. Harry Lackritz, Chicago, 4 July, 1956, David Smith Estate, Box 3, Correspondence, 1956.

<sup>171</sup> McCoy, 1973: 180.

<sup>172</sup> David Smith, Interview with Thomas B. Hess, McCoy, 1973: 176.

<sup>173</sup> David Smith, ‘Drawing’, in McCoy, 1973: 119.

<sup>174</sup> This was largely in opposition to the prevailing and somewhat outdated Gestalt theory applied to painting in the 1970s, which claimed perception was informed by the holistic image rather than specific details. See for example, F.P. Kilpatrick, ‘Experiments in Perception’, Scientific American, vol.185, August, 1951, 52.

information.<sup>175</sup> Indeed he postulates that perception may be 90% memory and only 10% from retinal information.

Smith spoke often about the necessity of the viewer completing the work, and the importance of memory information in perception, stating that “perception through vision is a highly accelerated response...the mind records everything the senses experience”.<sup>176</sup> With this in mind, it is possible to address tactility in Smith’s work. Our perception of Smith’s drawings on paper is informed by our past experience and understanding of how ink and paint interacts with paper. Our understanding of the textural surface of quality paper allows us to trace the greasiness of the egg-ink across its surface, the kinaesthetic sense of the viscosity of the medium.

The addition of red and blue pigment and steel particles to adjust the perception of Smith’s drawings is certainly connected with ideas of reflectance and texture, but it may also reflect a desire for the hidden in his work. Whether or not Smith used these additions to specifically allude to aspects of his sculpture or whether they were simply quotidian studio materials that fell readily to hand may never be known. However, they were certainly a conscious part of his process, and performed an aesthetic function. Use of thick viscous ink and adulterating this with other materials to heighten the three dimensional in his drawing relates specifically to the unifying aspects of paint in Smith’s sculpture and the promotion of new associations that were available to both.

Why this is important in understanding Smith’s ideology and approach to making art is in the importance of eidetic memory in the perception of textural aspects of an apparently graphic or flat form. His drawings might be considered eidetic after images of his sculpture, and the subtleties in the drawings work in a similar manner to those of his sculpture. Nuances of texture, reflectance or colour in his drawing and painting media immediately allow us to perceive the work as something other than flat. The brushstroke in this case, or the textural additions made to many drawings provide the perceptual memory of touch in a medium (drawing) that is traditionally linear and two dimensional.

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<sup>175</sup> Richard Gregory, ‘Brainy Mind’, *British Medical Journal* 317, 1998: 1693-5.

<sup>176</sup> David Smith, ‘The Language is Image’, in McCoy, 1973: 80.

It is clear that David Smith was considerably more experimental in the materials he used for his works on paper than in painting, and that this provides evidence for the close relationship between drawing and sculpture. Furthermore, as I have demonstrated, many of Smith's materials and techniques in drawing reflect and resonate with similar concerns in his sculpture. It is clear that Smith utilised virtually every form of paint available to him as both artist and the industrial worker. Although the egg-ink drawings and spray stencils represent the majority of his work, as discussed above, he also worked in PVA, acrylic emulsion, acrylic solution (magna), alkyd and nitrocellulose enamels, and casein temperas. His choice of paints came from both artistic use, and from industrial sources. These paints were chosen for their quick drying, their ability to produce effects and their durability.

Smith's deliberate adulteration of his medium with textural material appears to correspond with perceptual notions concerned with both tactile and kinaesthetic sensations. These adulterations were specifically intended to impart qualities to his drawings that were observed in sculpture, such as texture and reflectance. As I have discussed, Smith's regard for and attention to the materials that he used in both drawing and sculpture demonstrates that he created works that were in part guided by, and in part created in response to those materials. In the sense that these relationships in drawing were extended in three dimensions, Smith's work is unlike any other artist of his generation.

Tactile qualities in both drawing and sculpture are important in the understanding of Smith's work. That they appear to have come from his origins as a painter reflects all the more strongly the relationship between drawing and sculpture. Understanding Smith's origins also provides an understanding of why he adopted tempera and industrial synthetic paints in the 1950s. The materials that Smith used in both sculpture and drawing have a commonality in their durability. The use of texture and egg tempera in his work reflects his early experiences as a painter. It is worthwhile, therefore, to explore further why Smith chose to use tempera medium in his drawings, and how his early experiences in the 1930s influenced his later adoption of materials that reflected his origins.

### **CHAPTER 3: TEMPERA, AND THE APPROPRIATION OF AN INDUSTRIAL STUDIO IDEOLOGY**

I have argued in the previous chapters that Smith's use of egg-ink, commercial tempera paints and synthetic media in his drawings were chosen largely for their expressive properties and the exigencies of his technique. This necessitated a fast-drying medium, and an ability to provide a variety of texture and lustre that could replicate many of the qualities of oil paint, but that could be used without concern for the deterioration of the paper. I have also posited that aspects of Smith's technique in these drawings illustrate that he felt a particularly affinity with his materials and that in several cases, his drawings reflect in their materiality and texture, aspects of the creation of sculpture. However, as I will demonstrate below, Smith's decision to use egg-ink tempera was also based upon its durability in accordance with the extensive experimentation and testing he carried out on the medium in the 1930s. Furthermore, it is possible to view Smith's use of tempera in the context of his development of an industrial studio practice, crucial to his achievements as an artist. Appropriating the methods and materials of the factory not only allowed Smith to produce work at an increasingly rapid rate, but also demanded that he use materials that were durable and of high quality. The fact that he did so in both sculpture and drawing demonstrates the strong association he felt between the two disciplines.

David Smith stated in 1951 that his decision to name his studio after the Terminal Iron Ironworks, the Brooklyn Factory where he worked in the early 1930s, reflected his beginnings as a sculptor.<sup>1</sup> It is interesting therefore that he returned to using tempera in 1952, a medium that he had investigated extensively in the early 1930s. Smith's experience working as Technical Director of Mural Painting at the Public Works Art Project, in combination with his political engagement with leftist politics as a member of the Artists Union in the early 1930s engaged his interest in the methods and materials of industry. This environment also stressed pride in using quality and durable materials. The application of industrial standards in metal working and the intimate relationship between drawing and sculpture inevitably had a reciprocal application for the materials and

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<sup>1</sup> David Smith, 'Notes for David Smith Makes a Sculpture', 1951, McCoy: 1973:73-77.



methods Smith used in drawing. This occurred at the same time as a renewed interest in artists' materials in the United States, and the publication of several important books on the subject. In this way Smith was able to apply standards to his drawing and painting materials by engaging with the rediscovered techniques of the Old Master painters first articulated in Max Doerner's The Materials and Techniques of the Artist (published in English in 1934) and subsequently in other works by American writers. David Smith's papers reveal that he studied casein tempera extensively as a media for mural painting during his time at the WPA. He wrote to the Casein Manufacturing Company of America on several occasions requesting information on the permanency of casein emulsions for the purposes of mural painting.<sup>2</sup> He paid particular attention to details regarding the type and permanency of the paint to be used, and the recommended permanent pigment palette, and his notebooks contain extensive notes on these formulations. Although often cited in the literature on Smith, the technical work that Smith carried out during this period has not been fully documented, and this research represents the first attempt to address it.<sup>3</sup>

In this Chapter, I will discuss the rediscovery of tempera in the United States, which was a part of the general interest in Old Master painting techniques among American artists in the 1930s. I will elaborate on the meaning of tempera, (an arbitrary term often used erroneously), and its properties, and discuss how Smith's use of tempera and industrial paints relates to his adoption of a new industrial practice that occurred at the same time, and how these aspects were deeply ingrained in Smith's sense of artistic identity. Before embarking on a discussion of Smith's studio practice, it is necessary to elaborate on egg and casein temperas, their meaning, manufacture and use by artists.

### **3.1: The Composition of Egg and Casein Temperas**

Hilaire Hiler writing in 1934 perhaps provides the most useful definition of tempera as being "any sort of paint which contains oil in an emulsion mixable with water."<sup>4</sup> Although tempera is generally considered to be a mixture of egg-yolk, water and pigment, it can refer to any mixture of pigment, oelific medium and water that may or may not contain

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<sup>2</sup> Letters to David Smith from H.V Dunham of the Casein Manufacturing Company of America, inc. Bainbridge NY, 29 Sept. 1934 and 8 Apr. 1935, David Smith Estate, Box 1, Correspondence 1928-33.

<sup>3</sup> It is mentioned only briefly in most of the published chronologies of Smith's career. For example, those compiled by Anna Brook (Wilkin, 1984: 117), and Sarah Kianovsky (Gimenez, ed. 2006: 394).

<sup>4</sup> Hilaire Hiler, Notes on the Techniques of Painting (London: Faber and Faber, 1934) 170.

egg.<sup>5</sup> Although often described as an emulsion, egg-yolk is in reality a much more complex and heterogeneous substance.<sup>6</sup> It is a mixture of hydrophilic proteins and hydrophobic lipids components, which are not so separated as to be described as a true emulsion. The major components of the yolk are lipids, encountered as tricylglycerides, phospholipids, cholesterol and cholesterol lipids. Almost all of these lipid components are complexed with proteins. The dominant fatty acids in these lipids are palmitic acid (16:0), Stearic acid (18:0), Oleic acid (18:1) and linoleic acid (18:2). Almost 50% of all fatty acids in egg-yolk contain potentially reactive double bonds.<sup>7</sup> Egg-yolk dries by evaporation of the water component. As the water evaporates, the proteins denature (become hard and insoluble) and begin to form cross linkages. The fatty acids in egg-yolk survive without much change, and contribute to the plasticization of the paint. Providing the pigment to binder ratio is correct, the paint film can be very tough. Traditional egg tempera cannot in general be thickly painted, as when the water evaporates the paint loses much of its bulk, shrinking and subsequently flaking and cracking. It is also difficult for tempera to be blended while wet as it would simply not adhere to the under paint. Similarly, its fast drying properties mean that painting is typically carried out in thin flat strokes observed in the stippling or hatching technique used by early panel painters.<sup>8</sup>

Casein is manufactured from washed or acidified milk curds (solids) after removal of the whey. These curds form a colloidal suspension in an alkaline solution such as ammonium hydroxide or slaked lime solution, which can be used as a strong glue or painting medium. The early history of casein as a painting material is difficult to determine.<sup>9</sup> Gettens and Stout state that it is mentioned in ancient Hebrew documents, and was probably used in ancient Egypt, China, Greece and Rome, and certainly used as a joining glue for

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<sup>5</sup> Cennino Cennini, *Il Libro dell' Arte*, trans. Daniel V. Thompson (New York: Dover, 1933).

<sup>6</sup> Gettens and Stout describe egg-yolk as “an oily emulsion in which the oil particles are suspended in a solution of albumen. Lecithin ... acts as an emulsifying agent.” Gettens and Stout, 1966: 20.

<sup>7</sup> Alan Phenix, ‘The Composition and Chemistry of Eggs and Egg Tempera’, *Early Italian Paintings: Techniques and Analysis*, Symposium, 9-10 Oct. 1996 (Maastricht: Limbourg Conservation Institute, 1996) 12.

<sup>8</sup> See: David Bomford, ed. *Art in the Making: Italian Painting Before 1400*, (London: National Gallery Company Ltd, 2002).

<sup>9</sup> John S. Mills and Raymond White, *The Organic Chemistry of Museum Objects* (London: Butterworth-Heinemann, 1987) 88.

cabinetmaking in the middle ages.<sup>10</sup> Cennino Cennini discusses a glue made from cheese and lime in the fifteenth century, but does not mention this as a painting medium.<sup>11</sup> However, his Bianco di San Giovanni is likely to have been a casein based-tempera. It is possible that Lime Casein was used in the twelfth century as a decorative paint on the ceiling of the Benedictine Monastic Church of St. Michael at Hildesheim in Germany.<sup>12</sup> E.W. Tristram notes that the method of English monastic wall painting from the twelfth to the fourteenth-centuries was to use a casein paint made using pigment, slaked lime and milk, following the method of Theophilus.<sup>13</sup> However, after this, there are scant references to it until the late nineteenth century, when casein paints were introduced commercially to the United States. They became a popular medium for interior and exterior house paints due to their hardness, durability and fast drying. The popularity of casein likely stemmed from the publication of French recipes brought to America in the nineteenth century. Morgan Phillips has identified formulations developed in France in the late eighteenth-century, published in England and then brought to America in the nineteenth century, that were used in architectural paint and furniture.<sup>14</sup> The ability of casein to be buffed to a sheen or waxed made it a popular choice for wooden artifacts and furniture, and it was used in the mid-nineteenth century in Shaker Furniture.<sup>15</sup> Virtually no detailed study of casein paints exists, and there has been almost no study of its use by artists in the twentieth century.<sup>16</sup> This is important in the discussion of works by Smith and the

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<sup>10</sup> Gettens and Stout, 1966: 8.

<sup>11</sup> Cennini, 1933: 68.

<sup>12</sup> Edgar Denninger, 'The Examination of pigments and Media from the Painted wooden Ceiling of St. Michael's Church at Hildesheim, West Germany', Studies in Conservation 14, 1969, 92. Samples taken from the ceiling painting indicated that the white paint was a carbonised slaked lime mixed with casein tempera, creating an insoluble lime casein. (Cennini refers to this as Bianco di San Giovanni). The original painting was carried out in lime casein tempera with a small proportion of oil. The identification of casein in this case was by confirmation of significant amounts of phosphorus. Phosphorus is also found in much lower proportions in egg-yolk however, so it not impossible that egg-yolk was used in this case.

<sup>13</sup> E.W. Tristram, 'The English Method of Wall Painting', Papers of The Society of Mural Decorators & Painters in Tempera, ed. John D. Batten, vol.2, 1907-1924 (London: Dolphin Press, 1925) 65-66.

<sup>14</sup> Morgan W. Phillips, 'A Survey of Paint Technology: The Composition and Properties of Paints', Paint in America: The Colors of Historic Buildings, ed. Roger W. Moss (Washington D.C: National Trust for Historic Preservation, 1994) 253.

<sup>15</sup> 'Paints and Their History', Western Morning News, Jan. 2002. 25 Aug. 2008.  
<<http://www.mikewye.co.uk/PaintsArticle.pdf>>

<sup>16</sup> Phillips notes that "the history of milk and casein paints as applied not only to architecture but also to furniture and other objects is a subject that deserves much more attention by historians and paint analysts." Phillips, 1994: 253.

development of tempera painting in America in the 1930s. Smith used casein widely, and it is found in his drawings either mixed directly into ink as a thickening agent, or as tube casein paints used in combination with his egg-ink. The following sections will elaborate on both casein and egg temperas used as artistic media.

### **3.2: David Smith and the Revival of Tempera painting in America**

Although several authors have written specifically on the tempera revival, and the various formulations and recipes used by artists in the 1930s and 1940s, there is little written on use of tempera by post-war artists.<sup>17</sup> Although its use declined after the 1950s, several artists, including David Smith, made use of the medium throughout the 1950s and 1960s. As discussed, David Smith reinvented traditional egg tempera by mixing both egg-yolk and casein with drawing ink to create a medium that would both respond to his concept and prompt new associations.

There were two distinct reasons behind the American rediscovery of traditional techniques during this time. Firstly there was a distinct resurgence of interest in the ‘lost’ techniques of the Old Masters by artists, and secondly there was an concurrent interest in the durability and preservation of Old Master paintings. This occurred at the same time as artists became increasingly politicised under the various artist unions, and the government art projects, which fostered identification with sound craft knowledge, quality materials, dialogue with manufacturers, and experimentation. This practicality, together with an interest in the fast-drying and vibrant quality of tempera paints made the medium attractive to painters who were, until this point, working largely in tube oil paints, many of which were deemed by the 1930s to be of inferior quality.<sup>18</sup>

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<sup>17</sup> The most comprehensive survey of the American Tempera Revival from 1930-1950 is provided by two essays: Richard J. Boyle, ‘The American Tempera Revival in Context’, and a technical history of tempera paints: Hilton Brown, ‘On the Technical Side’, Milk and Eggs: The American Revival of Tempera Painting (Seattle: Washington University Press, 2002). Mayer and Myers have also carried out extensive research in the early use of tempera by American artists: Lance Mayer and Gay Myers, ‘Old Master Recipes in the 1920s, 1930s and 1940s: Curry, Marsh, Doerner and Maroger’, Journal of the American Institute for Conservation, vol. 41, no.1, Spring, 2002.

<sup>18</sup> The paint chemist Maximilian Toch noted in 1911 that many commercial tube oils available in America at the time were of inferior quality and permanence. (Toch, 1911, 5-6). Certainly Smith also thought as much after conscientious experimentation with tube oils in the 1930s. As discussed in Chapter 2 (p71), he noted his concerns to his friend and fellow painter, Edgar Levy. See: Smith, Letter to Edgar Levy, nd. AAA, NDSmith R1, Edgar Levy and Lucille Corcos correspondence, F33.

The practice of painting in egg tempera was virtually unknown in America and Britain until Mary Merrifield's translation of Cennino Cennini's Il Libro dell' Arte in 1844. While the English painter William Blake certainly used a form of tempera as early as 1799, his medium was based on gum and glue, and although Blake possessed an Italian copy of Cennini, there is no evidence that he used egg tempera.<sup>19</sup> Despite the availability of egg tempera recipes from Cennini in translation after 1844, the essence of the medieval technique itself was considered to be lost. Indeed, in 1901, The Society of Painters in Tempera was formed specifically to discuss the practical aspects of tempera painting and to promote its revival, producing a number of occasional papers, which were also published in America. Society founder Christiana Herringham's superior translation of Cennini in 1899 also brought considerable attention to the rediscovery of tempera painting. However, much was left to be clarified, and the medieval point of view, as was noted by artists at the time, was difficult to translate into modern practice.<sup>20</sup>

Max Doerner's book, The Materials of the Artist and their Use in Painting, published in German in 1921 and in English translation in 1934, was well received by American artists and immediately prompted experimentation with Old Master techniques.<sup>21</sup> By the 1920s, Thomas Hart Benton had taught himself how to paint with egg tempera. He was followed by Reginald Marsh and by John Sloan, who was David Smith's painting teacher at the Art Students League in the late 1920s. It is likely that, under Sloan, Smith was introduced to both egg and casein tempera.

According to one contemporary artist, the tempera technique lent itself to "close-packed composition, not spatial, small, well-defined masses of clear, and precise colour, or large

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<sup>19</sup> Ormsby et al. confirmed that the tempera medium used by Blake during the period 1799-1826 was based on a mixture of plant gums, cane sugar and honey together with intermediate glazes (both pigmented and clear) of (gelatine) glue. Egg was not identified in any of the works examined. See: Joyce Townsend, ed. 'William Blake: The Painter at Work' (London: Tate Publishing, 2003).

<sup>20</sup> Joseph Southall, one of the leaders of the English revival of tempera painting, admitted that it took some eight years to find the correct formulation and technique to paint successfully in egg tempera.

<sup>21</sup> Though as Mayer and Myers point out, later writers such as Helmut Ruhemann and David Bomford have since shown that Doerner's experiments often aged poorly, and that his interpretation of the techniques of certain painters were erroneous. See Mayer and Myers, 2002: 24 and Helmut Ruhemann's comments in 'Review: The Materials of the Artist and their Use in Painting by Max Doerner', Studies in Conservation 9, Nov. 1964, 170-172.

masses graduated, and a low type of relief.”<sup>22</sup> However, others recommended that artists refrain from any pretension of discovering the lost techniques of the Old Masters, and use the medium for the expression of new ideas: “If you are considering tempera as a medium, you must rid yourself of misconceptions. You must not think of tempera in its early historical use ... You must be prepared to take a new round, to break with past habit.”<sup>23</sup> Smith’s use of egg in his drawing ink represented an entirely new method of working that reflected a new cultural era. As one artist observed:

Translucent tempera is well-adapted to our own cultural milieu. It is adapted to new architectural trends, not fads of the moment, but enduring trends. This milieu is free from unnecessary and cumbersome “decoration”, plastic protrusions, thick and heavy appendages. It is free from the capricious undulating surfaces. It is in key with the even smoothness of the tempera picture surface. It is free from the darkness and murkiness in harmony with the translucence of tempera colour and tonality.<sup>24</sup>

Smith was employed by the Public Works Art Project in 1934 as a Technical Director for mural paintings. During this period, he spent a great deal of time in research, studying the most durable pigments and media that could be used in the PWAP mural projects. His notes indicate experiments carried out in both egg and casein tempera, and letters written to The Casein Company of America requesting information on the longevity of the medium, and the pigments to be utilised. In these notes is a list of the recommended palette of the most permanent pigments to be used for mural painting. Amongst his papers also is list of recipes for casein solutions

Smith’s egg-ink tempera was essentially a form of gum tempera. Ralph Mayer recommended a similar material that was an emulsion of five parts gum Arabic, five parts

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<sup>22</sup> Maxwell Armfield, *Tempera Painting Today* (London: Pentagon Press, 1946) 26. Prior to Armfield, Daniel Thompson’s teaching of tempera painting at Yale University in the 1920s and early 1930s greatly contributed to the popularity of the medium. His 1936 publication, ‘The Practice of Tempera Painting’ also prompted many in both America and Britain to experiment with the medium, and several guides written by artists themselves, including those by Armfield and Zoltan Sepeshy, were published during the 1940s.

<sup>23</sup> Zoltan Sepeshy, *Tempera Painting* (New York and London: American Studio Books, 1946) 8.

<sup>24</sup> Sepeshy, 1946: 8

stand oil, one part dammar and  $\frac{3}{4}$  parts glycerine.<sup>25</sup> The properties of this gum emulsion may have appealed to Smith for a number of reasons. Mayer states that gum tempera was easier to manipulate than egg tempera since it dried more slowly. They were also capable of producing a great number of effects that could significantly be achieved in either the thin strokes of traditional tempera painting or heavy impasto, which in egg tempera would have led to cracking. As Mayer states:

Their most important advantage is that their formulas may be more widely varied within the bounds of sound practice than those of other emulsions. They are therefore more adaptable to the requirements of the individual.<sup>26</sup>

Mayer's gum tempera formula did not include egg. However, in the 1930s, John Sloan made use of a gum tempera solution that was based on 1 whole egg,  $\frac{1}{4}$  part oil, 3 drops of oil of clove and  $\frac{3}{4}$  thick gum Arabic solution painted on Masonite. Sloan's Chrysalis (1930) is underpainted in gum/oil tempera on a gesso panel, and finished in oil-resin glazes.<sup>27</sup> Smith would undoubtedly been aware of Sloan's tempera recipes, since he was Sloan's student at the Art Students League in 1927-1928.<sup>28</sup> Several early paintings by Smith are also executed in tempera on Masonite. The fast-drying and flexible nature of the gum tempera medium was highlighted by the painter, Robert Vickrey (b.1926) who noted the qualities that egg imparted to a water-based medium for working fast.

I did 77 Time Covers...nobody could figure out how I did an egg tempera Time cover in one day...I would take tubes of watercolours with me, which of course has gum Arabic, and I would take a couple of eggs and I would put the gum Arabic watercolour out on a palette... and have my jars of egg binder (egg-yolk and water) and I would just put a lot of egg-yolk into all the colours...technically I painted one in one

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<sup>25</sup> Mayer, 1985: 277.

<sup>26</sup> Mayer, 1985: 277.

<sup>27</sup> Brown, 2002: 146. Brown notes that these glazes were in various mixtures of stand oil, damar or mastic varnish, Canada balsam or Venice turpentine, powdered pigments or tube oil colours.

<sup>28</sup> In a short biography that Smith composed around 1950, he states that he learned "cones and cubes", and "the artists' position as a rebel" from Sloan's classes in 1927. (Gray, 1988: 24). In Smith's papers, the only painters that Smith acknowledged as having a significant influence on his work are John Sloan, Jan Matulka and John Graham. Notebook 40, 1950-54, David Smith Estate, Box 9.

night...gum Arabic and egg tempera mixed beautifully.<sup>29</sup>

Smith's mixing of drawing ink with egg-yolk then, is in essence, similar to Vickrey's medium. It is an egg emulsion created using a water/gum-based medium (drawing ink). While, his impetus for mixing egg-yolk and water based medium may have come from his association with Ralph Mayer and John Sloan in the late 1920s and 1930s, it is clear that he only realized its potential for drawing in the 1950s. It provided a medium that was flexible and fast-drying that could also be subjected to a range of expressive techniques. In his early career, and also throughout the 1950s, Smith used commercial tube casein temperas. It is worthwhile therefore to explore these early commercial temperas in context.

### **3.3: Commercial Tempera Formulations, 1930-1960**

Historically, tempera simply referred to any emulsion paint media with an oil and water component. It has come today to refer more specifically to egg tempera, a mixture of egg-yolk, water and pigment, but it has been used during the twentieth century in an arbitrary manner to describe almost any form of matt water-based media. Formulations that contained mixtures of oils, resin, glues, gums, caseins and egg have all, at one stage been described or marketed as tempera. During the brief resurgence of traditional tempera painting in America in the 1930s, a letter to the Editor of The Art Digest indicated the problem for artists at the time: "Sir: A useful definition of the word tempera is needed. The term should apply to made-up emulsions, not to mere solutions of gum water."<sup>30</sup>

The paint chemist, A.P. Laurie wrote in 1926 that "there are many tempera mediums on the market, of which some, if not all, are artificial emulsions."<sup>31</sup> Most commercial "egg" temperas were essentially emulsions that contained a variety of resins, oils waxes and other media. Although several artists' tube temperas contained egg-yolk as the primary binder, often these commercial temperas (and, as I shall point out below, artist recipe

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<sup>29</sup> Robert Vickrey, interview with Richard Boyle, 21 June, 1993 quoted in: Brown, 2002: 146. Boyle also states that the painter, Ben Shahn worked in a gum tempera that included honey, ox-gall, gum Arabic and sometimes egg-yolk.

<sup>30</sup> Mr. S. Sutton, letter to the Editor, Art Digest, vol.13, no.6, 15 Dec. 1938, 29.

<sup>31</sup> A.P. Laurie, The Painter's Methods and Materials (New York: Dover, 1967) 188.



temperas) did not include egg alone or in combination with other binders.<sup>32</sup> The tube temperas available to Smith during his lifetime thus might have consisted of emulsions of one or more of the following: egg-yolk, gums, drying oils (linseed, walnut and poppy), liquid resins (copal, mastic, dammar, and Venice turpentine), waxes (beeswax in turpentine). Such simple materials are not true tempera paints and will not behave in the same manner.<sup>33</sup> Casein paints were generally labelled as such, and Smith appears to have favoured these casein paints, or simple tube oils.

Ralph Mayer confirms that there was certain confusion in the commercial paint field over what was termed tempera, stating that “some artists and commentators apply the word tempera to any opaque waste paint such as the cheap poster colours, gouache colours, and simple casein paints, but this is incorrect.”<sup>34</sup> According to Mayer, with the popularisation of commercial tempera colours in the 1930s, almost every combination of emulsion had been used - particularly in European brands - and that these components were only occasionally labelled, adding to the confusion. Of the early commercial ‘temperas’ manufactured in America, many were simple emulsions of oil and soaps, desiccated egg and other components. In 1940, Mayer noted only one commercial tempera paint based on a traditional egg recipe: Martini Tempera Colours, which were manufactured as early 1919 by Herbert H. Martini.<sup>35</sup> For the most part, commercial tempera paints available in America during Smith’s working life were egg-oil emulsions, casein-oil emulsions, gum-oil emulsions or various mixtures of these.

The Spanish-American painter, Ramon Shiva (1893-1963), keen to manufacture quality paints for himself and his contemporaries in the 1920s, produced a casein tempera based on an oil-casein medium in 1933 which became extremely popular amongst artists in the

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<sup>32</sup> Brown, 2000.

<sup>33</sup> Brown, 2000.

<sup>34</sup> Ralph Mayer, The Painter’s Craft: An Introduction to Artists’ Methods and Materials 1948 (New York: Viking, 1975) 122.

<sup>35</sup> Mayer, The Artists’ Handbook of Materials and Techniques, revised edition (New York: Viking Press, 1957) 257. Presumably considered to be of little use after Martini stopped manufacturing temperas in the 1960s, Mayer’s citation and recommendation of Martini temperas was edited out of the 3<sup>rd</sup> (1970), 4<sup>th</sup> (1981) and 5<sup>th</sup> (1991) revised editions. The text simply states, “I am well-acquainted with only three brands of prepared tempera; these are said to be carefully made from an egg emulsion, and have been used with success by many painters.” He does not, however, refer to these brands by name. It is interesting to note that archaic (but useful) technical information, pertinent at the time of original publication, may often have been expunged from the text in later editions.

1940s and 1950s.<sup>36</sup> Grumbacher, Permanent Pigments and others followed the trend, and advertisements carried in artist's journals of the time (such as American Artist Magazine) show that, for a period in the 1950s, a casein tempera range was carried by most manufacturers.<sup>37</sup> In England, Rowney made a range of egg and linseed oil tempera paints based on a "nineteenth century recipe",<sup>38</sup> and in France, Sennelier manufactured a tempera paint based on egg, gum Arabic and oil.<sup>39</sup> Tempera was also seemingly used as a generic term, not only for emulsion paints, but to describe any water-based medium. For example, the paint known as 'Show Card Tempera' (used extensively in the 1930s by Jacob Lawrence), was described by Raphael Doktor in 1938 as a simple mixture of gum and gelatine.<sup>40</sup>

Around the same time, Hilaire Hiler's discussion on artists' technique from 1934 provides some interesting insights into the availability of commercial tempera paints in Britain.<sup>41</sup> There were several commercial temperas available at the time, which were, according to Hiler, largely linseed oil and limewater emulsions rather than traditional egg or casein tempera.<sup>42</sup> However, Hiler cites tube temperas available at the time that were based, at least partially, on egg. These included a resin-oil-egg tempera known as "Kevrose" (a mixture of copal and elimir resins with egg, wax, essence of lavender, linseed oil and water), and another paint, made by French company, Paillard Paints, known as Sadep, based on a similar formulation.<sup>43</sup>

### 3.4 Casein Tempera

In the 1930s, David Smith experimented with casein temperas on his early paintings. A

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<sup>36</sup> Shiva casein tempera continues to be manufactured today by Jack Richeson and Co, Inc. <[www.richesonart.com](http://www.richesonart.com)>, accessed November, 2009.

<sup>37</sup> See 3.4, below. Surveying trade advertisements in American Artist Magazine and other publications throughout the 1950s, the author found that casein temperas were advertised frequently by several manufacturers throughout the decade (Particularly Grumbacher). Towards the end of the decade, references to casein paints dwindled, possibly due to the introduction of acrylic emulsion paints, which were widely advertised after 1958. See also: Brown, 2002: 134-141.

<sup>38</sup> Letter from George Rowney & Company Ltd. to Ralph Mayer, 31 December 1962, AAA, Ralph Mayer Papers, R212, Selected Correspondence, 1928-1964.

<sup>39</sup> Sennelier, Pigments & Application Products, Product Brochure (2007), 9.

<sup>40</sup> Raphael Doktor, 'Painting Techniques', Parnassus, vol.10, no.7, Dec. 1938, 31.

<sup>41</sup> Hiler, 1934: 170.

<sup>42</sup> Hiler, 1934: 171.

<sup>43</sup> Hiler, 1934: 171.

number of early experimental paintings on canvas and board from the time clearly demonstrate Smith's interest in tempera paints, and in particular casein tempera.<sup>44</sup> Smith made frequent use of casein tempera paints in his drawings, both pre and post 1952. He had researched and experimented with the medium in the 1930s for the Public Works Art Project and for the College Art Association, and numerous list of drawings indicate that he worked in both inks and casein (likely commercial tube casein paints).<sup>45</sup> Furthermore, as noted in Chapter One, in a letter to Wells Barnett in 1952, he notes that he also mixed casein media directly into his ink to achieve the same effect as the egg yolk.<sup>46</sup> The author found that Smith referred to works in casein frequently during 1954, also a period in which the advertisement of commercial casein tempera paints was to be found frequently in the artists' journals.<sup>47</sup>

Little use had been made of casein tempera in America prior to the late nineteenth century, when it became popular as an interior and exterior housepaint.<sup>48</sup> As an artistic medium, advertisements for casein tempera paints began to appear in American Artist Magazine around 1950, and generally they were considered to be extremely versatile and adaptable in handling both opaque and transparent painting. It seems that it also possessed several properties unique to water-based painting media. Firstly, casein was able to provide deeper tints that were not achievable using gouache media. It dried quickly and had good covering power over other paints. More importantly, lighter paint could be used over darks without bleeding, and casein temperas could be painted in thick impasto; egg tempera could not. It is likely that through a combination of encountering pioneer tempera painters such as John Sloan and Thomas Hart Benton at the Art Students League, and in

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<sup>44</sup> These notes are transcribed in Appendix A.

<sup>45</sup> In drawings listed in a 1955 sketchbook, Smith notes five that contain casein. A typical example: "David Smith 1/7 Prov 1956 Red, Blue, Black, Brown impasto – egg had casein WC ink", is an indication of the often complex mixtures used. Sketchbook 51, 1955, David Smith Estate, Box 10a Sketchbooks 49-51.

<sup>46</sup> David Smith, letter to Wells Barnett, Mar. 23, 1952, AAA, David Smith Papers, NDSmith R4, F1095. The author's analysis confirms Smith's statement that he began to add egg yolk to his ink around 1952. (See Appendix C).

<sup>47</sup> See 3.3, above.

<sup>48</sup> See Rutherford J. Gettens and George L. Stout, *Painting Materials: A Short Encyclopaedia* 1942 (New York, Dover, 1966) 8, and Cennino Cennini, The Craftsman's Handbook, trans. Daniel Thompson (New York: Dover, 1954) 68. Virtually no studies have been made on the use of casein paints by artists in the conservation literature, and their history and use is discussed in Chapter Three.

using commercial casein paints on paper, Smith was able to invent his own form of tempera which could be worked in a similar manner as oil.

Smith appears to have used casein extensively throughout the 1950s. It was typically used to augment the black ink drawings, or as erasure, delimiting the hard edge of the black inked lines. Casein is identified in several drawings where thick opaque medium is found, and it is likely that Smith also used casein resin itself mixed into his ink, although it appears less common than egg-yolk. In 1964, Smith lent twenty-one framed drawings to the Pennsylvania University Gallery. In the accompanying hand-written list of works, he described the date, size value, title, colour and media for all drawings lent. Included in the list are twelve drawings described by Smith as 'ink egg', five as 'enamel' and three as 'oil egg'.<sup>49</sup> Two years later a loan receipt from the Museum of Modern Art, for the exhibition David Smith Drawings, December 1963-December 1966, lists several drawings as 'Ink and egg', 'Ink, egg, and casein', 'Casein egg and ink', and 'casein', presumably from information provided by the artist.<sup>50</sup> Out of forty-nine drawings listed in the MOMA document, forty-two are noted as 'Ink and egg', four are noted as 'ink, egg and casein' and three as 'casein'. A copy of a letter from Smith to the Otto Gerson Gallery dated 1959 lists six drawings described as 'egg tempera'.<sup>51</sup>

Casein Tempera was introduced as commercial tempera tube paint in the early 1930s, but only became a popular medium with artists in the 1950s.<sup>52</sup> Ramon Shiva produced a series of casein emulsion tempera paints in 1933 that were exhibited at the Chicago Worlds Fair in 1934, which subsequently became the best selling tube caseins. That they are still manufactured today is a testament to their popularity. In 1950 they were advertised as having been subjected to the most rigorous standards of purity and durability,

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<sup>49</sup> 'Penna Univ. Gallery 21 Framed Pictures', David Smith, written note to Bill Landing, Jan. 20, 1964, David Smith Estate, Box 5 Correspondence, 1964.

<sup>50</sup> Loan Receipt, Museum of Modern Art, October 2, 1963, David Smith Estate, Box 5 Correspondence, 1963.

<sup>51</sup> Otto Gerson Gallery, letter to David Smith, New York, 1959, David Smith Estate, Box 3, Correspondence, 1959.

<sup>52</sup> Similarly in England, the papers of The Society of Mural Decorators & Painters in Tempera do not discuss painting with casein until after 1954. Although he used it for works throughout the 1950s alone and in combination with egg-ink, from the author's analytical findings, Smith appears to have used casein most extensively in 1954.

“scientifically testing through Spectroscope and Fadeometer”.<sup>53</sup> American Artist magazine began advertising commercial casein tempera paints around 1943, but it was the period from 1950 until about 1958 that casein paints appear to have had the most coverage in the artists’ journals, specifically at the time that Smith was painting his classic egg-ink drawings.<sup>54</sup>

An article by the painter, Henry Gasser appeared in the January 1950 issue of American Artist which formed an introduction to casein paints and painting techniques.<sup>55</sup> He states that only recently had casein paints been improved by manufacturers and that they were rapidly gaining popularity with artists. Like Smith, it appears that for Gasser, casein was a way to improve the textural nature of his painting, which was previously executed in watercolour. Casein was found to be a perfect medium for both transparency and opacity and in contrast to gouache colours, produced intense darks.<sup>56</sup> Further, casein colours were found to dry more or less to the same value as their wet form, something that could not be achieved with gouache or watercolour, which dries considerably lighter. Gasser acknowledges that with casein, the working properties of gouache could be attained without sacrificing tone: “I was gratified to discover that casein would do what I had wanted to do in gouache, but could not achieve in that medium.” He also acknowledges the powerful covering power of casein meant that, unlike watercolours and gouache, lighter paints could be applied over darker tones, building up a surface that was more in the manner of painting in oil, achieving impasto effects without the risk of cracking.

The quick drying qualities of casein paints were highlighted by many artists, as was the

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<sup>53</sup> Shiva Casein paints, advertisement, American Artist, June 1950.

<sup>54</sup> American Artist Magazine began publication in 1937 (as Art Instruction) with the aim of filling a gap in the journal market to offer a practical journal to artists. It provided practical instruction, articles on technique and interviews with artists. Although its content and aim was distinctly anti-avant-garde and abstract artist and toward the promotion of the more traditional American painting (an opinion often expressed vehemently in the monthly columns of the painter Frederick Taubes), it remains an excellent source for studying the history of commercial paints in the mid-twentieth century.

<sup>55</sup> Henry Gasser, ‘From Hamilton Hill: A Casein Aquarelle by Henry Gasser’, American Artist Magazine, Jan. 1950, 22-26, 68. Later Gasser published a book: Casein Paintings Methods and Demonstrations, Watson-Guption, New York, 1950. Though casein had declined in popularity as a medium by the 1960s, Gasser also included it in his 1964 publication, A Guide to Painting: The Techniques of Handling Oil, Watercolour and Casein, Golden Press, New York, 1964.

<sup>56</sup> Gouache is technically a water and gum medium that has added body through the addition of inert white pigment, hence dark pigments were liable to be chalky and less intense.

fact that casein was versatile and could be used as tempera, transparent watercolour gouache and fresco secco on canvas, wood, gesso, cement, plaster and lime walls and glass. Of particular note was the fact that the casein paints were able to dry in a few hours, could be used in a similar manner to both watercolour and oil paint, were applicable to almost any surface, and that they could be superimposed repeatedly without lifting the underpainting.

Numerous other authors write specifically on the merits of casein paints during Smith's lifetime, advocating both its ability to replicate the working properties of oil, its ability to create layered work, and its longevity. In particular casein was adopted by a number of painters as a good ground layer, for which oil paints could then be overpainted in glazes. Ralph Mayer wrote in 1933, "casein is used to make emulsions in combination with beeswax, resin varnishes and oils. It forms the basis of many of the prepared tempera paints, particularly those made in Germany."<sup>57</sup> John Sloan similarly described a casein tempera recipe in 1939 that consisted of powdered casein or cottage cheese, water and a teaspoon of ammonia or a casein emulsion of two parts casein solution, one part varnish and one quarter part stand oil.<sup>58</sup> Arthur Dehn who wrote on casein and water-colour painting in 1955 describes casein as "gouache carried one step forward to the point where the effect approaches that of an oil painting... the resulting surface has the body and weight of an oil painting and lends itself to varnishing and waxing after the pigment has dried."<sup>59</sup> The nature of casein to replicate oil painting may have been very attractive to Smith, who had begun his career making paintings in oil. The poor durability of oils on paper was known to him, as was the poor quality of the tube oils available in the 1930s (see below). The belief in the durability of casein temperas in the 1950s however, is apparent in Dehn's belief that a painting in casein would remain as originally painted considerably longer than a painting in oil.

By the time that Smith began painting his egg-ink drawings, and using commercial tempera paints on paper in 1952, there were already several popular brands of casein temperas available. Permanent Pigments produced what they termed True casein, Talens

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<sup>57</sup> Ralph Mayer, 'Tempera Painting II', *Creative Art*, vol.12, Apr. 1933, 284.

<sup>58</sup> John Sloan, *The Gist of Art* (New York: American Artist's Group, 1939) 174.

<sup>59</sup> Arthur Dehn, *Watercolour, Gouache and Casein Painting* (London: Thames and Hudson, 1955) 89.

produced Rembrandt Casein, and Ruxton and Grumbacher also produced a series of casein colours. By the 1950s however, only Grumbacher, Shiva and Permanent Pigments still made casein temperas in America.

By 1958, fewer advertisements for casein appeared in American Artist, although Shiva and Talens continued to advertise their casein paints until the 1960s. Advertisements for casein were slowly replaced by advertisements for the recently introduced Liquitex acrylic emulsions (Permanent Pigments) which in many ways reproduced many of the qualities of casein tempera paints: they were fast drying, could be easily mixed and retained their colour on drying. Smith, as noted in Chapter Two, appears to have used acrylic emulsions during this time, but appears not to have preferred them over casein or other commercial tempera paints. Analysis confirms that many of the white paints that he used to heighten or make erasures to black ink drawings after 1956 contained no trace of acrylic. He may have been cautious in taking up the new artists' acrylic paints, suspicious of their durability given his in-depth experiments into casein, although he must have been aware of industrial acrylic solution coatings for metal surfaces. Additionally, early acrylic emulsions lacked intensity in the darker colours, and also in thicker passages had a definitive plastic feel that Smith that may not have liked.

Smith's use of tempera paints in his drawings and paintings therefore is strongly associated with the renewed interest in Old Master techniques and materials that was prevalent in the early 1930s, when Smith was developing a nascent artistic style. However, it is intimately linked to the development of Smith's political ideology during the 1930s, developed at a time when his interest in the properties of materials was at its height. Smith's appropriation of an industrial studio practice was informed strongly by his political beliefs but also by his need to associate his work with his beginnings as an artist and worker. This attitude, as I discuss in the next section, is critical to the understanding of Smith's working process in sculpture, yet has strong implications for the understanding of his drawings.

### **3.5: Smith's Studio: The WPA and appropriation of an Industrial Working Method**

During the 1930s, David Smith, like many artists, found employment under several New Deal art projects: specifically the Public Works Art Project (PWAP), Temporary

Emergency Relief Administration (TERA), and the Federal Art Project of the Works Progress Administration (WPA).<sup>60</sup> As mentioned above, this work is often cited in the literature on Smith, yet the details of his role in these projects have not been fully documented. Smith had been interested in the scrupulous testing of painting materials as early as 1930, and took a position as Technical Director of the Mural Painting section of the Public Works of Art Project (Civil Works Administration) in 1934, continuing this work under TERA until July 1935. After his trip to Europe, Smith returned to New York and took a position in the sculpture division of the WPA, which he held until 1939.<sup>61</sup> These New Deal Art projects not only provided artists with work, but with an increasingly politicised socialist ideology favoured among artists, the exchange of technical information, and move toward standardisation for artists' materials. Furthermore, the appropriation of methods used by factory workers engendered a link between materials, studio process and revolutionary ideals.

The Works Progress Administration (WPA) was set up in 1935 by Executive Order of the US Federal Government. It acted as a co-ordinating and inspection agency to examine projects proposed by the Government to provide work relief for the countless unemployed during the Depression. The Federal Arts Project, somewhat independent of the WPA (most of which was focussed on unskilled labour) consisted of four projects: Art, Theatre, Writing and Music, and employed 5,212 artists at its peak. Smith took his Technical Director job extremely seriously, and evidence that he took great personal interest in the work, going beyond the remit of his job description is indicated in the account of Dorothy Dehner:

His job entailed knowing about paint, all painting materials, wall and their materials in relation to mural painting that were part of the project....He was very good at this job, educated himself in paint technics (sic) by buying and reading all published material in English,

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<sup>60</sup> The PWAP was the first of the New Deal Federal Art Projects. It existed from December 1933 to June 1934. After its termination, incomplete works continued under various other relief organizations including the TERA until 1935 when the Works Progress Administration and Federal Art Project were created. Smith worked under the WPA and other projects until at least 1939.

<sup>61</sup> Smith and Dehner spent nine months in Europe and Russia, from October 1935 to July 1936, visiting Paris, Greece (where Smith collected paint samples from antique statuary), Crete, Naples, Malta, Marseilles, London, and Moscow.



and he was very enterprising in getting in touch with paint chemists (Maximilian Toch, for one) and others interested in the materials of the artist.<sup>62</sup>

Smith's interest in materials is obvious from the technical notes present in many of his notebooks, and Dehner felt that Smith preferred his technical position, as the WPA was generally hostile toward abstraction in 1934.<sup>63</sup> However, the choice to take a Technical Director position may have also been related to financial concerns. Dorothy Dehner states that the WPA Technical Directors were paid \$35 dollars a week, while the painters and sculptors were paid only \$22.<sup>64</sup> Smith, however, clearly took the position very seriously carrying out extensive research on durable pigments and media for mural painting, and educating himself on all aspects of painting materials.

However, after Smith returned from Europe in 1936, the WPA's hostility to abstract sculpture had apparently lessened, and he felt able to take up a position in the Sculpture Division. According to Dehner, this was difficult also due to the fact that Smith was considered to have excelled as a Technical Director, by WPA and they preferred that he keep that position.<sup>65</sup> This is notable since it was only a year before that he decided to concentrate on sculpture rather than painting in his work.<sup>66</sup> Smith's work carried out at the project included a cast iron Torso (1938), Abstraction in Painted Iron (1939), and Abstraction in Steel (1939). Some of this work was allocated to the building of the radio station WNYC. However in subsequent years, efforts to find the works led to nothing, and

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<sup>62</sup> Dorothy Dehner, letter to Jane at the Fogg Art Museum, 19 May, 1966, AAA, Dorothy Dehner Papers, Roll 796, F197.

<sup>63</sup> The abstract sculptor, Ibram Lassaw, also a member of the WPA Sculpture Division states that despite claims that the WPA continued to be conservative in its views, he was not pressured to change the direction of his work. Eleanor Carr, interview with Lassaw, 16 November, 1968, in Eleanor Carr, 'New York Sculpture during the Federal Project', Art Journal, vol.31, no.4, Summer, 1972.

<sup>64</sup> Garnett McCoy, interview with Dorothy Dehner, New York, Oct. 1965 and Dec. 1966, AAA, Oral Histories, transcript.

<sup>65</sup> Dorothy Dehner letter to Margaret Haggerty 14 Oct. 1967, quoted in Margaret Haggerty, David Smith: A Painter's Approach to Drawing, MA thesis, University of Maryland, 1968, 48.

<sup>66</sup> The painter Jean Xceron apparently convinced Smith to concentrate on sculpture in May 1935. Smith acknowledges this in a letter to Xceron, 7 Feb. 1956. McCoy, 1973: 206.

as was the case for a large amount of the work created during the WPA, was likely destroyed.<sup>67</sup>

David Smith's activities in mural painting, however, came under the activity of PWAP and TERA. Much of the mural work of PWAP that Smith oversaw was for high schools in Brooklyn and Manhattan. A statement that he gave to the *New York Times* in 1934 on a series of murals painted for the Textile High School in New York, not only demonstrates Smith's pride at bringing in a job under cost without sacrificing quality, but also his grasp of technique and knowledge of painting materials:

The problem was to complete the entire group without sacrificing permanency and quality for the sake of cost... The plaster walls were treated with a specially prepared acid resin primer to neutralise the lime. A slightly absorbent top dressing was laid to approximate the texture of fine grained canvas. The entire treatment was composed of permanent white pigments which are unaffected by hydrogen sulphide gas. The final oil painting, though laid directly on the wall, is perfectly isolated from free lime in the base plaster... American pigments [were] ground especially for the project. The colors were tubed by our own artists. As a means of further economy, spirits and oils were refined and filtered with the aid of school equipment. Fixative and varnishes were made to meet painters' needs. Thus quality was not sacrificed at any point, yet five rooms are being completed at the cost originally estimated to cover one room.<sup>68</sup>

This pride in both the use of quality materials and in the manner of production of art more related to the factory than the atelier, may have related to Smith only recently discovering his voice as a steel sculptor, only a year after he made his first welded steel work. It is also

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<sup>67</sup> Dorothy C. Miller, then Curator of Museum Collections at The Museum of Modern Art attempted to find these works by Smith in 1965. In a letter written to Dorothy Dehner, she states: "finding an example from each artist that had been produced for one of the projects was amazingly difficult. I came to the conclusion that most of the art produced on WPA had disappeared: murals have been painted over, and easel pictures and sculptures allocated to public buildings mostly can no longer be found": Letter to Dorothy Dehner, 23 Sept., 1965, AAA, Dorothy Dehner Papers, Roll 298, F60.

<sup>68</sup> Edward Alden-Jewell, 'Acres of Wall Space: A Few of the Projects Fostered by the PWAP – Work carried on under the TERA', *New York Times*, July 15, 1934.

significant that in the same year, 1934, Smith moved his studio from his apartment to Terminal Iron Works in Brooklyn. This was a practical necessity since it was impossible to safely use a welding torch in his Brooklyn apartment. However, it is clear the experience at Terminal Iron Works was profound in terms of the development of Smith's process, and that the environment was conducive to his work. Smith's recollection of the period demonstrates the ease with which he could settle into the life and schedule of the factory workers who were part of his world around the Terminal Iron Works location, and who understood craftsmanship and quality better than most artists. In 1959, recalling his experience at the ironworks in the 1930s he wrote:

For several years we were ideal workmates, each with separate quarters. Buckhorn Senior was a great craftsman ... The Ironworks was inside the gates of the Atlantic Avenue Ferry terminal. George Kieman who ran the "men-only" saloon at 13 Atlantic Avenue had inherited it. We ate lunch, got our mail, and accepted it as a general community house. It was the social hall for blocks around ... any method or technique I needed, I could learn it from one of the habitués, and often got donated materials besides.<sup>69</sup>

This understanding that the means of production for industry could be utilised for both practical and aesthetic ends was one of Smith's greatest discoveries. It had far-reaching consequences for the development of a studio process in both sculpture and painting that evolved toward production of works in series and in larger numbers, and ultimately making use of assistants and fabricators. Whereas in the 1930s, many painters explored their political and aesthetic ideologies by utilising fast drying paints that were developed for commercial or industrial use, Smith was likely the first artist to truly create work according to industrial principles. As I have demonstrated above, in painting and drawing, much of Smith's vocabulary of tempera painting techniques were developed on research that he carried out personally for his own work and for the PWAP and TERA.

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<sup>69</sup> David Smith, letter to Emmanuel Navaretta, Nov. 1959, McCoy, 1973: 208. Smith refers here to Buckhorn Senior, the father of the Buckhorn who owned the original Terminal Iron Works along with the ironworker, Blackburn. Buckhorn Senior moved his ivory, bone and pearl works to the Atlantic Avenue site in 1939.

It is clear that Smith had a sophisticated grasp of all painting techniques by the time that he took the position of Technical Director at PWAP. By the 1950s, his technical library contained virtually every publication available on artists' techniques and paint chemistry that was available in the English language. An inventory of technical manuals in his library was compiled by Peter Stevens and Rebecca Smith, and published by Albert Marshall in 1995.<sup>70</sup> Included are; Arthur Herbert Church's The Chemistry of Paints and Paintings (London, 1915), Martin Wild's The Scientific Examination of Pictures (London, 1929), J. Newton Friend's The Chemistry of Linseed Oil (London, 1917), Gettens' and Stout's Painting Materials (New York, 1942), Noël Heaton's Outlines of Paint Technology (London, 1928), Christiana Herrington's translation of Cennino Cennini's Il Libro Dell'Arte (London, 1899), George. H. Hurst's Painter's Colours, Oils and Varnishes: A Practical Manual (London, 1901), a number of works by A. P. Laurie, including, The Pigments and Mediums of the Old Masters (London, 1914), The Painter's Methods and Materials (London, 1930), and The Materials of the Painter's Craft from the earliest times to the end of the 17<sup>th</sup> century (London 1910), A treatise on Painting by Leonardo da Vinci, Ann MacDonnell's translation of The Memoirs of Benvenuto Cellini, and several publications by Maximilian Toch including an edition of Paint, Paintings and Restoration, inscribed to Smith and his wife by the author, the 1911 publication, Materials for Permanent Painting, and an article by Toch, cut from the New York Times Magazine (25<sup>th</sup> August 1935): 'New aids for the Detection of Picture Defects'.

These works reflected a new positivist approach to the understanding of art that had begun in the nineteenth century with a view toward the role of science in investigating works of art, and a renewed interest in the materials and techniques of the Old Masters. By the early twentieth century, there appears to have been a general sense that art materials and techniques in America were of a poor standard, and that artists' understanding of technique was similarly poor. Smith certainly understood this, and it became part of a larger sense of pride in materials that was brought about by his experiences in the factory, and his increasing politicisation discussed below. His understanding of the poor quality of these paints was likely informed by his correspondence with Maximilian Toch in the 1930s, and later with Toch's nephew, Ralph Mayer in the 1940s. Toch was considered

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<sup>70</sup> Marshall, 1995: Appendix.

the foremost expert in paint chemistry at the time, and also worked as an art restorer who was frequently called upon to identify and authenticate paintings.<sup>71</sup> Toch had investigated the permanency of tube paints as early as 1886, and his 1911 publication was one of the earliest in America to deal specifically with the ignorance of artists regarding the permanency of their materials:

In the course of my acquaintance with artistic painters, I was astonished to find the enormous amount of ignorance that exists among them as to the composition of the materials which they use and the science of painting. Almost every painter of note will tell you what a pity it is that the science of making colors is lost, and that the ancient painters and great masters were so successful primarily because their pigments and materials were far superior to those which we can obtain today.<sup>72</sup>

Ralph Mayer also stressed the need for good education for contemporary artists. He wrote in 1942 that “although the level of sound craftsmanship in painting was low throughout the nineteenth century, particularly in the latter half, there have always been always been some artists who were continually searching out correct procedures.”<sup>73</sup> Mayer noted that although the 1930s and early 1940s had seen a great increase in the number of artists, curators and art historians realizing the importance of materials, its teaching had lagged behind, and that the artist/teacher with such technical knowledge at his disposal remained the exception rather than the rule. Mayer attempted to resolve many of these issues by the setting up of a National Artists’ Laboratory: a central agency for testing art materials,

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<sup>71</sup> A 1932 publication on the authentication of an oil portrait of Shakespeare confirms Toch’s reputation as a paint chemist and (Conservation) Scientist. It also illustrates the growth in interest in science applied to art. The author suggests that Toch was “known as one of the great experts who can accurately determine the genuineness, the age, and the painter of a picture by scientific methods. He has a private laboratory specially equipped for this work.” Tracey Klingman, An Authenticated Contemporary Portrait of Shakespeare (New York: William Edwin Rudge, 1932) 76. Toch was also Vice President of Toch Bros Inc. which merged with Standard Varnish Company in 1926 to become Standard-Toch Chemicals Inc., at one time one of the largest manufacturers of varnishes and coatings in America. Toch ‘MM Picture Varnish’ was used on at least one occasion by Smith (on an experimental canvases dated 1930 and now at the David Smith Estate: 75.30.111: See Appendix A).

<sup>72</sup> Maximilian Toch, Materials for Permanent Painting: A Manual for Manufacturers, Art Dealers, Artists and Collectors (New York: Van Nostrand, 1911) 5. Toch appears to be one of the first writers to highlight this lack of quality in American artist paints. However, in France, Merimée had noted the poor quality of some commercial oil paints as early as 1830. J. F. L. Merimée., The Art of Painting in Oil, 1830, trans. W.B.S. Taylor (London, Whittaker, 1839).

<sup>73</sup> Ralph Mayer, ‘Education in the Technology of Art’, College Art Journal, vol.1, no.4, May 1942, 98.

collecting technical data, encouraging the maintenance of standards in the production of oil paints, and arranging courses, lectures, conferences and demonstrations in artists' materials and techniques. In 1949, Mayer set up the Artists' Technical and Research Institute in New York, which was a non-profit organisation established to engage in laboratory research and educational activities in artists' materials and techniques. Mayer specifically set up the institute to standardize the use of quality artists' materials. In his words, to "establish standards to replace the vague empirical rules that artists have followed in the past."<sup>74</sup>

David Smith probably encountered Ralph Mayer at the Art Students League in the late 1920s, where Mayer was also studying painting. Sharing an interest in artists' media and techniques, Smith consequently worked with Mayer providing samples and other technical information from his own experiments, which ultimately contributed to Mayer's 1940 publication The Artists' Handbook of Materials and Technique.<sup>75</sup> Although there is scant correspondence between Smith and Mayer concerning these contributions, it is clear that Smith spent considerable time investigating both pigments and media. As noted in Chapter Two, his studio materials contain a microscope and box of pigment samples mounted on slides which he used for observing how the pigments aged. Smith's concern for the quality of contemporary commercial paints in America was similarly expressed in a 1935 review of Max Doerner's extremely influential treatise, The Materials of the Artist and Their Use in Painting (1921), which was published in translation in America in 1934:

Since Doerner takes issue throughout this book with manufacturers, who make exorbitant claims for cure-alls – who market untested and questionable colors – it would be well for American painters to read and realise the numerous misapprehensions under which they paint ... To point out the difference in our materials, one manufacturer gives an analysis of tube content, whereas another (one of our largest paint

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<sup>74</sup> Ralph Mayer, 'The Artists Technical Research Institute', College Art Journal, vol.8, no.3, Spring, 1949, 316.

<sup>75</sup> Smith is the only artist acknowledged by Mayer in the Preface of the first edition. (Mayer, 1940:vii). Mayer's book remains in print today, which gives some indication of its importance.

dealers) peeps up his pigment color with dye and does not label it to that effect.<sup>76</sup>

This demonstrates that Smith had a fairly sophisticated understanding of the chemistry of paint by 1934. His referral to the presence of dyes in tube oils paints may refer to experiments that he carried out on Osborn tube oil colours. Smith discussed the results of his research into these and other paints in several letters to the painter Edgar Levy. He states in one example that he had tested the Osborn colours for dyes (likely the manufacturer he referred to as ‘pepping up pigment with dyes’ in his review), although he does not describe the process. In another letter to Levy he observed: “The quality of our paint isn’t OK. The oil separates from the pigment and I think our Osborn colors should be ground finer. Have you tried the yellow ochre? Isn’t very well bound.”<sup>77</sup>

This dissatisfaction with tube oils in the 1930s, combined with the added experience of researching casein tempera colours for the PWAP Murals programme, may have contributed to Smith directing his attention away from oil paints and gouache toward tempera that he could manufacture himself as a drawing medium. Smith used tube oils on canvas and panel throughout his career, and it is significant that the only branded artists oil paint that is found in his later receipts was Bellini oil colours by Bocour, a small company that manufactured hand-made oil paints of a high quality. Smith also understood that an interest in the quality and standardisation of manufactured artist materials, combined with the careful and empirical study of Old Master techniques, were the means by which the modernist artist could find methods that would embody his identity both artistically and politically. Smith ends his review of Doerner by stating that “many of the practices of these earlier painters could be utilised by modern artists to the enrichment and permanence of their products.”<sup>78</sup> This interesting discourse between the modern artisanal ideal of creating a product by utilising industrial means, and at the same time looking to past masters to understand lost craft tradition was bound up in the political atmosphere of the 1930s in which Smith found himself increasingly involved.

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<sup>76</sup> David Smith, ‘Review of The Materials of the Artist by Max Doerner’, *Art Front*, Jan. 1935, 6.

<sup>77</sup> Smith, Letter to Edgar Levy, nd. AAA, NDSmith R1, Edgar Levy and Lucille Corcos correspondence, F33.

<sup>78</sup> Smith, 1935: 6.

The Doerner review appeared in Art Front the journal of the left-wing Artist's Union, of which Smith was a member. Art Front discussed matters of avant-garde art in terms of leftist politics, and in its short lifespan (1934 to 1937), often offered technical advice to the artist. In the May 1935 issue for example, there is an article by Stefan Hirsch on gesso painting, one of a series on technique. The tone of the article connects the importance of good technique and sound materials to the social impact of painting:

We have to handle subject matter for which we have only little precedent. We have to find symbols to express our social philosophy. We want to meet this situation with the best possible equipment, and with a minimum of mental and technical ballast. We want the technical side of our craft to be no sordid duty, but an inspiration for the formal aspects of our art ... We must master a technique that constantly offers new possibilities as the requirements vary.<sup>79</sup>

The tone of the excerpt exemplifies contemporary Marxist concerns for the artist as worker/propagandist, and the need to raise the artist/worker to the level of respected craftsman. It also echoes Smith's own Marxist leanings, which in many ways were carried forward into his studio process in terms of its industrial ideology, and the high standards of quality that he demanded from his materials and tools. Smith's identification with the men he worked with in the factory in the 1930s was not simply one of artisan respect. He clearly understood his place as a worker creating a product that was of benefit to society. He was a lifelong member of his local steelworkers union, and his political associations were clearly stated in a short autobiography written in the 1940s:

By choice I identify myself with working men and still belong to Local 2054 United Steelworkers of America. I belong by craft – yet my subject of aesthetics introduces a breach. I suppose this is because I believe in a

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<sup>79</sup> Stefan Hirsch, "Techniques and Media: Gesso Painting", Art Front, May 1935, 5, 8.



working men's society in the future, and in that society I hope to find a place.<sup>80</sup>

Although Smith came from a distinctly middle class background, and held white collar positions prior to and at the same time as his factory/workshop experiences in the 1920s, it was clearly his choice to identify himself philosophically and politically – even aesthetically with the factory worker. Although not as vocally political as he was in the 1930s, he certainly sustained this identity throughout his career. In 1962, when he was introduced to his workmen at the Italsider steel factory in Voltri, where he was to make sculpture for the Spoleto Festival of the Two Worlds, he wrote in his notebook (under the heading “Problem”) that it was awkward to be “introduced in white collar.”<sup>81</sup> Clearly important to be seen by the workmen as an equal, as someone they could understand on their own terms, Smith felt that this awkward social faux pas was redressed on the subsequent morning, and that his industrial credentials were validated by putting himself in the same position as the workmen. He felt it important to note in his journal: “In equal garb the next day ... after welding, moving, sweeping, my collar was OK. We worked together from then on great.”<sup>82</sup>

Anthony Caro has noted that this was a position that Smith took to appear simplistic in his attitude to making art, and perhaps to suppress any form of pretentious critical interpretation that might be applied to his work. Caro recalls:

I'm just a welder, he used to say. He consistently made the most intelligent decisions in his sculpture, and yet he hated art-talk; he stressed his role as maker perhaps because he was embarrassed by his own artistry .. I have talked to some old friends in which he confided and they have confirmed what I suspected – although David never

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<sup>80</sup> David Smith, *Autobiographic Sketch*, c.1940, in Gray, 1988: 61.

<sup>81</sup> David Smith, 'Report on Voltri', 1962, McCoy, 1973: 160.

<sup>82</sup> Smith, 1962, McCoy, 1973: 160.

showed what was on his mind, he was paying attention to every sculptural or artistic thing that was happening.<sup>83</sup>

It was this identification with both the methods and materials of industry and with the workers themselves however that facilitated Smith's development over three decades of an industrial studio practice which clearly influenced his choices of materials in both sculpture and drawing.

### **3.6: The Development of an Industrial Studio Practice**

The magazine Art Front was originally published with the intention of publicising a mass demonstration on workers' conditions at the City Hall in New York on October 1934, under the auspices of the Artists' Union.<sup>84</sup> The leaders of the Artists' Union were largely influenced by Marxist doctrine, and strongly believed that the magazine would function as a guide for the artist in the production of art that was truly revolutionary and propagandist. The painters that Smith associated with in the 1930s were also closely linked to the Artists' Union and Art Front. Stuart Davis, for example served as Editor in Chief of Art Front from Issues 2 to 10, and John Graham reviewed 'Eight modes of Modern Painting', an exhibition at the Julian Levy Gallery.

Although the Artists' Union promoted the study of craft skills and master techniques, the art that provoked the most ire amongst its artists was the tempera painting of the so-called American Scene Painters Thomas Benton, Grant Wood, Reginald Marsh and John Stewart Curry, which was viewed as a kind of archaic and phoney Americanism. The Union promoted abstraction and particularly the works of Picasso and Cézanne as an exemplar of a new kind of art that would be identified with America. There were lively discussions on abstract art as vehicle for revolutionary change and a condemnation of the prevailing popularity of Surrealism, Social Realism and Regionalist painting. Stuart Davis singled

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<sup>83</sup> Anthony Caro, A Discussion with Peter Fuller (1979) in Kristine Stiles and Peter Selz eds. Theories and Documents of Contemporary Art: A Sourcebook of Artist's Writings (Berkeley: University of California Press, 1996) 105.

<sup>84</sup> A number of artists' union groups sprang up in New York in the 1930s. Of these, the Artists' Committee for Action concentrated on promoting professional aspects of the artist's life whereas the Artists' Union primarily dedicated itself to the cause of economic freedom for artists. Eventually Art Front was placed under the directorship of the Artists' Union. After a brief run of only three years, the journal ended with the December 1937 issue. For an overview of the history of Art Front, see: Gerald M. Monroe, 'Art Front', Archives of American Art Journal, vol.13, no. 3, 1973, 13-19.

out Curry as an artist whose revisionist style brought a negative image to American painting in an editorial in 1935: “How can a man...who wilfully or through ignorance ignores the discoveries of Monet, Seurat, Cézanne and Picasso, and proceed as though painting were a jolly lark for amateurs to be exhibited in county fairs...be considered an asset to American art.”<sup>85</sup>

Smith’s political ideology in the 1930s and 1940s has, until recently, been largely overlooked in favour of the formal analysis of his work. It is examined elsewhere, and an in-depth account is not the focus of this thesis.<sup>86</sup> However, in terms of Smith’s adoption of a distinctly industrial attitude to studio process and materials, and of the ideology that appears to have informed this throughout his career, it warrants some discussion.<sup>87</sup> Smith was an active member of the Artists’ Union, which he joined around 1935. He participated in street protests in support of both artists’ and workers’ causes including the 1935 May Day parade in New York city.<sup>88</sup> He was also a member of the American Artists’ Congress, a political group that stood against the War. Smith’s commitment to the ideals of Communism well into the 1940s, as Wisotski has clearly illustrated, defies the received understanding that avant-garde art was de-Marxified by the advent of the Second World War.<sup>89</sup> His commitment to the series of fifteen anti-war Medals for Dishonor (1939-40) and his enthusiasm for the ultimately aborted commission for a series of Medals for the Chinese government (1943) marked him out as an artist with strong political ideals. That

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<sup>85</sup> Stuart Davis, ‘The New York American Scene in Art’, Art Front Feb. 1935, 6, quoted in Monroe, 1973: 15.

<sup>86</sup> In recent years, Paula Wisotski has published the most important work on Smith’s political life in the 1930s and throughout his early career, and I have relied heavily on her research for my understanding of Smith’s politics in this section. Of particular note are; Paula Wisotski, ‘Artist and Worker: The Labour of David Smith’, Oxford Art Journal, vol.28, no.3, 2005, 347-370, and ‘Strategic Shifts: David Smith’s China Medal Commission’, Oxford Art Journal, vol.17, no.2, 1994, 63-77.

<sup>87</sup> Although evidence of Smith’s political agenda slowly disappeared from his writing, speeches and in his work, he continued to discuss his identification with workers, even in the 1960s, in the comfort he felt with the workers at the Italisider factory at Voltri, during the Spoleto Festival in 1962, and his support for the Socialist government in Italy. Wisotski, 1994: 75.

<sup>88</sup> Karen Wilkin suggests that Smith joined the Union around 1937. (Wilkin, 1984: 118) Wisotski suggests that he may have already been a member by this time as he participated in Union events from 1935. Given that he wrote a review of Doerner’s Materials of the Artist, in the 1935 edition of Art Front, it seems likely that he was a member of the Union by this time.

<sup>89</sup> Wisotski points out that Smith’s intellectual commitment to the Marxist ideology was longer and deeper than that of many of his peers. Smith qualified to become a member of the Communist Party of the United States of America (CPUSA) in the 1930s by participating in a study group reading Marxist literature. Furthermore, unlike many artists who resigned from the American Artists’ Congress over the Soviet invasion of Finland in 1939-40, Smith’s accepted the event as an ‘unpleasant necessity’. Wisotski, 1994: 63.

the Artists' Union considered its members to be "cultural workers" that suffered from the same deprivations as workers in other trades is exemplified by Smith's contribution to an ultimately unpublished Federal Art Project work entitled 'Art for the Millions':

The government needs to unify its art direction by creating a ministry of fine arts, to sponsor democracy in art, to enhance its buildings, to preserve its culture, and maintain its artists. The artists are willing to give to the fullest extent of their abilities, for a living wage. It is high time the government takes concerted action for the welfare of its cultural workers.<sup>90</sup>

Michael Leja has highlighted the fact that what set Smith apart from many of his contemporaries was that he did not convert to a kind of "classless liberal humanism, or buy into the theories of the alienated modern intellectual artist."<sup>91</sup> This personal and long-term commitment to the artist-as-worker, and to a characteristic dichotomy between a return to artisanal craft of the master painters, and the application of new methods and process appropriated from an industrial model of production were an integral part of Smith's identity in the 1930s and throughout his career. This rigorous working process, to which Smith kept religiously, demanded techniques that reflected this mode, and materials and stock that fell pragmatically to the hand when needed, and were of sufficient quality to meet a high industrial standard.

Seen from this perspective, Smith's pride in belonging to his local Steelworkers Union can be seen as another way of asserting his craft skills, "having met Union standards at a time when the art world tended to question his technical approach".<sup>92</sup> This is true in both his drawing materials as much as it was for sculpture. Smith's use of industrial paints seems to have been informed by a desire for craftsmanship and permanence. Challenged about his use of colour, he stated:

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<sup>90</sup> David Smith, 'Modern Sculpture and Society', McCoy, 1973: 41-2.

<sup>91</sup> Michael Leja, *Reframing Abstract Expressionism* (New Haven: Yale University Press, 1993) 67. For example, John Graham, who was a considerable influence on Smith in the 1930s, had rescinded his belief in both modernism and Marxism by 1943, promoting classicism and the primitive, hidden and private values in art. Although Smith had distanced himself from Graham by the mid-1940s, largely due to his rejection of abstraction and his attacks on Picasso, his belief in the private symbolism was still very much apparent throughout the 1950s. See Chapter Two for a discussion on the private meanings in Smith's work.

<sup>92</sup> Wisotski, 2005: 357.

It's a foreign introduction, but why not? ... I colour them. They are steel. So they have to be protected, so if you have to protect them with a paint coat, make it a colour. Sometimes you deny the structure of steel. And sometimes you make it appear with all its force in whatever shape it is.<sup>93</sup>

Smith reiterated this in 1965, stating that his use of automobile paint was primarily born out of a practical need to protect his metal sculpture that since 1962 he had begun to store in the fields outside his studio and home. But in his description of the practicalities of the paint, he also emphasized that he had met and furthermore surpassed contemporary industrial standards:

The paint here is not artist's paint. It is auto enamel, and I mix it; and it is much better than artist paint for outdoors. First the iron is ground down so that it is raw, and it is primed with about 15 coats of epoxy primer; and then a few coats of zinc, and then a few coats of white, and then the color is put on after that; so it runs about twenty-five or thirty coats, and that's about three times the paint coat on a Mercedes or about thirty times the paint coat on a Ford or Chevrolet ... There is nothing better for outside painting than auto enamel as far as I know.<sup>94</sup>

In fact, as discussed in Chapter Two, Smith's business receipts indicate that the paints he used were of a much wider variety. Although he certainly purchased paints from automobile parts suppliers, the majority of his paints were obtained from domestic hardware suppliers and were designed for uses other than automobile finishes.<sup>95</sup> Charles Appleyard, who worked for J.E. Sawyer and Co. in the 1960s, confirmed to the author that the paints that Smith purchased from the company in the late 1950s and early 1960s were gloss or flat (matte) alkyd paints designed for various domestic and industrial uses, rather than specifically for automobile finish. These alkyd paints differed from household alkyds in terms of their superior durability, wearing and covering power, and were likely chosen

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<sup>93</sup> David Smith, interview with Thomas B. Hess, McCoy, 1973, 181.

<sup>94</sup> David Smith, Student Talk at Bennington College, 12 May 1965, Baro, 'Some Late Words From David Smith', *Art International* 9, October, 1965, 48.

<sup>95</sup> For example, Air-Land Motor Parts, Inc. (Glens Falls, NY) and Warren Auto Parts, Inc., (Warrensburg, NY).

by Smith for their practical protective properties over any choice of colour range, which would have been limited.<sup>96</sup> The alkyd Masury Syncota and Masury 4-hour Enamel, which appear in Smith's receipts, were developed specifically for use on "trucks, tractors and automobiles", again likely chosen primarily for their protective qualities.<sup>97</sup>

Evidence from Smith's receipts suggests strongly that the paints he chose to use for sculpture were not, as he had suggested, true automotive paints. Automobile enamel paints, whether alkyd, nitrocellulose or acrylic were formulated to be stoved (baked) at a high temperature in order to cure to a hard and glossy finish. Decorative/domestic alkyd paints were based on long-oil alkyds, formulated with a drying or semi-drying oil – initially linseed and subsequently soya bean oil. However, those intended for industrial use were based on short-oil alkyds, formulated with non-drying oils (such as castor oil) and therefore required stoving to cure. These industrial paints were not available to the retail market. Smith may have been referring to automobile refinishing paint, an aftermarket paint used to touch up damage on paint finishes, and not as durable as stoved automobile paints. These refinishing paints were often based on short oil alkyds or nitrocelluloses, or mixtures of the two. The paints that appear on Smith's receipts were almost certainly medium or short-oil oxidising (air-drying) alkyds, designed for kitchen appliances, farm implements and other domestic/industrial metal products. Because these alkyds have less oil in their formulation than decorative (long oil) alkyd paints, they have similar properties to true industrial automobile paints. Certainly more durable than household alkyds, these paints were still not as durable as true automobile paints. Smith in describing his paints as such may have been actively promoting the industrial nature of his process in suggesting he used the most practical, durable paints that he could find, or he may have simply used "auto paint" as convenient terminology for the discussion.

Smith's industrial studio process came to public attention for the first time in Elaine de Kooning's 1951 article in the series of Art News articles that featured descriptions of

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<sup>96</sup> Charles Appleyard, letter to the author, 8 Aug. 2008.

<sup>97</sup> It is clear that Smith struggled with finding the correct colour, particularly in his late works Smith felt that the final colour on many of his works was realized only after several failed attempts, or by chance after mixing several tins of paint together and finding a colour that worked. He often found it difficult to be entirely satisfied with a final colour, but accepted that in his output there would be works that were less than successful. He acknowledged this with a corollary in 1964, "some of them were not successful, but I make a lot of sculptures, so it doesn't matter." Baro, 1965: 49.

artists' studio and technique.<sup>98</sup> The article, and particularly the notes that Smith sent to de Kooning indicate that Smith's identity was strongly tied to his studio materials and process.<sup>99</sup> In the notes, rather than describe the process of making a sculpture, he preferred instead to describe in detail his daily working schedule, including the regular hours he worked, his stock of materials, and his ideology in asserting an industrial method of working. Smith named his studio Terminal Iron Works after the Brooklyn factory, which he felt reflected his origins in factory working; he subsequently purchased the rights to the name when the original Ironworks shut down. The term, 'studio' was too romanticised to describe the space in which he worked, and he stated: "My shop here is called the Terminal Iron Works, since it closer defines my beginning and my method than to call it 'studio'."<sup>100</sup> Referring to his place of work as 'shop' rather than 'studio' is further distinguished in terms of the differentiation of the physical processes involved in making sculpture and making painting/drawing:

I have two studios. One clean, one dirty, one warm, one cold. The house studio contains drawing tables, etching press, cabinets for work, records, photographs, and drawing paper stock. The shop is a cinderblock structure, transite-roofed, and has a full row of north window skylights set at a thirty degree angle. With heat in each end, it is usable in zero weather.<sup>101</sup>

In other words, here Smith identified both sculpture and drawing as industry in the description of his working life. He found it important to draw attention to keeping materials in stock, and that the workshop was usable all year, highlighting his industrious attitude to work. In addition to the conceptual branding of his place of work as Terminal Iron Works, which formed a part of his identity as artist-worker, owning the rights to trade under the name was also a practical necessity for Smith to work in this manner. With this identity he was able to facilitate the ordering of bulk amounts of materials and services as

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<sup>98</sup> Elaine de Kooning, 'David Smith Makes a Sculpture', *Art News*, vol.49, no. 2, April, 1951, 36-39, 64.

<sup>99</sup> David Smith, 'Notes for David Smith Makes Sculpture' 1951, McCoy, 1973, 73-77. This was originally published in *Art News*, Jan., 1969.

<sup>100</sup> Smith, 1951, McCoy, 1973: 75.

<sup>101</sup> Smith, 1951, McCoy, 1973: 73.

a business. In particular this enabled the ordering of stock quantities of steel, which enabled him to have a consistent output, and to work on many projects simultaneously.

Smith also made it very clear that he was concerned with buying the best materials that he could, understanding that having stock, and using quality materials would allow him to perpetuate his work output in a more practical manner:

I do not resent the cost of the best material or the finest tools and equipment. Every labor-saving machine, every safety device I can afford, I consider necessary. Stocks of bolts, nuts, taps, dies, paints, solvents, acids, protective coatings, oils, grinding wheels, polishing discs, dry pigments, waxes, chemicals, spare machine parts are kept stocked on steel shelving, more or less patterned after a factory stockroom.<sup>102</sup>

The importance of using the most practical tool and method for the job was outlined in a note written in 1947 about the significance of his use of arc-welding, placing emphasis on the fact that, as far as he knew, he was the first artist to use the method. His ideology regarding the particular technique of arc-welding was not born out of a conceptualisation for its contribution to a new artistic language, but simply that it was the most efficient means by which to produce the concept. This applies equally to the materials that Smith used in other media. To illustrate the point, he stated in 1947: “The technical procedures must flow so freely that they in no way interfere with the mind’s vision or art concept...I expect perfection and precision from my materials - my mind is involved in the creation of form.”<sup>103</sup>

The 1951 notes demonstrate that Smith was undoubtedly the first artist to break down canons of traditional artistic process by the introduction of industrial methods and work schedule, and transmuting this process into his work and his identity. Indeed maintaining a constant and regular working schedule was a way of maintaining his identity, such was his association with process. This is demonstrated in the lengthy description in his notes for

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<sup>102</sup> Smith, 1951, McCoy, 1973: 74.

<sup>103</sup> David Smith, ‘Design for Progress – Cockfight’ 1947, McCoy, 1973: 60-61. The case is the same for drawing, since Smith states that he kept a stock of several types of quality paper, not giving a thought to the (considerable) cost so that he could be free to concentrate on his work. Smith, 1951, McCoy, 1973: 75.



de Kooning of his daily schedule, which was arranged according to a regular timetable. Since Smith clearly felt that his vision far exceeded his ability to produce, this exhaustive manner of working facilitated the creation of the most amount of quality work that could be produced from this stream. The de Kooning article demonstrates clearly that Smith's identity was tied up in his process and in the work it produced. He stated in his notes for de Kooning: "I maintain my identity by regular work, there is always labor when inspiration has fled, but inspiration returns quicker when identity and the work stream are maintained."<sup>104</sup>

The progression of Smith's studio process is seen in his own 1960 Arts Magazine piece, 'Notes on my Work'.<sup>105</sup> By 1960, it is clear that Smith had fully embraced the industrial mode of working, and that it was instrumental in vastly increasing the output of work that came from Bolton Landing in the 1960s. In 1951, Smith stated that he made two or sometimes four pieces at the same time.<sup>106</sup> By 1960, he had radically accelerated his production. Smith's annotated photographs of sculpture in progress lying flat on white rectangles painted on his studio floor and outside on large sheets of metal demonstrate that at this point, he was working on multiple sculptures at the same time (Figure 33). Juxtaposed with the photographs of sculpture in progress are photographs of the floor of his drawing studio covered with ink drawings laid to dry, and of the black marks left behind on the white floors which were transferred into his spray drawings.

New materials and tools, and the ability to delegate much of the industrial labour to assistants, enabled Smith to achieve a truly remarkable output.<sup>107</sup> Although he had stated in 1952: "In the work process I control the entire process from origin to finish. There are no in between craftsmen or process distortions",<sup>108</sup> by 1960, Smith appears to have relinquished much of his labour to his assistants, even though he still denied using them in 1961: "I can't use studio assistants any more than Mondrian could have used assistants to

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<sup>104</sup> Smith, 1951, McCoy, 1973: 76.

<sup>105</sup> Smith, David. 'Notes on my Work', Arts, February, 1960, 44-49.

<sup>106</sup> 'Smith, 1951, McCoy, 1973: 77.

<sup>107</sup> Smith's working methods in sculpture in the 1950s and 1960s is discussed at length in Marcus, 1983: 117-130, though Marcus does not elaborate on the apparent incongruity of Smith's statements about using assistants.

<sup>108</sup> Smith, 'The New Sculpture', 1953, McCoy, 1973: 84. He denies using assistants in his 1961 interview with David Sylvester, McCoy, 1973: 173.

paint in solid areas.”<sup>109</sup> In fact Smith employed Leon Pratt as a part-time assistant as early as 1949, and by the mid 1950s, Pratt was employed full-time. From 1963 Smith was employing at least two other men part-time.<sup>110</sup> Leon Pratt states that although Smith’s process was in no way a production line, Smith generally laid out the patterns with stencils that he cut from cardboard and made to the exact dimensions of the sculpture, creating the composition, and then moved on to the next work. In this way, he worked almost according to a foreman role in a factory where the concept and design was implemented by a supervisor, the essential construction was carried out by assistants, and then the work was sent for finishing in paint, lacquer or burnishing by Smith. Several Cubi sculptures were created at the same time, with Smith making adjustments and changes as necessary.<sup>111</sup>

In this case, it may simply be that Smith did not consider the work carried out by assistants as part of his artistic process. It is important to note that although Smith allowed Pratt to finish the burnishing on the surfaces of the Cubis, he never permitted him to apply the final coat of paint to a work.<sup>112</sup> This highlights issues that will be discussed in the next chapter. The role of assistants in the production of artists work is complex and is rarely discussed in the literature or by the artists themselves; it is an area that requires further investigation.<sup>113</sup> However, Jeremy Lewison has made the interesting observation that Smith’s comment to David Sylvester (a British art historian) in the interview that he did not make copies, may have been indirectly aimed at Henry Moore, the most important British sculptor at the time.<sup>114</sup> In other words Smith’s stating that he did not use assistants may have simply another way of asserting the difference between his work, and the

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<sup>109</sup> David Smith, Interview with David Sylvester, 1961, McCoy 1973: 173-4

<sup>110</sup> In 1963, Smith wrote; “I continue with new work, ordering new material, keeping two men busy as aids, and plans for bigger work.” David Smith, letter to Robert Motherwell and Helen Frankenthaler, 10/4/63, AAA, NDSmith RD, F360. Marcus states that Smith’s payroll for 1963 included \$10,000 for three assistants. Marcus, 1982: 127.

<sup>111</sup> Interview with Leon Pratt, 1970, in Marcus, 1972: 227.

<sup>112</sup> Leon Pratt, interview with Margaret Haggerty, 11 and 12 July, 1967, in Haggerty, 1968:87.

<sup>113</sup> Although, the role of assistants is occasionally acknowledged in more recent studies of artists’ work (for example, Robert Motherwell et al. Reconciliation Elegy: A Journal of Collaboration, Skira Rizzoli, New York, 1980), they are rare elsewhere and almost never mentioned in artists’ own discussions of their working methods in the 1940s and 1950s.

<sup>114</sup> Jeremy Lewison, ‘Sculpture is Part of My World: The Worlds of David Smith and Henry Moore at Mid-Century’, Abstraction Across Media: David Smith, Tate Gallery Symposium, London, 4 Nov. 2006.

position of American sculpture and the work of Moore, who he clearly admired but who was representative of a form of monolithic sculpture that Smith considered outdated.

In the 1960s, Smith began to use assistants and fabricators for more of the basic welding work in his sculptures. The enclosed stainless steel forms that he used for the Cubis were particularly difficult to produce. Buckling and warping occurred when closing the final side of the form, due to the build up of heat inside. Leon Pratt states that Smith tried various techniques to solve this issue, including drilling holes to release the heat, and creating internal rods and diagonals to hold the structure. He finally reached a solution: leaving four or five inches open until the cube cooled, then welding them shut the next day. However, this process was unwieldy, and may have interfered with his work flow. It may have contributed to Smith's decision in the early 1960s, to have many of the cubes fabricated for him, the fabricators creating the shapes according to his dimensions.<sup>115</sup> Although Smith was not the first artist to outsource methods to others, it is likely that this method of production was not seen before in artists' studios.

It is clear then that Smith was a kind of forerunner for the rejection of the traditional studio methods and materials, and the embrace of fabrication by Minimalist artists. Smith's adoption of both industrial method, delegation to assistants, (and, to a limited extent, use of fabricators) must have been known to Judd, though he was by no means the first artist to use fabricators. In the 1920s, Moholy Nagy ordered paintings from a paint factory over the telephone specifying colours from paint charts and locations by schematic drawing. Smith, however, was likely the first to bring fabricators into a continuing studio process in sculpture with the manufacture of his cubes and cylinders. Stephen Weil, administrator of the Whitney Museum of American Art and Marlborough Galleries stated

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<sup>115</sup> The stainless steel cubes and cylinders were fabricated at Ryerson Steel, NY. According to Marcus, 1972, Smith's inventory lists 35-40 austenitic stainless steel cubes of various sizes. In 1961, according to Marcus, Smith's orders for stainless steel totalled over three and a half tons. Dan Clenderman, General Order Manager at Ryerson Steel in the 1970s, stated that the creating the cubes using welding alone could create internal stresses and buckling due to the differing cooling rates of the panels. Ryerson solved this issue for Smith by placing the cubes inside a furnace to remove the stresses, heating all the surfaces at an equal rate. Dan Clenderman, Interview with Stanley Marcus, Marcus, 1972: 223-224.

that Smith's production method for the Cubis "broke the way to truly fabricated sculpture."<sup>116</sup>

However one might view Smith's approach to making his work, it is clear that his early experiences and political engagement was strongly connected to a belief that to produce art efficiently and to a high standard, the artist must use materials of high quality. As I have discussed above, having carried out extensive research into the casein and egg tempera medium, and obtaining the significant credentials as a unionised steel worker, Smith was actively producing work with what he considered to be durable materials. The identification with the factory worker in his statements was perhaps posturing on the part of Smith, but as Caro observes, it was simply a need to assert his position as a worker, shed any possible accusation of pretension, reduce the application of critical verbiage to his work, and present his work as a break from tradition. Tradition, he said, "comes wrapped in word pictures. Words are the traps which lead the non-artists into cliché thinking and conclusive evaluation".<sup>117</sup>

Given the attention that Smith paid to the durable quality of his materials in drawing and sculpture, and the extensive experiments and research that he carried out into the tempera medium, it is perhaps unusual that a significant number of his egg-ink and synthetic media drawings suffer from a disfiguring white efflorescence. The need to address this issue prompts an important discussion on the nature of the phenomenon, why these works have deteriorated, and how one should proceed. As I will point out, even the smallest change in his work was unacceptable for Smith, yet he died without leaving clear instruction about how to proceed where damage occurred. Chapter Four attempts to provide some form of context for the identification of Smith's intent (if this can accurately be identified) by interrogating the scant information on the subject left in several statements and letters, to date largely unpublished.

The need to redress Smith's intent for the deteriorated drawings is also weighted by considerable provenance. In the early 1970s, the removal of deteriorated white paint from

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<sup>116</sup> Stephen Weil, Interview with Stanley Marcus, August 7, 1971, Marcus, 1972: 232. Smith also mentions ordering the fabrication of forty-five forged works from drawings from a company in Philadelphia. David Smith, McCoy, 1973: 185.

<sup>117</sup> Quoted in McCoy, 1973: 13.

five of Smith's sculptures by the then executors of Smith's estate resulted in these works being completely stripped of their paint and represented in an entirely different aesthetic framework. This was carried out in an apparent decision to redress Smith's intent. While the decision to treat the drawings is by no means as radical, there remain considerable issues that need to be addressed.

The previous chapters for example, have outlined how subtle nuance in both sculpture and drawing is often hidden in Smith's work, and also that his concern for durable and quality materials were an essential part of his artistic life. There are many ways in which these aspects might be compromised through deterioration, age and inappropriate treatment that may negatively impact on our understanding of Smith's life and work. Ignorance of this complex procedural knowledge in Smith's work can lead to misidentification of intent, and this forms the discussion in the following Chapter.

## **CHAPTER 4: Alteration and Intent in David Smith's Drawings and Sculpture**

A work of art belongs to its time. We are entitled to find new meanings in it as history progresses, but in order to justify substantial physical alterations to the work itself, we would have to have to produce very sound reasons indeed.<sup>1</sup>

Peter Fuller's reaction to the deliberate alteration of the surfaces of several of David Smith's sculptures by the executors of his Estate in the mid-1970s provides an introduction to the themes of this chapter. The previous chapters have demonstrated that tacit and material investigation can highlight new meanings and new contexts for Smith's work, yet it has also demonstrated that the subtleties of meaning can be delicate and subject to damage, both physical and conceptual. This Chapter highlights two aspects of damage/alteration in Smith's works - one unexpected, one intentional - and suggests that both can alter our perception of his work and intent. Disfigurement of the surfaces of several of Smith's ink and alkyd drawings through the formation of efflorescence, and the corresponding loss of media damages our perception of the nuances of reflectance, sheen and texture so treasured by Smith. Similarly, the deliberate removal of deteriorated paint from several of Smith's sculptures, and the subsequent presentation of these stripped works as more accurately representing Smith's intent profoundly altered the perception of these works and placed them in a new (and arguably inauthentic) conceptual framework. How does conservation respond to such damage while imposing minimal alteration to the artist's original intent?

In order to make these decisions, thorough technical investigation is vital. Although efflorescence is treated fairly often on painting media, its presence on works on paper is comparatively rare. Standard treatment for its removal in paintings may not be appropriate for works on a paper substrate. Given David Smith's interest in the durability of his media, discussed in Chapter Two, the presence of such extensive and damaging efflorescence in his work is unexpected, and it warrants investigation. Damage and loss to

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<sup>1</sup> Peter Fuller, 'Smith's Original Greenbergs', *Arts Review*, 26, Oct. 1974, 630.

Smith's drawing media can require extensive intervention, particularly where media is to be replaced. Yet, can one replicate the subtle textures and surface qualities achieved by Smith in his drawings? Would this be appropriate? This issue highlights the importance that we place on the power of origin and the touch of the artist's hand in imposing authenticity for works of art. As I point out below, Smith was vehemently opposed to artwork that did not come from the hand of the artist. But his unexpected death leaves those in charge of the care of his work with difficult decisions. This is an emotive issue particularly for the perception of Smith's works, since poor decisions made on behalf of the artist's work have such a notorious precedent. The removal of paint from Smith's sculpture in the 1970s was carried out ostensibly to redress Smith's original intent, though as I argue below, it simply imposed another aesthetic on the works that reflected the prevailing philosophy of the Executor, Clement Greenberg. This incident has of course, been cited frequently in discussions on Smith's work and on the conservation of sculpture. However, surprisingly little has been published regarding the details, and it is surrounded by considerable myth and inaccuracy. This chapter will collate and interrogate the various documents charting this in order to illustrate the complexities of making significant and sometimes irreversible decisions on behalf of an artist.

#### **4.1: Identifying what is intentional in David Smith's work**

Identifying what may be considered "authentic" and "intentional" in a work of art has become increasingly voiced in both historical and conservation discussion.<sup>2</sup> Identifying what "authenticity" really means in terms of a physical work of art is a difficult task and it is not my intention to articulate its various meanings. For the purposes of this discussion, however, I would argue that damage or alteration in Smith's work provides an interesting viewpoint from which to discuss how articulation of the tacit might inform our perception of what may or may not be intentional or authentic. Authenticity is naturally a relative term, but in this case, I use Denis Dutton's definition of "nominal authenticity", which specifically relates to the correct identification of the origins, authorship or provenance of

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<sup>2</sup> See for example: David Phillips, *Exhibiting Authenticity* (Manchester: Manchester University Press, 1997) and Kimberly Davenport, 'Impossible Liberties: Contemporary Artists on the Life of Their Work Over Time', *Art Journal*, vol.54, no.2, Summer, 1995.

an object, and how this informs our perception of it.<sup>3</sup> As Dutton observes, much of what we take to be authentic in art is implicit in our understanding of the specific origin of the work, as it comes from the hand of the artist. From this view of identifying the authentic, I am referring directly to how we might interpret alteration in Smith's work, whether intentional or unintentional.

The meaning of these terms therefore is difficult to articulate and may be entirely contextual. David Phillips and Kimberly Davenport, for example, have discussed the possibility that authenticity and intent are concepts that are in constant flux, and as a generalization may be impossible to articulate in conservation/restoration theory.<sup>4</sup> Both Cathleen Hoeniger and David Lowenthal observe that identification of the authentic in works of art is entirely dependent on the ideology of the moment, and cannot reveal the artist's original intent.<sup>5</sup> The idea of the impossibility of correctly identifying intention is not new. As early as 1946, Wimsatt and Beardsley suggested an anti-intentionalist viewpoint, and observed that artists' intent was neither available, nor desirable as a standard for interpreting art.<sup>6</sup> Time, dirt, deterioration and mishap all contribute to the alteration or destruction of the character of the original work, but as Steven Dykstra observes, physical materials decay, but artists' purposes, aims, objectives "exist in a psychological arena where they do not compose or deteriorate."<sup>7</sup>

Addressing intent is fraught with difficulties, since conservators deal specifically with both the physical damage/deterioration, and in the "psychological arena" of artists' aims and objectives. Questions about whether the artist can be the ultimate authority for his/her own intent are outside of the discussion of this thesis. However, a reliance on artist statements, or the statements or opinions of those who were close to the artist while alive

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<sup>3</sup> Denis Dutton, 'Authenticity in Art', Oxford Handbook of Aesthetics, ed. Jerrold Levinson (Oxford: Oxford University Press, 2003) 258-275.

<sup>4</sup> Phillips, 1997, and Davenport, 1995.

<sup>5</sup> Cathleen Hoeniger, 'The Restoration of the Early Italian "Primitives" During the 20<sup>th</sup> Century: Valuing Art and its Consequences', Journal of the American Institute for Conservation, vol.38, no.2, Summer, 1999, 144-161, and David Lowenthal, The Past is a Foreign Country (Cambridge: Cambridge University Press, 1985).

<sup>6</sup> W.K. Wimsatt and M. Beardsley, 'The Intentional Fallacy', Sewanee Review, vol.54, 1946, 46-88.

<sup>7</sup> Steven. W. Dykstra, 'The Artists' Intention and the Intentional Fallacy in Fine Arts Conservation', Journal of the American Institute for Conservation, vol.35, 1996, 200.



may result in over-interpretation or over-generalization. For example, Smith's stress on the importance of the hand of the artist on all work is seemingly contradicted by his leaving much of the welding of his later sculptures to assistants. Particularly this is so in the creation of the gestural marks on his Cubi sculptures, which are often identified with the mythology of Smith as a larger-than-life Vulcan character who could wield a metal polisher as a brush, a task that he also often delegated to his assistant, Leon Pratt. This kind of thinking can lead to dangerous generalisations however. Rhetorically, if Pratt was permitted to carry out the burnishing, should he then be considered an authority on Smith's intention for other, unfinished works? Can we rely on a handful of David Smith's statements to extract enough information to understand how damaged works should be addressed?

#### **4.2: Artists' Statements**

Davenport's survey of the attitudes of contemporary artists to aging and restoration of their work demonstrates that over-generalization of an artists' statements can result in erroneous judgements regarding the interpretation of their wishes. The American artist, Sol Lewitt is widely known for his conceptual approach that permits gallery assistants to recreate his wall drawings by following a set of instructions. Additionally, Lewitt has made it clear that identical wall drawings can exist in more than one location and remain individual authentic works. However, this theory is specific only to certain works in Lewitt's oeuvre. When contacted by the Wadsworth Atheneum regarding the possible creation of another edition of his sculpture Standing Open Structure, Black (1964) so that it could safely be loaned to another institution, Lewitt stated clearly that the original sculpture was a unique work, and could not be replicated.<sup>8</sup> Similarly, Mel Bochner, an artist also identified with conceptualism, and who also creates wall drawings, applies an entirely different conceptual frame to his work. He has stated that his wall drawings are unique to their environment and can only be created by himself. For Bochner, the casual generalization of conceptual art in the mid 1970s was such that all works were considered to be without specificity and individuality and therefore were therefore considered to be endlessly reproducible. This attitude was certainly not applicable in the case of his own

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<sup>8</sup> Davenport, 1995: 42.

work, and he states clearly that this had caused him some considerable problems in the past.<sup>9</sup>

Fortunately, both Lewitt and Bochner were alive when these questions were being considered. In the case of David Smith, we must rely on personal testimony, statements about process, statements about the importance of the artist's touch, and statements related to his thoughts about damage, alteration and restoration in his work. These can only hope to provide a partial impression of the overall intent behind Smith's work. Personal testimony is often unreliable and, as I demonstrate below, can lead to poor decisions in the interpretation of intent. Additionally, with the kind of over-generalization discussed above - or worse, a selective interpretation of the statements made by Smith - it is possible to over-interpret many of the ideas expressed in his writing.

#### **4.3: David Smith and Restoration**

David Smith left a number of important statements and correspondence that might lead us to an understanding of his attitude toward damage and alteration in his work, the majority of which come from the last five years of his life (1960-65). In 1960, a collector bought Smith's *17h's* (1950) from Castelli Gallery, who had in turn purchased it after it had been exhibited at the Museum of Modern Art in 1957. The owner intended the work to be placed in the collection of the University of Arizona. However, prior to doing so, disliking the red paint that Smith had used, he had it stripped of its coating. David Smith, however, was clearly outraged when he discovered that this had occurred, and demanded that the owner return the work to the gallery. When he refused, Smith publicly denounced the act, and disowned the work. In a letter to the editor of Art News, he wrote:

Sir,

Since my Sculpture, *17h's* (44 ¾ inches high), 1950, painted cadmium aluminium red, during the process of sale and resale, has suffered a wilful act of vandalism, I renounce it as my original work and brand it a ruin. My name cannot be attributed to it, and I shall exercise my legal rights against anyone making this misrepresentation. All persons

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<sup>9</sup> Mel Bochner, quoted in Davenport, 1995: 45.

involved in this act of vandalism will be, to the best of my ability, prohibited from acquiring any more of my work. I declare its value to be only its weight of 60lbs of scrap steel.

David Smith, Bolton Landing, N.Y.<sup>10</sup>

In addition, he wrote to the Editor of Arts specifying that he had painted the work with six coats of cadmium red, and perhaps more significantly: “possibly we should start an action for protective laws.”<sup>11</sup> Smith’s anger at the removal of this paint led to his renouncing authorship of the work. As Patricia Failing points out however, legally his renunciation had no validity in the United States at the time; his statement about protective laws suggests that perhaps he was aware of this.<sup>12</sup> In fact, it was not until 1983 that artists’ moral rights for the protection of the physical integrity of their work was brought into law in New York, prohibiting the display or reproduction of a work in an altered state that might inaccurately represent his/her intentions. Even the advent of the Federal mandate of the Visual Artists Rights Act (1990) in the United States would only have protected Smith’s moral rights during his lifetime. This is significant for both the alteration to 17h’s and the later alterations of Smith’s sculpture after his death which are discussed in the next section. In both cases, the alterations were performed entirely within the law.

Marcus has pointed out that Smith’s outrage in the pages of Arts and Art News may have been a carefully managed scheme on the part of Smith to use the media for publicity, possibly having been aware of marketing strategy from working at A.G Spalding in the 1920s.<sup>13</sup> Certainly afterward, when Castelli demanded the current market price for the resale of the work - \$3500 or more -Smith claimed that since the work was effectively

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<sup>10</sup> David Smith, letter to the Editor, Art News, May, 1960.

<sup>11</sup> Smith, letter to the Editor, Arts, June, 1960.

<sup>12</sup> Patricia Failing, ‘Artists Moral Rights in the United States Before VARA/1990: An Introduction’, Session Paper: Beyond Copyright: Do Artists Have Rights?, Panel Discussion, Committee on Intellectual Property of the College Art Association. February 2002. 1 Nov. 2008: <<http://www.studiolo.org/CIP/VARA/Failing/Failing.htm#n01>>. Failing also observes that prior to the present Visual Artists Rights Act (VARA) in 1990, artists’ rights were represented by a “patchwork of state laws.” Even today, the legal position of artists’ rights is complex. State laws still apply, and therefore artists’ rights shift with the artist’s geographical location.

<sup>13</sup> Marcus, 1983: 133.

vandalized, it had no market value, and demanded that the Gallery return the work to him to purchase at its initial sale price plus an additional five percent.

Marcus' scepticism is understandable, given Smith's difficult relationships with museums and dealers, discussed below. However, in Smith's notebooks, there is further evidence that he was concerned with aspects of the care and preservation of his work, and these letters point to a genuine attitude toward the impact of damage to his work; they are also indicative of his cautious but skittish attitude to dealers; his work had, he believed, suffered poorly at their hands. In particular, Smith's desire to have the work returned to him, and his subsequent decision to completely withdraw it from any future sales, makes it clear that he was personally affronted by the act, and that he felt that the work had no value without its coating. Significantly on its return, he repainted the work in the same manner. This is an important insight into the manner in which Smith regarded the surface treatments of his sculpture, and as I point out below, pertains to the events that occurred in 1974.

Smith's negative attitude to dealers stemmed from several incidences in the 1950s where work was damaged, and in one instance, stolen. These events, together with rising costs, difficulties in storing work that had increased dramatically in scale, and lack of sales resulted in the severance in 1956 of his relationship with Marian Willard, the dealer who had promoted his work since 1938. Willard received several complaints from Smith over damage to his sculpture. For example, Agricola IV (1952/3) went missing en route to an exhibition at the Art Institute of Chicago, and Smith also claimed that two further sculptures were damaged while in her care. One of the sculptures he refers to in this case was Head #3 (1939), which was damaged in 1954 in a shipment to the University of Wisconsin, and over which he had a long battle to reclaim damages from the railroad company.<sup>14</sup>

Subsequently, Smith demanded that Willard adhere to the packing standards of the Metropolitan Museum in New York. In another letter of the same year, he pointed out that aside from taking time, the more important consequence of damage was a "loss to the

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<sup>14</sup> Letter from Harvey K. Littlejohn to David Smith, 12 Aug. 1954, AAA, Marian Willard Papers, R986, F635.

original concept.”<sup>15</sup> A letter to the Director of the Whitney Museum two years later shows that these aspects were still on his mind: “Work never restores satisfactorily, and reimbursement does not compensate for the time that should be put on new work.”<sup>16</sup>

His concern was not only for his sculpture. A letter to Dan Johnson, Marian Willard’s husband, from 1955 indicates that Smith was also concerned over the transit and storage of his drawings. He stated: “I don’t want to leave my drawings in portfolios loose. They wear too hard that way. If you don’t have room, return both. I despair seeing my work worn, and in the case of sculpture, often damaged.”<sup>17</sup> After the damages to his work in 1954, he was considerably more vehement about the transit of his work. He insisted that no work be sent out of New York without being packed individually and according to contemporary museum standards, and that no drawings be shipped unframed.<sup>18</sup>

Smith’s personal attitude to restoration was complex. He stated that on some occasions it was acceptable to repaint certain works - for example, in a letter to the collector Lois Orswell, he suggested that she periodically repaint her sculpture, Fish (1950, Harvard Art Museum) specifically with “tube cadmium red and varnish mixed”.<sup>19</sup> However, on other occasions, he stated that only he should carry out restoration work. For the gestural marks on the surface of the Cubi sculptures, as noted above, he felt that when they became dulled, assistants could regrind the works.<sup>20</sup> Though often identified by critics as an important part of his process in making the Cubis, he stated that: “The burnishing is

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<sup>15</sup> Letter to Grace McCann, San Francisco Museum of Art, 14 Nov. 1954, Marian Willard Papers, R986, F656.

<sup>16</sup> Letter to Herman More, Director of the Whitney Museum of America Art, 30 Oct. 1956, David Smith Estate, Box 3, Correspondence, 1956.

<sup>17</sup> Letter to Dan Johnson, 12 July, 1955, AAA, Marian Willard Papers, R986 Correspondence File on David Smith, F683.

<sup>18</sup> Letter to Marian Willard, 14 Nov. 1954. Willard Papers, R986 Correspondence File on David Smith, F684.

<sup>19</sup> Letter to Lois Orswell, 16 Oct. 1960, Harvard Art Museum Archive (1976.156.33).

<sup>20</sup> See interview with Leon Pratt in Marcus, 1972, Appendix 18: 227, and Peter Stevens in Magda Salvesen and Diane Cousineau, eds. Artists’ Estates: Reputations in Trust (New Jersey: Rutgers University Press, 2005), 231.

incidental to the shape. A workman can reburnish. I or one of my men would do this in case of injury.”<sup>21</sup>

There is also evidence in some of Smith’s correspondence that he felt strongly about restoring some damage to his work himself during his own lifetime. He provided perhaps the most pertinent advice only a year before his death. A letter to Smith from the Cafritz Insurance Company in 1964 indicates that they were concerned over possible vandalism that could occur through displaying Cubi XI (1963) in public at the exterior of their building. Smith wrote a draft response to the questions from Cafritz on the letter itself, in which he stated clearly his aims for any restoration, and the importance his supervision:

[Cafritz] In the event of any loss, do you have any recommendations as to how restoration could be effected and by whom?

[Smith] During my lifetime I’ll supervise it. There is a higher artistic value to this than any monetary consideration. I want all my work to represent me in its best possible way. I am in Washington DC six times a year at least. I’ll supervise or restore any possible vandalism.<sup>22</sup>

Smith was clearly an artist for whom any alteration or intervention in his work was unacceptable. However, his statements were also contradictory, and achieving a clear understanding of his intention is particularly difficult given these contradictions.

If alteration was unacceptable for Smith, how do we proceed when faced with unintentional, unexpected damage? Misidentification of Smith’s intent had profound consequences for several of Smith’s later sculptures, but it has an important bearing on how to approach damage in his ink and alkyd drawings caused by efflorescence. As noted above, the local loss of media in many of these works requires substantial intervention to redress the important balance of texture, line and surface. However, in order to begin to achieve an understanding of how to intervene in these works, it is important to understand how and why this efflorescence formed.

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<sup>21</sup> Letter from Cafritz General Insurance Underwriters, Washington D.C, 10 Mar. 1964, David Smith Estate, Box 4, Correspondence 1960.

<sup>22</sup> Letter from Cafritz General Insurance Underwriters, Washington D.C, 10 Mar. 1964, David Smith Estate, Box 4, Correspondence 1960.

#### 4.4: Efflorescence in David Smith's Ink Drawings

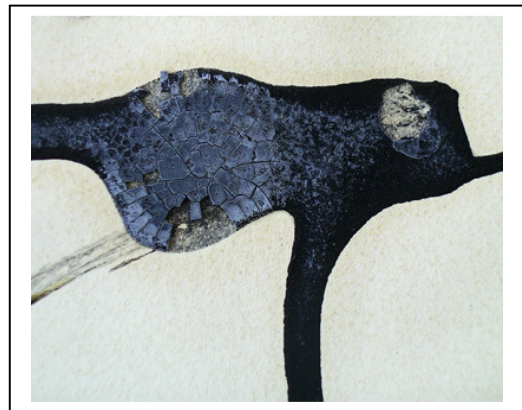
Given David Smith's clear concern for durability, desire to produce work in both sculpture and drawing according to industrial/artistic standards, and extensive testing of painting/drawing media, it is somewhat surprising that a significant proportion of his drawings in both egg-ink and alkyd from the 1950s and 1960s suffer from a disfiguring white surface efflorescence (see Figures 43). The efflorescence causes extensive desiccation and cracking of the medium, and in several cases medium is lost. It has been estimated by the David Smith Estate that five percent or more of their collection of drawings from this period suffer from some degree of efflorescence. It also appears that the phenomenon has become significantly noticeable to warrant intervention only in the last decade, indicating that the efflorescence may have had an "incubation" period of approximately fifty years.<sup>23</sup>

Several authors have put forward hypotheses in order to explain the mechanism whereby free fatty acids can be formed within the paint matrix, and why in certain circumstances they migrate through the paint and are exuded onto its surface. A complete scientific investigation into the mechanism of fatty acid efflorescence formation in artistic media is not within the scope of this research; more research is required to fully understand its mechanism in artistic media. However a review of certain hypotheses is presented here in order to understand more fully the cause of the efflorescence on Smith's ink and synthetic media drawings. As a result, it appears that a combination of inherent deterioration of the components of Smith's egg-yolk and alkyd media and the lack of an adequate preservation strategy by the original Executors of Smith's Estate after his death may have resulted in the conditions necessary for the appearance of efflorescence his work.<sup>24</sup> By reviewing the

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<sup>23</sup> Peter Stevens, conversation with the author, June, 2005. The author confirmed that Smith drawings in black egg-ink in the collection of The Museum of Modern Art, the National Gallery of Art, Washington D.C, the Metropolitan Museum of Art, and the Harvard Art Museum also have begun to show signs of efflorescence.

<sup>24</sup> The original executors of David Smith's Estate were the critic Clement Greenberg, the artist Robert Motherwell and a lawyer, Ira Lowe. The mismanagement of Smith's Estate in the years after his death, largely through the actions of Clement Greenberg, and the many issues involved in the reclamation and the return of the collection to Smith's daughters was discussed by Peter Stevens, Executive Director of the David Smith Estate in several conversations with the author (March 2006, March 2007, April 2008). Much of the history of the Estate is also available in an interview with Peter Stevens in Salvesen and Cousineau: 2005.



**FIG. 44:** Fatty acid efflorescence and corresponding loss of medium on several of David Smith's ink drawings, with image of mould (below) exhibiting characteristic target appearance, often found in combination with efflorescence.



literature on efflorescence, it is possible to identify the conditions under which efflorescence has formed on Smith's drawings.

#### **4.5: Ghost Images: Fatty Acid Efflorescence in Artists' Media**

Efflorescence on works of art is a relatively common phenomenon. It appears to be most prevalent on oil paintings from the late nineteenth to the early twentieth-centuries, though it has been observed on sculpture, leather bindings, egg tempera paintings and works on paper. It has been found on objects as diverse as wax sculpture, ethnographic wood, and even chocolate artifacts.<sup>25</sup> Efflorescence on stone is also commonly reported in the conservation literature. This comprises alkaline earth metal salts that are carried through stone in solution, forming on the surface as crystalline deposits. In the 1960s, Elizabeth West found sodium chloride, calcite and calcium acetate efflorescence in a sculpture stored in a wooden box.<sup>26</sup> She identified changes in temperature and humidity as the probable cause of the migrating salts. At the same time, Sayre and Majewski identified gypsum efflorescence using XRD in frescoes by Giotto in the Scrovegni Chapel in Padua.<sup>27</sup>

Efflorescence on painting media was first described by Bromelle in 1956, who theorized that it consisted of exuded ammonium sulphate crystals.<sup>28</sup> Although there are notable exceptions, for example the discovery of efflorescent silver sulphide crystals on the surface of paintings by Whistler in 1985, more recent work has identified that efflorescence on works of art is a result of exudation of free fatty acids from the painting media, forming on the surface of the paint as either metal soaps or fatty acid crystals.<sup>29</sup>

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<sup>25</sup> Cate Harley, 'A note on the Crystal Growth on the Surface of a Wax Artefact', Studies in Conservation, vol.38, no. 1, Feb. 1993, 63-66, Ellen Pearlstein, 'Fatty Bloom on Wood Sculpture from Mali', Studies in Conservation, vol.31, no.2, May 1986, 83-91, Helen Cox, 'The Deterioration and Conservation of Chocolate from Museum Collections', Studies in Conservation, vol.38, no.4, Nov. 1993, 217-223.

<sup>26</sup> Elizabeth H. West, 'Efflorescent Salts on Museum Objects', Freer Bulletin of the American Group, IIC, vol.2, no.1, Oct. 1961, 31-41.

<sup>27</sup> E.V. Sayre, and L.J Majewski, 'Studies for the Preservation of Frescoes by Giotto in the Scrovegni Chapel at Padua: II: Technical Investigations of the Paintings', Studies in Conservation, vol.8, no.3. May, 1963, 42-54.

<sup>28</sup> N. Bromelle, (nt), Museums Journal 55, 1956, 233-267.

<sup>29</sup> Elizabeth West Fitzhugh, 'Some Technical Notes on Whistler's Peacock Room', Studies in Conservation 30, 1985, 149-154, E. Ordonez, and J. Twilley, 'Clarifying the Haze: Efflorescence in Works of Art', WAAC Newsletter, Jan. 1998, vol.20, no.1, and S.R. Williams, 'Blooms, Blushes, Transferred Images and

Fatty acid efflorescence has also been observed in modern egg tempera paintings, especially where framed. It has been discovered on the works of several early American tempera artists including Andrew Wyeth, as discussed below, and also in work by Mark Rothko, Jacob Lawrence and the early English tempera revivalist, Joseph Southall.<sup>30</sup>

The most comprehensive study of the causes of fatty acid efflorescence found in oil paintings to date is by Jorrit van den Berg,<sup>31</sup> whose thesis encompasses analytical results from many samples of efflorescence, and investigates the theoretical causes of efflorescence in oil painting. Although it is mentioned in passing in certain works,<sup>32</sup> efflorescence in egg tempera paintings has not been studied in such an in-depth fashion. This is perhaps due to the relatively few examples of egg efflorescence extant in studied collections, and the large number of canvas painting in oil.

Michael Schilling et al confirm that modern tempera paints have never been fully investigated, and although Boyle et al have discussed the technical history and use of various temperas in America, their study is limited to the period 1930-1950.<sup>33</sup> Richard Newman (in Boyle et al) discusses the analytical techniques required to identify egg-yolk in painting media; however they do not mention deterioration of the media or efflorescence. Three articles which have associated efflorescence specifically with the use of egg are: Mancusi-Ungaro and Gotschaller discussed the treatment of several canvases

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Mouldy Surfaces: What are these distracting accretions on art works?' Conference Papers, 14th Annual IIC-CG Conference, Ottawa, 1989, 65-84.

<sup>30</sup> See Carol Mancusi-Ungaro, 'Preliminary Studies for the Conservation the Rothko Chapel Paintings: An Investigative Approach', AIC Preprints, Philadelphia, 1981, 109-113, Carol Mancusi-Ungaro, 'The Rothko Chapel: Treatment of the Black Form Triptychs', Cleaning, Retouching and Coatings: Technology and Practice for Easel Paintings and Polychrome Sculpture, Preprints IIC Congress, Brussels, 1990, 134-137, and Jill Dunkerton, 'Joseph Southall's Tempera Painting', Joseph Southall 1861-1944 (Birmingham: Birmingham Museum and Art Gallery, 1980) 22.

<sup>31</sup> J.D.J. van den Berg, Analytical Chemical Studies on Traditional Linseed Oil Paints, PhD Thesis, University of Amsterdam/MOL-AMOLF, 2002.

<sup>32</sup> For example: In Wyeth's tempera paintings in Joyce Hill Stoner, 'Collaborations With Living Artists: The Wyeths (A.K.A. The Pennsylvania Bruegels)', Conference Proceedings, ICOM-CC, 12th Annual Meeting, Lyon, France, 1992, 409-414, and Jacob Lawrence paintings in Michael Schilling et al. 'Modern Science and Contemporary Paintings: Preserving an Evolving Legacy', Getty Conservation Newsletter, vol.17, no.3, 2002.

<sup>33</sup> Michael Schilling et al. 'Appendix: Identification of Binding Media and Pigments in the Paintings of Jacob Lawrence', Over the Line: The Art and Life of Jacob Lawrence eds. Peter Nesbitt, and Michelle DuBois (Seattle, University of Washington Press, 2000) 266, and Boyle, et al. Milk and Eggs: The American Revival of Tempera Painting, 1930-1950 (Seattle, Washington University Press, 2002).

by Mark Rothko painted for the Rothko Chapel at the Menil family in Texas in 1964.<sup>34</sup> However, Rothko's chosen media of oil paint, turpentine, whole egg and dammar resin makes it difficult to ascertain whether the efflorescence occurred due to the oil paint, the egg or indeed both. Alan Phenix mentions efflorescence on freshly prepared egg tempera films, but does not provide examples on works of art.<sup>35</sup> Efflorescence in Jacob Lawrence's painting Magic Man (1958, Hirshhorn Museum and Sculpture Garden) is mentioned briefly by Schilling et al, though it is not clear whether this resulted from Lawrence's home made egg tempera, or the commercial tempera that he used prior to the 1940s, which may or may not have included egg.<sup>36</sup> Efflorescence has also been identified on paintings by Adolph Gottlieb, Willem de Kooning, Meret Oppenheim, Arthur Dove, Ben Shahn, and Andrew Wyeth.<sup>37</sup>

Though the majority of the published literature refers to efflorescence on paintings in what may be termed 'traditional' media, the phenomena has also been identified on paintings in alkyd in both paintings and canvas. This is unsurprising since alkyd paints contain a significant proportion of drying (often linseed) and later, semi-drying (often soybean) oils as a component part of the paint. During manufacture, alkyd paints are typically modified with oils in the form of triglycerides, additional fatty acids or mixtures of the two. The fatty acids are added to supplement those contained in the oil component of the paint, which typically contains only a small proportion of free fatty acids. The ability of free fatty acids to form soaps at the pigment interface aids pigment dispersion and settling.<sup>38</sup> Therefore, fatty acid mobility in alkyd paints is not unexpected.

The author identified fatty acid efflorescence on a Cocktail Party, a 1962 alkyd painting

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<sup>34</sup> Carol Mancusi-Ungaro, and Pia Gottschaller, 'The Rothko Chapel: Reflectance, Reflection and Restoration', Zeitschrift für Kunsttechnologie und Konservierung (ZKK), Wernersche Verlagsgesellschaft, 16 Jahrgang 2002, Heft 2.

<sup>35</sup> Alan Phenix, 'The Composition and Chemistry of Eggs and Egg Tempera', and J.J. Boon et al, 'Mobile and Stationary Phases in Ageing Tempera and Oil Films' in Early Italian Paintings: Techniques and Analysis, Limbourg Conservation Institute, Symposium, Maastricht, 1996.

<sup>36</sup> Schilling et al, 'Modern Science and Contemporary Paintings: Presenting an Evolving Legacy', 2002.

<sup>37</sup> Adolph Gottlieb, Thrust (1959 Metropolitan Museum of Art, New York) Personal communication between the author and Easel Paintings Conservators, 2003. de Kooning, Oppenheim and Dove in Ordonez, 1998: 6, Shahn in Schilling et al, 2002: 3 and Wyeth in Stoner, 1999: 409-414.

<sup>38</sup> See for example, Charles S. Tumosa, 'A Brief History of Aluminium Stearate as a Component of Paint', WAAC Newsletter, vol.23, no.3, Sept. 2001. np.

on paperboard by Antonio Saura in the collection of the Metropolitan Museum of Art. Furthermore, a 'ghost image' was formed on the underside of the glazing corresponding to the same areas of paint exhibiting efflorescence. This is not uncommon, and Schilling et al. have identified the phenomenon in oil paintings.<sup>39</sup> They ascribed it to volatile fatty acids migrating through the paint, evaporating and then condensing on the glass.

This effect is also seen in efflorescence in Smith black dripped alkyd Nudes on paper created in 1963. All five examples examined by the author suffered from extensive efflorescence and cracking.<sup>40</sup> The works were stored for some time in sealed glassine envelopes, and these envelopes show distinctive ghost image formation (See Figure 45). This appears to relate to the hypothesis that fatty acids are deposited on the surface of media in framed works where they are prevented from evaporating fully, exemplified by the formation of ghost images on the underside of glass. In the case of the Smith drawings, they were stored flat and largely interleaved in plan chest drawers or, prior to the existence of the present Estate's storage facility, were left outside the drawers, but were stacked on top of each other. It is possible then that this manner of storage may have prevented complete evaporation of the fatty acids from the works on paper, allowing significant deposits to form on the surface.

This may explain why the alkyd Nudes on gessoed canvas, painted at the same time and in the same medium, do not appear to exhibit any efflorescence.<sup>41</sup> The canvas paintings on stretchers were stored vertically, unlike the works on paper, and it is possible that this method allowed more evaporation of fatty acids to take place. However, the extent of the efflorescence observed on the alkyd works on paper is such that it seems unlikely that either paper interleaf or glassine envelope could have retarded evaporation to such an extent to allow such a quantity of fatty acids to be deposited on the surface.

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<sup>39</sup> M. Schilling, D.M. Carson, and H.P. Khanjian,, 'Evaporation of Fatty Acids and the Formation of Ghost Images by Framed Oil Paintings', in: WAAC Newsletter, Sept. 1998, vol.21, no.1, 1-6.

<sup>40</sup> Photographs by Alexander Libermnan taken of Smith's studio after his death show that this paint was Dupont Dulux alkyd paint, a household enamel.

<sup>41</sup> Analysis of samples from both works on paper and on canvas confirm that Smith used the same medium in both. See Appendix C.



**FIG. 45:** Ghost image formed on underside of glassine envelope that contained a work in black alkyd paint on paper (Untitled, 1963)

The indication that efflorescence can occur on such a young paint is further exemplified by several panel paintings in alkyd by the American artist Frank Stella (b.1936). Van den Berg mentions two paintings from the Art Institute of Chicago; Gobba, Zoppa e Collorto (1985) and Cricce, Croce e Manico D'Unico (1986).<sup>42</sup> Both paintings exhibited extensive efflorescence, which, as with Saura, was limited to certain colours. In this case, areas painted in alizarin red and cobalt blue. It is not certain however, whether these works were glazed, like the Saura, and therefore whether the evaporation principle can be applied.

Both examples clearly allow the hypothesis that pigment type is involved in the efflorescence mechanism. Indeed, a series of woodcut prints by Donald Judd also show efflorescence in the coloured printing ink. The series of thirty prints, ten of each colour, entitled Red, Blue and Black, was created in 1988, and are in the collection of The Museum of Modern Art. On examination in 1995, fatty acid efflorescence was identified only on the black prints.<sup>43</sup> Eugenia Ordonez states that a conversation with the artist's printer confirmed that the printing inks were unadulterated, and were applied straight out of their tubes.<sup>44</sup> As is outlined below, carbon black and certain other pigments may promote the exudation of fatty acids from the paint or ink media, and this has particular relevance for Smith's black egg-ink drawings.

Efflorescence can form on the painted surface in different states. A white cast is most common, but occasionally it forms as white, yellow or brown crystalline aggregates. In several cases, this has been mistaken for mould which can take on a similar appearance on the surface of paint. Initially, the rapid formation of efflorescence on David Smith's drawings in the last ten years was considered to be mould. The misidentification of efflorescence for mould has in the past led to inappropriate treatment decisions being made for other artists' work. Early conservation records at the Metropolitan Museum of Art indicate that efflorescence found on African Wood sculptures was presumed to be mould. The sculptures were subsequently fumigated before the deposits were removed using petroleum benzene. Joyce Hill-Stoner's interviews with the Wyeth family in 1998 revealed that Andrew Wyeth had been informed that the white matter on the surface of

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<sup>42</sup> Van den Berg, 2000: 221-234.

<sup>43</sup> Eugenia Ordonez, Analytical Report, Donald Judd, 1995, Museum of Modern Art.

<sup>44</sup> Ordonez, 1998: 9.

several of his egg tempera paintings was mould, and they were subsequently “unnecessarily and possibly excessively fumigated.”<sup>45</sup>

Stoner adds that other paintings by Wyeth exhibited mould in addition to efflorescence, likely due to damp storage conditions, and making positive identification of both phenomena difficult. This is also found in Smith’s work. The author noticed that several of Smith’s drawings exhibited the white cast in the form of concentric rings (Figure 44). On closer inspection under magnification, mould hyphae were observed, often in conjunction with efflorescence. The appearance of the mould was extremely similar to efflorescence previously identified as fatty acids, though in most examples could be readily identified by the regularity of the circular pattern, and by the confirmation of mould hyphae by microscopic examination.

The full extent of the efflorescence on Smith’s works from the 1950s is only now being realised. According to the Estate the efflorescence became noticeable to the point of warranting intervention only within the last five to ten years. This correlates with examples in other collections. The author has found that recent correspondence from conservators working in institutions holding Smith’s work have concerned the formation of efflorescence. Smith drawings the Metropolitan Museum of Art, The Museum of Modern Art, The Fogg Museum at Harvard University, The National Gallery of Art, D.C., and the Whitney Museum of American Art have been studied by the author and examples of efflorescence have been found in all collections.

Interviews and correspondence with conservators at the National Gallery of Art, Washington D.C., and with conservators who have treated efflorescence on Smith’s drawings held in private collections were also carried out by the author. In all reported cases, efflorescence and corresponding desiccation and cracking of the media had appeared noticeably within the last ten years. Given the extent of problem, and the likelihood of further encounters with efflorescence in Smith’s works in the future, it is necessary to explore the various hypotheses suggested to explain the formation of efflorescence in artist’s media.

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<sup>45</sup> Stoner, 1999: 413-14.





**FIG. 46:** Untitled, 1963: Detail showing extensive efflorescence, desiccation and losses in alkyd paint medium.



#### **4.6: Mechanism of Efflorescence Formation in Smith's Egg Ink and Alkyd Media**

In Smith's work efflorescence is observed from the mid 1950s until the early 1960s - roughly the period where he began to mix egg-yolk into his black ink - but is also observed on his drawings made using alkyd medium (Figure 46). GCMS Analysis by the author of several samples of efflorescence from of Smith's drawings across the 1950s has confirmed that the substance deposited on the surface of the ink is a mixture of free fatty acids, mainly composed of palmitic (C16) and stearic (C18) acids.

Fatty acids are found in all animal fats and vegetable oils. They are also found in substantial amounts in beeswax. They are reactive triglycerides, and on aging react to form larger polymers, or break down into smaller fragments including free fatty acids. Aged materials contain mostly saturated fatty acids which are relatively unreactive with small amounts of unsaturated fatty acids. The type and relative quantities of these fatty acids is dependent on the particular oil wax or fat.

Free fatty acids are incorporated into paint by several means. Van den Berg proposes that the release of fatty acids in an egg medium is likely to stem from the initial hydrolysis of the triglycerols contained in the egg in such a way that the paint cannot accommodate or trap these compounds sufficiently, resulting in a migration to the surface.<sup>46</sup> Indeed, he has found that the degree of hydrolysis of young egg-yolk paint films (from the 1980s) was as much as 40%. Schilling has suggested that the free fatty acids found in oil paint, which are similar to those found in egg-yolk, may come from the hydrolysis of the glyceride ester backbone or the decomposition of extenders such as aluminium stearate.<sup>47</sup> Hydrolytic reactions are certainly a large part of the mechanism, but the fact that efflorescence occurs in some media and not others suggests that there are several other contributing factors.

As mentioned above, commercial paint manufacturers add fatty acids for the purposes of aiding dispersion and settling of the pigment. This is true of commercial oil paints as it is for alkyds. Free fatty acids can also form on heating oils. For example, while raw linseed oil contains a very small proportion of free fatty acids, stand oil contains a much higher proportion due to the isomerization that occurs during heating. This, according to

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<sup>46</sup> Van den Berg, 2000: 196.

<sup>47</sup> Schilling, 1998: 5.

Ordonez, leads to thermally-induced triglyceride cleavage and the formation of free species within the oil.<sup>48</sup> Additionally, because of a lack of unsaturated bonds, certain fatty acids remain uninvolved in the cross linkages that occur during the drying of the paint, thus remaining mobile in the matrix.

The addition of fatty acid salts, such as aluminium stearate, is common. Aluminium or zinc stearate acts as a surfactant, which aids the adsorption of oil onto the pigment surface. Ordonez further points out that 'aluminium stearate' as encountered in manufacture is in reality usually a mixture of di-stearates and free fatty acids, and is rarely pure stearic acid.<sup>49</sup> The free fatty acids included in commercial oil paints may contribute to the formation of fatty acid efflorescence, but this does not explain the mechanism for efflorescence formation on Smith's home-made egg-yolk tempera.

Cate Harley found that efflorescence found on a stearin wax sculpture took one of two forms; a light powder or aggregates of larger white crystals.<sup>50</sup> Stearin wax is formed by the hydrolysis of the animal fat glyceryl stearate, and contains both stearic and palmitic acids. Her analysis by GCMS confirmed the presence of both palmitic and stearic acids. Again, the larger crystalline material was found to be largely palmitic acid with small amounts of stearic. The smaller particles were found to contain negligible amounts of stearic acid, and mostly palmitic acid.

This is of significance since it is in direct opposition to the analytical findings in the case of Smith's medium, which suggest large amounts of stearic acids. Katrien Keune has suggested that the extent of the fatty acid efflorescence on Smith's work is unlikely to derive from an egg-yolk source alone, and may have involved the addition of further stearates or drying oil.<sup>51</sup> It was originally considered possible that Smith further adulterated his ink using drying oil (such as linseed oil). As noted in Chapter Three, drying oil was a common ingredient in artists' tempera paint, and it was identified in Old

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<sup>48</sup> Ordonez, 1998: 4.

<sup>49</sup> Ordonez states that this formulation may be 28% Stearic acid, 50% palmitic acid and a smaller proportion of oleic acid. Ordonez, 1998: 5.

<sup>50</sup> Harley, 1993: 65.

<sup>51</sup> Katrien Keune, email to the author, 6 Dec. 2005.

Master tempera paintings (as tempera grassa) as early as the fourteenth-century.<sup>52</sup>

However, the efflorescence in Smith's work often showed an unusually *low* palmitic to stearic acid (P:S) ratio, indicating that the addition of a drying oil was likely not a factor. Furthermore, oil tends to become absorbed into paper and presents staining on the verso of the work, and this is not generally observed in efflorescent drawings by Smith. Several samples of efflorescence analysed by GCMS all presented a P:S ratio of between 0.4 and 0.5.<sup>53</sup> This is of particular interest, as efflorescence in traditional oil paints tends to present a vehicle-specific high P:S ratio.<sup>54</sup> Furthermore, the five samples of efflorescence on Smith's works, analyzed by GCMS, did not show a palmitic:stearic ratio typical of any drying oil. The low percentage of azeleic acid found in Smith's ink indicates that the source of the fatty acids was likely to be primarily due to the added egg-yolk. The higher proportion of stearic acid in all samples is unusual, but not without explanation.<sup>55</sup>

The higher proportions of stearic acid and often low palmitic acid content present in several samples of the Smith efflorescence may be due to the faster evaporation rate of palmitic acid. This has been recently identified by several writers. For example, S.R. Williams at the Canadian Conservation Institute found that ghost images formed on the underside of the glazing in certain framed paintings consisted almost entirely of palmitic acid, thereby reflecting an extremely low P:S ratio in the medium itself.<sup>56</sup> He speculated that volatile ketones in the paint film might undergo oxidation on the glass surface and form palmitic acid. However, in the same year, Stefan Michaelski theorized that the free fatty acids simply evaporate from the painting and condense on the glass because the boiling point of palmitic acid is much lower than that of stearic.<sup>57</sup> Schilling et al.

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<sup>52</sup> See for example, Jill Dunkerton, 'Modifications to Traditional Egg Tempera Techniques in Fifteenth Century Italy', *Early Italian Paintings: Techniques and Analysis*, Symposium, Maastricht, October 1996, 29-33.

<sup>53</sup> See for example; MMA2003.38 (DS3) and 73.58.53 (DS24), Appendix C, which both show a higher ratio of stearic to palmitic acids. Other samples indicate higher proportion of palmitic to stearic acid, but the proportion of stearic acid remained consistently high throughout all samples analysed. See for example; 73.58.75 (DS74), 73.59.68 (DS89) and 73.60.166 (DS100), Appendix C.

<sup>54</sup> Tom Learner, Getty Conservation Institute, email to the author, September, 2008.

<sup>55</sup> See

<sup>56</sup> Williams, 1989: 65-84.

<sup>57</sup> Stefan Michaelski, 'A Physical Model for the Cleaning of Oil Paint' in: Cleaning, Retouching and Coatings: Technology and Practice for Easel Paintings and Polychrome Sculpture, Preprints, IIC Congress, Brussels, 1990, 85-92.

confirmed this hypothesis at the Getty Conservation Institute by using Thermogravimetry to determine the evaporation rates of the fatty acids contained in drying oils.<sup>58</sup> Their findings have interesting consequences for the understanding of the efflorescence found on Smith's drawings. Schilling et al. found that the estimated half time for the rate of evaporation of palmitic acid at 25°C was approximately 40 years, whereas the rate for stearic acid was 140 years. Given the author's analysis of efflorescence on Smith's media has been performed for the first time approximately fifty to sixty years after the works were created, it may be that the palmitic acid has evaporated to such an extent as to skew the P:S ratio in favour of stearic acid.

Although such a low P:S ratio is extremely uncommon, the author identified one other example. A similarly low palmitic to stearic ratio was found by Craigen Bowen and Jens Stenger in an orange varnish/coating on a print by Charles-Melchoir Descoutis in 2005 in the collection of the Harvard Art Museum.<sup>59</sup> The analytical report for the quantitative GCMS analysis of the varnish indicated that the P:S ratio was, like the Smith efflorescence, approximately 0.5, again a particularly high proportion of stearic acid. Stenger confirmed that this does not match any known drying oil or oelific medium. The report also acknowledged the possibility of applying the Schilling et al evaporation model to this substance, and found ultimately that the coating contained fatty acids common to vegetable oils, but whose molar ratios have changed over the 150 year lifetime of the print, due to the various chemical and physical interactions of its aging process.

Further explanation might be found in the type of pigment used. As indicated above, efflorescence often occurs only in specific colours. Van den Berg has suggested that carbon blacks, sienas, ultramarine, alizarins, cadmium yellow, cinnabar, toluidine red, chrome oxide green, Hansa yellow, and Kassel brown are all particularly susceptible to efflorescence.<sup>60</sup> By the same token, inorganic pigments including lead white, iron oxides, umbers, cobalt blue, red lead, zinc white and chrome yellow tend to inhibit the phenomenon.

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<sup>58</sup> Michael Schilling et al. 1998: 1-6.

<sup>59</sup> Jens Stenger, Analytical Report, orange coating on a print by Charles Melchoir Descourtis, Harvard Art Museum, July 2005.

<sup>60</sup> Van den Berg, 2000: 197.

This is certainly supported by Smith's work, largely comprised of the thick application of a carbon black medium which, in all its forms, requires a particularly high medium to pigment ratio. This has long been an issue for modernist painters who have used considerable amount of black oil paint laid on in thick impasto. Robert Motherwell acknowledged the problem in a 1980 interview:

I never would have turned to acrylic, I think, if I didn't use so much black. As you know, black (the pigment) is made out of soot, and in oil the proportion of the weight of the oil to pigment is incredible in comparison with other pigments. This means it takes a year to dry, and it dries unevenly; if you try and repaint it, as I often do, you get into a nightmare.<sup>61</sup>

Williams also found that the ghost images formed on glazing on oil paintings noted above were more intense over darker colours, contributing to the typical negative image formed on the underside of the glazing.<sup>62</sup> Slow drying paint formulations were found to present more intense ghost images enriched in saturated fatty acids. Schilling states that this is consistent with the partial hydrolytic degradation of the triglyceride oil matrix, and that slow drying paints included ochres and vine black, or those made from walnut or poppy oil.<sup>63</sup> Koller and Burmeister observed that oil rich paints made with pigments that do not promote cross linking are particularly susceptible to the formation of efflorescence.<sup>64</sup>

Several other pigments have been observed to form efflorescence frequently. In the Chicago Stella panels discussed above (Gobba, Zoppa e Collorto, 1985 and Cricce, Croce e Manico D'Unico, 1986), both alizarin crimson and cobalt blue oil paints were found to suffer from extensive efflorescence. Reference panels from LA County Museum of Art painted with commercial artists' oil paints have similarly found that cobalt blue and carbon black were commonly affected by efflorescence.<sup>65</sup> Though as Ordonez observes,

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<sup>61</sup> Fiske and Alberson, 1980: 2.

<sup>62</sup> Williams, 1989: 74.

<sup>63</sup> M. Schilling, 1998: 5.

<sup>64</sup> J. Koller and A. Burmeister, 'Blanching of Unvarnished Modern paintings: A Case Study on a Painting by Serge Poliakoff, in: Cleaning, Retouching and Coatings: Technology and Practice for Easel Paintings and Polychrome Sculpture, Preprints, IIC Congress, Brussels, 1990, 138-143.

<sup>65</sup> Ordonez, 1998: 4.

Singer et al. have cited a group of paintings from 1893 in which cobalt blue is associated with decreased fatty acid efflorescence, and suggests that the environmental history of the work should also be considered.<sup>66</sup>

Organic pigments appear particularly susceptible to efflorescence. These pigments may contribute to efflorescence because they are unable to sufficiently trap free fatty acids in large amounts. Inorganic pigments - especially lead and zinc white - can react with free fatty acids to form metal soaps. These metal soaps may immobilize the free fatty acids and therefore prevent them from migrating to the surface. Metal soap formation is primarily a reaction of the oil with basic pigments such as zinc and lead white, often used in the commercial preparation of drying oils.<sup>67</sup> Metal soaps can present their own form of efflorescence, usually observed as a hard protrusion on the surface of oil paintings. However, in most cases the formation of metal soaps does more to prevent fatty acid efflorescence from occurring. This may explain why Smith's alkyd Nude drawings on paper suffer from efflorescence where his paintings on canvas in the same medium do not. In the 1930s, Smith's experimental canvases were prepared using a zinc white ground. It is not known whether Smith prepared the canvases for his 1960s Nude paintings himself, or purchased them pre-prepared. However, if he did use a zinc white ground for these works, it is possible that the zinc impeded the migration of fatty acids from the media to the surface.<sup>68</sup> Katrien Keune has suggested that since the medium Smith used on paper does not contain any reactive metal (such as a zinc oxide ground) to react with the fatty acids to form metal soaps and there is no other possibility for trapping these fatty acids in a network, they are free to move within the matrix, and migrate to the surface.<sup>69</sup>

Smith's black ink also has a high media to pigment ratio, given that he added media (egg-yolk) to an already balanced system (drawing ink). Van den Berg states that efflorescence is more likely to occur in thin areas of medium, arguing that thicker areas of paint can act

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<sup>66</sup> Brian Singer et al. 'Examination of a Blooming Problem in a Collection of Unvarnished Oil Paintings', *The Conservator*, 19, 1995, 3-9.

<sup>67</sup> Leslie Carlisle, 'Paint Driers Discussed in Nineteenth-Century British Paint Manuals', *Journal of the American Institute for Conservation*, vol.38, 1999, 68-32.

<sup>68</sup> It was not possible to analyse the grounds in Smith's Nude paintings in the time available for the purposes of identifying zinc white. It is an area worthy of further research.

<sup>69</sup> Katrien Keune, email to the author, 6 Dec. 2005.

as a larger reservoir for free fatty acids, and therefore that it will take a longer period of time for the paint to reach its critical concentration of free fatty acids. The opposite appears to be true in most cases in Smith's work. Excess egg is observed in the thicker passages of ink where efflorescence occurs, commonly seen on the edges of the thick brushstrokes, and very rarely observed in the thinner areas of ink. The efflorescence in thicker areas may simply be due to an excess of egg-yolk (and therefore fatty acids) in those areas.

Finally, the storage and environmental history have important implications for the development of efflorescence. These are important considerations when looking at the deterioration of Smith's drawings. What is clear, as is outlined below, is that Smith's drawings were not considered to be of particular interest aesthetically to the critic Clement Greenberg who was responsible for the management of Smith's Estate from 1965 to 1979. Peter Stevens has stated that Greenberg showed a distinct lack of interest in the extensive collection of works on paper left by Smith after his death.<sup>70</sup> This result of this had both positive and negative results. Greenberg found enough collector interest in the drawings to sell them as he had done with a large number of sculptures, but he had also failed to provide adequate storage conditions. This lack of adequate storage and the often harsh weather conditions at Bolton Landing may have been a significant contributor to the formation of efflorescence on Smith's drawings.

Fats, oils and waxes all undergo polymorphic transformations, in which the same substance can assume different crystal forms. Triglycerides behave like paraffins, emphasizing one dimension by having two fatty acid esters extending one way and then a third parallel but facing the opposite direction. Rapid changes in temperature may enable the oil molecules to pack more closely together and fit into a smaller volume. This may allow the fatty acids greater mobility within the matrix. Ellen Pearlstein for example, has shown that there are three crystal packings possible for triglycerides in fats and waxes – alpha, beta and beta prime. This may be equally valid for the drying of liquid drying oils.<sup>71</sup>

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<sup>70</sup> Peter Stevens, interview with the author, April 2006.

<sup>71</sup> Pearlstein, 1986: 89.

Temperature conditions influence which polymorphic form is the most stable so, for example, rapid cooling from the melted form encourages the formation of alpha crystals, which are observed as fine platelets, whereas gradual cooling from the melted form results in the more granular, needle-like beta crystals, large enough to create visible granularity.<sup>72</sup> The manufacture of chocolate takes advantage of this process in tempering the product by heat in order to produce the highest possible number of small beta crystals, which have the highest melting point of all the crystalline forms. If this does not occur, larger beta-prime crystals can form, which can further crystallise into conglomerates and result in formation of efflorescent crystals on the surface – such as the white haze encountered often on chocolate. The rapid changes in temperature and humidity that occur in the far north of America may have contributed in a similar way to alter the composition of Smith's drawing media, particularly where they were not stored adequately.

Smith carefully stored his drawings in large flat file drawers. He felt strongly enough about their condition to ensure their correct mounting and care in transit when on loan, specifying to his dealer that drawings were not be stored loose in portfolios because of the risk of wear.<sup>73</sup> In a notebook entry, Smith noted that his drawings were “incomplete memories...the immediacy of feeling flashes back when I go there - the drawers – the years – the days – the memory of past time – the inadequacies calling for new effort.”<sup>74</sup> The careful storage and preservation of drawings was clearly important to him.

The vast majority of Smith's drawings have been stored interleaved in plan chest drawers in a climate controlled storage facility since 1979. However, prior to this time, and prior to the management of the present Estate, there is considerable evidence to suggest that the drawings were stored poorly. Clement Greenberg had little respect for Smith's drawings aesthetically, but had in fact reluctantly agreed to climate-controlled storage after protestations from Smith's daughters. However, this did not occur until around 1978.<sup>75</sup> The drawings themselves were catalogued in 1973 by Pricilla Leggett and Susan Metzke,

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<sup>72</sup> Though, as Pearlstein notes, morphological examination of fat crystals is not a reliable form means for identifying polymorphs. Pearlstein, 1986: 91.

<sup>73</sup> David Smith, letter to Dan, 7 Dec. 1955. Willard Papers: R986 F683.

<sup>74</sup> Notebook 49, 1962, David Smith Estate, Box 10a 49-50.

<sup>75</sup> Peter Stevens in Salvesen and Cousineau, 2005: 227-228.



Curators at the Hyde Collection, Glen Falls, New York, and according to Dorothy Dehner were left in poor condition. Dehner noted that Leggett “organized, catalogued and has properly arranged David’s drawings which had been left in a shocking condition – mouse eaten, unnumbered, no slip sheets & just stacked up like newspapers (I saw them like that myself).”<sup>76</sup> Perhaps they were too intimately connected to expressiveness, something often abhorred in Greenberg’s reductive formalist ideology. (As if to illustrate the matter clearly, he stated once that the drawings of Leonardo da Vinci were “sheer rumination, reverie, wish fulfilment, that amount to works of art only in the limited way that isolated passages of verse do – even worse, because their presumptive wholes never saw existence.”<sup>77</sup>). What is clear is that he had little interest in maintaining the collection in a good state.

Rebecca Smith confirms that when Leggett began cataloguing the drawings, many were discovered stacked on tables and in cupboards in the house and studio.<sup>78</sup> If the drawings were surveyed by Leggett in 1973-4, then it could be estimated that some of these works would have been stored in the conditions noted by Dehner for the previous eight or nine years since Smith’s death, or possibly longer. This may explain the fact that efflorescence tends to be encountered more often in later drawings (from 1957 onward) that Smith had not been able to put into storage before his death. Furthermore, mould was found largely in ink drawings (eg. 73.60.6, 73.60.5, 73.60.2, 73.60.7 and 73.60.40) from 1960 on larger sheets of paper.<sup>79</sup> It is possible that these large format sheets were too large to be stored in Smith’s drawers. These later works therefore may have remained stacked and left to be subject to more extreme fluctuations in temperature and humidity than other works. As mentioned, Smith lived in the far north of New York State where the winters are exceedingly cold and dry and the relative humidity can be extremely low.<sup>80</sup> Rapid changes

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<sup>76</sup> Dorothy Dehner, handwritten note to the Archives of American Art attached to a letter from Patricia Leggett to Dehner, 7 Sept, 1974. AAA, Dorothy Dehner Papers, R 796, F33-35.

<sup>77</sup> Clement Greenberg, ‘The Great Precursor: Review of Drawings by Leonardo da Vinci’, John O’Brien, ed. *Arrogant Purpose, 1945-59* (Chicago: University of Chicago Press, 1988) 110.

<sup>78</sup> Rebecca Smith, conversation with the author, April, 2008.

<sup>79</sup> See DS 7, DS42, DS79 and DS95-107, Appendix C.

<sup>80</sup> Smith writes in a 1947 letter requesting technical information on tetrasylsilicate, a replacement for water in the tanks of his heating system that Lake George “is a possible minus 40 degree F district.” David Smith, letter to John B. Pierce Foundation, 29 Dec. 1947, David Smith Estate, Box 24, Business Papers.

in temperature and/or humidity can occur frequently. These conditions combined with the stacking of the drawings, which would have retarded fatty acid evaporation are likely to have contributed significantly to the deterioration of the drawings, and the formation of efflorescence.

#### **4.7: Efflorescence Formation on Modern Works after a Period of Fifty Years**

There may be some evidence to suggest that certain artists' media used initially in the 1950s-60s are only now beginning to show signs of efflorescence. Incidences of efflorescence in Smith's works have occurred with greater frequency over the last five to ten years. Several oil paintings by Clifford Still, painted during the same period as Smith's works have also recently been shown to exhibit significant efflorescence. The Estate of Clifford Still has recently begun to notice problems with efflorescence in Still's oil paintings.<sup>81</sup> Barbara Ramsey, painting conservator states that approximately ten percent of the collection examined have "significant conservation problems" including many that exhibit efflorescence.<sup>82</sup> As with Smith, the works were not adequately stored, and this may have a great deal to do with the formation of the efflorescence.

Similarly, efflorescence encountered on an oil painting by Serge Poliakoff dating from 1959 (Untitled, Private coll. Germany) was cited in a recent German study.<sup>83</sup> It seems therefore that there may be a link between works created in the late 1950s and 1960s and a formation of efflorescence that becomes significantly noticeable after a period of approximately fifty years. It may be that there is an 'incubation' period for the formation of efflorescence, where the free fatty acids present in the medium are relatively immobile or during which evaporation of a substantial proportion of the palmitic component occurs. It also may be that after a period of approximately fifty years, the build up of deposited fatty acids on the surface of the medium is simply sufficient enough to become noticeable to the eye. It is known that removal of the deposited fatty acid crystals may not necessarily solve the problem since mobile components will continue to migrate toward the surface of

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<sup>81</sup> David Anfam, quoted in: Steven Henry Madoff, 'Unfurling the work of a Lifetime', The New York Times, 18 March, 2007, Art, 1-5, 2.

<sup>82</sup> Madoff, 2007: 4.

<sup>83</sup> Sandra Hons et al. 'Migrationsprozesse Freier Fettsäuren in Malmittelfilmen: Untersuchungen zur Entfernung von Ausblühungen und Überlegungen zur präventiven Konservierung', Zeitschrift für Kunsttechnologie und Konservierung, vol.19, no.1, 2005, 32-38.

the paint as long as they are present within the medium. Further work is required to understand the complex mechanism that is involved in the formation of efflorescence, and why it forms in some works and not others.

Treatment of efflorescence in oil paintings has typically been carried out using aliphatic and aromatic hydrocarbon solvents.<sup>84</sup> These are usually chosen for their ability to dissolve the fatty acid deposits with minimum swelling or solubility of the paint film. For David Smith's tempera medium on paper, the treatment may require a different approach.

The author carried out several cleaning tests on a badly effloresced ink drawing by David Smith from 1958. While tests were carried out using a number of solvents including aliphatic and aromatic hydrocarbons and ketones, it appeared that aqueous methods, in particular saliva, were most effective for removal of efflorescence on Smith's ink medium.<sup>85</sup>

While the true cause of the fatty acid efflorescence on Smith's egg-ink drawings may not be entirely known, there are several hypotheses outlined above which may wholly or partially explain the phenomenon. It is likely that several chemical processes occur at the same time, and combine with environmental and other complications to form a highly complex series of physical and chemical mechanisms. However, it is clear that these drawings were not stored adequately until approximately ten years after Smith's death may also have had a significant influence.

It is obvious that Smith could not have foreseen the dramatic deterioration of his drawings. In this case identifying tacit knowledge contained in Smith's works provides a way of thinking about his process and intent, thereby enabling decisions to be made that can impact on the future representation of that intent. In identifying the causes of efflorescence on Smith's drawings, we clearly see that despite Smith's extensive research and investigation into the durability of his tempera medium, inherent vice compounded by external factors have resulted in their deterioration to the point of disfigurement and damage.

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<sup>84</sup> Hons et al. found that SBP spirit ( a mixture of aliphatic and aromatic hydrocarbons) was the most effective solvent for treatment of the Poliakoff efflorescence. Hons et al. 2005: 38.

<sup>85</sup> See Appendix D.

The unforeseen effects of both aging and ill-judged decisions have led to consequences for the interpretation of Smith's work and working process. The mythology that represents Smith as industrial worker and artist forms an important aspect of Smith's identity, as discussed in Chapter Three. That this was misinterpreted by Clement Greenberg, the critic and friend who had championed his work for many years, is indicated in the neglect of Smith's drawings and in the imposition of his own critical judgement on the perception of several sculptures.

#### **4.8: Intentional Alteration: The Misidentification of Intent in Smith's Sculpture**

The history of art is littered with examples of controversial decisions carried out by those responsible for the care and preservation of an artist's work after his/her death.<sup>86</sup> The management and control of artists' estates and the body of work left after their death is an area fraught with controversy, division, high profile court cases, and highly emotive issues, often covered extensively in the media, art historical publication and elsewhere.<sup>87</sup> Although frequently discussed, decisions made on behalf of artists by those responsible for their care have only recently been subjected to study. An extensive and sensitive

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<sup>86</sup> Particularly this is true in sculpture, where the several custodians of sculptors' estates have controversially created Surmoulages (casts or editions of unique finished sculptures) or enlarged/reduced versions of finished works, sometimes in different media after the death of the artist. Whether or not they had the authority or permission to do so is difficult to ascertain, since the artist often had left no specific instruction not to do this. These versions or casts are often sold as authentic/official works by the artist. Amongst others, this has occurred in the works of Julio González, Constantin Brancusi and Raymond Duchamp-Villon. David Smith abhorred this practice, and was particularly critical of the bronze casts made of González's welded sculpture, which he felt were outright fakes having never had the hand of the artist upon them, and, perhaps more significantly, that the achievement of the works as constructed welded sculpture was completely denied by casting them in as holistic works in bronze. These issues appear to have been brought to the fore in the mid-1970s, possibly initiated by the controversy over changes to David Smith's works. It may be no coincidence that only a month after Rosalind Krauss brought attention to possible negligence in the care of Smith's sculpture in *Art in America*, Sylvia Hochfield published an article that described many of the problematic casting and reproductions issued by sculptors' estates and dealers after their deaths. Sylvia Hochfield, 'Problems in the Reproduction of Sculpture', *Art News*, Nov. 1974, vol.73, no.9, 21-29.

<sup>87</sup> Of particular note was the 'Rothko case', where three executors of Mark Rothko's Estate, Morton Levine, Theodoros Stamos and Bernard Reis along with Marlborough Gallery were accused of conspiring to sell hundreds of Rothko's paintings to the Gallery at rates disadvantageous to the Estate. Rothko's daughter, Kate successfully won back control over the Estate after a lengthy legal battle. The profile of the case was such that it resulted in a book: Lee Seldes, *The Legacy of Mark Rothko* (London: Secker and Warburg, 1978), and even a poorly-received television movie. See: Grace Glueck, 'TV: "Rothko Conspiracy", A Movie', *New York Times*, Arts, 3 May 1983.

survey in 2005, demonstrated clearly that the legitimacy of artists' work and reputation is often largely in the hands of those who are charged with its care.<sup>88</sup>

Adams has observed that by 1970, after the significant deaths of both Rothko and Barnett Newman, the effort to establish "a seminal pantheonic generation of American artists" whose work was abstract and purist led to the selective exhibition of works that fitted the criteria of those whose critical interest was in promoting those ideals.<sup>89</sup> This has led to the suppression of much of the work of these painters that did not fit into the canon of those critics who promoted these ideals in favour of works that did. In Smith's case, the painting and animation of the surface of his sculptures were experienced by Clement Greenberg and others as what Kirilli describes as "blemishes on the ideology of formalist purity."<sup>90</sup> Kirilli's view is not simply a modern criticism of Greenberg's reductive formalism as viewed from a contemporary perspective. In 1974, Hilton Kramer had stated that "it is well-known in art circles for some time that Mr. Greenberg felt the application of paint to the Smith sculptures was an artistic mistake",<sup>91</sup> and Greenberg himself had acknowledged as early as 1956, that Smith had a tendency "to over-elaborate a work beyond the point to which the momentum of inspiration has carried it."<sup>92</sup>

The re-interpretation of Smith's painted unfinished sculptural works as rusted and lacquered works were intended to correctly represent the original intent of Smith, but in doing so the executors created works that were pastiches of other works. The act essentially re-evaluated these works in terms of a completely different series of Smith's works (Particularly perhaps, the Voltri and Voltri-Bolton series 1963-64) or possibly, and perhaps less convincingly, to the contemporary aesthetic of Cor-ten steel works that were being made by artists at the time. That the works were ostensibly restored according to Smith's original intent and that the executors acted in according to this, and not a personal

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<sup>88</sup> Magda Salvesen and Diane Cousineau, eds. Artists' Estates: Reputations in Trust (New Jersey: Rutgers University Press, 2005).

<sup>89</sup> Brooks Adams, 'Last Nudes' in David Smith: The Last Nudes, Gagosian gallery, New York, 2001, 7.

<sup>90</sup> Alain Kirilli, 'David Smith's Happiness', David Smith: Dibujante. Entre Eros y Tanatos (Valencia: Centro Julio González, IVAM, 2004) 24-25, 24.

<sup>91</sup> Hilton Kramer, 'Altering of Smith's Work Causes Dispute', The New York Times, Sept. 13, 1974, 28.

<sup>92</sup> Clement Greenberg, 'David Smith', Art in America, vol.44, no.4, Winter, 1956-1957, 32.

agenda, is highly questionable, and the ulterior motives that have been suggested for the actions of Clement Greenberg are convincing.

David Smith left his entire Estate in trust to his two daughters who would receive it on reaching the age of twenty five. At the time of his death, however, his eldest daughter, Rebecca was only eleven years old and would not reach this age for another fourteen years. The Estate was therefore administrated by three executors: the critic, Clement Greenberg, who had been an ardent promoter of Smith's work, Smith's friend, the artist Robert Motherwell and Smith's lawyer, Ira Lowe. However, as Peter Stevens has discussed, the actions of the executors, particularly, Greenberg (who was the de facto controller of the Estate) proved to be highly questionable.<sup>93</sup>

In 1974, Clement Greenberg was publicly accused by Rosalind Krauss of deliberately altering the surfaces of number of Smith's later sculptures. The accusation was published in the September/October edition of Art in America in 1974 and discussion continued sporadically in both art journals and the popular press until 1978.<sup>94</sup> Greenberg, as discussed below, had considerably mismanaged the Estate since Smith's death. On this occasion, he had made a decision to remove ostensibly deteriorated white (primer) paint from five sculptures, and deliberately allowed the paint on another to deteriorate. According to Greenberg, these actions were carried out in order to restore the works to a state that would accurately reflect Smith's artistic intention. However, as I will demonstrate below, this decision was highly problematic. It is evident that Greenberg's predominant intention was to serve his own notions of how Smith's work should have appeared. This was largely in accordance with his dogmatic critical viewpoint. Secondly, there was a clear financial incentive indicated by Greenberg's seemingly arbitrary selling of large amounts of Smith's work at the same time, and finally, that the identification of Smith's intention for these particular works is far from clear, making decisions for re-intervention, unlike the efflorescent drawings discussed above, particularly difficult.

Photographs of the sculptures in the fields at Bolton Landing, over the ten year period from Smith's death until the writing of Krauss's Art in America article were taken by Dan

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<sup>93</sup> Peter Stevens in Salvesen and Cousineau, 2005: 221-238.

<sup>94</sup> Rosalind Krauss, 'Changing the Work of David Smith', Art in America, Sept./Oct. 1974, 30-33.

Budnik, who was a close friend of Smith's and who had photographed his work in the early 1960s. Alarmed by the condition of certain sculptures, Budnik brought it to the attention of Krauss who concurred with the photographer and stated that she had observed "startling alterations" in certain works.<sup>95</sup> For Krauss, these alterations concerned two issues. Firstly, there was no direct intervention to protect or restore the surface paint of Rebecca Circle (1961, painted in black, white, green and red alkyd paint on one side, and yellow and green on the reverse) the surface of which Greenberg had allegedly intentionally allowed to deteriorate. Secondly, four steel sculptures that were painted in a white or yellow paint were stripped of their paint and either varnished, allowed to rust, or repainted in a brown colour that replicated the surfaces of many of Smith's (finished) work in rusted steel.

The sculptures Circle and Box (1963), Untitled (1963), Primo Piano IV, and Primo Piano III (1962) were painted white (or yellow in the case of Primo Piano III) in 1963, when Budnik photographed Smith's fields and studio. However, by February of 1970, Circle and Box had already been stripped of its white paint and left to rust. By October 1970, Untitled (1963) was also stripped of its paint. By September 1973, both works were (ostensibly) varnished or painted in brown paint. In February 1963, Budnik's photograph showed Smith with Primo Piano III which was painted in a yellow primer. In February 1970, Primo Piano III was shown in a photograph to be painted in white. By January 1973, the work had been stripped of paint and allowed to rust (see Figures 49 to 51).

For Krauss, the more serious of the issues was the disintegration of the gestural paint on Rebecca Circle, which was more indicative of the presence of the artist's hand than the works painted in flat colour, which could arguably be replaced without difficulty. Perhaps the worst offence however, was the presentation of some of these works in exhibition as works by Smith without any mention of their having been altered. In 1974 a number of these altered sculptures were present in an exhibition of outdoor sculpture in Newport, Rhode Island.<sup>96</sup> The original paint on Rebecca Circle had weathered to the extent that it was beyond preservation (Figures 47 and 48). Krauss's claim that Primo Piano III, Circle

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<sup>95</sup> Krauss, 1974: 30.

<sup>96</sup> 'Monumenta', a Biennial exhibition that was, at the time, one of the largest outdoor sculpture exhibitions in the United States.

and Box, Lunar Arc (1961) and Oval Nude I (1963) were all painted in a “shiny opaque paint” that was intended to mimic the “Cor-Ten rust which was “voguish” of the late 1960s and early 1970s has a point, but is probably incorrect, since Greenberg was likely using Smith’s Voltri sculptures as a reference rather than the contemporaneous Cor-ten steel sculpture.<sup>97</sup>

The sculptures in question were not painted, but were prepared (after the removal of the primer) by removing the rust scale, and then varnishing with a sealant, in the same manner that Smith had prepared his Voltri sculptures.<sup>98</sup> It is probably in this case that Greenberg was not following a contemporary trend, as Krauss had suggested, but was simply following Smith’s own technique taking advice from Smith’s assistant, Leon Pratt who had worked with Smith on the similar Voltri-Bolton and Voltron sculptures, and remained working for the Estate under its executors. It is therefore likely that Pratt performed the stripping of the paint for the works in question on instructions from Greenberg, who was at that point effectively his employer. This highlights the importance that we place on the authority of artists’ assistants in the identification of intent, and how those opinions must be treated carefully. The fact that Pratt performed the action implies somehow that it was more valid, since he had direct contact with Smith’s practice, and could claim an identification of Smith’s intent that was based on first hand experience.

For Krauss however, this alteration was in direct violation of the principles of artist’s intent, as it revealed “an impairment of the integrity of the oeuvre of a major artist – an aggressive act against the sprawling contradictory vitality of his work as Smith himself conceived it.”<sup>99</sup> Budnik’s photographs make it very clear that, removed of their paint, all four sculptures become very different structures. The works are somewhat muted and certainly less animated in rusted steel than they are in their state of preparatory whiteness. Reflectance is largely absent, and the stark contrast of the works in white or yellow against the blue sky particularly in the case of Circle and Box is almost completely lost.

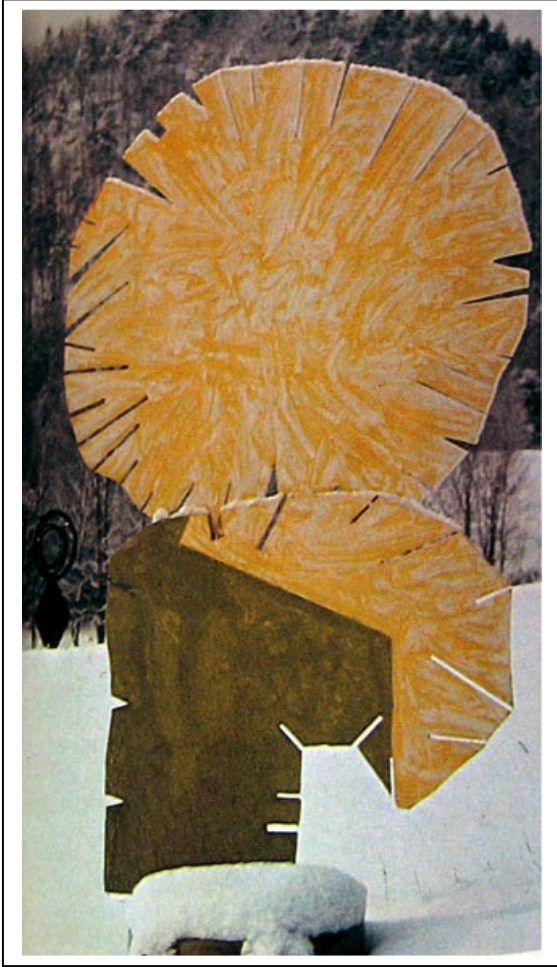
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<sup>97</sup> Cor-ten was a high-strength, low-alloy “weathering” steel, manufactured by the US Steel Corporation in the mid 1960s, used extensively by artists such as Richard Serra.

<sup>98</sup> Greenberg stated that the coating was in fact a “colorless metal sealant of the kind that Smith himself had used (taken from cans he’d left in his shop).” Letters, Art in America, vol.66, no.2, Mar./Apr. 1978, 5. Smith describes a similar process in ‘Report on Voltri’, 1962, in McCoy, 1973: 157.

<sup>99</sup> Krauss 1974: 32

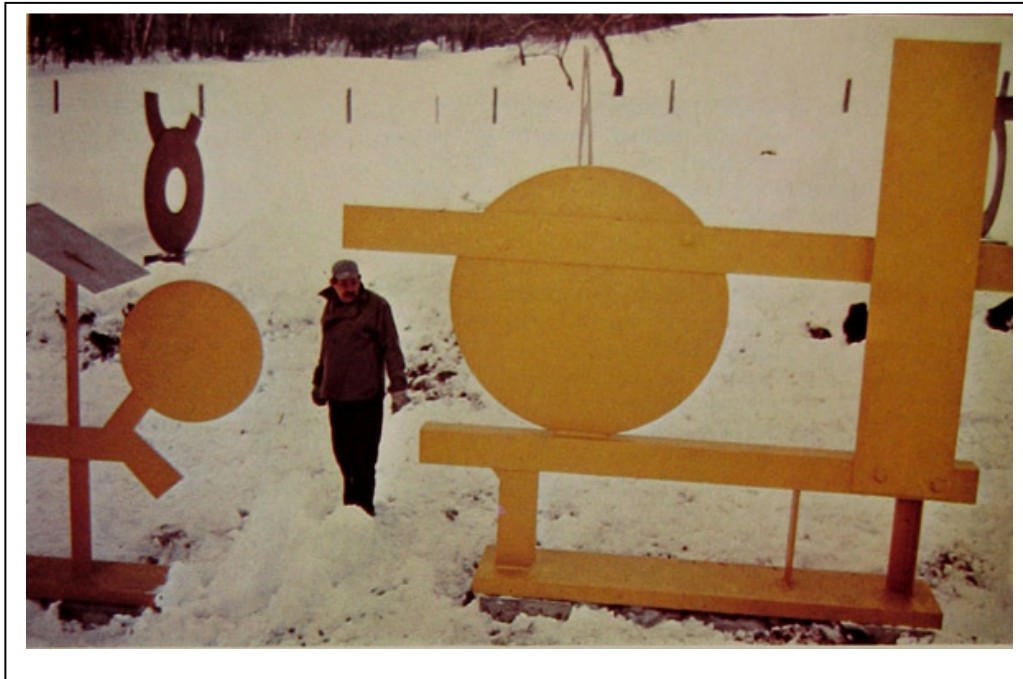




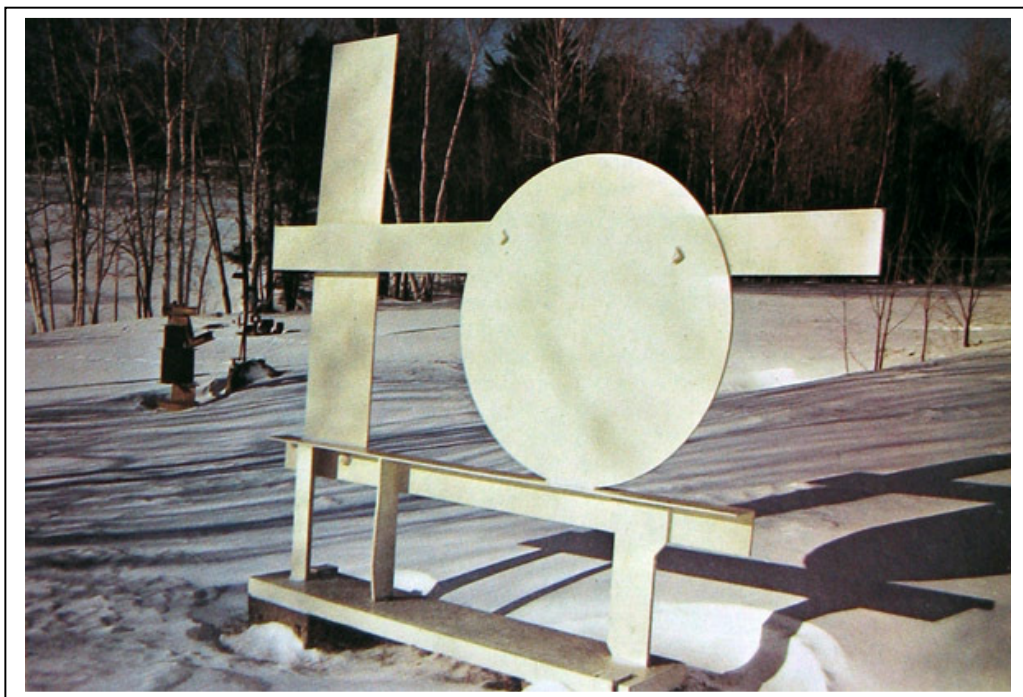
**FIG. 47:** Rebecca Circle (1962). Dec. 1962. Photo. Dan Budnik.



**FIG. 48:** Rebecca Circle (1962). Jan. 1973, showing deterioration of the yellow paint, and extensive rust damage. Photo. Dan Budnik.

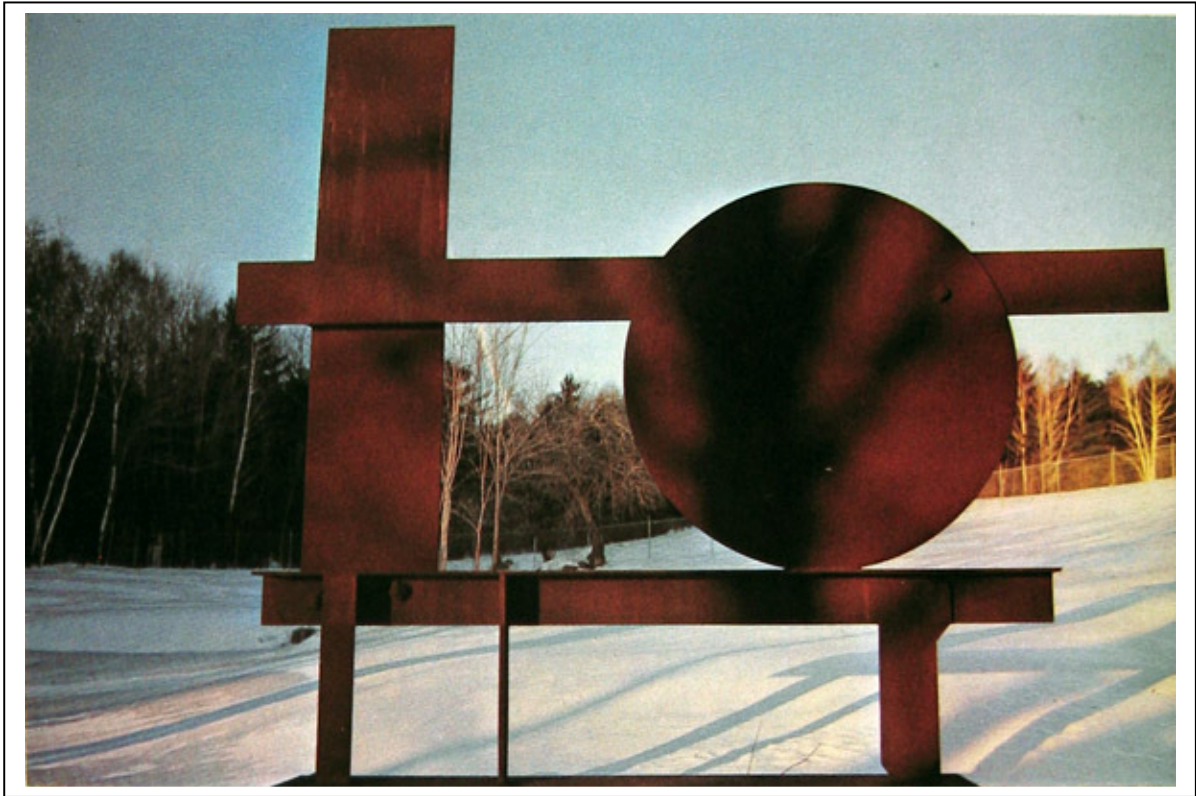


**FIG. 49:** David Smith and Primo Piano III (1962). Feb. 1963, showing yellow primer. Photo. Dan Budnik.



**FIG. 50:** Primo Piano III (1962). Feb. 1970, painted white by Smith (or Leon Pratt) prior to 1965. Photo. Dan Budnik.





**FIG. 51:** Primo Piano III (1962). Jan. 1970, stripped of its white paint, rusted and lacquered.

However, what is interesting about the reaction to Krauss's revelations in 1974 was the immediate presumption – discussed below - that leaving the sculptures in their preparatory state represented Smith's artistic integrity in a more authentic manner than Greenberg's removal of what he considered to be a temporary protective coating that had already begun to deteriorate by the time that it was removed. However, it is clear that this white was far from being a simple primer, but rather formed the ground for subsequent painting in colour. As such the works were effectively unfinished sculptures. Furthermore, as discussed below there is some evidence that Smith spent some time on finding the correct white for this ground.

Reaction to Krauss's revelation was varied. Some critics were in favour of Greenberg's actions, largely citing the fact that the works were unfinished and that the white paint was primer, never intended by Smith to be seen. Far from denying his involvement, Greenberg adamantly defended his decision, apparently claiming, "David said these works were unfinished, and I know damned well what he wanted."<sup>100</sup> However, it is important to note that there was no consensus or discussion concerning whether or not to remove the paint, and Greenberg, who clearly felt that the painted work did not fit within his idea of Smith's aesthetic, acted on his own authority. Greenberg was by this stage promoting the work of Anthony Caro and other artists, whose work was perhaps more in tune with Smith's earlier Voltri sculptures, which Greenberg admired. As Peter Stevens observes, Greenberg had begun to see Smith, who he had championed in the 1950s and 1960s, simply as a stage on the path toward a new generation.<sup>101</sup> It might be argued therefore that Greenberg's presentation of the stripped sculptures as rusted and varnished works corresponded more to what his idea of great sculpture was at that time, than any attempt to preserve Smith's early 1960s aesthetic as representative of Smith's achievement.

The effort of stripping five works of their primer represents a significant decision on the part of Greenberg, and there is some evidence to suggest that it was carried out for reasons other than the preservation of Smith's reputation. Fuller has observed that the sculptures were always intended for sale and that as executor, Greenberg would have received a 2%

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<sup>100</sup> Fuller, 1974: 630.

<sup>101</sup> Peter Stevens in Salveson and Cousineau, 2005: 228.

commission on all sold works, so there was a clear financial incentive.<sup>102</sup> As noted, Greenberg had sold a large amount of Smith's later work in a particularly arbitrary fashion, but had also undersold a great deal of work that he decided was not of great value artistically. Furthermore, his underselling of certain works to Marlborough Gallery, at that time representing all sales from Smith's Estate, was clearly a conflict of interest and has much in common with the similar Rothko case (though since Greenberg was an executor, his actions were - in contrast with the Rothko case - completely legal).<sup>103</sup>

Furthermore, though Greenberg was close to Smith at the end of his life, it is clear that the issue of colour was an aesthetic problem for the critic. Greenberg stated in 1964 that "the question of colour in Smith's art (as in all recent sculpture along the same lines) remains a vexed one. I don't think that he has ever used applied color with real success."<sup>104</sup> Hilton Kramer, who interviewed Greenberg for the New York Times, stated that he had readily taken responsibility for both the stripping of primer layers and the deliberate leaving of sculptures in the open so as to allow the natural effects of the weather affect.<sup>105</sup>

Greenberg's tenuous justification for continuing to leave Rebecca Circle to be weathered once the degradation became noticeable was somewhat bizarrely, to "remove the possibility of later retouching by other hands".<sup>106</sup>

There were however, a significant number of people who supported Greenberg's case, including those considered associates of the artist and therefore felt could speak on his behalf. In a letter to Art in America, J. W. Henderson, a Boston art lawyer, attempted to reconcile the act by stating that Smith had never exhibited 'primed works', and that Smith had left many works to "weather" out of doors.<sup>107</sup> In fact there is no evidence that Smith had an interest in the effect of weathering in his work. He spoke more often about

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<sup>102</sup> Fuller, 1974: 630 Fuller claims that twenty million dollars of Smith's work were sold from 1965 to 1974, though he does not cite a reference for this figure.

<sup>103</sup> Peter Stevens, in Salvesen and Cousineau, 2005: 229.

<sup>104</sup> Clement Greenberg, Introduction, David Smith: Sculpture and Drawings, (Philadelphia: Institute of Contemporary Art, University of Pennsylvania, 1964).

<sup>105</sup> Kramer, Sept.1974:28.

<sup>106</sup> Kramer, Sept.1974:28.

<sup>107</sup> Joseph W. Henderson, 'Letters', Art in America, Mar./Apr. 1974, 136.

protecting the steel surface of his work from the elements, than any interest in the aesthetic effect of weathering. When he made use of rusted steel, as discussed in Chapter Two, it was as a factor of colour, rather than any interest in the effects of time and the elements on his sculpture, and Henderson here may be confusing Smith's interest in rust, with an anachronistic interest in the results of weathering in his work.

The eminent historian, William Rubin who had known Smith well (and who had once owned Australia, 1950), also defended Greenberg's actions. He related an anecdote where on a visit to Bolton Landing, Smith told him that he disliked an all over white-painted work, that it was "weightless, ghostly...[and had] negative associations with plaster."<sup>108</sup> This was undoubtedly true, but in his letter to Art in America, Rubin comes to the rather illogical conclusion that since Smith made many sculptures in colours that approximated steel, it was clear that he preferred those colours, and therefore it was acceptable to have removed the paint. While it is certainly true that Smith produced sculptures (ie. Voltris, Voltri-Boltons and Voltrons) that were either scaled and varnished, or patinated in such a way as to recall the mottling of rusted steel, he equally made works that were highly coloured. It would seem by Rubin's argument that it could be equally acceptable to paint the sculptures in question with red and blue paint, also colours that Smith used extensively.

Stanley Marcus, whose book David Smith: The Sculptor and His Work (1983) remains a significant source of Smith's working technique in sculpture, had never known Smith, but had interviewed his assistant, Leon Pratt. Marcus stated in a letter in 1974 that Pratt told him on several occasions that the white paint was simply primer.<sup>109</sup> Furthermore, Marcus felt that in Greenberg's capacity as the most influential figure in Smith's life at the time of his death, there were only two options available to him – to remove the paint, or to destroy the sculptures to protect Smith's interests. Marcus is correct in his view that there were many sculptures that made use of steel in its natural state. Similarly he is correct in stating there were no other works that Smith painted entirely in white, but crucially neither Rubin

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<sup>108</sup> William Rubin 'Letters', Art in America, vol.66, no.3, May/June 1978, 5.

<sup>109</sup> Stanley Marcus, 'Letters', Art in America, vol.66, no.3, May/June 1978, 5.

nor Marcus suggest that the works should have been simply acknowledged as incomplete and left as they were.

In this it is clear that Clement Greenberg acted on his own volition, without consultation with the two other executors, and certainly without consultation of Smith's daughters, who were significant stakeholders in the preservation of his work. Of the two remaining executors, Ira Lowe stated that in all technical affairs he deferred to Greenberg, who had assured him that on "sandblasting two non-saleable works", he was doing "nothing violative of Smith's art."<sup>110</sup> Robert Motherwell had, due to ill health, been unable to follow the affairs of the estate closely, but stated that he had previously written to the other executors, recommending that the sculptures be removed from the fields to warehouses in New York for safekeeping, but claimed that he never received a reply from Greenberg.<sup>111</sup> While Motherwell distanced himself from the affairs of the Estate for personal reasons, the third executor, Ira Lowe, stated that he only handled the administrative side of the Estate and "deferred to Mr. Greenberg the technical art decisions."<sup>112</sup> It is therefore clear that Greenberg had effective control of the entire Estate. Greenberg's identification of the works as non-saleable in their pre-stripped state infers that the works would have had a better sale value were they stripped, rusted and lacquered to resemble the Voltri sculptures.

There were also consequences for the authenticity in the presentation of the altered sculptures as authentic works by Smith at the Monumenta exhibition in Newport Rhode Island. Lunar Arc (1961) was described in the catalogue as "rusted steel". However the full page catalogue entry shows a photograph of the work with its original white painted surface. Greenberg stated that he believed the white paint was never "intended" to be the final surface, and thus its presence misrepresented Smith's intentions.<sup>113</sup> However, although clearly he could identify what Smith's intentions for these works were not, he stopped short of categorically stating what they were (or at least what he thought they

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<sup>110</sup> Kramer, 13 Sept. 1974: 28.

<sup>111</sup> In 1974, the year of Krauss's article, Motherwell had five major surgical operations in three weeks.

<sup>112</sup> Kramer, 13 Sept. 1974: 28.

<sup>113</sup> Kramer, 13 Sept. 1974: 28

were), and his application of the rusted surface and lacquer finish on the works represented a subjective imposition of critical judgement.

As to the significance of the white paint, Greenberg and others who were critical of Krauss's article, stressed the unimportance of the white paint, and the fact that it had already degraded by the time that it was removed. However, in 1961, only two years before the constructed works in question, Smith referred directly to the significance of the artist's hand, even if that were simply "pure white": "I can't use studio assistants any more than Mondrian could have used assistants to paint in solid areas, or any more than de Kooning or any of my friends can use somebody else to put the backgrounds in, even though they might just be pure white. They don't want the marks of another hand on their own work."<sup>114</sup>

As discussed in Chapter Three, this is a reflection of the difficult and often contradictory nature of Smith's statements, and of the difficulty involved in identifying his intent. He is known to have employed at least three assistants, including the full-time Leon Pratt who had worked for Smith since the late 1940s. Smith's identification with the methods and materials of industry seems occasionally at odds with his self-perception as an artist. However, it may simply have been that he considered the work of assistants purely functional – lifting, polishing, welding, whereas the application of paint was somehow linked to his conception, something that was always carried out by Smith himself.

If this is true then the presence of original paint, albeit white, might be considered not as primer, but as part of the original conception of the work, albeit an unfinished work. Irving Sandler for example, agrees that the removal of paint was arrogance on the part of Greenberg who was acting to promote his own conception of Smith's sculpture, but his recollection hints at the fact that Smith's application of white paint was considerably more nuanced than simply applying a coat of protective primer:

I personally think that it had to do with Greenberg's idea that sculpture shouldn't be polychromed, that skin, colour worked against the material. And therefore when he became the executor of Smith's Estate he either

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<sup>114</sup> Smith, Interview with David Sylvester, New York, 1961, in: McCoy, 1973: 174.



let the things rot, or removed the paint. I think that it was an act of arrogance. I know from my personal experience, when Lucy and I were at Bolton Landing, we wandered around and Smith pointed to a white sculpture and said ... "I put seventeen coats of paint on that before I got the white I wanted."<sup>115</sup>

Furthermore, it is probable that Greenberg's assumption that the white paint was primer and had no aesthetic function was erroneous. It is true that Smith did coat sculptures in many coats of primer, and set them in the fields around Bolton Landing so that he could consider how to colour them at a later stage. However, the zinc chromate primer that Smith used specifically for the purpose of protecting the surfaces of mild steel works was available largely only in yellow and green, and the lead oxide primer only available in red. This is confirmed by both Leon Pratt, and by Albert Marshall's analysis of cross sections of several painted sculptures from the 1960s.<sup>116</sup> While it is true that the coating on Primo Piano III was likely to have been the zinc chromate primer, as Sandler mentions above, the white coating was not a primer, but paint applied over a primer coat and possibly according to criteria of achieving a specific tone for subsequent painting. As such the sculptures should have been considered as incomplete works by Smith. As Beverly Pepper observed at the time: "should we not value phases of an artist's research as much as the conclusions he came to?"<sup>117</sup>

It is clear that Smith used the white paint on his sculpture as a ground to be used for painting, rather than a simple protective coat to be removed later. Smith experimented widely with colour at this point, often painting and repainting works several times, and was certainly influenced by his friendship with Kenneth Noland, who was creating circular colour field paintings in bright acrylics. Given Noland's influence, and Smith's finished Circle sculptures of the same period, the five sculptures were likely intended to be brightly coloured. A letter sent by Smith in 1963 states "[I am] painting white coats on

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<sup>115</sup> Irving Sandler, Interview with the author, 27 June, 2007.

<sup>116</sup> Marshall demonstrates that primer layers for Zig V (1964) contained a poly vinyl butyral and zinc chromate etch primer that was green or yellow in colour. Marshall 1995: 95.

<sup>117</sup> Beverly Pepper, 'Letters', Art in America, Mar./Apr. 1974, 136. Pepper was a sculptor who had worked with Smith at the Spoleto Festival of the Two Worlds in Italy in 1962.

all the primed sculpture – before I paint the color.”<sup>118</sup> This indicates that Smith’s white-painted works were intended to be coloured later, and that the Greenberg’s white “primer”, was not primer itself, but paint applied over primer. As highlighted in Chapter Two, Smith’s drawing media were considerably more complex than previously considered. Perhaps Smith’s “perfect white” as noted by Sandler, was an integral part of a complex paint structure that was intended to be added to the five disputed sculptures.

Greenberg resigned from the Estate in 1979, and the present David Smith Estate began to catalogue Smith’s sculptures, paintings and drawings, and construct a preservation strategy for the storage and conservation of his work. After some discussion, the Estate decided that the sculptures be repainted to the state that they were at the time of Smith’s death. This included the restoration of the gestural painted surface on Rebecca Circle, which could be recreated from photographs that Smith had taken of the work. Peter Stevens, Executive Director of the Estate underscores the importance of the painted surface in Smith’s works: “The conservators we work with basically treat the steel sculpture as you would treat a canvas, as a support, like a wood panel, and the painting is the artwork.”<sup>119</sup>

It is clear then, that the intention of removing deteriorated paint from Smith’s painted and unfinished sculptural works was intended to redress Smith’s intent for those works. However, the actions of Clement Greenberg - the de facto custodian of Smith’s works - led to the creation of new works that were essentially pastiches of Smith’s earlier Voltri and Voltri-Bolton series of sculptures, which Greenberg admired and which were prepared in a similar fashion. As discussed above, the act essentially re-evaluated these works in terms of a completely separate series of Smith’s works. The incident reflects the difficulties involved in representing artists’ intent. It is clear that Greenberg’s actions were highly questionable. It is also possible that he had ulterior motives. However, the fact that important writers such as William Rubin were prepared to stand by Greenberg’s action, believing that it was the correct decision based on their knowledge of Smith’s work, states that identifying intent is an issue of considerable complexity.

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<sup>118</sup> Smith, letter to Robert Motherwell and Helen Frankenthaler, 27 July, 1963, AAA, NDSmith RD, F356.

<sup>119</sup> Peter Stevens in Salvesen and Cousineau, 2005: 232.

This incident clearly has a resonance with the deterioration of both egg ink and alkyd media on Smith's drawings. It is clear efflorescence forms as a result of a number of chemical and physical interactions largely due to imbalance in the chemistry of the medium mixture. It may however require certain ambient conditions to become initiated, and these may have occurred through the inadequate storage of the drawings for several years after Smith's death.

What both of these cases demonstrate is that thorough technical and tacit understanding of Smith's work is required before an informed decision can be made to intervene in addressing its deterioration. David Smith extensively researched his media in both drawing and sculpture and used materials that he presumed were of durability. On the one hand, the industrial alkyd paint used for his sculpture was initially intended to be durable, but was not expected to possess the same kind of long-term durability one would expect of artists' media. The consequences of its deterioration required substantial intervention, yet the Executors at the time made the ill-judged decision not to restore, but to 'recreate' sculptural works that Smith may never had intended to exist. On the other hand, intervention to redress the damage to Smith's drawings is perhaps more simple, yet the removal of the efflorescence is an aesthetic decision that will redress Smith's intent in the short term, but will require more serious investigation as the deterioration and media loss continues.

## **Conclusions**

Documentation regarding the production of art has become more readily available over the last two decades, facilitated by new technology, and an understanding of the value of artists' working procedures for the conservation, preservation and understanding of their work. However, such documentation may be prone to over-interpretation and error. This has been investigated recently by Rebecca Fortnum and Chris Smith, who have illustrated that archival material on artists' process can be problematic if taken at face value.<sup>1</sup> Many avant-garde artists of the 1940s and 1950s, including David Smith, were adamantly reluctant to discuss meaning and technique in their work which was captured from a universality of ideas, rather than from a pre-planned conceptual framework.<sup>2</sup> In this sense, it can be difficult to extract an authentic representation of the artist's creative process, which may lie somewhere between conception and practicality. Martin Kemp has stated, for example, that "works of art are physical products made by executants who face real challenges, and do not come ready-made from the heads of their makers". This has meaning for understanding David Smith's process, which was certainly more complex and reflective of "real challenges" than it appears in the available documentation.<sup>3</sup>

David Smith did not wish to overstate the material or technical dimension of his work. He stressed the primacy of concept over any medium or technical considerations, writing in the 1950s that "the ideal state seems to me to be when the work of art is of such force that

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<sup>1</sup> Rebecca Fortnum and Chris Smith, 'The Problem of Documenting Fine Art Practices and Processes', Journal of Visual Arts Practice, vol.6, no.3, 2007, 167-174.

<sup>2</sup> As discussed in Introduction. See for example: Pollock in Sidney Janis, 'Abstract and Surrealist Art in America', California Arts and Architecture, vol. 61, 1944, 37, and particularly this excerpt from David Smith's speech, 'Tradition and Identity' given at Ohio University in 1959: "Art is made from dreams and visions and things not known, and least of all from things that can be said. It comes from the inside of who you are when you face yourself." McCoy, 1973: 147.

<sup>3</sup> The Visual Arts Intelligences Research Project at the University of Lancaster has recently highlighted this fact, finding that "most visual artists make a number of decisions whilst making their work that aren't purely conceptual or only to do with material and technique, but lie in the relationships between these aspects of making." Fortnum and Smith, 2007: 169.

its material or method is not an intimate consideration.”<sup>4</sup> However through technical study, Smith appears as an artist who had an intimate engagement with methods and materials from the beginning of his career. That his becoming more conversant with techniques in drawing has parallels with similar advances in his sculpture-making only advances the argument that he saw little difference between working in the two disciplines. Drawing and sculpture were simply related parts of one aesthetic vision. Furthermore, it is clear that the media Smith used in drawing possessed an aesthetic affinity to both making and concept in sculpture, and that this is an unmistakable expression of his identity as an artist. This is largely unseen in the work of any other sculptor of his time, and contributes significantly to our understanding of the meaning of Smith’s work.

David Smith’s understanding that drawing was no simple preparatory study, but was possibly the only art form that could show the true nature of the artist is reflected in the beautiful variety of texture, surface, medium and technique in his works on paper. Gesture was something that he could engage with completely as a sculptor and looking at many of his lyrical drawings of the 1950s, one has a kinaesthetic sense of the movement involved, the decision to act, and the sensuality of the medium. Smith’s comical description of being taught to draw with a little pencil on little paper speaks volumes about his need to find a technical solution to creating drawings that could express his physicality. In this he shared the opinion of Robert Motherwell who has stated:

A few years ago, I was standing next to one of my huge black and white pictures ... I realized there were about ten thousand brush strokes in it, and that each brush stroke is a decision. It is not only a decision of aesthetics-will this look more beautiful?-but a decision that concerns one’s inner I: is it getting too heavy, or too light? It has to do with one’s sense of sensuality: the surface is getting too coarse, or is not fluid enough. It has to do with one’s sense of life: is it airy enough, or is it leaden? It has to do with one’s own inner sense of weights: I happen to

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<sup>4</sup> Notebook 40, 1950-54, David Smith Estate, Box 9, 35-40.

be a heavy, clumsy, awkward man, and if something gets too airy, even though I might admire it very much, it doesn't feel like my self; my I.

Robert Motherwell<sup>5</sup>

Technical matters are not typically discussed as part of critical discourse on Smith's drawings. By way of addressing physicality, materiality and the nuances of materials and techniques used in the 1950s, however, it is possible to begin to reach an understanding of the embedded or tacit knowledge possessed by Smith that contributed to the making of the work. Certainly, technique in drawing flowed freely during this period and did not interfere with form and concept during production. However, to achieve this required a great deal of experimentation, sometimes successful and sometimes not. Abandoned experiments are found throughout Smith's body of work in the 1950s where, for one reason or another, the technique, or material did not achieve synergy with his concept. For example, he never truly engaged with the acrylic medium which, despite conforming to the durability and fast-drying nature of his other media in drawing did not possess the required characteristics to develop further on paper. Likewise, the textural glass beads that were added to an early spray painting were not carried forward in other works. Yet other experiments were clearly rediscovered and integrated into Smith's practice. His use of texture, very much in vogue as a painter in the 1930s came back into his work in the 1950s, and clearly early experiments with tempera must have informed its reinvention as egg ink in 1952.

Smith was an artist for whom errors, mistakes, and works that were unresolved were all a necessary part of production. He understood that a form in steel, or brushstroke on paper found in one drawing or sculpture might prompt a response in another. Smith never sought answers and always understood that it was in travelling the path of making the work that true artistic identity could be found. Often, he claimed, he would work backwards if the work seems too complete, so that in the end it would pose a question, rather than an answer.<sup>6</sup> In this way, his experimentation in drawing was part of that continuity, not for

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<sup>5</sup> Robert Motherwell, quoted in Dore Ashton and Jack D. Flam, *Robert Motherwell* (New York: Abbeville Press, 1983) 12.

<sup>6</sup> David Smith, 'Tradition and Identity' in McCoy, 1973: 148.

the ideal work, but to continue to prompt new and interesting associations.

Experimentation in drawing, by its nature was more direct, and Smith represented a more efficient way of prompting ideas than sculpture (the abandoned experiments were also less costly in terms of materials). New methods and materials, and new associations that could be achieved through mixing immiscible media or adding texture in drawing were therefore part of this continuing workstream. Kinaesthetic and haptic notions that seem to be common to sculptors' drawings and the drawing act in general are also seemingly provide an interesting platform from which to view Smith's work.

Smith's identification with industrial space was part of his identity, and may also reflect a certain reaction amongst American artists to the prevailing nineteenth century studio ideology of artists such as William Merritt Chase and Arthur Pinkham Ryder. Chase's opulent studio/museum was a space "filled with almost every conceivable art and artefact" - a cabinet of curiosities that was designed to entice patrons, and at the same time be a constant inspiration to the painter himself, very much in contrast to the stark, airless interiors that were inhabited by the abstract expressionist painter, and far from the noisy stripped down industrial space that Smith inhabited.<sup>7</sup> This nineteenth-century studio ideology, inherited from Europe, represented the studio as sacred and quasi-mystical space, requiring the kind of reverence given to visiting a church or temple. In fact, a nineteenth-century writer on visiting Chase's studio, commentated that, "the library of genius and the studio of art are holy ground; and there, if ever, we feel the sacredness of being; the most giddy and thoughtless talk in these places in subdued tones, as we do in Church."<sup>8</sup> From this perspective we can view Smith's understanding of his own working process as strongly tied to his identification with something that was not concerned with lofty aesthetic ideals, but with daily work, often dirty and tough, and the production of an end product that could represent the self and an art that was distinctly American.

However, we must be careful in taking this representation at face value. The Abstract Expressionist studio photograph, as Jones has noted, typically portrays the artist alone, in

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<sup>7</sup> Nicolai Cikovsky Jr., 'William Merritt Chase's Tenth Street Studio', Archives of American Art Journal, vol.16, no.2, 1976, 3.

<sup>8</sup> E. O. Smith, Studio of an Artist, quoted in Cikovsky, 1976, 2.

a contemplative seated pose in front of the painting.<sup>9</sup> For example, Hans Namuth's photograph of Barnett Newman portrays the artist in an almost completely bare studio, sitting some distance away from his easel. It is illustrative of a general trend toward the contemplative pose, often taken against the light imparting a film noir intensity to the perception of the artist.<sup>10</sup> These representations are often problematic as authentic documentation of studio process. Namuth's documentation of Pollock, which although valuable as studio documentation to assist in the understanding of the process, also captured the artist in somewhat contrived circumstance, more performance than documentation.<sup>11</sup> It is even further the case in the documentation of Willem de Kooning's practice. Namuth's film The Painter Willem de Kooning, 1964, as Jones points out, has a voiceover by de Kooning, ostensibly on his painting technique, but which in reality was taken from a much earlier interview, with the voice of the interviewer edited out.<sup>12</sup> Furthermore, de Kooning's painting technique was captured by the contrivance of having the camera film the artist in action through hole cut in the center of the canvas. Namuth had used a similar technique in filming Pollock's poured paint method from the underside of a glass sheet, while the artist applied paint and other detritus to the surface above.

An earlier attempt in 1955 to capture de Kooning at work by Irving Sandler, also provided a fictive account of the artist's process. While Sandler was excited by being able to capture the painter's "flailing brush and dancing feet", he met de Kooning the day after the filming, and discovered that the painter had destroyed the work immediately after the film crew left. de Kooning stated that he destroyed the work because he never painted in the manner captured on film. He had given the film crew a fictive performance of what he thought would appear good on film, and stated: "I spend most of my time sitting there

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<sup>9</sup> Caroline Jones, Machine in the Studio: Constructing the Post War American Artist (Chicago: University of Chicago Press, 1996).

<sup>10</sup> Hans Namuth, Barnett Newman, New York City, photograph, 1951.

<sup>11</sup> Barnett Newman criticised filming of artists at work in an interview in 1966. He stated that in filming the process, it ultimately became a performance, and further that the value of film and photography in the artist's studio was in simply documenting where the artist lived and worked. This is more in keeping with both Alexander Liberman's artists' studio photographs, which documented the cracked cups, paint cans, brushes, and other studio detritus, rather than attempting to capture the essence of the how the space was used to create art. (Barnett Newman, dir. Lane Slate, prod. Curtis Davis, WNet, 1966)

<sup>12</sup> Jones, 1996: 75



studying the picture and trying to figure out what to do next. You nice guys brought up all that equipment, what was I supposed to do, sit in a chair all night?”<sup>13</sup>

This technical information becomes all the more pertinent, when aspects of damage and deterioration are discussed. Clearly, the unexpected deterioration of both drawing media and sculptural paint would have been something that Smith would have abhorred. However, his early death left scant detail regarding his intention should works suffer damage and deterioration. To restore the badly effloresced drawings might be a simple act, yet profound questions remain. As I have noted above, the many hypotheses that might explain the formation of the efflorescence do not provide a convincing explanation as to why Smith's alkyd Nude paintings are in excellent condition where his drawings in the same medium are not. Similarly, the unusual ratio of fatty acids similarly does not correspond to efflorescence that has been found in other works. Furthermore, it is far from clear whether removal of this efflorescence from works on paper will have a preservative consequence rather than simply an aesthetic one. The consequent loss of media also prompts discussion on how this might be re-integrated. It is clear that the investigation raises many more questions than it answers. It is clear that much more research is required on this issue.

David Smith stated that he used no particular method to approach the beginning of a work, and that its conception evolved from a pool of ideas. He stated, “I have no concept behind it other than myself.” However, it is clear that the identity that Smith claimed for his work was also expressed in the materials he used. It is the task of the technical art historian to elucidate the tacit knowledge involved in making of an artist's work, and this can only extend our understanding of Smith's work and his identity. Once the work is finished, it may fall to the technical art historian or the conservator to articulate some of this knowledge for as David Smith stated presciently, “Understanding is for words. As far as I'm concerned, after I've made the work, I've said everything I can say.”<sup>14</sup>

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<sup>13</sup> Irving Sandler, *A Sweeper-up After Artists: A Memoir* (London: Thames and Hudson, 2003) 53.

<sup>14</sup> David Smith., 'Tradition and Identity', McCoy, 1973: 148.

## **Appendix A: Annotated Experimental Paintings by David Smith from the 1930s**

As noted in Chapter three, David Smith's early experiments with painting media during the 1930s are indicative of the importance that he placed on the quality of materials throughout his career. The complex media he used in both drawing and painting was not born of casual mixtures thrown together with haste, but of careful experimentation. In Chapter three I point out that on his tour of Europe in the late 1920s, Smith noted with respect the superior aging of early tempera paintings over later oils, and that he was given permission to take samples from painted sculpture in Greece for later study. Although there is only scant reference to these experiments in Smith's papers, several canvases from the 1930s on which Smith carried out tests do exist. More importantly, these canvases are annotated with descriptions of the materials and techniques used in the experiments.

These notes make it clear that from an early point, Smith was interested in subtle effects that he could achieve with media, yet also maintained an interest in how these materials interacted and aged. More pertinent to this study perhaps, is that his experiments with casein and egg tempera media are clearly documented in these early paintings. The following are transcribed from four extant canvases, now held at the David Smith Estate.<sup>15</sup>

As noted in the text, Smith was in communication with the paint chemist, Maximilian Toch during the 1930s. He used Toch's MM varnish formulation on several works below.<sup>16</sup> Of particular note are; Smith's interest in the effect of varnish over wet oil paint (75.30.119), the aging of a tempera-over-oil mixture after a period of five years and experiments with oleo-resinous mixtures (75.30.86), experiments with a black Indian ink/casein mixture and black oil paint over casein (75.30.22). These provide the strongest indication of the possibilities that were eventually to form the expressive egg-ink medium that Smith would develop in the 1950s for his works on paper.

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<sup>15</sup> The author acknowledges Peter Stevens, Director of the David Smith Estate for drawing his attention to these largely overlooked works.

<sup>16</sup> See fn 72, p169, Chapter three.

75.30.119: Untitled, 1930

*Casein prepared Canvas attached Casco Cement to Board ... Toch Color 11lb cans ...  
Toch MM picture varnish on still damp underpaint for test of color and cracking*<sup>17</sup>

75.30.81: Untitled, 1934

*Oct 193... Casein Primed Oil ... Titanox Zinc Bare ... Aliz O, Ult B + MM Varnish. Aliz +  
MM Varnish ... Black, Burnt Siena*<sup>18</sup>

73.30.86: Untitled, 1930-1935

*Made St. Thomas 1930 ... Painted B.L 1935*<sup>19</sup>

1. Zinc Oil Primer on Glue Size 1930

2. 1935 Zinc Tempera Gel/Oil/Dammar

3. Temp Underpaint

4. Stand Oil/ Mastic/Dammar – Oil Paint

75.30.22: Untitled, 1930

*June 9 1934 ... Casein Method with Color ... Oil over Casein, Black India ink ...*

*Casein Sized Cotton Canvas, black oil over casein ... oil paint over casein ...  
MM Varnish*

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<sup>17</sup> Casco cement likely refers to a casein glue produced by the company A.B Casco from 1928 (now part of Akzo Nobel). <<http://www.cascoadhesives.com/AboutHistory>> (accessed October, 2009). As discussed above, Toch colours/varnish were the paints and varnishes manufactured by Toch Brothers/Standard Varnish company. Based on Toch's published recommendations, Toch Picture Varnish was likely based on a mixture of mastic or dammar resin and stand oil.

<sup>18</sup> Titanox refers to a pigment containing Titanium (such as Titanium white:TiO<sub>2</sub>), in this case likely in admixture with zinc. Smith refers to (tube) oils when he notes the pigments alizarin orange, ultramarine blue, black and burnt Siena.

<sup>19</sup> The numbers in this annotation refer to quarters of the painting in which Smith attempted various experiments. B.L refers to Smith's house and studio in Bolton Landing, New York, where he lived and worked from the early 1940s until his death. Smith and his wife Dorothy Dehner spent eight months in St. Thomas in the US Virgin Islands from October to June, 1931 (the 1930 date on the canvas, likely added in 1935, is erroneous). Developed in the 19<sup>th</sup> century, stand oil is linseed or other drying oil which is heated in the absence of oxygen to temperatures of approximately 300 degrees Celsius. It dries more slowly than untreated linseed oil, but yellows less on drying. Mastic and dammar are both naturally occurring resins dissolved in turpentine to create picture varnishes. Mastic was a popular varnish until the late 19<sup>th</sup> century, but it has a tendency to crack with age and bloom in humid environments. It was largely replaced by dammar. Maximilian Toch advocated the use of both mastic and dammar in his 1911 publication. (Maximilian Toch, *Materials for Permanent Painting* (New York: D. Van Nostrand Company, 1911) 72, but Mayer had already noted the tendency for mastic to bloom and crack by 1940 (Mayer, 1940, 225).

## **Appendix B: Sampling, Analytical Techniques and Analytical Protocols Used**

### **1.1: Sampling** <sup>20</sup>

Though it is clear that important information can be gained by analysing samples taken from works of art, there are ethical issues pertinent to the removal of any part, however minute, from original works. While it is preferred that non-interventive techniques be used where possible (for example, the X-ray Fluorescence spectrometric instrument used for this study was used to obtain information without the necessity of a sample), at present the most accurate instruments for the characterisation of binding media require a small sample to be removed.

In this context, the potential gain in knowledge achieved by removal of the sample is inevitably weighed against the cost/damage to the object itself. This cost is mitigated by the size of sample required - typically a minute speck of approximately 10-20 $\mu$ m - and the sample is, as far as possible, taken from an area as insignificant to the object as possible, often from an area of existing damage. Where this is impossible, samples are taken from the very edge of passages of ink or paint. The effect of the removal of such a minute sample is always visually imperceptible and the number of samples taken are kept to a minimum.

For example, FTIR analysis, which can identify the general class of an binding medium, and which is non-destructive to the sample, is often performed as a precursor to further, destructive analysis. Where more accurate information is required, further analysis (eg. by GCMS) can be performed using the same sample. In the case of drawings by David Smith, where samples were taken, they were taken as far as possible, from areas of active flaking and loss. Samples from paintings on canvas were removed from tacking edges, and those from painted sculpture were removed from the underside of sculptural elements.

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<sup>20</sup> All analytical data compiled by the author for this study is stored in electronic format at the Analytical Laboratory, Straus Center for Conservation and Technical Studies, Harvard Art Museums, 32 Quincy St., Cambridge, MA 02138,

## 1.2: Analytical techniques used in this study for binding media analysis

### Fourier transform infrared (FTIR) spectrometry

Fourier transform infrared (micro)spectroscopy (FTIR) is a non-destructive analytical technique commonly utilised in the characterization of binding media in works of art (Figs. 52-53). It has been in several technical studies.<sup>21</sup> FTIR spectrometry records the quantity of infrared radiation absorbed by a sample. Since all organic materials (and some inorganic materials) absorb infrared radiation at different wavelengths, it is possible to record the quantity that a material absorbs as a function of its wavelength. The resultant data is displayed as a transmittance vs wavelength spectrum (the wavelength in this case typically displayed as the reciprocal of the wavelength in centimetres). Identification of materials is possible because the manner in which the components of a material absorb infrared radiation can be characteristic of their type. When irradiated with infrared energy, chemical bonds within an organic compound deform. These deformations are characteristic of bonds between certain elements, for example between hydrogen and carbon atoms. Since paint vehicles typically contain a complex mixture of carbon-carbon, carbon-oxygen, oxygen-hydrogen and other bonds, all of which have characteristic infrared absorption patterns, the sample can be identified through interpretation of the resultant spectrum. Although the peaks of the spectrum can be read and interpreted individually, identification of an unknown paint sample is more often achieved through comparison of its spectrum to those of known standards.

Though FTIR is a fast, non-destructive and useful technique for identifying the general class of binding medium (eg. proteinaceous, oelific, synthetic), its limitation is that many aged paint binders demonstrate very similar infrared absorption spectra, and this often limits its ability to provide positive identification of a particular medium. Similarly, differentiation between compounds of a similar class, or between components that

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<sup>21</sup> See for example, Richard Newman, 'Analysis of Paint Binders' in Milk and Eggs: The American Revival of Tempera Painting (Seattle: Washington University Press, 2002) 170-206. FTIR has also been used, for example, in the study of the aging of acrylic emulsion paints: Tom Learner et al. 'Ageing Studies of Acrylic Emulsion Paints', in Vontobel, R. ed. Preprints, 13<sup>th</sup> Triennial Meeting, ICOM-CC, vol. 2 (London: James and James, 2002) 911-19, and in the identification of modern synthetic organic pigments: Suzanne Quillen Lomax et al. 'The Identification of Synthetic Organic Pigments by FTIR and DTMS', in Learner, T. et al. eds. Proceedings, Modern Paints Uncovered, Tate Modern, 2006 (Los Angeles: Getty Conservation Institute, 2006) 105-118.

demonstrate similar absorption spectra (eg. casein, shellac, egg) is often impossible. In this study it was useful for identifying media of similar type but different class. For example, the FTIR spectrum of egg yolk is different to that of egg white since egg yolk contains lipids and proteins where egg white contains only proteins and thus where egg white was suspected, egg yolk often could be identified or eliminated by the confirmation of proteins in the sample. This is naturally complicated by the fact that Smith's egg-ink mixture would have likely contained shellac as a component of the proprietary drawing ink that he used, and obtaining clear spectra for egg yolk was not always possible. FTIR is also useful in differentiating drawing media that were visually very similar but chemically different (for example egg ink and black acrylic paint). Where accurate characterisation of individual components contained in the often complex mixtures of media used by Smith during the 1950s and 1960s, or where further confirmation of type was needed, further analysis by GCMS and Py-GCMS was required.

#### Gas chromatography-mass spectrometry (GCMS) and Pyrolysis Gas Chromatography-mass spectrometry (Py-GCMS)

Gas chromatography-mass spectrometry (GCMS) is typically used in cases where the accurate identification of oils or synthetic organic media (often by Pyrolysis GCMS) in artists' media is necessary. The FTIR spectra obtained from aged oils are often too similar to allow accurate identification of individual drying oils, and GCMS can be useful in providing more accurate information to differentiate between these.<sup>22</sup> For this reason, it can also be useful in confirming the presence of alkyds, of which drying oils or semi-drying oils are also a major component.

Oils are essentially mixtures of triglycerides - esters of the trihydric alcohol glycerol with a number of possible long chain fatty acids. Most triglycerides are composed of a relatively small range of fatty acids, often those composed of straight chains of eighteen carbon atoms. The composition of oils is usually discussed in terms of the types and proportions of fatty acids present within the triglyceride composition. The majority of oils remain liquid at room temperature, but certain oils have the ability to dry (polymerise) to a

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<sup>22</sup>See Table 3.1 and 3.2 in: John S. Mills and Raymond White, The Organic Chemistry of Museum Objects (London: Butterworth-Heineman, 1987) 33.

solid or semi-solid state. This is possible if the oil has sufficient quantities of di- or tri-unsaturated fatty acids in the make up of their constituent triglycerides. The presence of double (di) unsaturated linoleic acids and triple (tri) unsaturated linolenic acids in drying oils is largely responsible for their ability to dry. A number of naturally occurring drying and semi-drying oils exist, but drying oils used in Western oil paintings are typically linseed, walnut and poppyseed oils.

In order to identify a particular drying oil using GCMS, the sample is prepared by chemically breaking down the constituent oil into its component glycerol and fatty acids.<sup>23</sup> It can then be vapourised without decomposing. The vapourised sample is injected into a separation column in a stream of helium. As the component parts exit the column, they are collected by a mass selective device, and a spectrum is compiled - a function of the intensity of the signal versus retention time for the individual components (Fig. 54). Whereas the GC spectrum of the sample itself can be used for identification by comparison to known standards, this second stage using a mass spectrometer results in a spectrum in which individual peaks can be identified, without the confusion of compounds that have similar retention times. Since the proportion of fatty acids in a sample of paint containing an oelific components (linseed oil, egg yolk etc.) are particular to that medium, the medium can be characterised by the ratio of fatty acids contained in the sample. In the case of the present research, GCMS was used successfully to confirm the presence or absence of egg yolk, alkyds and drying oils in a given sample.

Pyrolysis GCMS has been used since the 1990s in the characterisation of modern artists' paints.<sup>24</sup> Although the development of alternative mass spectrometric techniques in recent years has led to increased refinement and detail in the study of modern paints, Pyrolysis GC-MS is often more easily accessible to the conservator.<sup>25</sup> For the purposes of this study

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<sup>23</sup> See Analytical Protocols outlined in 3.1, below.

<sup>24</sup> Though in use since the 1960s in the forensic identification of modern industrial paints, its use in the field of modern artists' paint was considerably later. See: Tom Learner, 'The Analysis of Synthetic Paints by Pyrolysis-Gas Chromatography-Mass Spectrometry (PyGCMS)', *Studies in Conservation*, vol. 46, no. 4, 2001, 225-241.

<sup>25</sup> These various mass spectrometric techniques are outlined in Jaap J. Boon et al. 'Mass Spectrometry of Modern Paints' in Learner, T. et al. eds. Proceedings, *Modern Paints Uncovered*, Tate Modern, 2006 (Los Angeles: Getty Conservation Institute, 2006) 85-95. Although a comparative analysis of such methods lies outside the scope of this thesis, Boon et al. cite studies in which Laser Desorption/Ionization Mass Spectrometry (LDI-MS) and Secondary Ion Mass Spectrometry (SIMS) have been used for the

Pyrolysis GCMS was found to be a powerful and definitive tool for the identification of synthetic media used by David Smith. Synthetic paints (PVAs, alkyds, acrylics etc.) tend to be of a very high molecular weight. As Learner points out, because these compounds are typically non-volatile and often insoluble in solvents, the diagnostic components cannot be extracted from the polymer matrix through chemical means, and therefore traditional analytical techniques used for binding media (such as gas and liquid chromatography) are ineffective. However such compounds can often be broken down into volatile fragments through the action of pyrolysis (heat in the absence of oxygen). Once this has been performed, the fragments can then be separated by gas chromatography as outlined above.

Both methods require a certain amount of sample preparation, are time-consuming to perform and ultimately destroy the sample. However, they are both highly accurate. In the method used for this study, elimination or identification of the general class of binder was achieved through non-destructive FTIR analysis. Subsequently, where further information was required, the mass spectrometric techniques outlined here were used.

#### X-ray Fluorescence (XRF) Spectrometry

X-ray Fluorescence spectrometry is used to identify inorganic compounds by their constituent elements. X-rays are generated using an X-ray tube and focused onto the surface to be analysed. The molecules in the compound, excited by the X-radiation emit secondary X-rays of differing wavelengths (fluorescence). These signals are characteristic to individual chemical elements, and can also demonstrate the quantity of these elements present at the point at which the X-ray is directed. XRF is largely used in the conservation field for the identification of inorganic pigments in traditional painted surfaces.<sup>26</sup> The

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characterisation of synthetic organic pigments in modern works. Quillen Lomax et al. (2006) cite the use of Direct Temperature Resolved Mass Spectrometry (DTMS) for the successful characterisation of acrylic emulsion paints. Similarly, F.J. Hoogland (2004) demonstrated the use of Electrospray Ionisation Mass Spectrometry (ESI-MS) and Matrix Assisted Laser Desorption/Ionisation Mass Spectrometry (MALDI-MS) in the identification of surfactants in acrylic emulsion paints in F.J. Hoogland, 'Mass Spectrometric Identification of Modern Water Extractable Polymeric Additives From Artists' Acrylic Emulsion Paint and Acrylic Paint Samples from Paintings', Unpublished MSc Thesis (University of Amsterdam, 2004).

<sup>26</sup> See for example, Ferrero et al. 'X-ray Fluorescence of Yellow Pigments in Altarpieces by Valencian Artists of the XV and XVI Centuries', Nuclear Instruments and Methods in Physics Research, A422, 1999, 868-873 and Seiji Shirono and Yashiro Hayakawa, 'Identification of Painting Materials Used For Mural Paintings by Image Analysis', Advances in X-ray Analysis, 49, 2006, 213-217.



major advantage of using the XRF technique is that it does not require the removal of a sample from the object. Furthermore, results are given instantaneously. However, the 'chamberless' instrument used for in situ work is disadvantaged by the fact that it cannot detect elements of mass below titanium in the periodic table because the secondary X-rays from these lighter elements are absorbed by the air in the gap between object and detector. For the purposes of this study, XRF was successfully used to confirm the presence of steel particles and red and blue inorganic pigments (such as the iron oxide reds) added by Smith to his drawing media. (Fig. 55)

### **1.3: Analytical Protocols, Straus Center for Conservation and Technical Studies, Harvard Art Museum<sup>27</sup>**

#### Lipid analysis: Gas chromatography-mass spectrometry (GCMS)

A sample that was visually homogenous was selected. Samples were weighed and a 2:1 mixture of Methprep II (Alltech Associates, 2051 Waukegan Road, Deerfield, IL 60015) and benzene added to an equivalent of 1:1 weight per volume. The sample was heated to 50°C for half an hour to complete the transesterification of the fatty acids. Samples were injected via autosampler onto a DB-5 MS column (30m x 0.25mm, 1µm phase coating) using a splitless injector heated to 300°C. The Agilent 6890N GC oven heated the column from an initial temperature of 50°C (2 minutes) to 300°C at a ramp rate of 10°C/minute and maintained the final temperature for 10.5 minutes. The mass spectrum of the separated components was collected using an Agilent 5973 mass selective detector.

#### Polymer analysis: Pyrolysis Gas chromatography-mass spectrometry (GCMS)

The sample was inserted into a quartz pyrolysis tube (CDS Analytical Inc, 465 Limestone Road, Oxford, PA 19363). The sample and tube was placed inside a platinum heating coil which was then placed into the pyrolysis injector (CDS Pyroprobe 2000) and pyrolyzed at 750°C for 10s. The sample then passed to a DB5-MS column (30m x 0.25mm, 1µm phase coating) through a split-splitless inlet (ratio 23.4:1, split flow 21 ml/min) heated to 300°C. The Agilent 6890N GC oven heated the column from an initial temperature of 40°C (1

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<sup>27</sup> Compiled by Dr. Narayan Khandekar, Senior Conservation Scientist, Straus Center for Conservation and Technical Studies, Harvard Art Museum, Cambridge, MA.

minute) to 300°C at a ramp rate of 10°C/minute and maintained the final temperature for 20 minutes. The mass spectrum of the separated components was collected using an Agilent 5973 mass selective detector.

#### Fourier transform infrared (FTIR) spectrometry

FTIR spectrometric analyses were carried out using a Nicolet 510 instrument coupled to a Spectra-tech IR-plan infrared microscope with a 32x objective, or a Bruker Vertex 70 infrared bench coupled to a Bruker Hyperion 3000 infrared microscope with a 15x objective. The sample was compressed onto a diamond cell (2mm x 2mm) with a stainless steel roller and the sample area defined by double apertures contained in the microscope. An absorbance spectrum (4000–500 wavenumbers) was measured (resolution setting 8cm<sup>-1</sup>) and subtracted against a blank background. The spectrum was compared with the Straus Center for Conservation and Infrared and Raman Users Group (IRUG) database of artist's materials.

#### X-ray Fluorescence (XRF) Spectrometry

Areas were examined *in situ* using a Rontec ArtTAX  $\mu$ XRF Spectrometer equipped with an electronically cooled X-Flash detector, which contains a silicon drift detector and high-speed, low-noise electronics with a resolution of 160eV at a count rate of 10kcps. X-rays were produced by a low power tube with a molybdenum target. The beam was focused by polycapillary optics to a spot size of 70 $\mu$ m x 50 $\mu$ m. The analysis area was purged by a stream of helium. Analysis was carried out at 50kV for 200s. Bronk et al. (2001) have published a detailed description of this instrument.

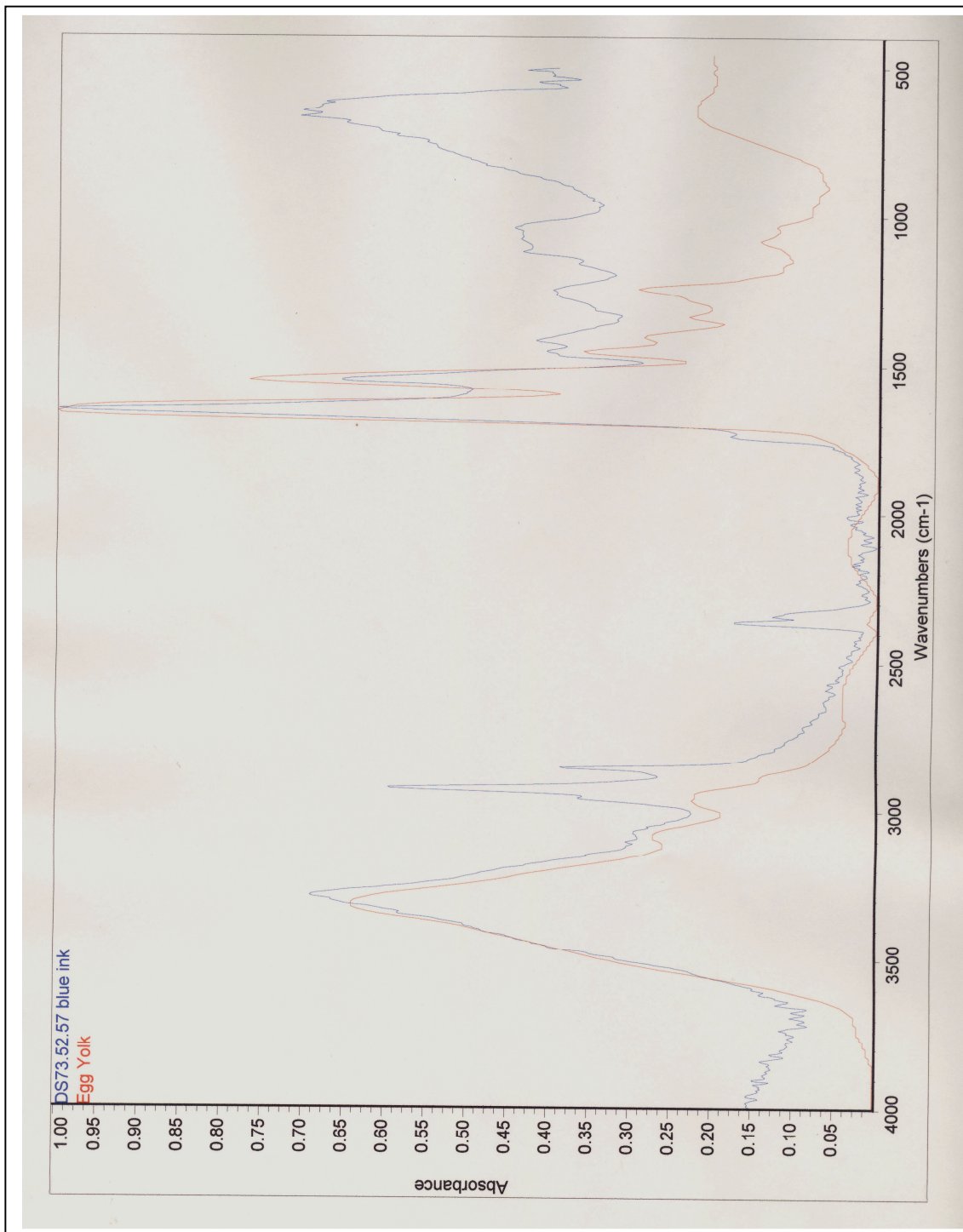
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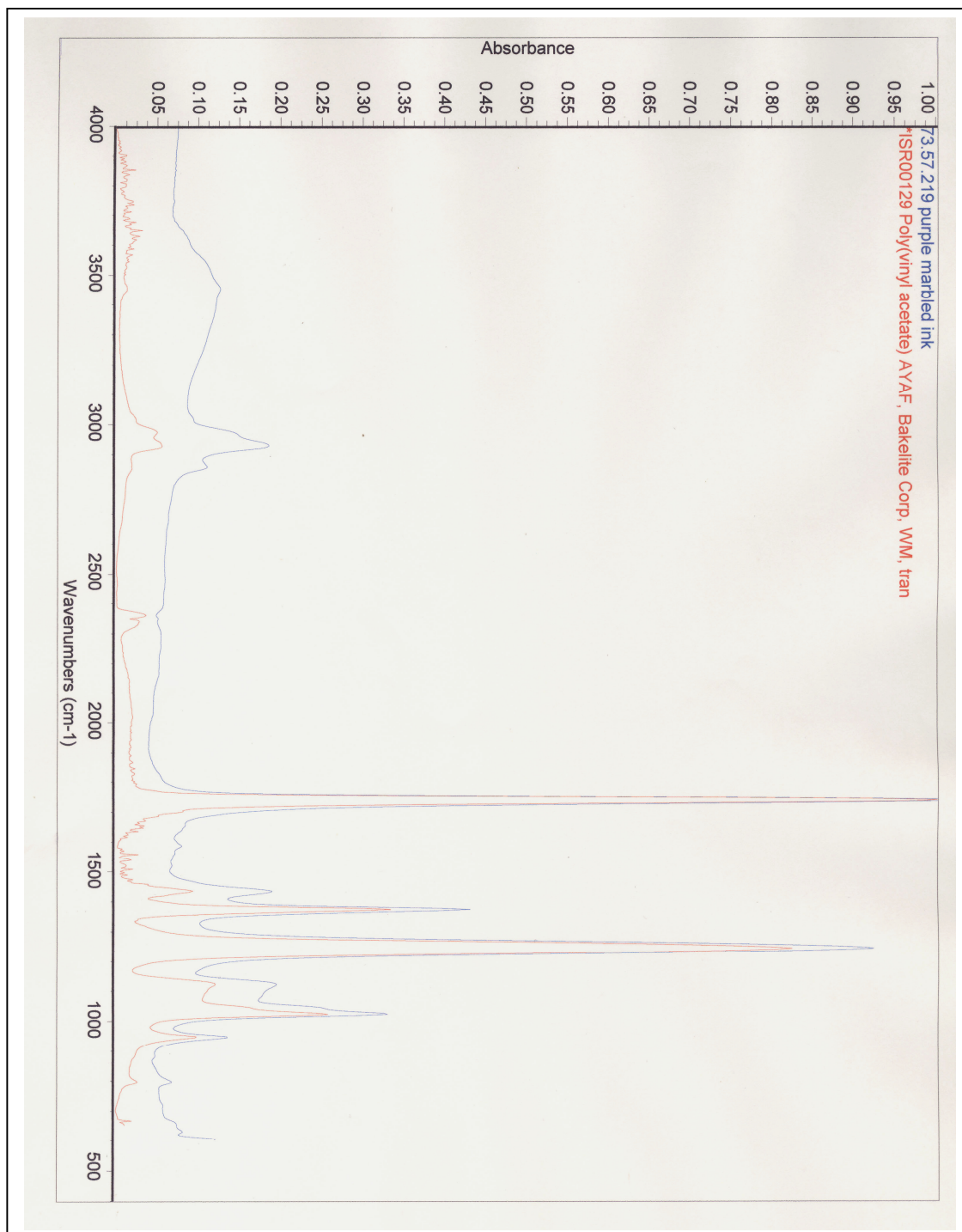
Johnson, M., and Packard, E. 'Methods Used for the Identification of Binding Media in Italian Paintings of the Fifteenth and Sixteenth Centuries', Studies in Conservation 16, International Institute for Historic and Artistic Works, 1971, 145–164.

Martin, E. 'Some Improvements in Techniques of Analysis of Paint Media', Studies in Conservation 22, International Institute for Historic and Artistic Works, 1977, 63–67.

**Fig. 52: FTIR Spectrum from blue ink in DS73.52.57 and reference for egg yolk**

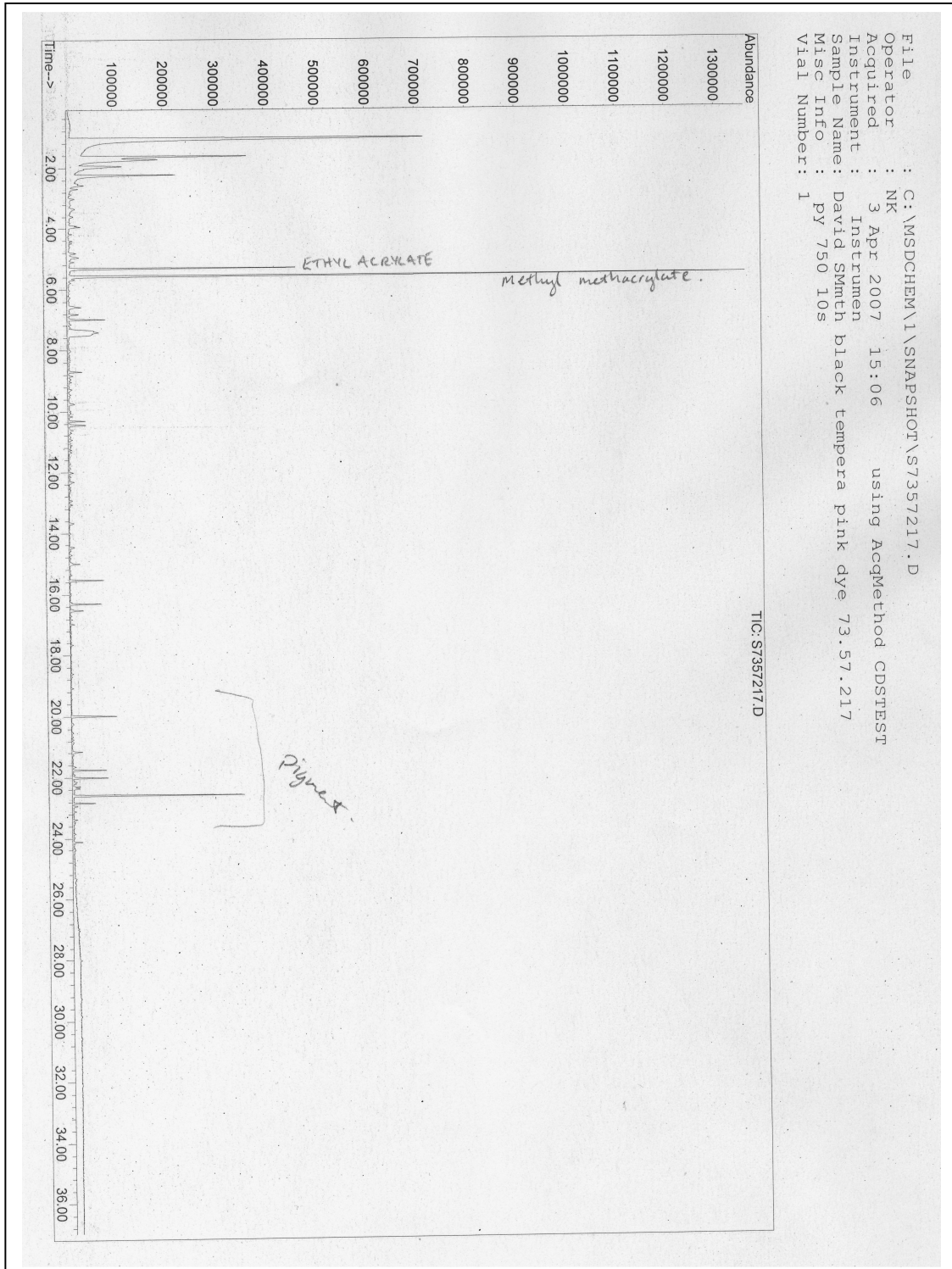


**Fig. 53: FTIR Spectrum from purple ink in DS73.57.217 and reference for (Poly) Vinyl Acetate**

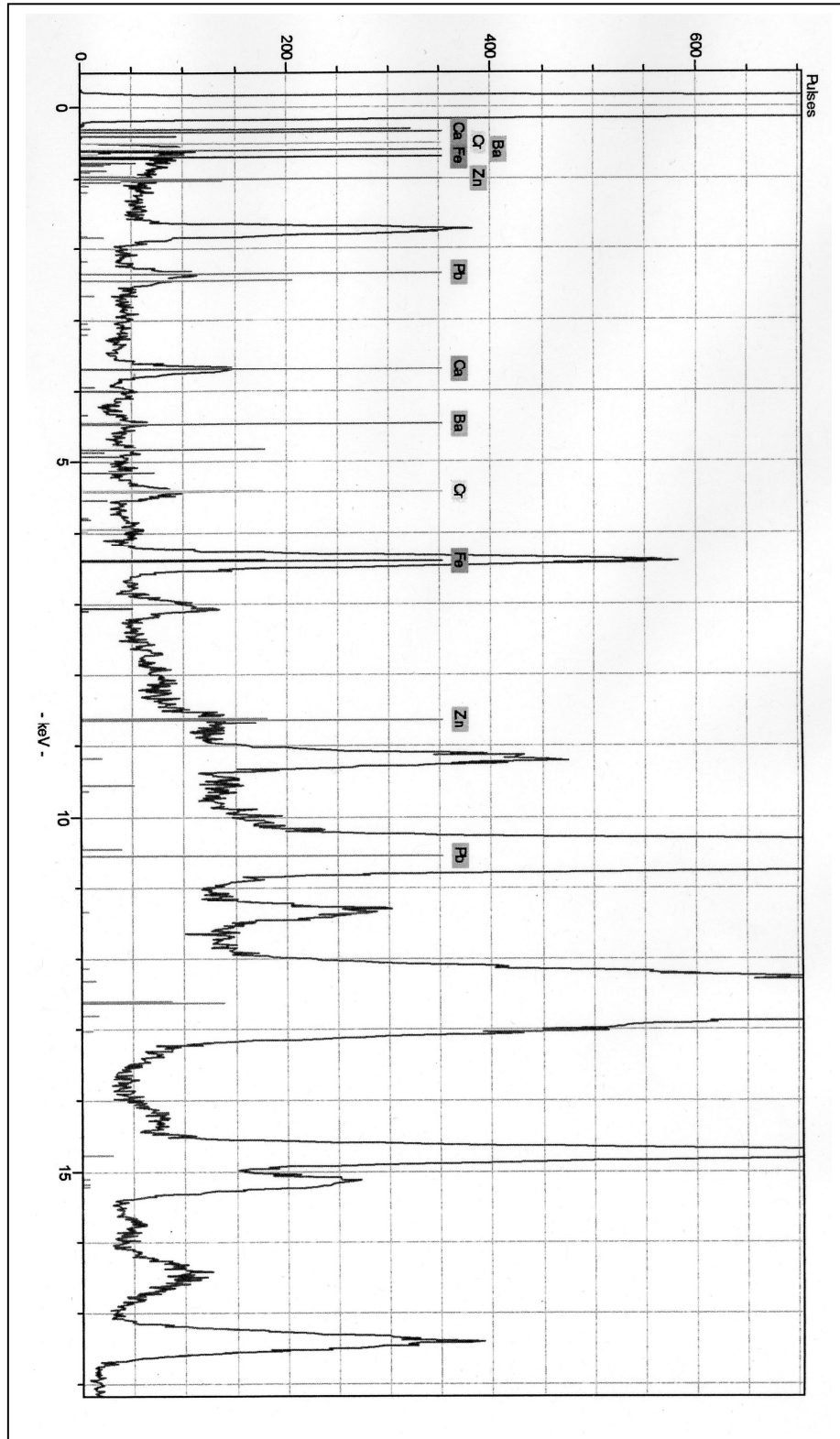




**Fig. 54: GCMS: Mass Spectrum from black medium in DS73.57.217 with annotated peaks suggesting acrylic emulsion paint**



**Fig. 55: XRF Spectrum from metallic particulates found in untitled relief showing peaks for iron, lead and zinc.**



## Appendix C: List of Works Examined and Analytical Results

Sample /ID No.	Date sampled	Accession No.	Title	Date	Support	Notes	Sample	Analysis	Inference
DS1		WMAA <sup>1</sup> 79.46	Untitled	c.1935-7	Medium weight, off-white, smooth-surfaced laid paper.	Charcoal and brown ink wash. Demonstrates early concern with manipulating negative space.			
DS2		WMAA 79.45	Untitled	1946	Heavy weight, buff smooth-surfaced wove paper.	Figural brush drawing in black and white gouache/tempera paint using heavy black line and painting wet-in-wet.			
DS3	4/05	MMA 2003.38	Untitled	1950	Medium-weight, white, wove hand-made paper.	Gestural brush drawing in black ink showing minor signs of white crystalline efflorescence observable under 40x magnification.	Black ink. <sup>2</sup>	<b>GC/MS:</b> Stearic and Palmitic acids. Unusually high Stearic:Palmitic ratio.	Fatty acid efflorescence.
DS4	02/03	HAM 1994.20	Fish	1950 - 51	Painted steel.	Steel sculpture painted in several coats of red paint. In a letter to Lois Orswell (Harvard Art Museum Archive), Smith recommends that she repaint in tube cadmium and varnish.	Red paint taken from chipped paint on underside.	<b>FTIR:</b> Alkyd, Cadmium red.	Cadmium Red Alkyd.
DS5		73.52.23	ΔΣ 11/23/52	1952	Med weight off-white, wove, paper.	Drawing in black ink and green ink, and brown, blue, pink and white gouache/tempera with heavily incised scratchwork added to the black ink, possibly with the end of the brush. Biomorphic forms in this work refer more to drawings created in the 1940s drawings than to the increasingly calligraphic drawings of the early 1950s, and thus it may be regarded as a transitional work. The pattern of the incisions, which are often deeply gouged into the paper often causing heavy burrs, relate perhaps to the grinder marks on the <i>Cubi</i> sculptures of the 1960s, where the grinding wheel judders and catches as it passes over the surface of the steel. Though scratchwork/incising into the wet media is evident in several drawings, it is not observed to this extent.			
DS6		73.52.33	none	1952	Heavy weight, off-white hand-made paper.	Drawing in black oil paint applied with tube and orange-brown ink/watercolour sprayed over stencils, possibly using a mouth sprayer (Two of these tools found in Smith's studio by the author, 2007). This work represents a precursor to the later spray drawings made using stencils and aerosol spray paint from cans. There were no further examples of drawing made in this			

<sup>1</sup> Collections from which works were examined are abbreviated in their respective accession numbers as follows: HAM (Harvard Art Museum), MMA (Metropolitan Museum of Art, New York), AIC (Art Institute of Chicago), WMAA (Whitney Museum of American Art, New York), PC (Private Collection). All other numbered works from the collection of The Estate of David Smith.

<sup>2</sup> The sample size required for FTIR and GCMS analysis is extremely small (approx. 10-20µm) and therefore represented an insignificant and imperceptible loss to the original. The location from which samples were removed varied. Preference for sampling was given to drawings in ink that had existing flaking and loss. Where this was encountered, minute samples were taken from the edge of an area of loss. Where the medium was intact, the sample was taken from the extreme edge of a thicker passage of ink or paint. The sampling process in all cases left no perceptible effect to the original. FTIR analysis, non-destructive to the sample, was performed initially. Where it was felt that further analysis (by GCMS or Py-GCMS) was required, samples were reused. For canvas paintings, samples were removed from paint on the tacking margin. For painted sculptures, samples were removed from the underside. XRF analysis was performed on drawings in situ, involving no sampling.

Sample /ID No.	Date sampled	Accession No.	Title	Date	Support	Notes	Sample	Analysis	Inference
						technique found prior to 1957-8 when Smith began to use aerosol spray paint from cans with stencils in a similar fashion. The fact that the earlier technique was not developed at this time suggests perhaps that Smith found the application of sprayed media via the mouth-sprayer too cumbersome and awkward to develop further.			
DS7	04/08	73.52.39	none	1952	Heavy weight, white, hand/mould-made paper with one deckle edge present.	Gestural brush drawing in thick black ink and white gouache/tempera with metal particulates of a uniform size observable under 40x magnification. Analysis of these metal particulates in other works by XRF confirms the presence of steel. The drawing is also covered in white mould spots. White is painted wet-in-wet and dissolves red dye in the black causing pink areas where it cross black strokes. This phenomenon also found in a drawing from 1957 (73.57.219: see below). Some scratchwork incised into the white paint.	Black ink.	<b>FTIR:</b> Mixture of proteinaceous and carbohydrate media, egg. Mould hyphae observed under 40x magnification. Metal particulates added to the black ink clearly observed under 40x magnification.	Egg-ink. with steel particulates.
DS8	04/08	73.52.44	none	1952	Heavy weight, buff, watercolour paper, slightly discoloured, slightly foxed.	Gestural brush drawing in black ink. Lustrous quality and presence of efflorescence suggests addition of egg. There are no works found in egg-ink prior to 1952, though Smith refers to the addition of egg as early as 1951. <sup>3</sup> Minor efflorescence formation in thicker passages and particularly where strokes cross.	Black ink.	<b>FTIR:</b> Matches for proteinaceous media.	Egg-ink.with steel particulates.
DS9		73.52.78	Untitled	1952	Medium weight, off white, antique laid, gelatine-sized, hand-made, Barcham Green F.J. Head paper. Watermarked with head of Christ (TR), "1399" and "FJH" monogram, and hand of the Pope (TL). <sup>4</sup>	Gestural brush drawing in black egg-ink. One of a series of similar drawings on this paper.			
DS10	04/06	73.52.5	Untitled	1952	FJH antique laid paper as 73.53.78.	Gestural brush drawing in brown-black and blue-black inks with metal particulates of a uniform size observable under 40x magnification added to both. Brown and yellow efflorescent particulates throughout blue-black ink.	Blue-black ink.	<b>FTIR:</b> Egg yolk/white Metal particulates added to the black ink clearly observed under 40x magnification.	Egg-ink.with steel particulates.
DS11	04/06	73.52.63	Untitled	1952	FJH antique laid paper as 73.53.78.	Gestural drawing in immiscible mixture of blue and black ink/paint. After 1952, Smith began to exploit the immiscibility of media to achieve this marbled effect. The composition in this instance is formed by allowing the liquid media to form directional runs through physical manipulation of the paper support.			
DS12	04/06	73.52.57	Untitled	1952	FJH antique laid paper as 73.53.78.	Gestural drawing in immiscible mixture of blue alkyd paint and magenta ink (a mixture of blue and red inks) achieving marbled effect as above. The technique is similar to 73.52.63 above, except that in this instance,	Blue paint. Red ink. Blue ink.	<b>FTIR:</b> Blue paint: Alkyd short oil (100% match). Magenta ink: saffron,	Short-oil alkyd paint mixed with blue and red dye based inks.

<sup>3</sup> List of drawings, Notebook #36, 1952, David Smith Estate, Box 9, #35-40.

<sup>4</sup> J. Barcham Green Ltd. produced **F J Head** papers in England from 1918 to 1987. It was named after the papermaker, Frederick Head, who had worked for O. W. Paper and Arts Company Ltd. until about 1910. The company was purchased by J. Barcham Green after the First World War. The paper is antique laid, and its watermarks allude to Head's desire to emulate medieval papers, which he researched extensively. According to Simon Green, it was designed for etching and engraving and was mostly used for book printing. (Simon Green, email to the author, 25/9/2006). David Smith made frequent use of this paper throughout the 1950s.



Sample /ID No.	Date sampled	Accession No.	Title	Date	Support	Notes	Sample	Analysis	Inference
						Smith appears to have made use of an implement – the end of the brush or similar - to draw out attenuated 'spikes' from pools of ink.		various dyes. Red ink: various red lake pigments.	
DS13		73.52.20	Untitled	1952	FJH antique laid paper as 73.53.78.	Gestural brush drawing in orange ink. Lustrous quality indicates inclusion of egg. Smith appears to have only occasionally used egg for colour ink works.			Egg-ink.
DS14		73.52.8	Untitled 10/10/52	1952	FJH antique laid paper as 73.53.78.	Gestural drawing in blue ink. Lustrous quality indicates egg-ink, as does the presence of yellow/brown efflorescent crystals throughout. These large particulates are have clearly erupted through the surface film, and create a somewhat rough texture to the ink. Compare with fine crystalline formation on many other drawings.			Egg-ink.
DS15		73.59.19	Untitled 10/10/52	1952	FJH antique laid paper as 73.53.78.	Gestural brush drawing in yellow ink			Egg-ink.
DS16		73.52.15	Untitled	1952	FJH antique laid paper as 73.53.78.	Gestural brush drawing in grey/purple ink with added metal particulates of a uniform size, and dry red pigment particulates observable under 40x magnification. Smith appears to have dripped water into the wet ink causing a mottled appearance where the ink is displaced. There is some evidence of efflorescence on a small particle of ink.			Ink with steel particulates and dry red pigment.
DS17		WMAA 79.43	Eng. No.6	1952	Medium weight, buff, rough surfaced, wove paper.	Drawing in gouache/tempera. Smith delineates the main form in red with white paint, deliberately making the strokes narrower than in his original form. Additionally, the white paint is allowed to drip toward the bottom margin suggesting that the work was painted vertically, or deliberately turned upright to allow this to occur. Smith also makes scored incisions into the red paint, and appears to have added a clear varnish (perhaps gum Arabic) to heighten certain areas.			
DS18	04/06	73.53.136	Untitled	1953	FJH antique laid paper as 73.52.78.	Gestural brush and dripped drawing in purple ink. The media shows considerable crackle and flaking in thicker areas.	Purple ink.	FTIR: gum Arabic. No match for egg.	Purple drawing Ink
DS19		73.53.30	Untitled	1953	Heavy weight, white, rough, wove paper. Watermarked 'A C+M Watercolour Paper, England'	Gestural brush drawing in black ink. Lustrous quality suggests presence of egg. Small patches of efflorescence are beginning to form throughout.			
DS20	04/06	73.53.88	Untitled	1953	FJH antique laid paper as 73.52.78.	Gestural brush drawing in immiscible mixture of black and purple inks achieving marbled effect as noted in 73.52.63 above. The black ink is desiccated and exhibits crackle and several losses. Presence of triethanolamine (used as a plasticizer and solvent for casein) indicates possibility of casein as replacement for egg yolk. Smith admitted that he occasionally used casein mixed into his inks in a 1952 letter to Wells Barnett. <sup>5</sup>	Purple ink.	FTIR: gum Arabic (86%) match for triethanolamine. No PVA, no egg.	Ink and Casein?
DS21		73.53.130	Untitled	1953	Medium weight, buff Japanese paper.	Gestural brush drawing in black and blue inks, executed on both sides of the paper. The absorbency and translucency of the paper is exploited by Smith in this			Ink with steel particulates and

<sup>5</sup> David Smith, Letter to Wells Barnett, Mar. 23, 1952, AAA, David Smith Papers, NDSmith R4, F1095.

Sample /ID No.	Date sampled	Accession No.	Title	Date	Support	Notes	Sample	Analysis	Inference
						work. Where the composition in black is executed on the one side, Smith deliberately applies blue ink to the verso, allowing it to strike through. Added metal particulates and dry red pigment are clearly visible in passages of black.			dry red pigment.
DS22		73.52.112	Untitled	1953	Medium weight, white, wove, hand-made paper. Watermarked "Arnold Unbleached".	Gestural brush and dripped drawing in red ink. Drips have been carefully controlled by manipulation of the paper. The presence of a number of pinholes at the bottom right corner may indicate that the direction of the drips was controlled as the paper was pinned and moved around this point.			Egg-ink.
DS23		73.53.26	Untitled	1953	FJH antique laid paper as 73.52.78. Heavier weight.	Gestural brush drawing in blue ink and mmiscible medium.			
DS24	04/08	73.58.53	Untitled	1958	Medium weight, white, wove, hand-made paper, well-sized.	Gestural brush drawing in black ink. Yellow-brown and white crystalline efflorescence visible throughout. Some craquelure in thicker areas.	White crystalline efflorescent.  Yellow-brown efflorescence	Yellow-brown efflorescence <b>GC/MS:</b> fatty acids (oleic, stearic, azelaic, palmitic. As with other examples, unusually high amounts of stearic acid and high stearic:palmitic ratio.  White efflorescence <b>GC/MS:</b> fatty acids (oleic, stearic, azelaic, palmitic. As with other examples, unusually high amounts of stearic acid and high stearic:palmitic ratio.	Fatty acid efflorescence
DS25	04/05	MMA 1994.400	Untitled	1953	Medium weight, white, wove, hand-made paper.	Gestural brush drawing in black ink with added particulate matter.	Particulate matter.	<b>GC/MS:</b> Though resembling efflorescent particulate, sample failed to dissolve in Methprep, suggesting inorganic material.	Egg ink with inorganic particulate substance.
DS26	04/07	73.54.166	ΔΣ11/8/54 - 8	1954	FJH antique laid paper as 73.52.78	Gestural brush drawing in matt brown ink/casein. Smith refers to this drawing in his notes as casein. Minor efflorescence is present in thicker areas of the medium, suggesting oelific component.	Brown medium.	<b>FTIR:</b> Large amounts of calcite (filler), Protein peaks, though no match for egg.	Casein.
DS27	03/07	73.54.91	ΔΣ2-4-54	1954	Heavy-weight, poor-quality, calandered paper.	Gestural brush drawing in thick black gouache.	Black ink.	<b>FTIR:</b> gum Arabic/carbohydrates, weak protein peaks.	Gouache/ watercolour.
DS28		73.59.77	ΔΣ 10/23/54	1954	Medium weight, off-white, textured hand made, Fabriano paper. Watermarked: 'Fabriano Italy'.	Calligraphic brush drawing in thin brown and black inks, and added particulates. As the medium has dried, the particulates have migrated to the edges. One of a series.			Ink/casein with inorganic particulates, possibly sand.
DS29	03/07	73.54.87	ΔΣ10/24/54	1954	Medium weight, off-white, textured hand made, Fabriano paper. Watermarked: 'Fabriano Italy'.	Calligraphic brush drawing in thin brown and black inks, pink gouache/tempera and metal particulates. In the same series as 73.59.77 above.	Brown/black ink.  Particulate matter.	<b>FTIR:</b> Calcite and other mineral fillers as 73.54.166 <b>XRF:</b> Si, Fe, Ca.	Casein? with inorganic particulates, possibly sand.

Sample /ID No.	Date sampled	Accession No.	Title	Date	Support	Notes	Sample	Analysis	Inference
DS30	03/07	73.54.85	ΔΣ 1/7/54 M NY	1954	Medium weight, off white Japan paper.	Gestural brush drawing in thick, greasy black egg ink with red pigment. Smith refers to this drawing in his notes as 'ink egg casein'. The medium is slightly somewhat chalky in certain areas, possibly indicating presence of casein.	Ink/casein. Red pigment.	Ink: <b>FTIR:</b> Egg yolk, whole egg, casein. Red particulates: <b>FTIR:</b> Madder, kermes and Cochineal.	Egg-ink with casein and organic red pigment particulates.
DS31		73.54.74	ΔΣ10/23/54	1954	Medium weight, off-white, textured hand made, Fabriano paper. Watermarked: 'Fabriano Italy'.	Gestural brush drawing in thin brown and black inks, white and green gouache/tempera with metal particulates added to the black ink. Minor efflorescence throughout.			Egg-ink, possibly with casein and inorganic particulates, possibly sand.
DS32		73.54.20	ΔΣ 11/8/54 -6	1954	FJH antique laid paper as 73.52.78.	Gestural brush drawing in brown ink and green gouache/tempera. Smith again incises into the green medium using the brush end or similar. Minor efflorescence present on thicker areas.			Egg-ink and gouache /tempera.
DS33	04/08	73.54.8	10/21/54/vers on 10/23/54 recto.	1954	Heavy weight, white, hand made paper.	Double sided abstract figural drawing. One of a series made by Smith that relate to the subject of Don Quixote. 10.21.54 is painted in thin blue black ink. Referred to in Smith's notes as 'egg, ink, casein. There is no record of whether this referred to one or both drawings on this sheet. The medium used for 10.23.54 in blue-black ink with a large proportion of particulate matter strongly resembles that of other drawings listed as casein (73.59.77, 73.54.87, 73.54.74). As with the previous 'casein' drawings, the particulate matter has collected along the edges of the strokes as the medium has dried.	Particulate matter	<b>XRF:</b> Significant peaks for: Ca, Si. Minor peak for Fe.	Ink/casein with inorganic particulates, possibly sand.
DS34	02/03	HAM 1966.17	Untitled	1954	Medium-weight, white, wove paper.	Gestural brush drawing in black egg ink with added red pigment.	Black ink	<b>FTIR:</b> Egg yolk, egg white.	Egg-ink with red pigment.
DS35		(Uncatalogued)	Untitled	1954	Buff coloured note paper/paste paper.	Sculpture study created using original swatches from automobile paint catalogue. Smith's inscription, added later in ink significantly refers to the sculpture as a 'drawing': "Black drawing on stainless base 7-14-1956"			
DS36		AIC E14215	ΔΣ5/22/55	1955	Medium weight, white wove paper.	Unexamined in person. Gestural drawing in black ink and blue and white gouache with metal particulates of a uniform size observable under 40x magnification. Scratchwork in the white paint. Metallic particulates noted by Art Institute of Chicago. <sup>6</sup>			Egg-ink, and gouache/tempera with steel particulates.
DS37		73.55.99	Untitled	1955	Medium weight Fabriano Ingres laid paper. Watermarked: 'C.M Fabriano' and 'Ingres Made in Italy'.	Gestural brush drawing in blue and red oil paint and black ink The immiscibility of oil and ink media is exploited to produce the marbled effect observed on earlier drawings (eg. 73.52.63 and 73.52.57)..			Tube oil paints and black egg ink.
DS38	02/02	HAM 1966.18	Untitled	1955	Medium-weight, white, hand-made wove paper	Gestural brush drawing in grey casein/tempera, white tube oil and black egg-ink.	Grey Paint Black ink White paint	<b>FTIR:</b> Grey paint: Egg, casein etc. Black ink: egg yolk, egg white. White: Llinseed oil	Black egg -ink, tube oil paints and tempera.

<sup>6</sup> Personal correspondence between Mark Pascale and The David Smith Estate, March 19<sup>th</sup> 2007.

Sample /ID No.	Date sampled	Accession No.	Title	Date	Support	Notes	Sample	Analysis	Inference
DS39		73.56.64	none	1956	Medium weight, white wove paper.	Gestural brush drawing in greasy lustrous blue ink. Appearance suggests addition of egg.			
DS40	04/08	73.56.61	none	1956	Heavy weight, rough, wove paper, with two deckle edges cut from larger sheet .	Gestural brush drawing in black ink with metal particulates of a uniform size observable under 40x magnification.	Metal particulates	<b>XRF:</b> Significant peaks for: Fe. Smaller peaks for: Al, Zn, Ca, Cu.	Black egg ink with steel particulates.
DS41	04/08	73.56.63	none	1956	As above	Gestural brush drawing in blue medium with red pigment particulates. Almost identical in appearance to similar examples in egg-ink. Smith almost certainly added the red pigment to paint while still wet, as brushing out has caused red streaks of pigment throughout the composition. Also contains small proportion of metal particulates, but not to the extent of other works (such as 73.56.61).	Blue paint	<b>FTIR:</b> Acrylic/styrene <b>PyGCMS:</b> Large amounts of Butyl Methacrylate with smaller amounts of methyl methacrylate, methyl acrylate and phthalic anhydride.	Magna acrylic paint (poly butyl methacrylate).
DS42		73.56.54	Untitled	1956	Heavy weight, buff wove, machine made paper.	Gestural brush drawing in black ink and blue gouache/tempera. Mould spots overall.		Fungal conidia clearly visible under 40x magnification.	Black egg-ink and blue tempera.
DS43		73.56.56	Untitled C-4-1956	1956	FJH antique laid paper as 73.52.78.	Circular drawing in black egg ink. Relates to several similar works from the same period including the Harvard drawing 1974.144 (see below). The circular form may have been drawn around a template. Subsequently, in certain areas, ink pools have been drawn out into several attenuated spikes using a brush end or similar. Unlike the Harvard drawing there is no evidence of the addition of pigment or metallic particulates.			Black egg-ink
DS44		73.56.41	Untitled '1956 prov 14'	1956	Heavy weight, white, wove paper. Watermarked: 'Unbleached Arnold'	Gestural brush drawing in black egg ink. Patchy efflorescence throughout.			
DS45	04/08	HAM 1974.144	Untitled	1956	Medium-weight white watercolour paper	Circular drawing in black ink with blue, red and metallic particulates. One of a series of similar works that includes the Estate drawing 73.56.56 (above). Both red and blue particulates are identified under 40x magnifications. Metallic particulates are visible to the eye.	Black ink Blue pigment Red pigment Metal particulates	<b>FTIR:</b> Black ink: Egg yolk, egg white. <b>XRF:</b> Blue pigment: Fe, Al, Zn. Red pigment: Fe. Metal particulates: Fe, Zn, Cu, Al.	Black egg ink with iron oxide red and, Prussian blue (?) pigment and steel particulates.
DS46	02/03	HAM 1974.151	Untitled	1956	Medium-weight white watercolour paper	Brush and dripped ink drawing in black egg ink. Smith applied a less viscous egg ink to the page initially with a brush. He then manipulated the paper in to allow the pooled ink to travel across the page in several directions. Thicker areas of ink contain significant amounts of a thick white waxy material observable particularly under the ink in areas of cracking. Although there are minor patches of efflorescence throughout the ink, the waxy material appears under the surface of the ink. The FTIR result suggest the possibility of adulteration of the ink with aluminium stearate (frequently used as an extender in proprietary oil paints), but it is more likely that the instrument has picked up on an excess of free stearic acid in the sample, consistent with the unusually high proportions of stearic acid found	Black ink Waxy material	<b>FTIR:</b> Ink: Egg yolk, egg white. Waxy material: Stearic acid, aluminium stearate. <b>XRF:</b> Waxy material: K, Ag, S, P (small amounts), traces of Al	Black egg ink. Fatty acid efflorescence. Possible addition of aluminium stearate.

Sample /ID No.	Date sampled	Accession No.	Title	Date	Support	Notes	Sample	Analysis	Inference
						in samples of efflorescence elsewhere in this study. Although the ink itself does not possess a waxy quality per se, the waxy feel to the white material and the matches for stearates in the FTIR result have a parallel in the 1958 drawing 73.58.75 and other drawings in the same series.			
DS47	03/07	73.57.217	ΔΣ80-12-57	1957	Medium weight, white, wove 'Japan' paper. Watermarked: 'JAPAN', bottom left.	Gestural brush drawing in black acrylic emulsion and white gouache/tempera? Part of a large series of drawings created in December 1957 on the same paper. Smith's notes state that the related work (ΔΣ 85-12-57) is painted in casein. In this instance, the white is painted wet-in-wet with the black acrylic and curiously acts to dissolve a constituent red dye in the black resulting in a pink tone in those areas where white crosses black. Compare with 72.57.219 and 73.57.197. That this work contains acrylic emulsion is highly significant, since it demonstrates that Smith was experimenting with acrylic emulsion paints very shortly after they were introduced to artists by Liquitex in 1956. Smith used Magna acrylic solution acrylic paints in the same year (see 73.56.63, above) and would have undoubtedly been aware of the acrylic medium as used in industrial paints, which was introduced by Dupont as <u>Lucite</u> in 1931 and widely used in the automobile industry by the 1940s. (See also 73.58.209, below).	Black paint	<b>FTIR:</b> Not positive for casein. <b>GC:</b> Positive match for Acrylic. Ethyl acrylate and Poly methyl methacrylate.	Acrylic emulsion paint.
DS48	03/07	73.57.219	ΔΣ82-12-57	1957	As 73.57.217	Gestural brush drawing in ink and PVA solution (?) medium. Part of a large series of drawings created in December 1957 on the same paper. One of a series of drawings in purple ink in which the immiscibility of the media is exploited to cause marbled effect. Compare with 72.57.217 and 73.57.197.	Purple ink/paint	<b>FTIR:</b> (poly) vinyl acetate, (poly) vinyl butyral. (98% match). <b>GC:</b> Confirms presence of (poly) vinyl acetate, (poly) vinyl butyral	Purple ink and PVA/PVB solution.
DS49		73.57.197	ΔΣ 55-12-57	1957	As 73.57.217	Gestural brush drawing in black egg ink. Part of a large series of drawings created in December 1957 on the same paper, though in this instance using a smaller brush and more emphasis on the calligraphic. In this instance the ink also contains metallic particulates, unseen in other examined works in the series. Compare with 72.57.217 and 73.57.217.			Black egg-ink and steel particulates.
DS50	04/06	73.57.209	Untitled	1957	Medium weight, buff coloured, Japanese paper.	Gestural brush drawing in black egg ink and immiscible medium. One of a number of drawings in black ink in which the immiscibility of the media is exploited to cause marbled effect. Strongly resembles the effect observed in drawings in which PVA was identified (73.57.219 and HAM1966.16). However, the sample spectrum lacks characteristic peaks for PVA/PVB. The possible presence of poly-n-methacrylamide in the sample, however, certainly suggests an admixture of ink and a modern synthetic. It points strongly to an acrylic emulsion component, consistent with Smith's use of acrylic emulsion paints in the same year (see 73.57.217, discussed above). In 1957, a US patent was granted (from a 1954 application) for a surfactant for emulsion	Black ink	<b>FTIR:</b> Poly-n-methacrylamide, No trace of (poly) vinyl acetate, (poly) vinyl butyral.	Black egg-ink and acrylic emulsion or vinyl-based medium.

Sample /ID No.	Date sampled	Accession No.	Title	Date	Support	Notes	Sample	Analysis	Inference
						systems consisting of co-polymers of acrylamide or methacrylamide and acrylic or methacrylic acids. <sup>7</sup> This suggests at least the possibility that acrylamides were used in acrylic emulsion paints at this time.			
DS51		73.57.106	Untitled 10-2-57	1957	FJH antique laid paper as 73.52.78.	Brush drawing in black egg-ink. Brushstrokes in this instance are spare, single and narrow. The drawing lacks the vigour of many more gestural examples.			Black egg-ink
DS52		73.57.108	Untitled 1/10 – 18 – 57	1957	FJH antique laid paper as 73.52.78.	Gestural brush drawing in black egg-ink, yellow and red oil paint painted wet-in-wet. As discussed above in drawings 72.57.219, 73.57.209, HAM1966.16 the immiscibility of the media (in this case tube oil paint and ink) is exploited to achieve a marbled effect. It is clear that the two were painted wet-in-wet as the ink and oil separate in the same brushstroke. There are minor patches of efflorescence but only on the egg-ink. The yellow and red oils were painted first, followed by the black egg-ink. Subsequently, Smith appears to return to the work with several passages of yellow oil paint. The effect is of a constantly changing and vibrant surface texture throughout the work.			Black egg-ink and yellow and red tube oil paints.
DS53		73.57.116	Untitled/unsigned	1957	FJH antique laid paper as 73.52.78.	Gestural brush drawing in red-black ink wash, black ink and magenta ink. The black is tempered by added red ink – there is a pink wash at the edges of the stroke. Smith applied the pale black/red wash first. The magenta ink and then the stronger, viscous black egg-ink was added subsequently. The purple ink contains both red and blue pigment particulates in large agglomerates. The black egg-ink is also heightened with the addition of metallic particulates. There is minor efflorescence in the thicker areas of the purple ink.			Red-black ink wash, black egg-ink, red and blue pigment and steel particulates.
DS54	02/03	HAM 1974.157	Untitled	1957	Medium-weight white wove paper	Spray painting over stencils in blue, black and gold aerosol spray paint. Smith has nuanced the hard edges of the stencils by using a variation of angles of approach with the spray can, allowing paint to creep under the stencil edge.	Blue paint Black paint Gold paint	<b>FTIR:</b> Blue paint: Nitrocellulose, cellulose acetate. Black: Alkyd. Transparent particulates observed in sample identified as starch. Gold: Alkyd, matches spectrum of gold paint on 174.145, but not bronze  <b>Py-GC/MS:</b> Black: Phthalic anhydride.	Commercial aerosol spray paint. Various formulations including nitrocellulose/cellulose acetate mixture and alkyd paints. Presence of phthalic anhydride in black paint strongly suggests an alkyd.
DS55	02/03	HAM 1966.16	Untitled	1957	Medium-weight white watercolour paper	Gestural brush drawing in purple ink and PVA solution. One of a number of drawings in a purple medium in which the immiscibility of the media is exploited to cause a marbled effect that Smith created in 1957. Strongly resembles the effect observed in drawings in which PVA		<b>FTIR:</b> Carbohydrate media, (poly) vinyl acetate, (poly) vinyl butyral (91% match) <b>XRF:</b> Purple: small	Purple Ink and PVA/PVB solution.

<sup>7</sup> Schiller, A.M. 1954. Polymeric Surface Active Agents. US Patent: 2,816,882. Filed Jan. 22, 1954. Issued Dec. 17 1957.

Sample /ID No.	Date sampled	Accession No.	Title	Date	Support	Notes	Sample	Analysis	Inference
						was identified (73.57.209, and particularly 73.57.219 ). Two works examined from this series were created using PVA (or PVB) solution mixed with an aqueous ink. Curiously, in the black ink drawing 73.57.209, no trace of PVA (or other synthetic organic medium) could be positively identified in the sample, indicating that Smith experimented widely with media to achieve this effect. Jean Freas states that Smith used Gentian Violet antiseptic solution to paint with on one occasion during the 1950s. However, the lack of significant amounts of chlorine in the sample, suggest that this solution was not used for these works.		amounts of Cl, Fe. (likely due to contamination from paper). <b>Py-GC/MS:</b> Benzene, methyl acrylic acid. Negative for Gentian Violet.	
DS56	02/03	HAM 1994.28	Untitled	1957	Gesso-prepared canvas on LeBron wooden stretcher.	Spray painting over stencils in cream, matt black and gloss black aerosol spray paints. In this instance, Smith deliberately exploits the variations in gloss of two black spray paints, creating nuance and texture. Possibly the result of an abandoned experiment, or fortuitous accident, the effect is not observed in other spray paintings examined by the author. The painting is one of four spray paintings purchased by the collector Lois Orswell directly from Smith, and it is worth noting that the two Orswell paintings examined here both demonstrate particular surface effects (See also 1994.26 below). In this painting, carefully manipulating the aerosol nozzle, Smith achieved a 'spatter' effect using the gloss black spray. The result is an effect similar to the flicking of paint from a brush. However, in this instance, the gloss black partially dissolves and displaces underlying matt spray causing the white ground to be exposed in a halo around the spatters of gloss. Likely the result of the differing solvent evaporation rates and other drying mechanics of these paints, the effect is peculiar to paints based on modern synthetic resins and the result was clearly prized enough by Smith to show and sell the work to Orswell.	Cream spray paint Gloss black spray paint Matt black spray paint White Ground spray paint	<b>FTIR:</b> Cream: Short oil alkyd. Gloss black: Alkyd. Matt black: Alkyd, high proportion of calcium carbonate. White ground: Barium sulphate and linseed oil.  <b>Py-GC/MS:</b> Cream: Dimethyl phthalate, benzene, toluene. Gloss black: Phthalic anhydride, fatty acids (18:0 and 16:0). Matte black: dimethyl phthalate, benzene , toluene etc.	Alkyd gloss and matt aerosol spray paints on oil white
DS57		WMAA 79.42	Untitled	1957	Medium weight, white wove paper.	Gestural brush drawing in black egg-ink with metal particulates of a uniform size observable under 40x magnification.			Black egg-ink and metallic particulates.
DS58	03/07	73.58.116	5/30/58_5	1958	Medium weight, buff-coloured, laid Fabriano paper.	Gestural brush drawing in black egg ink. There is minor efflorescence in thicker passages of ink. The black ink is a higher gloss/lustre than other works created in the same year, which appear somewhat waxy. However, FTIR spectra from samples of both inks were compared and found to be almost identical.	Black ink	<b>FTIR:</b> Egg yolk, whole egg etc. Compared with sample for waxy ink in 73.58.75. Spectra almost identical.	Black egg-ink.
DS59		73.58.79	a4/58 37	1958	Medium weight, white, wove hand made paper, hard sized (likely traditional gelatine size).	Part of a series of 32 drawings executed on the same paper. 17 were examined for the purposes of this survey. The works are variations exploring a theme, largely gestural and typically created using a thin 1/2 inch brush. The ink is not thickly applied, but the works have in common a particularly waxy quality. Extensive efflorescence was observed in all examples in the series examined, in this case encountered as an overall hazy white cast rather than as patches of crystalline matter. The ink, as a rule, appears more flexible and does not exhibit the crackle and flaking associated with samples in more glossy egg ink. The paper is highly			

Sample /ID No.	Date sampled	Accession No.	Title	Date	Support	Notes	Sample	Analysis	Inference
						sized, and it is possible that the lack of absorbency in the paper combined with a larger proportion of fatty acids present in the ink which has contributed to the extensive efflorescence observed in this series.			
DS60		73.58.65	David Smith a4/58 22	1958	As 73.58.79 above.	As above.			
DS61		73.58.51	a4/58 3	1958	As 73.58.79 above.	As above. In this case, Smith has used a mixture of black and purple inks with a considerably thicker brush. There is some craquelure and several small areas of loss in the inks.			
DS62		73.58.54	a4/58 6	1958	As 73.58.79 above.	As above. In this case there are obvious signs of the addition of egg in the greasy yellow streaks present in the ink. Significant staining, observable in the verso in areas corresponding with these yellow streaks of the paper suggests perhaps that the egg-ink mixture contained a relatively high proportion of fatty acids.			
DS63		73.58.55	a4/58 7	1958	As 73.58.79 above.	As above.			
DS64		73.58.56	a4/58 8	1958	As 73.58.79 above.	As 73.58.53 above.			
DS65		73.58.57	a 4/58 10	1958	As 73.58.79 above.	As above. The ink is applied with a thicker brush, and the work is more gestural. In this case, the efflorescence is not observed as an overall cast, but rather in localised spots. This may be an initial stage, as the drawing also shows the beginnings of an overall cast. Again the ink contains noticeable yellow streaks of unmixed egg yolk indicating an excess of egg yolk.			
DS66		73.58.58	a4/58 11	1958	As 73.58.79 above.	As Above. As 73.58.57, the efflorescence is more noticeable in thicker passages of ink and the drawing shows the beginnings of an overall cast. Smith's inscription on the verso of this work in pencil inscribed on a patch of orange (tempera?) paint reads: "PKG LA 11-15-59 invoice 13, and likely refers to the loan of several of his drawings to the Everett Ellin Gallery in Los Angeles for the exhibition, <u>David Smith, Sculpture &amp; Drawings</u> ( 7 <sup>th</sup> November – 3 <sup>rd</sup> December 1960).			
DS67		73.58.60	a4/58 14	1958	As 73.58.79 above.	As above.			
DS68		73.58.61	a4/58 15	1958	As 73.58.79 above.	As Above. Smith's inscription on the verso reads "LA 11-15-58 invoice 11" (See 73.58.59 above).			
DS69		73.58.62	a 4/58 16	1958	As 73.58.79 above.	As above.			
DS70		73.58.64	a 4/58 17	1958	As 73.58.79 above.	As above.			
DS71		73.58.69	a4/58 26	1958	As 73.58.79 above.	As above.			
DS72		73.58.70	a4/58 27	1958	As 73.58.79 above.	As above. In this case the efflorescence is encountered in large patches with several areas of loss.			
DS73		73.58.73	a4/58 30	1958	As 73.58.79 above.	As above.			
DS74	03/07	73.58.75	a4/58 32	1958	As 73.58.79 above.	As above. Although there are significant visual and tactile differences between the waxy black egg-ink in this series, and the more glossy, hard ink used in other works, analysis confirms that the ink is likely to be the same. A comparison of the FTIR spectra gathered from this sample, and that gathered from a sample taken from	Black ink	<b>FTIR:</b> Aluminium stearate Zinc stearate, egg yolk. <b>GCMS:</b> Low azelaic acid (9:0) . High palmitic (C16:0) to Stearic (C18:0) ratio, as found in	Black egg-ink.



Sample /ID No.	Date sampled	Accession No.	Title	Date	Support	Notes	Sample	Analysis	Inference
						a work made in the same year (see 73.58.116, above) shows that the two samples are almost identical. Further, under GCMS analysis, the sample showed the a high palmitic:stearic ratio but with a large proportion of stearic acid. This sample appeared to have a higher proportion of oleic acid, which seems to indicate (when considered together with the presence of streaks of egg yolk ) that the waxy nature of these particular inks may be simply due to an excess of egg yolk derived free fatty acids in the mixture. The large proportion of oleic acids in this compared with other samples of egg ink is also suggestive of a higher proportion of egg yolk in the ink. The presence of metal stearates was also found in the analysis of similar white waxy material found in the Harvard drawing HAM1974.151, above.		several samples above. Large proportion of stearic and oleic (18:1) acids.	
DS75		73.57.255	ΔΣ 89-12-57	1958	Medium weight cotton white wove paper.	Gestural brush drawing in a mixture of purple and black inks.			Purple and Black inks
DS76		73.58.3	David Smith 1-3-58	1958	Heavy weight large (42.5x30cm) off-white , wove paper.	One of a series of similar drawings made in 1958 on much larger sheets of watercolour paper. In this instance, Smith has used a medium brush and a greasy black egg ink streaked with brown, purple and blue (likely oil) paint. There are yellow and orange particulates but unlike other works, these do not appear to be dry pigment particles. It is possible that in this case, Smith dipped an ink-laden brush into his oil palette (or similar) creating a streaked effect as this paint was drawn along with the inked brush. There is some evidence of patchy efflorescence throughout. The ink also contains metallic particles visible under 40x magnification.			Black egg-ink with steel particulates.
DS77		73.58.165	9 David Smith 9/13/58	1958	Medium weight, white, rough paper. Watermark: Milbourne and co, British Hand Made bottom margin.	Gestural brush drawing in a heavily granular black egg-ink. Patchy efflorescence is observable in thicker areas.			Black egg-ink
DS78	04/06	73.58.209	Untitled	1958	Medium weight, soft sized, white wove paper. Watermark: 'JAPAN', bottom right.	Gestural brush drawing in glossy black acrylic paint. Visually, the medium is almost indistinguishable from the black egg-ink; it has the virtually same qualities of lustre, gloss and tactility, and proves a similar value to the black. However, analysis demonstrates that it is almost certainly a black acrylic emulsion paint. Smith used acrylic emulsion as early as 1956, very soon after artists' acrylic emulsions became available. It demonstrates perhaps, his search for a medium that would conform to the properties of egg-ink, but in which he might also indulge experimental nature.	Black media	FTIR: 96% match for (Poly) methyl methacrylate/ethyl acrylate co-polymer.	Black acrylic emulsion paint.
DS79	04/06	73.58.52	Untitled a-4-58-4	1958	Medium weight, hard-sized white wove, machine made paper.	Gestural brush drawing in black egg-ink. There are streaks of yellow egg yolk and corresponding staining on the verso of the paper. There is extensive mould and efflorescence present throughout. corresponding with these.			Black egg-ink.
DS80	04/08	73.58.80	Untitled a-F8-38	1958	As 73.58.52	Gestural brush drawing in thick, waxy black media similar in appearance to the waxy black egg-ink in many examples above. However, analysis suggests strongly that it is an acrylic emulsion paint. There is extensive efflorescence overall and minor craquelure throughout.	Black ink	FTIR: 96% match for (Poly) methyl methacrylate/ethyl acrylate co-polymer.	Black acrylic emulsion paint.

Sample /ID No.	Date sampled	Accession No.	Title	Date	Support	Notes	Sample	Analysis	Inference
						As noted in Chapter Two, Smith's appears to have increasingly used synthetic paints in the years after 1956; of significance, perhaps, this was the year in which Jackson Pollock died.			
DS81	02/03	HAM 1974.146	Untitled	1958	Medium-weight white wove paper.	Gestural brush drawing in thick waxy black medium that again appears visually to be egg-ink, but which contains significant amounts of PVA/PVB.	Black paint	<b>FTIR:</b> egg, linseed oil. <b>Py-GC/MS:</b> (Poly) vinyl acetate, fatty acids.	Black egg-ink and PVA/PVB.
DS82	02/03	HAM 1974.149	Untitled	1958	Medium-weight white wove paper.	Calligraphic brush drawing in black egg-ink, partially erased with white spray paint used over stencils. Although Smith began to use aerosol spray paint in 1957 and produced a large number of stencil works using the medium, it is rare to find spray paint used in gestural black ink works; in fact this is the only example found by the author. The use of white paint to partially erase and partially heighten areas of the composition is of course used by Smith in many works, but almost invariably he used white tempera or gouache.	Black ink White spray paint	<b>FTIR:</b> Black ink: egg yolk, carbohydrates White paint – oil modified alkyd <b>Py-GC/MS:</b> White paint: Phthalic anhydride, fatty acids (16:0 and 18:0, 18:1, 18:2)	Black egg-ink and white alkyd spray paint.
DS83	02/03	HAM 1974.145	Untitled	1958	Medium-weight off-white wove paper.	Stencil drawing in metallic blue, orange, black and gold aerosol spray paints. It is clear from the analysis that an attempt to characterise the medium of a typical aerosol spray paint may be futile. Alkyd, nitrocellulose and acrylic paints were all identified in the paints used for this drawing. As noted in the main body of the text, much aerosol re-spray automobile paint in the 1950s and 1960s was based on the cheaper nitrocellulose resins. However, spray paint designed for other uses (radiator paint for example) and later those designed for artists' use, were based on a number of vehicles. Indeed the paint vehicle of a manufacturer's range could, and often did, change across a range of colours. Additionally many paints were based on mixtures of two or more of these vehicles. FTIR results in this case are inconclusive due to the similarities in the spectra for typical aerosol paint vehicles. In this instance a comparison of the spectra of the gold paint sample here, and the gold paint sample taken from HAM1974.157 indicates that the paints were the same. The spray paintings on paper are almost invariably in excellent condition.	Metallic blue paint. Orange paint. Black paint. Gold paint.	<b>FTIR:</b> Metallic blue: Nitrocellulose (96% match) Orange: Oil-modified alkyd Black: (Poly) methyl methacrylate/acrylic emulsion. Gold: Acrylic, alkyd. <b>Py-GC/MS:</b> All colours: Acrylic	Aerosol spray paints based on acrylic, alkyd and possibly nitrocellulose vehicles.
DS84	03/07	73.59.2	10-2-59	1959	Medium weight, buff-coloured wove paper. Watermarked: 'PCO', bottom right and Crown motif and 'Umbria' top left.	Gestural brush drawing in black and purple egg-ink. On the verso inscribed into a stroke of orange paint in graphite: "PK6 LA 11/15/59" and "invoice 21" (See 73.58.59 above). Smith refers to this work in his notes as "sepia violet tempera".	Black/Purple ink	<b>FTIR:</b> Egg yolk, egg white. <b>GC:</b> Fatty acids: Low proportion of azelaic acid, high palmitic, moderate stearic, low oleic.	Black/purple egg-ink
DS85	03/07	73.59.116	none	1959	Medium-weight white wove paper. The dimensions (11.5x17.5") indicate that it may be a half-sheet of the 17x22" paper that Smith often worked with.	Stencil drawing in gold, orange and black aerosol spray paints. In these early spray drawings (c.1957 to 1961) Smith appears to make more use of organic shaped stencils. However, after 1963, he begins to make more use of hard edge stencils in drawings that parallel forms observed in the related Cubi sculptures. At the same time, carefully allowing the spray to creep under the edge of a stencil and contrasting this with a hard edged form allowed Smith to create forms that appeared to float in space on the sheet. This drawing also demonstrates the often-used technique of manipulating the aerosol nozzle to form large spatters of paint. This	Gold spray paint	<b>FTIR:</b> Acrylic.	Aerosol spray paints based on acrylic, alkyd and possibly nitrocellulose vehicles.

Sample /ID No.	Date sampled	Accession No.	Title	Date	Support	Notes	Sample	Analysis	Inference
						particular technique is more often found with the metallic spray paints – in this case, gold – and impart an enlivening reflectance to the drawing which is ultimately pursued in the burnishing of the stainless steel surfaces of the Cubis			
DS86		73.59.94	none	1959	Medium-weight off-white wove paper.	Stencil drawing in green, blue, orange, black and copper spray paint. There are several water stains along the edge of the stencilled areas.			
DS87		73.59.118	none	1959	Medium-weight off-white wove paper.	Stencil drawing in blue, black and copper spray paint. Also water damaged right side. As observed in 73.59.116 the metallic copper paint is applied in large spattered droplets. In this instance, Smith may have applied the copper paint from above, since the droplets have no 'tail' indicating direction of application. Pinholes at the four corners indicate that the paper was held in position while stencils were registered.			
DS88	04/06	73.59.13	David Smith H7 9-16-1959	1959	Medium-weight, white, antique-laid Barcham Green FJ Head paper (see 73.52.78 above).	Gestural brush drawing in black egg-ink. Signature in black egg-ink inscribed with graphite. The ink is similar to 73.60.163 below. There are thick streaks of unmixed egg yolk observable in the ink. Efflorescence is beginning to form on the surface of these areas. The unmixed streaks resemble unmixed oil paint (found in several drawings above). However FTIR analysis confirms a lack of drying oil and the presence of egg yolk. The drawing appears amongst a number of others in an annotated photograph by Smith, which shows a number of drawings drying on his living room and studio floor (published in <a href="#">David Smith, 'Notes on my Work', Arts, February, 1960: 44-49</a> ).	Oily accretion	<b>FTIR:</b> Egg yolk, egg white. No match for drying oils.	Black egg-ink.
DS89	04/08	73.59.68	Untitled	1959	Medium-weight, white, wove paper.	Gestural brush drawing in black egg-ink and white tempera/gouache. Severe efflorescence on thicker passages of ink, and along the ridges of brush strokes. Moderate cracking in thicker areas.	Efflorescence/ Black ink	<b>GC: GCMS:</b> Low azelaic acid (9:0). High palmitic (C16:0) to Stearic (C18:0) ratio (2.23), as found in several samples above. Large proportion of stearic and oleic (18:1) acids.	Black egg-ink
DS90	02/03	HAM 1974.158	Untitled	1959	Medium-weight, white, wove paper.	Gestural brush drawing in purple nitrocellulose/alkyd paint. As with works above, the richness and lustre of the synthetic medium strongly resembles egg-ink. FTIR suggests both alkyd and nitrocellulose vehicles. The date (1959) may favour alkyd, (the majority of automobile manufacturers in the United States favoured Dupont Dulux alkyd enamel, for example) although nitrocelluloses were present in several cheaper industrial paints. The presence of alizarin crimson in the sample indicates that the purple is a mixture of red and blue pigments.	Purple paint	<b>FTIR:</b> Oil-modified alkyd, nitrocellulose, alizarin crimson. Negative for egg/proteins.	Purple alkyd/nitrocellulose paint.
DS91	02/03	HAM 1994.26	Untitled	1959	Gesso-prepared canvas on Lebron stretcher.	Stencil painting in black, green, silver and orange spray paints. As noted above, the exact identification of the aerosol spray paint vehicle is difficult without further analysis. In this instance, the silver paint was chosen for Py-GCMS analysis. This was identified as based on an acrylic vehicle (the presence of phthalate plasticizers are additionally indicative of an acrylic vehicle). The black, green and orange paints are likely to be based on an	Black, green, silver and orange spray paint Glass beads	<b>FTIR:</b> Black: Alkyd Green: Alkyd Silver: Acrylic (MMA) Orange: Alkyd Glass beads: Glass.	Alkyd and acrylic aerosol spray paints, glass micro-spheres.

Sample /ID No.	Date sampled	Accession No.	Title	Date	Support	Notes	Sample	Analysis	Inference
						alkyd vehicle. Textural particulates mixed into the paint (discussed anecdotally as sand) were identified under 40x magnification as being spherical glass beads. FTIR confirmed the presence of glass. Glass beads of this type were typically used in industry as an abrasive for the removal of rust, or for high reflectance paint for road signs, applications that Smith would undoubtedly have been aware. The use of textural elements added to a medium is, as noted many times above, observed frequently in Smiths works on paper, and in several early paintings. However, there are no spray paintings on canvas known to the author, or to the artist's estate that make use of textural elements outside of this example. That Smith sold this work to Lois Orswell is indicative of the fact he thought highly enough of it to suggest its purchase to a close friend.		<b>Py-GC/MS:</b> Silver: (poly) methyl methacrylate, Diethylhexyl phthalate.	
DS92	02/03	HAM 1994.19	5 ½	1959	Welded steel	Welded steel sculpture painted in green, yellow and red paints with clear coating/varnish. Paint samples from the surfaces of this and several other painted sculptures were analysed for the purposes of comparison with synthetic media used for his works on paper and canvas. FTIR analysis suggests that the majority of the colours are based on an acrylic or alkyd vehicle. Given the age of the work, it is possible that the coating is a later addition.	Red paint Yellow paint Green paint Clear coating	<b>FTIR:</b> Red: Acrylic Yellow: Alkyd, acrylic. Varnish: Acrylic Yellow: Alkyd, acrylic. Clear varnish: Acrylic. Green: Acrylic.	Industrial acrylic and alkyd paints with clear acrylic varnish.
DS93		73.59.143	Dida 8-7-59	1959	Large, heavy-weight, white wove paper	Gestural brush drawing in black egg ink. The work is stored framed and has extensive efflorescence. A ghost image is beginning to form on the underside of the acrylic glazing, strongly pointing to the fact that an impediment to the evaporation of efflorescent free fatty acids from an oelific medium (ie. Egg yolk) may allow recrystallization of such fatty acids on the medium (as discussed in Chapter Four).			
DS94		73.59.142	Rebecca	1959	Large, heavy-weight, white wove paper	Gestural brush drawing in black egg ink. The work is stored framed and has extensive efflorescence. A ghost image is beginning to form on the underside of the acrylic glazing, strongly pointing to the fact that an impediment to the evaporation of efflorescent free fatty acids from an oelific medium (ie. Egg yolk) may allow recrystallization of such fatty acids on the medium (as discussed in Chapter Four).			
DS95		73.60.7		1960	Large, heavy-weight, white wove paper	Gestural brush drawing in black egg ink. The ink has circular patches of sporadic white mould throughout. These are circular colonies of fungal conidia which can be clearly observed under 40x magnification. On visual examination, the mould can in the first instance strongly resemble patchy white efflorescence observed on other drawings, and thus can lead to confusion. The bulls-eye pattern observed in the mould is not found with efflorescence, and can be used for typical identification. On several drawings both mould and efflorescence have been identified. The author found that the majority of inks that exhibit mould were those found in drawings dated 1960 -1965, the last works that Smith made before his death, and possibly those that may not have been properly "archived" in drawers by Smith before his death. This is consistent with reports that several of			

Sample /ID No.	Date sampled	Accession No.	Title	Date	Support	Notes	Sample	Analysis	Inference
						Smith's later drawings were poorly stored after his death discussed in Chapter Four. Mould is also found infrequently in earlier drawings (See 73.52.39 above), but is encountered as smaller, dispersed spots, rather than the sporadic circular colonies observed in the drawings from 1960 onwards.			
DS96		73.60.6		1960	Large, heavy-weight, white wove paper	Gestural brush drawing in black egg ink. The ink has sporadic circular colonies of white mould conidia throughout (See 73.60.7, above).			
DS97		73.60.5		1960	Large, heavy-weight, white wove paper	Gestural brush drawing in black egg ink. The ink has sporadic circular colonies of white mould conidia throughout (See 73.60.7, above).			
DS98	04/08	73.60.2		1960	Large, heavy-weight, white wove paper	Gestural brush drawing in black egg ink. The ink has sporadic circular colonies of white mould conidia throughout (See 73.60.7, above). A sample was taken in order to ascertain whether there was a correlation between the composition of Smith's ink in the 1960s and the presence of mould. No significant difference was noted on comparing the resultant spectrum with those of egg-inks used throughout the 1950s. As noted in Chapter Four, the composition of Smith's ink in the 1960s is presumed to be more or less the same as it was in the 1950s.	Black ink	FTIR: Egg yolk	Black egg-ink
DS99		73.60.40		1960	Large, medium-weight, buff paper.	Gestural brush drawing in black egg ink. The ink has sporadic circular colonies of white mould conidia throughout (See 73.60.7, above).			
DS100	04/07	73.60.166		1960	Medium-weight, white, antique-laid Barcham Green FJ Head paper (see 73.52.78 above).	Calligraphic brush drawing in black egg-ink with added hard, glossy particulate matter that is difficult to flatten or crush on the diamond cell. The particulates may be hardened lumps of linseed oil. FTIR strongly suggested the presence of linseed oil. The low proportion of azelaic acid in the sample indicates egg. The palmitic/stearic ratio and high proportion of stearic acid is consistent with samples above.	Particulate matter	FTIR: Linseed oil, Calcium, proteins. GC: Fatty acids: Low azelaic (9:0) acid, high proportion of both stearic and palmitic, higher palmitic than stearic.	
DS101		73.60.7		1960	Large, rough, heavy white wove paper.	Gestural brush drawing in black egg ink. The ink has sporadic circular colonies of white mould conidia throughout (See 73.60.7, above). Above drawing from 1952 is also mouldy but exhibits a different pattern – spots throughout the drawing, rather than bloom and bulls-eye pattern.			
DS102		73.60.6		1960	Large, rough, heavy white wove paper.	Gestural brush drawing in black egg ink. The ink has sporadic circular colonies of white mould conidia throughout (See 73.60.7, above).			
DS103		73.60.5		1960	Large, rough, heavy white wove paper.	Gestural brush drawing in black egg ink. The ink has sporadic circular colonies of white mould conidia throughout (See 73.60.7, above).			
DS104	04/08	73.60.2		1960	Large, rough, heavy white wove paper.	Gestural brush drawing in black egg ink. The ink has sporadic circular colonies of white mould conidia throughout (See 73.60.7, above).		FTIR: positive for protein – egg ink, no difference to other egg ink media	
DS105		73.60.40		1960	Large, heavy, buff wove paper.	Gestural brush drawing in black egg ink. The ink has sporadic circular colonies of white mould conidia			

Sample /ID No.	Date sampled	Accession No.	Title	Date	Support	Notes	Sample	Analysis	Inference
						throughout (See 73.60.7, above).			
DS106	04/06	73.60.20	Untitled	1960	Medium weight, white, wove paper.	Gestural brush drawing in thick gloss black egg ink. The ink has sporadic circular colonies of white mould conidia throughout (See 73.60.7, above). The ink also shows extensive patches of white efflorescence. The black ink appears particularly glossy and hard.	Black ink	<b>FTIR:</b> Egg yolk, egg white (strong match).	Black egg-ink (egg white?)
DS107		73.60.8	Untitled	1960	Heavy weight, rough, white, wove paper.	Gestural brush drawing in black egg ink. The ink has sporadic circular colonies of white mould conidia throughout (See 73.60.7, above).			
DS108	04/06	73.60.111	Untitled	1960	Medium-weight, white, antique-laid Barcham Green FJ Head paper (see 73.52.78 above).	Gestural brush drawing in brown-black ink. There is extensive efflorescence but only in two areas. Large streaks of unmixed egg yolk with associated staining to the paper and strike through to the verso.	Black ink	<b>FTIR:</b> Egg yolk, egg white (strong match).	Black egg-ink (egg white?)
DS109	02/03	HAM 1994.16	Doorway on wheels	1960	Steel, painted in black and orange paints	Sculpture painted in black acrylic and orange alkyd paints. There are red pigment particles observable in the sample of black paint. The presence of calcium in the FTIR analysis suggests calcium carbonate, likely added to the paint as a matting agent. The presence of phthalic anhydride in both black and orange paints suggests an alkyd vehicle for both. However, the presence of the PMMA co-polymer in the black sample also suggests the possibility of an acrylic. Acrylic vehicles were very much in use in automotive and industrial paints by the late 1950s, though were expensive. It is possible that the black acrylic is a later coat; like many of Smith's sculptures, this work may have been repainted at a later stage.		<b>FTIR:</b> Black: alkyd, calcium carbonate. Orange: Alkyd <b>Py-GC/MS:</b> Orange: Phthalic anhydride (large peak) Black: PMMA, Phthalic anhydride (large peak)	Black alkyd/acrylic and Orange alkyd paints.
DS110		WMAA 97.113.8	Untitled 1960	1960	Medium weight, off white, wove paper.	Stencil drawing in bronze and blue aerosol spray paints. Note on verso in Smith's hand reads: 'Dear Howard, Dear Jean, This is sure as hell mine and I made a sculpture like but different in 18-8 (304) David Smith March 1963'.			
DS111	04/07	73.60.163	none	1960?	Medium-weight, white, antique-laid Barcham Green FJ Head paper (see 73.52.78 above).	Calligraphic brush drawing in black ink with added red pigment, part of the series that includes 73.60.166. Comparatively larger proportion of red pigment than in other examples. The pigment is loosely fixed to the surface of the ink, and can be offset easily; there are streaks of red where the pigment has been disturbed.	Red pigment	<b>FTIR:</b> Alizarin crimson (97% match), or similar organic lake pigment. Not an iron oxide red.	Black egg-ink and organic red pigment.
DS112	04/08	73.61.27	none	1961	Medium weight, off white wove Arches/MBM paper. Watermark: "Lavis J Perrigot Arches Special MBM Trait".	Gestural brush drawing in blue-black ink exhibiting a marbled effect. The immiscible/marbling in this work does not resemble that achieved by mixtures of oil and ink, or synthetic medium and ink noted in several drawings above (as drawings made in PVA/ink in 1957; for example, 73.57.219). FTIR analysis confirms the lack of synthetic media or oil in the ink, but offers no suggestion as to how the effect was achieved.	Blue/black ink	<b>FTIR:</b> Shellac, Indian ink. Little evidence of drying oils.	Blue-black egg-ink.
DS113		WMAA 95.113.9	Sketch for Lectern Sentinel	1961	Medium weight, buff wove paper.	Stencil drawing in flat grey, white and silver aerosol spray paint and white tempera/gouache. As in many sprayed works, Smith heightens the negative space of the stencilled area with gestural passages of white paint.			
DS114		WMAA 62.20	Untitled	1961	Medium weight, white, smooth wove paper.	Gestural brush drawing in black egg ink. Some evidence of silver paint droplets within the ink, possibly from sprayed aerosol paint.			
DS115		WMAA	Untitled II	1961	Medium weight, white, wove	Gestural brush drawing in blue and black egg-ink.			

Sample /ID No.	Date sampled	Accession No.	Title	Date	Support	Notes	Sample	Analysis	Inference
		62.21			Arches paper.	Efflorescence is beginning to form on passages of ink at the right side with associated cracking. Ink viscosity changes with different techniques.			
DS116		WMAA 79.40	Untitled 1962	1962	Heavy weight, white wove paper.	Stencil drawing in black and gold aerosol spray paints. As with many similar works, Smith manipulates the aerosol nozzle to allow the gold paint to spatter. The drawing is on an unusually large sheet. Smith clearly utilises both large amorphous cut out stencils and also extremely small objects to form the negative spaces in this work. There is some evidence that some of these small objects/particulate were not removed after spraying, suggesting that Smith utilised selective removal of these stencils. As with other sprayed works, in certain areas, Smith carefully adjusts the angle of application so as to allow the spray to creep under the edge of a stencil and achieving a subtle feeling of depth. In other areas, he allows the spray to define a hard edge, lingering with the spraycan to achieve a thicker build up of paint.			
DS117	03/07	73.63.15	David Smith 3-11-63	1963	Medium weight, buff Arches Rives wove paper.	Dripped nude drawing in black ink applied with an ear syringe. This is one of only a few examples of dripped Nudes created on paper amongst a large series of several hundred made by Smith in alkyd paint on loose canvas. Although there are instances of Smith using alkyd paints on paper (see 73.52.57, above), FTIR analysis shows no evidence of synthetic paint and suggests black ink/egg-ink. There is extensive efflorescence throughout with associated cracking and loss to the ink. The works were previously interleaved using glassine enclosures. This may have contributed to a lack of evaporation of free fatty acids that were able to re-crystallize on the surface of the ink (see Chapter Four).	Black ink	FTIR: Shellac, egg yolk, egg white.	Black ink/egg-ink.
DS118		73.63.207	David Smith 4-1-63	1963	Medium-weight, white, antique-laid Barcham Green FJ Head paper (see 73.52.78 above).	Gestural brush drawing in black egg ink.			
DS119	04/08	73.63.20	none	1963	Medium weight, buff, antique laid Fabriano paper. Watermark: "Fabriano Italy".	Gestural brush drawing in glossy, hard black ink. The medium strongly resembles acrylic emulsion paint found in earlier drawings. Patches of efflorescence are beginning to form in the thicker passages of paint. There is little evidence of proteins in the sample, and the characteristic peaks for egg (large peak at 1750cm <sup>-1</sup> ) is not present in the FTIR analysis. The analysis is inconclusive, but possibly suggests a gum-based medium or an ink with added gum Arabic.	Black Ink	FTIR: carbohydrate, no proteins, no acrylic.	Ink with gum Arabic.
DS120	04/06	73.63.1	Untitled Nude	1963	Heavy weight, rough, white, wove paper. As 73.60.8.	Dripped nude drawing in black ink applied with an ear syringe. This is one of only a few examples (see also 73.63.15) of dripped Nudes created on paper amongst a large series of several hundred made by Smith in alkyd paint on loose canvas. This work is in extremely poor condition with extensive efflorescence, cracking and numerous losses throughout. Although 73.63.15 is in black ink, this work appears to be in a synthetic medium, likely alkyd.		FTIR: Polyurethane, glycol, alkyd.	Black alkyd paint.
DS121		73.63.16	Untitled	1963	Heavy weight, buff Arches Rives wove paper. Watermark:	Gestural dripped drawing in black egg-ink. Strongly related to the dripped nude, this work appears similar to			

Sample /ID No.	Date sampled	Accession No.	Title	Date	Support	Notes	Sample	Analysis	Inference
					'Rives' (BR and TL).	the black alkyd Nudes on canvas of the same period. It is likely that the ink was applied using the same ear syringe. There are streaks of unmixed egg yolk present and large patches of associated efflorescence, cracking and losses.			
DS122	02/03	HAM 1994.30	Untitled	1963	Gesso-prepared canvas on Lebron stretcher.	Stencil painting in blue and red aerosol spray paints. Analysis confirms that as with previous stencil works on both canvas and paper, the sprayed aerosol paints were based largely on either acrylic and/or alkyd vehicles. In this case, the presence of phthalic anhydride in both samples strongly suggests an alkyd.		<b>FTIR:</b> Red: Alkyd Blue: Alkyd <b>Py-GC/MS:</b> Red and Blue: Phthalic anhydride (large peak), fatty acids.	Red and blue Alkyd aerosol paints.
DS123		73.63.209	Untitled Nude	1963	Medium weight, white 'Japan' paper.	Dripped nude drawing in black ink applied with an ear syringe. This is one of only a few examples (see also 73.63.15) of dripped Nudes created on paper amongst a large series of several hundred made by Smith in alkyd paint on loose canvas. There is extensive efflorescence and staining throughout, and staining around the dripped paint. The pattern of the staining and the shrinking of the paint is suggestive of an alkyd medium.			Black alkyd paint.
DS124		WMAA 75.29	Untitled figure study	1963	Medium weight, buff wove paper.	Brush nude study drawing in red and white gouache/tempera/acrylic paint. Inscription reads: 'David Smith, September 10 1963, March 1963' The work is less gestural than the dripped nudes of the same period.			
DS125	04/08	Acc. number unavailable	Untitled Nude	1964	Gesso-prepared canvas on Lebron stretcher.	Dripped nude in black alkyd paint applied using an ear syringe. A comparison with the spectrum obtained from the 73.63.1 sample (above) confirms that the alkyd medium was used for both paper and canvas nudes. Although Smith made a small number of dripped nudes in both ink and alkyd on paper in 1963, he continued the series on canvas, indicating that he was perhaps unhappy with the effect that the alkyd had on the paper, and that he found canvas to be a more appropriate (and durable) support.	Black paint	<b>FTIR:</b> Alkyd	Black alkyd paint.



## **Appendix D: Cleaning tests for the Removal of Efflorescent Fatty Acids from the Surface of David Smith's Egg-Ink Drawings**

As noted in Chapter Four, a white efflorescence is present on many of Smith's works in egg-ink and several works in synthetic media. The perceived disfiguration that this efflorescence has caused has become an increasing concern for those holding collections by the artist. Understanding the ethics and practicalities for the removal of this efflorescence is worth examining. Efflorescence, as demonstrated in Chapter four and in Appendix C, is a phenomenon related to the movement and subsequent surface deposit of free fatty acids in Smith's egg-ink and alkyd painting media. The efflorescence is material inherent to the work itself.

Removing original material from works of art during conservation/restoration is a controversial matter, highlighted perhaps most significantly by the events described in Chapter four. Efflorescence, although disfiguring, does not fall into the same category as, for example, a discoloured varnish or a layer of surface grime in terms of its ability to disfigure, disrupt or otherwise detract from the perception of the original work. It may be regarded as an unfortunate consequence of Smith's use of medium, but one that should be accepted as part of the natural aging of his drawings. The decision to carry out experiments intended to remove efflorescence was based on the author's findings in Chapter four (in turn informed by the theoretical models proposed in the literature review in the same chapter) and also after discussion with the artist's estate. The consensus of opinion was that efflorescence on Smith's egg-ink and alkyd drawings was so disfiguring as to have a significant negative impact on the perception of the works, and was very much in favour of its removal.

There are additional complications in removing efflorescence. Particularly pertinent is in understanding whether removing efflorescent fatty acids from the surface of a medium might further desiccate the medium itself, whether the treatment will be effective and, perhaps more importantly, whether removing the efflorescence may cause an undesirable change in colour or gloss. These issues, however small must be weighed against the benefits of viewing the drawing in a condition unimpeded by the white haze caused by the

phenomenon, and experiencing the drawing as close as possible to its original state. Therefore, with permission from the artist's estate, cleaning tests were carried out on a badly effloresced drawing Untitled, 1957 (73.58.79) in order to understand the solubility characteristics of the fatty acid efflorescence frequently observed on Smith's drawing ink.

Four solvents that covered a reasonably wide remit of solubility parameters, and represented those typically used in the conservation of works of paper were chosen: ethyl alcohol, toluene, mineral spirits and saliva. As noted in Chapter four, treatment of efflorescence to date in oil paintings (where it is more commonly encountered) has typically been carried out using aliphatic/aromatic hydrocarbons such as mineral spirits (Stoddard solvent).<sup>1</sup> These solvents were chosen for use particularly on Smith's efflorescent ink medium. The removal of efflorescence on alkyd media was outside the scope of this very limited experiment.<sup>2</sup>

Although all four solvents had a marked effect on the efflorescence, it was observed that application of mineral spirit and toluene tended to impart a greasy appearance to the ink, moving the efflorescence around the surface but not necessarily resulting in its solubility. Ethyl alcohol had little effect. Where efflorescence was removed with these solvents, it was largely through the mechanical action of the swab. In terms of solubility, Saliva (cleared with deionised water) was found to be more effective than all other solvents for the removal of efflorescence from Smith's egg-ink. However, saliva, in common to all solvents tested, also tended to cause a slight but perceptible shift in surface gloss.

Richard Wolbers has noted the beneficial nature of the high salts content of saliva, which can enhance surface reactivity in removing surface dirt in paint films, and this appeared to

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<sup>1</sup> Hons et al. found that SBP spirit ( a mixture of aliphatic and aromatic hydrocarbons) was the most effective solvent for treatment of the Poliakoff efflorescence. Hons et al. 2005: 38.

<sup>2</sup> Alkyd films, like acrylics (see fn 8, p17), can swell and lose gloss when subjected to polar solvents such as ethyl alcohol. (see Harriet Standeven, The Historical And Technical Development Of Gloss Housepaints, With Reference To Their Use By Twentieth Century Artists, PhD Thesis, Royal College Of Art, London, 2004). They are also particularly sensitive to high pH aqueous solutions, used as a matter of course in many paper conservation treatments. This highlights once more the importance of accurately characterising Smith's drawing media since, for example, the black alkyd paint used in the majority of the dripped Nudes on paper is visually very similar to black egg-ink used in the same series (see Chapter 2:4).

be the case with the Smith drawings.<sup>3</sup> Saliva ultimately represents a non-hazardous method of removal for disfiguring efflorescence in the case of Smith's egg-ink, but the decision to remove efflorescence must be carried out in the knowledge that doing so may also have a small but perceptible effect on the appearance of the ink.

Hons et al. found that after their solvent treatment and a subsequent display in a climate controlled environment, the efflorescence in the Poliakoff painting showed no sign of reformation. Similarly, the Smith drawing, stored in climate controlled environment and examined by the author after a period of one year, was found to have no evidence of reformation of the efflorescence. Further work is required to ascertain whether free fatty acids become exhausted after efflorescence has formed to the degree that it has in the Smith drawings, whether efflorescence will continue to occur after a longer period of time, and finally whether a treatment can be formulated that will remove efflorescence without affecting the surface gloss of the ink, but this is outside the remit of the present thesis.

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<sup>3</sup> Richard Wolbers, Cleaning Painted Surfaces: Aqueous Methods, (London: Archetype, 2000) 6.

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