Distributions of the Dimensions of Paintings: A Potential Indicator of Artists' Choices and Artistic Change

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The dimensions of artworks chosen by painters are treated as indicators of artists' choices and of artistic change. This is for both individual artists and artists in aggregate. This is realised in terms of the distribution of the ratios of height to width of two-dimensional artworks. It is found that not only do individual contemporaneous artists frequently have very dissimilar distributions of height to width ratios but that aggregate distributions of the ratios change over time. Thus, using simple measures of changing dimensionality we can attempt to recognise artists who, for example, stand apart from their contemporaries, while also being able to identify mainstream artists who do not innovate but are successful. Distinct and quantifiable differences in dimensionality choices and the resulting distributions found between male and female artists were found. Some changes were unexpected. Thus male artists' distributions have slowly moved towards the female artists' distributions. In addition a clear move towards exactly square paintings took place through the late-nineteenth and twentieth centuries. The reasons for these differences and changes are suggested. It is argued, for example, that the increasing percentage of square paintings coincides with moves to greater abstraction, given abstraction has less requirement for a specific orientation in dimensions. The distributions are constructed from a very large data set for Australian artworks sent to auction for a large group of Australian artists from the nineteenth century to the present day.

1. Introduction

This paper represents a first approach to analysing and using the use of artwork dimensions, i.e. height and width, to analyse part of the creative decision making by individual artists and changes in the way in which different cohorts of artists exhibit significant differences in dimensions. One aspect of the research lies in explaining the distributions of art work dimensions and the other consists of using them to analyse art markets. Another is to examine how far economic imperatives helped determine these choices, but it is presently the case that economic methodology provides than an analytical framework rather than subject matter.

The height and the width of artworks are clearly not the most fundamental decisions made by artists. They would rank behind genre, style, subject matter and even medium of execution, and possibly even size. Consequently there is a possibility of modelling this subordinate choice as a dependent variable by using the ratio of height to width, H/W, where H=height and W=width. This would be a severe test of any modelling given the wide range of dimensions we see most artists adopting.

The present paper presents a set of empirical results related to this and other modelling problems, but it is essentially an introduction to this area, which is new. As such:

(a) it outlines the approach and where it can lead to;
(b) it indicates the major sources of data and how these can be used, and also very much lends itself to comparative studies, and
(c) examines this approach as a means of analysing artistic endeavour, especially in: (a) the differences between female and male Australian artists and (b) how artistic changes occurring over time can be measured in their impacts upon dimensions.
(d) The paper uses two related data sets, both for Australian artists and artworks. The first data set relates to a group of seventy prominent artists. These artwork and artists are largely used for illustrative purposes at the beginning of the paper. The second much larger group is used for broader analyses, with many of the artists being unknown and having relatively few artworks in the secondary auction market place. This prevents analysis of these individual artists but they can contribute to aggregate analyses.

We begin in section 2 by looking at the distribution of the dimensions, measured as H divided by width W, for all seventy artists. In section 3 we examine six individual artists belonging to the seventy – three male artists and three female artists. The data used are all Australian and are taken from auction records of the artists in Australia. It is here that distinct male/female

differences begin to appear. In section 4 we examine the possibility of modelling Artists' decisions and the constraints that operate on their decisions. As part of this we try to very briefly suggest why there is the anomaly that the four artists who most thoroughly charted the construction of the Sydney Harbour Bridge (built 1923-1932) were women. The differences between Australian female and male artists are then established quantitatively via their dimensional distributions. Section 5 then shows how the distributions of dimensions changed over time, including the popularity of square formats. Section 6 is concluding comments.

2. Charting Artwork Dimensions

Higgs and Forster (2014). examined the frequency distribution of height/width (HDW) to determine if Australian secondary art auction purchasers were prepared to pay a premium for artworks adhering to the golden ratio They found no evidence for this, but it required determining and analysing the ratio of height to width of the works (sold at auction) of these artists in aggregate. The resulting aggregate histogram for all 70 artists in the study data set is shown as Figure 1. It is striking in showing that artworks are not randomly distributed with respect to their dimensional ratios. Figure 1 represents works by 60 male and 10 female Australian artists. Of these 4 are aboriginal artists. All seventy artists are widely recognised in Australia, and all are represented in major Australian public galleries.

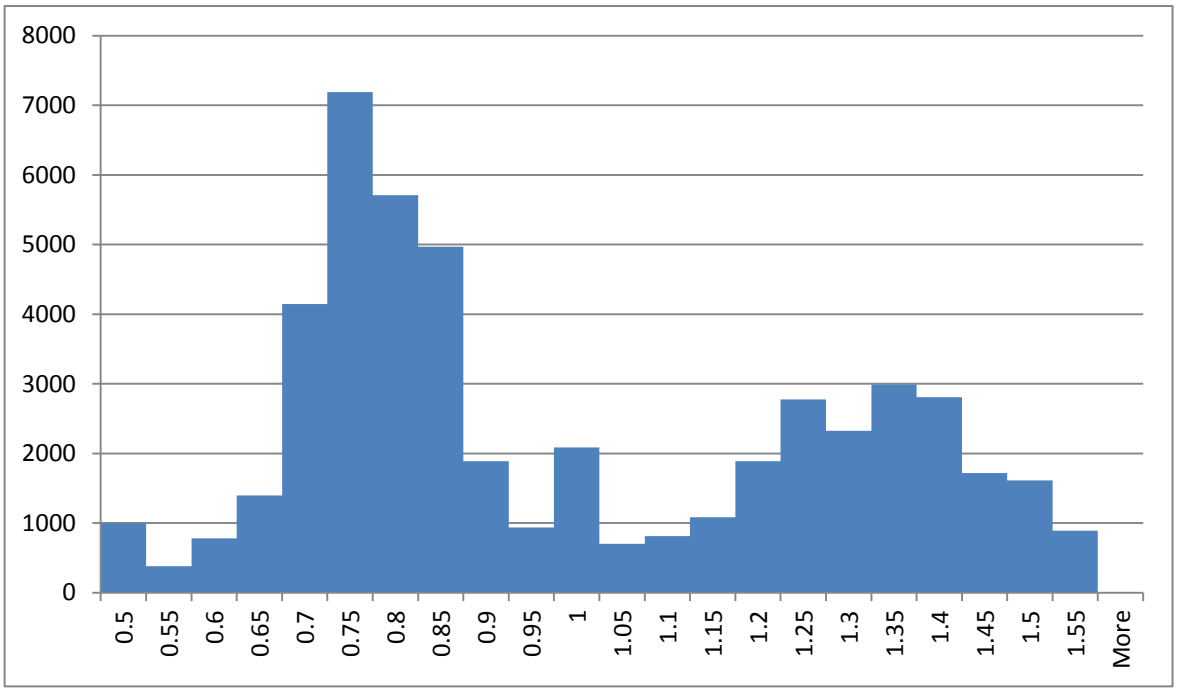

Figure 1: The Aggregate Artwork Dimensions Frequency Distribution of 70 Prominent Australian Artists

Essentially the frequencies of the dimensional ratios give a strongly bi-modal distribution, as well as an additional small peak at HDW=1, i.e. square works. As a guide an artwork of international A2 dimensions would have HDW = 0.71 (approximately) for landscape and 1.40 (approximately) for portrait. The modal peak to the left of that for the square works is for landscape oriented works and that mode is approximately 0.75. This means the height of the artwork, invariably a painting or drawing in this study, is three-quarters the length of its width. Over 7000 artworks auctioned fell into this set of dimensions. As another example, if HDW = 0.5 the height of the artwork is clearly half of its width and close to a panoramic view. There are approximately 1000 artworks auctioned of these dimensions, but figure 1 shows these to be extremes. To the right of the mode for square works is that for portrait oriented works.

Note that the terms 'landscape' and 'portrait' as used here describe only the orientation of the artwork and do not imply either landscape or portrait subject matter. Note also that we found that those using the square format were making deliberate choices, as further disaggregation by dimensions showed that dimensional ratios either greater than 1.0 or less than 1.0 but otherwise very close to HDW=1 were avoided. This also indicates and helps justify our view that the distributions represent artists' choices of dimensions. One important possibility suggested by one commentator at a conference where an earlier draft of this paper was presented was that the choices of dimensions were either influenced or dictated by the ratios of commercially available prepared grounds, i.e already primed/gessoed and stretchered canvases and standard paper sizes. We found no evidence of this occurring, and it seems more common for "serious" professional artists, such as those considered here, to prepare their own to obtain higher quality and lower costs. One aspect of the distribution from the viewpoint of choices that requires explanation is that the landscape oriented dimensions are much more peaked and greater in number than those that are portrait oriented.

3. Individual Distributions of Artwork Dimensions

To examine individual decisions individual artist distributions are required. From the 70 artists we examine 3 male and 3 female artists. The male artists are considered first as they conform to a pattern much more than the female artists, and they dominated the late nineteenth-century, early twentieth century art world. That individual artists do not adhere to group distributions is seen in the distributions for John Ashton (Figure 2) and John Peter

Russell (Figure 3). The bi-modality of their distributions does not disguise the fact that they differ markedly from the aggregate distribution.

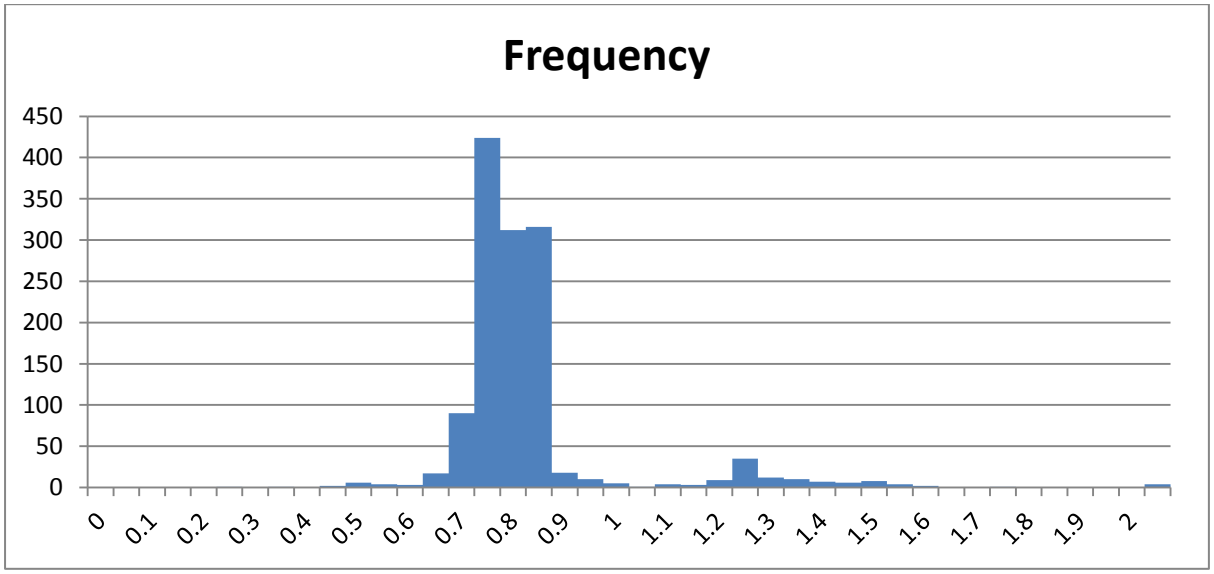

Figure 2: John (Will) Ashton (1881–1963) Artwork Dimensions Frequency Distribution

John Ashton's distribution (Figure 2) is that of a prolific landscapist and his distribution is an archetype of nineteenth century/early twentieth century Australian male artists. While the landscape orientation is not landscape subject matter, there is a strong relationship between the two. Russell's distribution (Figure 3), is very similar to that of is Ashton.

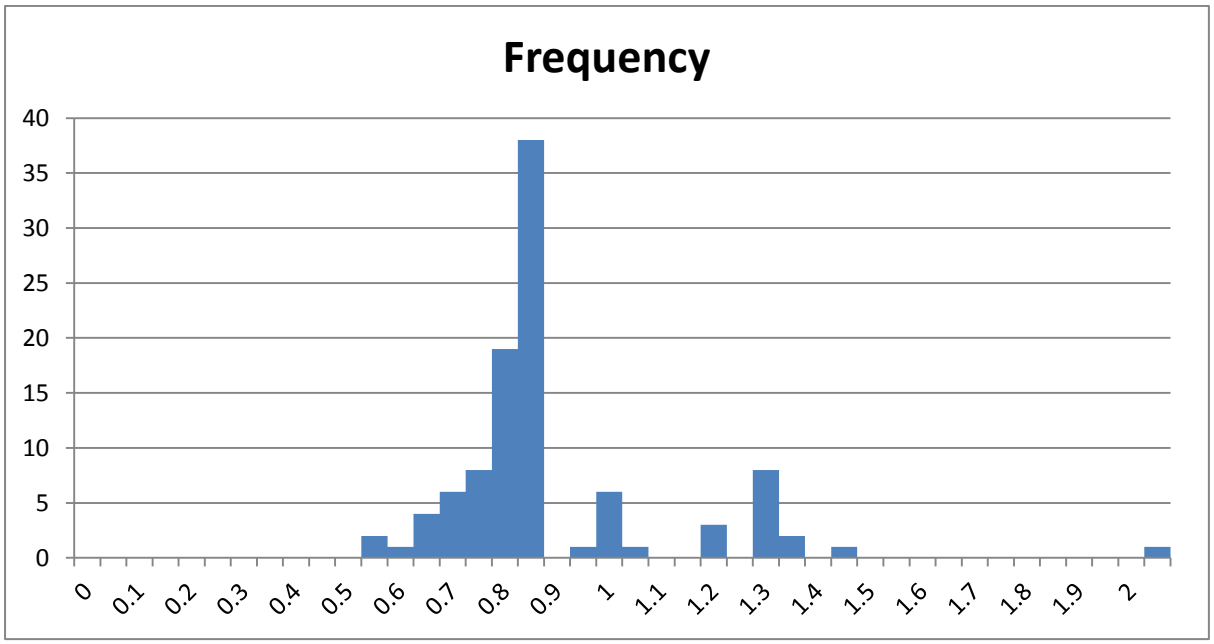

Figure 3: John Peter Russell (1859-1930) Artwork Dimensions Frequency Distribution

However, it is clear Russell had a much smaller output than Ashton, having inherited wealth and not requiring sales. Russell is regarded as the better of the two artists and moved in French impressionist and post –impressionist circles. Friendly with Van Gogh, whom he painted several times (Galbally, 2008), while Matisse claimed that Russell taught him colour.

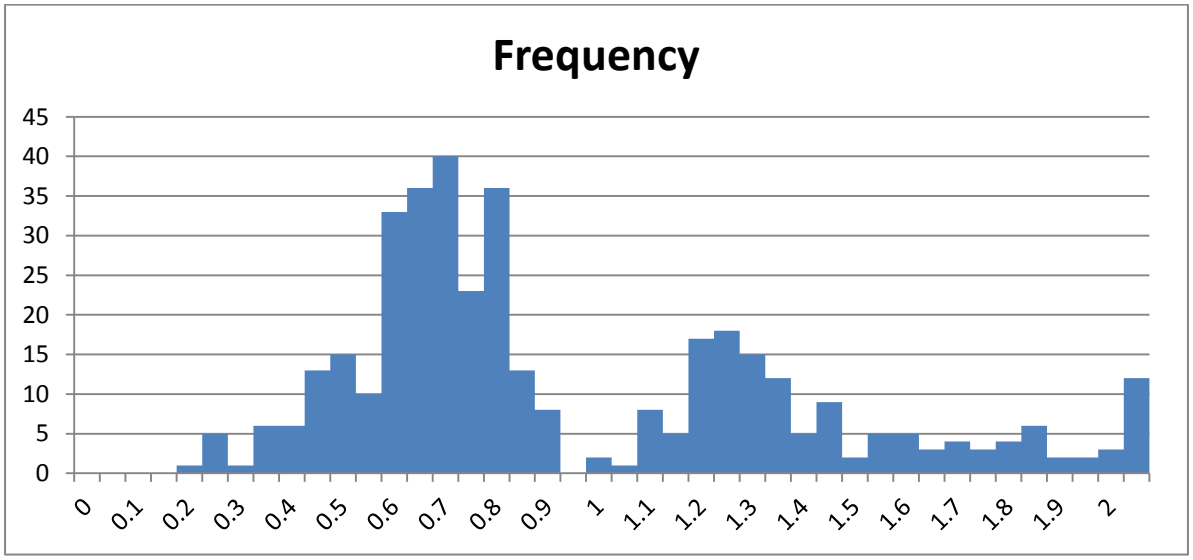

Figure 4: Tom Roberts (1856-1931) Artwork Dimensions Frequency Distribution

Roberts' distribution is different from both. He was born in England but apart from a period (1881 to 1884) of study at The Royal Academy schools and World War One he lived and worked almost entirely in Australia. His portraits are represented in the major Australian public galleries. Roberts painted over a wide range of subjects including portraiture. Conversely Russell was very much an impressionist landscapist (frequently impressionist seascapes of Belle Ile, Normandy). The diversity shown in Roberts' distribution may have been influenced by his work as a picture framer. Clearly the creativity of these two artists was very different.

We now examine three of the female artists in the group. It was impossible to find females with birth dates that corresponded to Russell and Roberts. Margaret Preston (Figure 5), was twenty years younger than Roberts and and Russell, but was nearly contemporaneous with Ashton. Although having far fewer auction sales, as with virtually all the female artists, it is clear Preston's distribution is different from the males. It is predominantly portrait oriented, due to Preston's genre (still-lifes and domestic scenes). The most striking feature in the distribution compared to both female male artists is the number of square canvases.

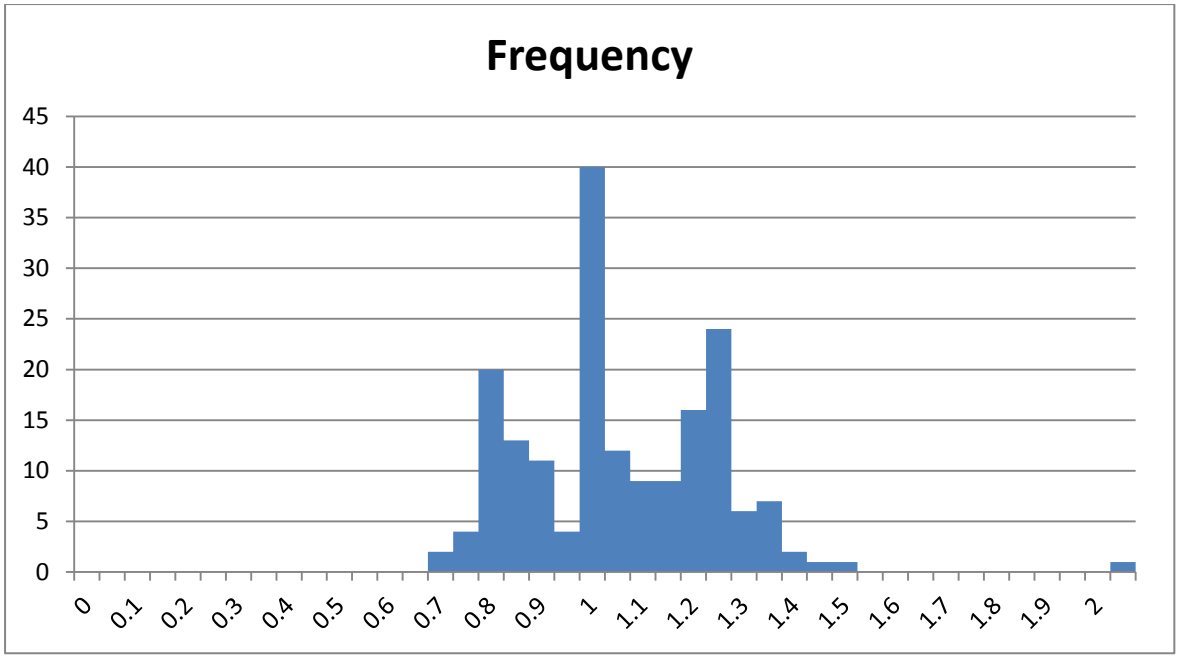

Figure 5: Margaret Preston (1875-1963) Artwork Dimensions Frequency Distribution

Clarice Beckett (Figure 6) is an anomaly among Australian female artists as a thoroughgoing landscapist. She has only recently been critically appreciated and enjoyed buoyant prices. She was nevertheless highly regarded by her contemporaneous fellow artists and her teachers.

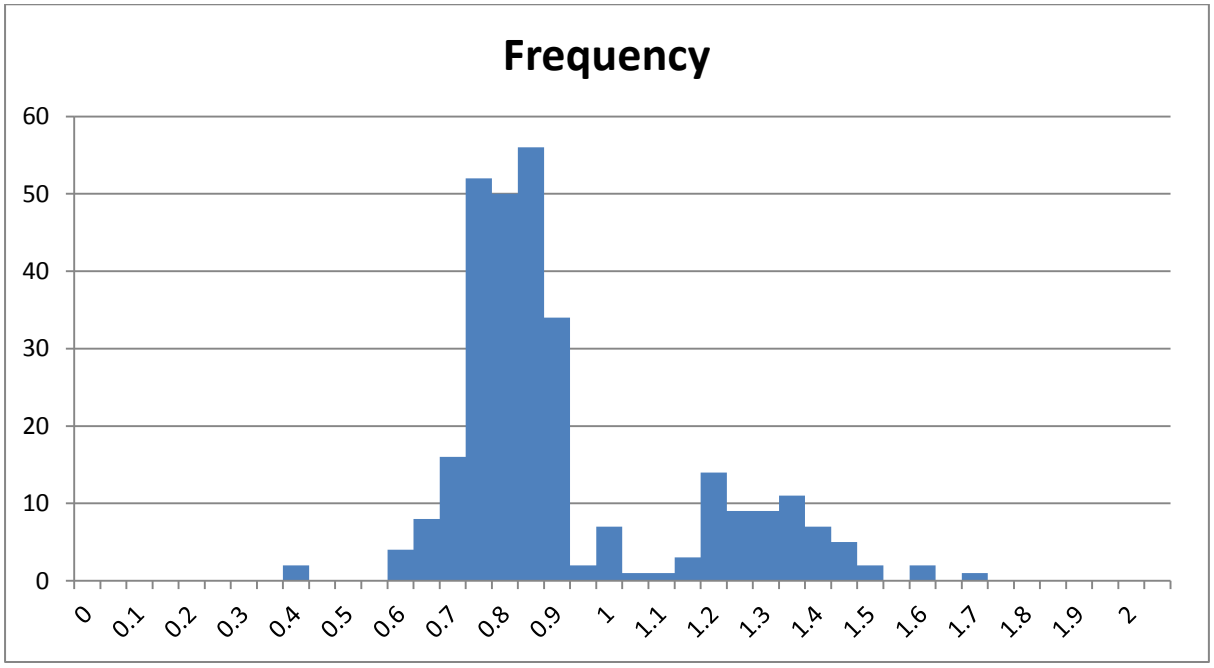

Figure 6: Clarice Beckett (1887-1935) Artwork Dimensions Frequency Distribution

Conversely Cossington-Smith has long been held in regard by both fellow artists and the market. She covered a wide range of subjects including landscapes, with striking images of the construction of the Sydney Harbour Bridge. Her main efforts were, however, domestic interiors and still-lifes.

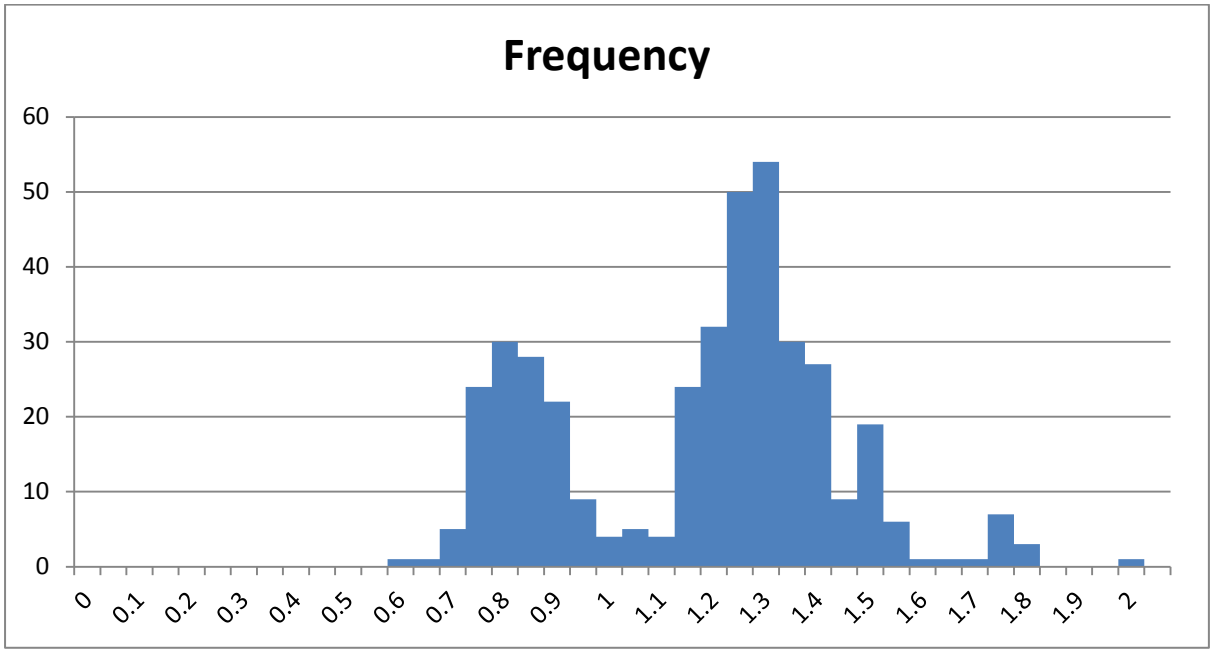

Figure 7: Grace Cossington-Smith (1892-1984) Artwork Dimensions Frequency Distribution

Some of the Sydney Harbour bridge landscapes were given a portrait orientation from a vantage point under the bridge looking from one side to the other.

Examining the six artists we have been at pains to point to anomalies and exceptions. That these exist is hardly surprising when considering the output of artists. What is surprising is how often they conform to the group norms given their freedoms to create as they please. So next we make the first faltering attempts to try to formulate an approach to decision-making that can use these data and the differences.

4. Artists' Decision-making and Social Constraints

Hedonic pricing estimation results have allowed the optimal size of an artwork for auction price to be calculated. While an interesting proposition, optimal size is problematic. Yet if every artist painted to a optimal size it would remain optimal no longer. While size is not part of this study, an optimal relative dimension is clearly also problematic. Certainly artists establish characteristic distributions of relative dimensions rather than adhering to one set of dimensions. Essentially there is a problem in modelling artists' decision-making processes

about artworks when there are so many variables involved and they have (apparently) have such freedom to make choices. It is not merely a problem with optimisation but even being able to establish what the objectives are. The dimensional ratios they choose are unlikely to be higher order decisions but will be dependent upon subject matter, medium and experience. Returning obliquely to optimal sizes and dimensions it is unlikely even if we can argue that artists take their markets into account.

So, having an ability to hypothesise on a priori grounds what any given artist will choose as the dimensional ratio for a given artwork is very, very unlikely. And a 'prediction' based upon a given artist's known distribution is merely a probabilistic exercise, having no explanatory power and with a low probability of success even if the artist is someone like John Ashton with a very peaked distribution (figure 2).

There are two avenues that we can use to approach this choice problem indirectly. The first relies on the argument that, as opposed to individual artists, it is far more likely is that we can make statements about the aggregated distributions of like artists and compare these with the aggregated distributions of different groups of artists. These may be artists of different gender and different periods in particular, but might also include those that belong to different schools.

The second avenue follows on from this in that we move from the intentionality of the decision-making to the background of artists and the constraints under which they operate as determinants of decisions. In the context of Australia and the data set, the most obvious grouping is between male and female artists.

Before moving to a quantitative approach to this question, the related issue of the subject matter of artists and different opportunities and constraints arises. The Sydney Harbour Bridge was under construction from 1923 to 1932 and that construction process formed a theme of several artists' best known works. A huge engineering construction site, the bridge grew towards joining at the centre as two self-supporting dramatic cantilevered arches, held in place by huge cables. It would seem to be a male domain for artists, especially as it was definitely landscape and definitely industrial. Mimmocchi (2013) sees this subject matter as the modernists in Australia spreading their wings. Male artists Roland Wakelin, James Cant, Arthur D'Auvergne Boxall, Robert Emerson Curtis, Henri Mallard and Paul Joyce chose the construction as the subject of mostly isolated works.. But the images, and mostly is series that follow construction, are predominantly by female artists and four stand above all the others,

both male and female. These were Cossington-Smith, Margaret Preston, Jessie Traill (Figure 8) and Dorrit Black (Figure 9).

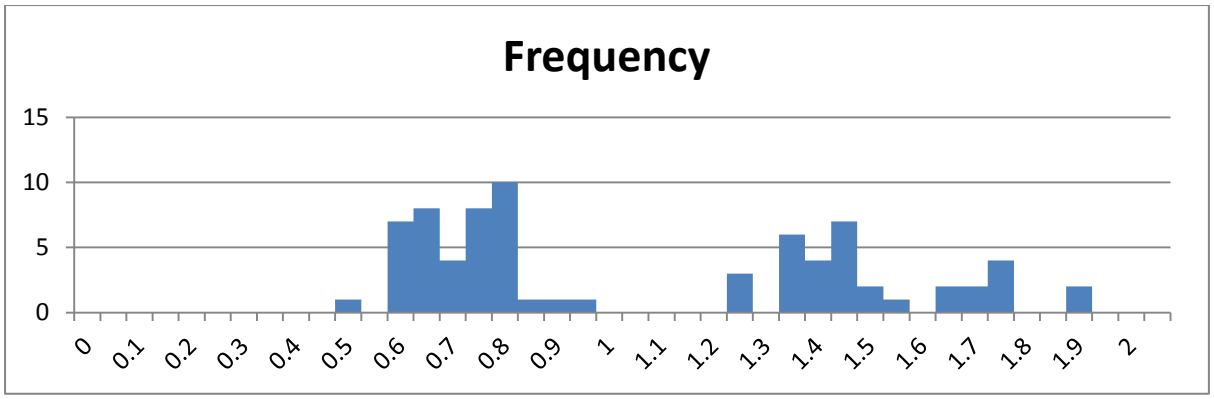

Figure 8: Jessie Traill: Artwork Dimensions Frequency Distribution

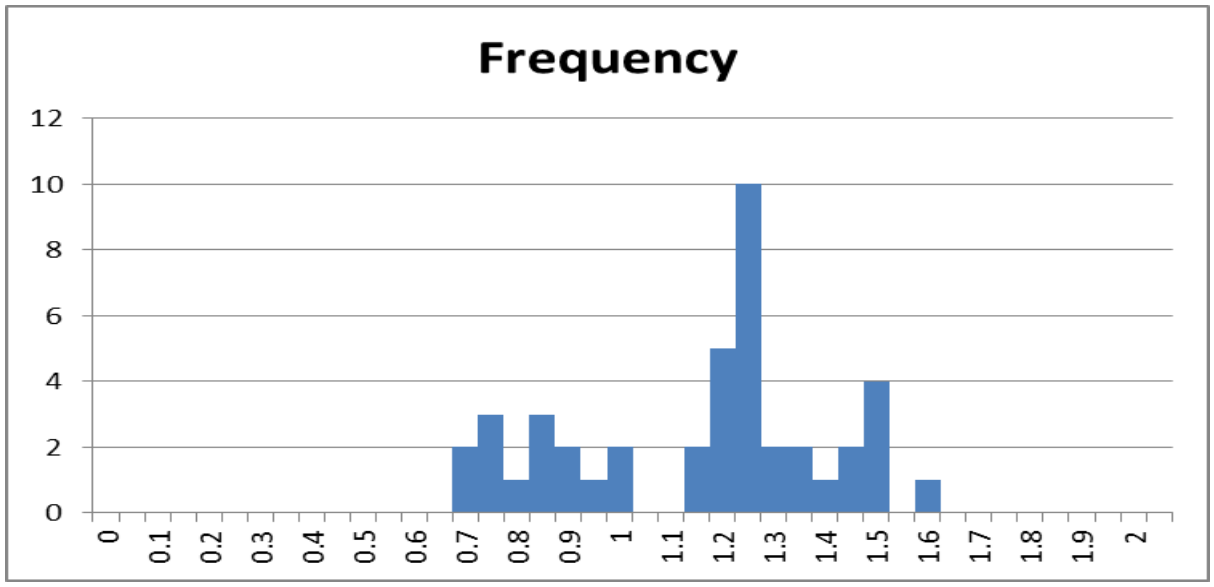

Figure 9: Dorrit Black: Artwork Dimensions Frequency Distribution

Yet of these four perhaps only Traill would be considered a landscapist from her frequency distribution. And for all the landscapes produced by them, overwhelmingly they are of the urban–rural fringe rather than the Australian bush. In each case the four seem to conform to the distributions typical of female artists, so why the industrial landscape? It is argued they were bound to the urban centres and fringes by the nature of the 1920s and 1930s in Australia. Under these constraints the construction of the bridge could not be ignored as an opportunity. For male artists the bush still called.

5. Are Australian Male and Female Artists Different?

That male and female artists are different is hardly in doubt, but the difference(s) are not necessarily easily demonstrable. That the art world's constraints and opportunities for male and female artists are identical seems highly unlikely. More importantly in the present analysis, it has also long been asserted that female and male artists have different approaches to art or, at the very least, paint very different subject matter. Whether or not this is due to the different constraints and opportunities they operate under is another question? But we would expect these to influence their output, both in quantity and form. Below in Figures 10 and 11 are the frequency distributions of the dimensions of the works of Australian female and male painters. These are then easily compared. The distributions are similar in that they are both bi-modal, both are asymmetric in favouring landscape over portrait orientations, and both have a small mode for square paintings, i.e. HDW=1. The crucial question for examining male/female differences is: are these two samples drawn from the same underlying population distribution?

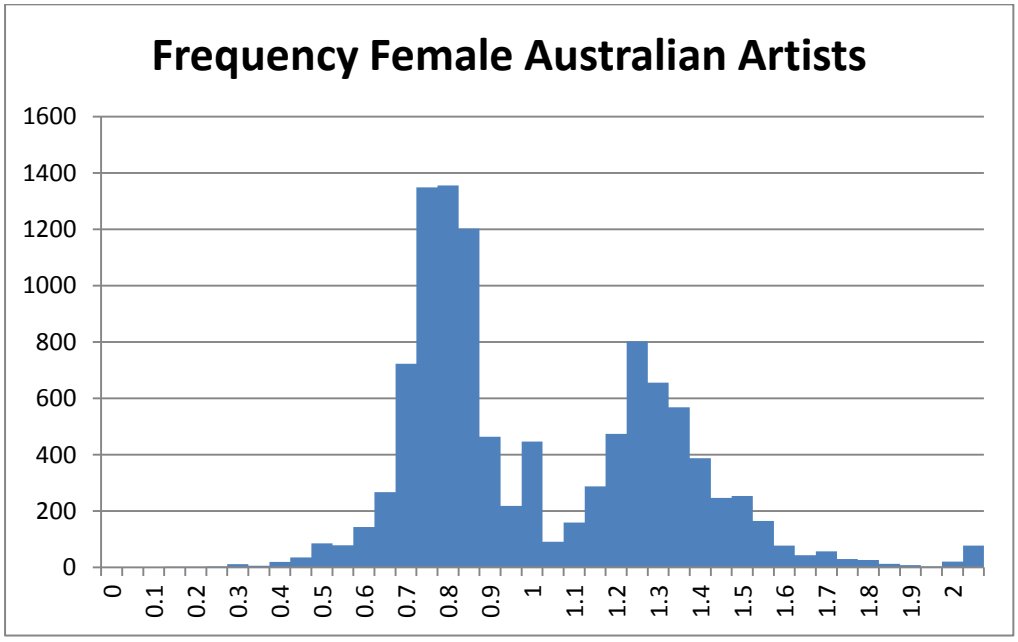

Figure 10: Aggregated Australian Female Artists' (born 1930-1974) Artwork Dimensions

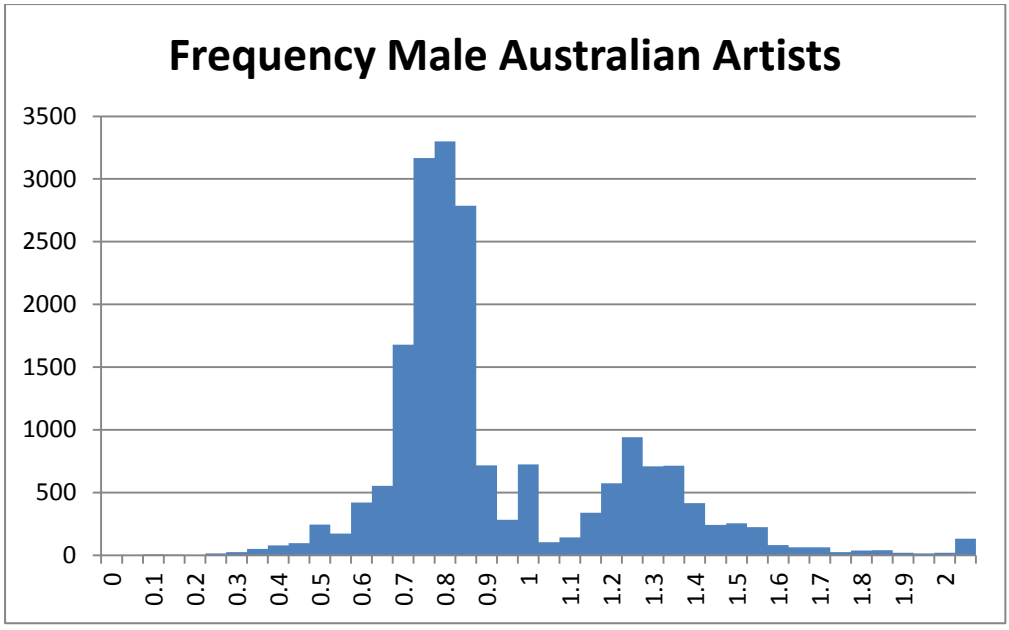

Figure 11: Aggregated Australian Male Artists' (born 1930-1974) Artwork Dimensions

The Empirical Methodology adopted to test this is as follows. The non-parametric Mann-Whitney U test and Kolmogorov-Smirnov Z test for independent samples are employed to determine whether the two population distributions of dimensions measured by HDW is the same across female and male artists. Because these are non-parametric tests, no assumptions are required concerning the underlying population distributions. We employ both tests for greater certainty, in case the result obtained depends solely upon the method used.

The Mann-Whitney U independent sample test is used to assess if two independent samples are selected from the same population. The null, H_0, and alternative, H_1, hypotheses are specified as:

H_0: The population distributions of dimensions, HDW, are the same for female and male artists

H_1: The population distributions of dimensions, HDW, are not the same for female and male artists

To calculate the Mann-Whitney U two independent sample test with sample sizes of n_1 and n_2 ($n_{females}$ and n_{males}respectively), all observations from the two samples are combined. The data are sorted and ranked, the rank of 1 being assigned to the smallest observation and so on. Consequently the highest rank is the sum of n_1 and n_2. In case of ties, the ranks are averaged

for the tied observations. The sum of the ranks for sample 1 is R_1 and the sum of the ranks for sample 2 is R_2.

The average rank for group *i* is:

$$\overline{R}_i = \frac{R_i}{n_i}$$

where R_i is the sum of ranks and n_i is the sample size of group i. The Mann-Whitney U statistic for group 1 is:

$$U = n_1 n_2 + \frac{n_1(n_1+1)}{2} - R_1$$

If $U > \frac{n_1 n_2}{2}$ then the *U* statistic is:

$$U' = n_1 n_2 - U$$

The standardised test statistic after adjusting for tied observation ranks is:

$$Z = \frac{U - \frac{n_1 n_2}{2}}{\sqrt{\frac{n_1 n_2}{n(n-1)}\left(\frac{n^3 - n}{12} - \sum_{i=1}^{k} \frac{t_i^3 - t_i}{12}\right)}}$$

where $n = n_1 + n_2$, t_i = number of observations in tied rank i and *k* = number of tied ranks.

The Kolmogorov-Smirnov independent sample test is employed to detect differences in both locations and shapes of distributions. The null, H_0, and alternative, H_1, hypotheses are outlined as:

H_0: There is no difference in locations and shapes of dimensions of HDW between female and male artists

H_1: There is a difference in locations and shapes of dimensions of HDW between female and male artists

To calculation the empirical cumulative distribution functions and differences for the Kolmogorov-Smirnov test, the data for each group are organised in an ascending order from $X(1)$ to $X(n_i)$, the empirical cumulative distribution function, C^i, for n_i is specified as:

$$C^i(X) = \begin{cases} 0 & -\infty \le X < X_{(1)} \\ j/n_i & X_{(j)} \le X < X_{(j+1)} \\ 1 & X_{(n_i)} \le X < \infty \end{cases}$$

For all Xj values in each group and the difference between the two groups is defined as:

$$D_j = C^{1(X_j)} - C^{2(X_j)}$$

where $C^{1(X_j)}$ is the group with the largest sample size. The maximum absolute, positive, and negative differences are calculated.

The Kolmogorov-Smirnov test statistic is defined as:

$$Z = \max_j \left| D_j \right| \sqrt{\frac{n_1 n_2}{n_1 + n_2}} j$$

The null hypothesis is rejected if the *p*-value calculated from the Z test statistic is less than the level of significance of 0.05 or lower. The *p*-value is calculated for a two tail test according to the alternative hypothesis.

Table 1 features the mean rank sum, rank sum, Mann-Whitney U statistic, *Z* statistic and *p*-value for dimensions, HDW, produced by female and male artists. The null hypothesis of no difference in the distributions of dimensions, HDW, produced by female and male artists is rejected using Mann-Whitney U test (*Z* statistic = -24.27, *p*-value = 0.0000). This suggests that there is a significant difference in the overall distributions of dimensions, HDW, produced by female and male artists.

Table 1. *Mann-Whiney U Independent Sample Test for Dimensions HDW for Female and Male Artists*

	Group	Sample Size	Mean Rank Sum	Sum of Ranks
HDW	Female	10858	16795.27	182363084.50
	Male	19465	14250.92	277394241.50
	Total	30323		
	Mann-Whitney U			87941396.50
	Z			-24.27
	p-value			0.0000

HDW is height divided by width; *p*-value is for a two tailed test

Table 2 presents the results of Kolmogorov-Smirnov maximum absolute, positive, and negative differences, independent sample *Z* statistic and corresponding *p*-value. The null hypothesis is rejected at the 0.01 level of significance with the Kolmogorov-Smirnov Z statistic of 13.4940 and corresponding *p*-value of 0.0000. This indicates that there is a significant difference between locations and shapes of the overall dimensions, HDW, for both female and male artists.

Table 2. *Kolmogorov-Smirnov Test for Dimensions HDW for Female and Male Artists*

		HDW
Most Extreme Differences	Absolute	0.1620
	Positive	0.1620
	Negative	0.0000
Kolmogorov-Smirnov Z		13.4940
p-value		0.0000

HDW is height divided by width; *p*-value is for a two tailed test

Having established that they do differ with respect to a very mundane set of criteria, we can also examine the areas where female and male artists differ in more disaggregated detail. There are several possibilities. One is that within landscapes and portrait orientations the distributions are essentially identical, so that the difference lies solely in the proportion of portrait versus landscapes. Another is that they differ in the distribution of landscapes and/or portraits or some combination of these possibilities. We can see fairly easily from the histograms that the proportions are different, with the proportion of portraits higher in females. However, we can also see other potential differences. Consequently, the two tests are employed to detect whether the differences are in the dimensions produced separately for landscapes, LAN, or portraits, POR artworks. The results for the Mann-Whitney U test are presented in Table 3. The null hypothesis of no difference in the distribution of dimensions, HDW, for landscape dimensioned artworks produced by female and male artists is rejected using the Mann-Whitney U test (*Z* statistic = -6.048, *p*-value = 0.000) but the null hypothesis

is not rejected for the portrait artworks (*Z* statistic = -1.358, *p*-value = 0.174). This indicates that while there is a significant difference in the overall distribution of dimensions for landscape, LAN, artworks, there is no significant difference in the overall distribution of dimensions for portrait, POR, artworks produced by female and male artists. Similar results are obtained in Table 4 using Kolmogorov-Smirnov test with *Z* statistic = 3.851 and *p*-value = 0.000 for LAN and *Z* statistic = 1.112 and *p*-value = 0.169 for POR.

Table 3. *Mann-Whitney U Independent Sample Test for Dimensions HDW for Landscapes and Portraits for Female and Male Artists*

		LAN			POR		
	Group	Sample Size	Mean Rank Sum	Sum of Ranks	Sample Size	Mean Rank Sum	Sum of Ranks
HDW	Female	6092	10270.57	62568286	4446	4755.69	21143779
	Male	13711	9738.24	133521021	5147	4832.69	24873842
	Total	19803			9593		
	Mann-Whitney U			39518404.5			11258098
	Z			-6.048			-1.358
	p-value			0.0000			0.174

HDW is height divided by width; LAN is the HDW dimensions for landscapes only; POR is the HDW dimensions for portraits only; *p*-value is for a two tailed test

Table 4. *Kolmogorov-Smirnov Test for Dimensions HDW for Landscapes and Portraits for Female and Male Artists*

		HDW	
		LAN	POR
Most Extreme Differences	Absolute	0.059	0.023
	Positive	0.059	0.007
	Negative	-0.003	-0.023
Kolmogorov-Smirnov Z		3.851	1.112
p-value		0	0.169

HDW is height divided by width; LAN is the HDW dimensions for landscapes only; POR is the HDW dimensions for portraits only; *p*-value is for a two tailed test

The question of why this difference occurs in landscapes and does not appear in portrait orientations is an open one.

Using their choice of orientation of artworks as the data, the Mann-Whitney U and Kolmogorov-Smirnov independent sample test results indicate that females and males create differently. Female artists are portrait oriented, while male artists are landscape oriented at least as far as dimensions are concerned. Breaking down the samples also suggests that within landscapes alone there are differences between female and male artists. Apart from the possibility of being due to innate differences, this may also be because there are differences in incentives and constraints under which both operate. In fact, this seems most likely with females more oriented to domestic subjects. The more restricted life and opportunities for commercial success for female artists suggests this is the case. Moving outside Australia the example of Mary Cassatt is an interesting one, but so are highly creative Australian female artists such as Margaret Olley, Margaret Preston and Grace Cossington-Smith. At the same time we showed, Using three male artists, that there are also distinct differences between individual artists in the manner in which they operate.

6. The Evolution of Artwork Dimensions

We now look at groups of artists and their artwork dimensions over time. HDW frequencies for females (Figure 12) and females (Figure 13) with births between 1860 to 1890 and 1940 to 1970. The diagrams indicate a large shift from landscape to square and portrait orientations. There is also a greater variety of dimension ratios and this suggests an increasing plurality of artwork production. While such gross temporal aggregation might be expected to both smooth and hide changes between those periods, the differences are dramatic. Several features are worthy of comment. In no particular order these are:

a. the major increase in the number and percentage of square format paintings created;

b. the decreasing emphasis on the landscape format; (which was already proportionately low;

c. the decreasing peakedness for both major parts of the distribution, the later female artists using a greater range of dimensional formats, and

d. the greatly extended tail to the portrait oriented works for the later born group, and to a lesser extent the same for landscapes.

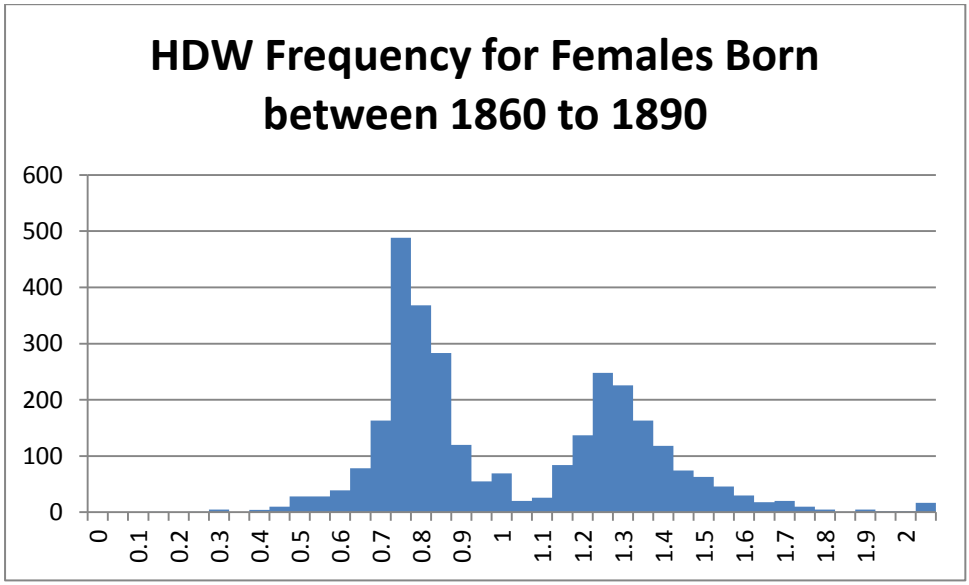

Figure 12: Dimensional ratio (HDW) Frequencies for Females Born between 1860 and 1890

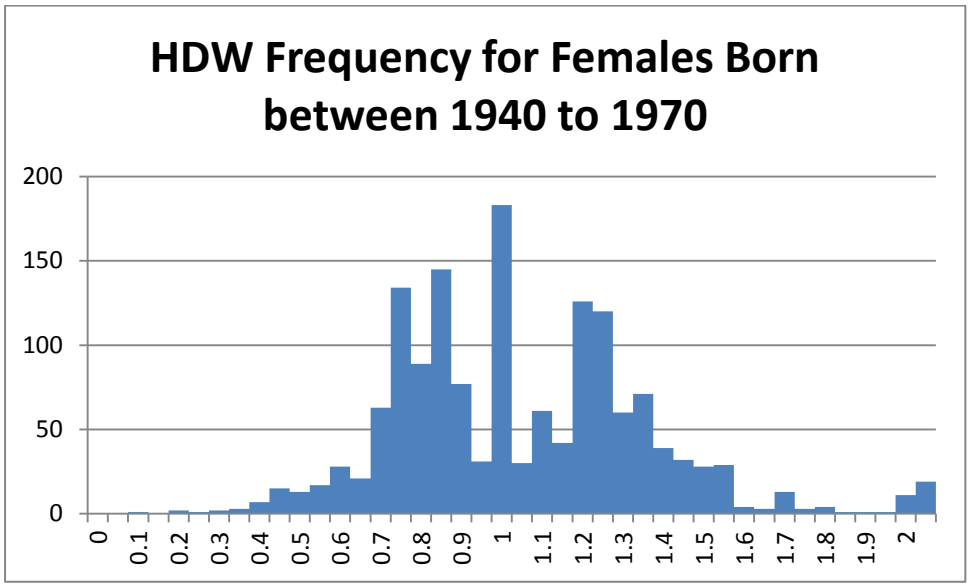

Figure 13: Dimensional ratio (HDW) Frequencies for Females Born between 1940 and 1970

Arguably one of the most important changes is the increased irregularity of the distribution. It has spread towards the extremes and become more ‘balanced ‘ between portrait and landscape.It is argued that this is due to a greater plurality in art, with artists varying their output more than before. This can be expected to be reflected in their dimension ratios. In addition artists differ more from each other,

with a plurality of schools of art helping make for these differences. The other major change, and perhaps the most striking one, is the increased frequency of square artworks.

What happens to males over these two long periods? For the nineteenth century born group the emphasis on the landscape format is striking, and this would be the mass of the market in nineteenth century and early twentieth century Australia. Moving to the later group (Figure 15) .The answer is a striking move to look more like female artists in terms of dimensions. We see this by comparing Figures 13 and 15. Neverthless there is still the domination by landscape dimensions (Figure 15) .

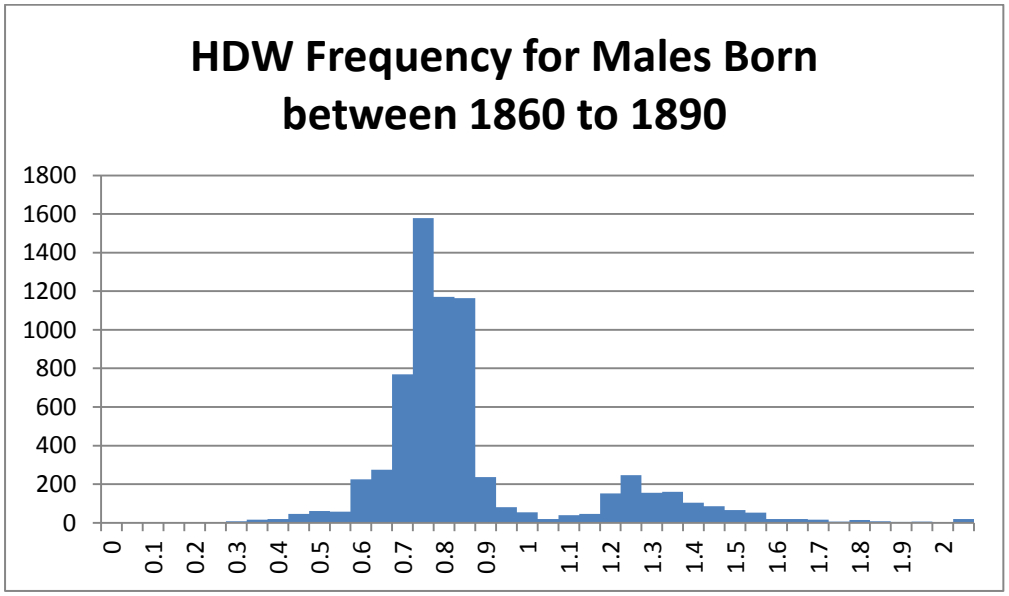

Figure 14: Dimensional ratio (HDW) Frequencies for Males Born between 1860 and 1890

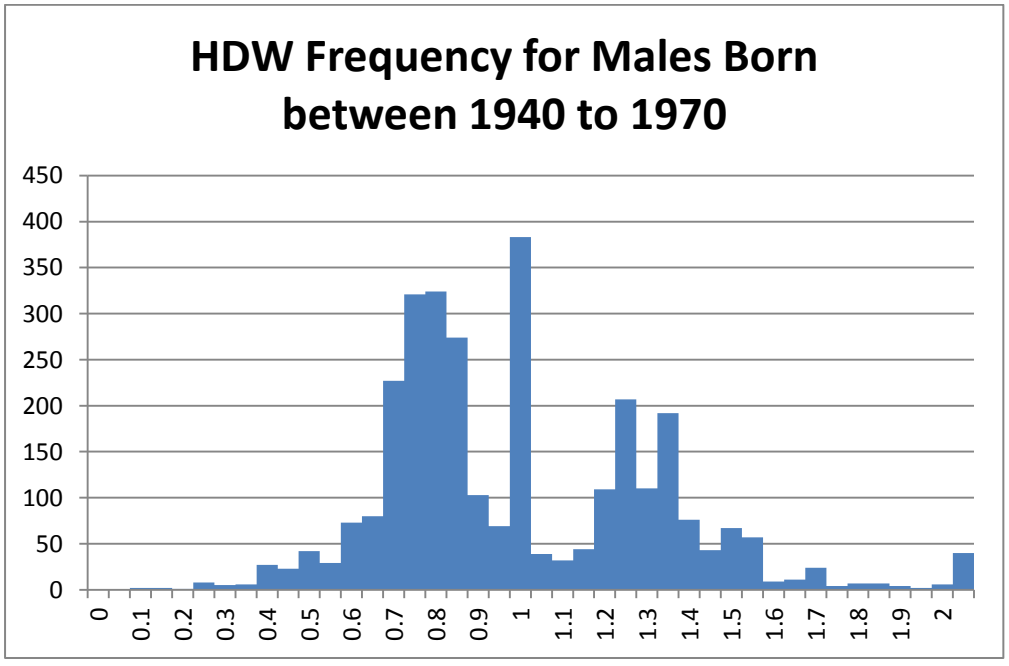

Figure 15: Dimensional ratio (HDW) Frequencies for Males Born between 1940 and 1970

There is an increased plurality, although less so than among females. One possible interpretation of the remaining but diminished dominance by landscape orientation is that bush landscapes remain immensely popular and for some unknown cultural reason this remains a male domain.

7. Concluding Comments

There seems little doubt from the evidence for Australia that the relative dimensions of two-dimensional artworks can be a diagnostic tool. They have potential to be used to test well formulated, i.e. precise, hypotheses about artists, their groups and their choice behaviour and changes. The advent of a new school for example, might lead to either specific changes in the relative dimensions for those belonging to the group or more pervasive ones that spread through art as a whole. The evidence here is that such pervasive change occurred in Australia over the twentieth century. We do not have the years of the creation of individual artworks but where such data exists a year by year tracing out is possible. These changes can then be correlated with art movements and significant events in art such as shows regarded as influential. Moreover they can be traced to external events such as economic and political conditions at the highest level down to local changes in art market conditions.

One possibility tht can be pursued relatively easily with the present data set is the increase in the number of square format artworks. We can hypothesise that these relate to the rise of modernism in Australia, but more particularly to a rise in abstraction. In abstraction there is less reason than for any other form for there to be a specific orientation.

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