Exercise: Primary and secondary colour mixing

For this exercise I have produced a number of colour swatches to identify which are the most intense primary colours in my set of art materials. This will help me to identify which mediums to utilise in later works and experimentations in the course.
Primary colour mixing: yellow colour studies

I started initially by juxtaposing all of the different yellows in order to determine the difference in **hue** (the way that one colour is distinguished from the other), **chroma** (the intensity of the colour) and finally **tone** (how light or dark the pigment is).

After much experimentation, it became clear that the yellow pigments vary considerably depending on the quality and the type of medium. For instance, the yellow acrylic from Fevicryl appeared positively transparent when compared to the water-mixable oil version produced by Reeves. It was apparent after these studies that the Fevicryl brand is a poor substitute for better quality pigments produced by other well-known brands. In some instances several coats of paint needed to be applied in order to mask the grey ground. Some of the cheaper pigments also proved to be less stable than the more expensive ones; this is likely to be as a result of the materials used to manufacture these paints.

The yellow pigments also appear to differ widely in terms of their hue, chroma and tone. For example, some of the yellow ochres are darker in tone as they have a red nuance. This exercise is useful to perform as it plainly identifies how different paints behave. Some are transparent which affects their intensity and produces a lighter tone; whereas others possess a thicker consistency resulting in a darker tonal value.

I have arranged the yellows in different sequences on the neutral grey ground in order to determine which yellow is the most intense and suitable for the following tasks. After much deliberation, the most intense yellow I have is the Lemon Yellow water-mixable oil paint which is produced by Reeves. This pigment is tough and durable and is ideal for this type of experimentation. In addition to this, the set of gouache paints that I have are also suitable for further exploration.
Primary colour mixing: red colour studies

Again, I produced a series of samples to identify which was the most intense red pigment in my collection. The red I have selected is the Cadmium Red acrylic version by Winsor and Newton. I will use this pigment for further study. The other reds were either too blue resulting in a crimson nuance or too orange (there was a visible yellow undertone). Some of the orange-reds were too light as a consequence of their formulation; whereas the blue-reds were too dark. The Cadmium Red I have selected is a happy medium between both ends of the spectrum.

As before, I used a selection of acrylics, gouaches or water-mixable oils by several leading brands (Royal and Langnickel, Reeves and Winsor and Newton). I also mixed Cadmium Red with some of the crimson mixtures in order to counteract the blue effects in the latter. In some instances I also added a splash of white pigment to the mixtures as some of the paints varied in transparency. This stabilised the paints which made my task much easier.

Primary colour mixing: blue colour studies

As before, I created a selection of primary mixes on my grey ground in order to identify the most intense blue. The majority of the blues were largely transparent so I combined them with touches of white to increase their opacity. The best blues in my collection are acrylics manufactured by Royal and Langnickel (Ultramarine Blue) and Winsor and Newton (Winsor Blue). These blues were neither too dark nor too light; so they suit the task perfectly. Due to the relative transparency of some of the other blue pigments, the values were too light; rendering them unsuitable for this exercise.

Figure 3 Primary colour mixing: red and blue colour studies, acrylic, gouache and water-mixable oil paint, 2016, Lucy Dean.
Secondary colour mixing: \textcolor{red}{yellow} + \textcolor{red}{red} = \textcolor{orange}{orange}

The yellow-red scale was produced by adding small amounts of red to my yellow mixture. Half-way across the scale orange was produced by adding tiny amounts of red to my yellow-orange mixture.

Secondary colour mixing: \textcolor{red}{yellow} + \textcolor{blue}{blue} = \textcolor{GREEN}{GREEN}

The yellow-blue sequence was created by gradually combining tiny splashes of the Prussian Blue to the yellow. Half-way along I generated a spring green pigment which was produced by adding tiny amounts of Prussian Blue to the yellow-green palette.

Secondary colour mixing: \textcolor{red}{red} + \textcolor{blue}{blue} = \textcolor{murry burgundy}{murky burgundy}

The red-blue scale was generated by combining varying amounts of Prussian Blue to the Crimson Red Lake acrylic paint. Mid-way along the scale a murky burgundy hue was produced as the Prussian Blue was added to a red-blue mix. In order to create violet I will have to employ different pigments as the Cadmium Red is too orange (too warm) and the Prussian Blue has a yellow undertone (again, too warm). To produce violet I will have to swap my warm red and warm blue for cooler reds and blues, as violet is a cool colour.
Secondary colour mixing test: \textcolor{blue}{rose red} + \textcolor{blue}{blue} = \textcolor{violet}{violet}

The previous colour mixing tests proved that violet has to be mixed in another manner. So for this study I used Rose and Ultramarine coloured pigments. These pigments veer towards the cooler end of the spectrum and are comprised of a bluer mixture than the Crimson Red Lake that I used previously. The Crimson I utilised before possessed an orange nuance which resulted in a murky burgundy rather than the violet I was aiming for. Also, the Prussian Blue was too warm and too yellowish to produce the much desired violet.

To create the violet, I mixed Ultramarine Blue and Rose by Royal and Langnickel which resulted in a deep blue-violet. I also added white to some of the violet mixtures in order to increase their opacity. The best violet I created was solely a mixture of Ultramarine Blue and Rose. This combination was eye-catching and free of any interference of the other primaries. I also tried a mix which incorporated the Prussian Blue, the Ultramarine Blue and the Rose gouache; but the result was too red - it was starting to veer too far towards the warmer end of the colour spectrum; resulting in a sumptuous shade of magenta.

I used left-over paint and varying amounts of white to create the violet swatches. The effects vary as I was able to create a multitude of samples including violet, Klein blue, magenta, mauve and crimson.
Primary and secondary colour mixing with white pigment (opaque colours)

For the next series of colour sequences I will explore all of the preceding tasks with the addition of white pigment throughout; in order to experiment with opaque colour mixes.

This series was the easiest to create as I’d already performed these exercises previously. I also understood how each pigment would react. It seems to me that with the addition of the white pigment; the colours seem flatter and to blend in more with the background. I believe this is partly due to the gouache paints which are in fact opaque watercolour; but it is also due in part to the grey ground. Unfortunately, the grey ground appears to kill the intensity of some of the values.

Secondary colour mixing: yellow - red = peach/pale orange

When I worked from yellow to red for the yellow-red sequence, I combined Lemon Yellow with Titanium White and Crimson Red Lake acrylic media. As I progressed along the scale I added a combination of white and red to create the next value until I was applying red paint directly from the tube. Over time the gouache has lost some of its vibrancy and has in fact become progressively transparent; I think this is due to the media used. For the purposes of this experiment it is fine for the paints to behave like this, but if this was a larger and more finished piece I would definitely use an alternative form of media.

Secondary colour mixing: yellow - blue = BOTTLE GREEN

The yellow-blue sequence is considerably longer than the former as I extended the scale across the page. As before, I commenced with the yellow pigment as I wanted to paint from light to dark in a natural progression. Each time I added more Titanium White and Ultramarine to the
mixture until I was using Ultramarine blue direct from the tube. The transition from yellow to green was challenging as I was trying to darken the values to produce a more realistic effect.

**Secondary colour mixing: **red - blue = brownish grey

The red-blue tonal scales fill the entire page as I was aiming to recreate the shades as one would see in nature. I applied Crimson Red Lake acrylic first to kick-start this series. I gradually applied various mixes of Ultramarine Blue and Titanium White until I was using the blue pigment directly from the tube. I also used acrylic gloss medium to extend the drying time of the pigments; this created a layer of gloss over the top of the work. I noticed that although the slow drying medium extended the drying time of the paints, it affected the opacity of the colours; some of which in places appear to be semi-transparent.

**Bibliography**