HPC - 2.3.1

Taha Enayat
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This report explores the opponent process models of color vision proposed by Hurvich & Jameson (1955), Ingling & Tsou (1977), Guth (1980), and Boynton (1986). These models attempt to explain how our visual system processes colors through different opponent channels: luminance, red-green, and yellow-blue. We will look at the calculated values for these channels and compare the final stage values for a set of nine color samples.

We started with the tristimulus values of nine color samples and computed the values of the opponent channels for each of the four models. The opponent channels considered were:

- Luminance (A)
- Red-Green (T)
- Yellow-Blue (D)

The final stage value was then computed for each color and each model. The results are summarized in tables for comparison:

Sample	Model	A	T	D
White	Hurvich Jameson	236.2	-24.5	-38.1
	Ingling Tsou	99.0	-2.1	-41.7
	Guth	95.0	-37.3	2.5
	Boynton	198.9	-105.7	90.1
Color 2	Hurvich Jameson	70.2	-3.0	-5.0
	Ingling Tsou	30.4	1.5	-6.4
	Guth	29.2	-6.9	0.3
	Boynton	60.3	-26.2	35.7

Sample	Model	A	T	D
Color 3	Hurvich Jameson	68.0	-9.3	1.1
	Ingling Tsou	29.1	-4.4	-0.2
	Guth	28.0	-8.5	-0.1
	Boynton	58.0	-27.7	43.1
Color 4	Hurvich Jameson	71.6	-16.4	4.9
	Ingling Tsou	30.1	-10.2	3.6
	Guth	28.9	-11.6	-0.4
	Boynton	60.5	-32.4	50.6
Color 5	Hurvich Jameson	69.6	-17.5	-4.2
	Ingling Tsou	28.4	-9.5	-5.1
	Guth	27.2	-14.6	0.3
	Boynton	57.8	-35.8	36.5
Color 6	Hurvich Jameson	73.0	-11.7	-17.2
	Ingling Tsou	29.7	-2.7	-18.0
	Guth	28.5	-15.3	1.2
	Boynton	60.4	-37.4	20.1
Color 7	Hurvich Jameson	70.7	-4.0	-30.0
	Ingling Tsou	28.8	5.2	-30.5
	Guth	27.5	-14.6	2.0
	Boynton	58.4	-35.9	0.6
Color 8	Hurvich Jameson	69.6	1.9	-26.1
	Ingling Tsou	29.3	8.8	-27.0
	Guth	28.1	-10.2	1.7
	Boynton	58.6	-30.1	5.5
Color 9	Hurvich Jameson	74.1	2.9	-19.3

Sample	Model	A	T	D
	Ingling Tsou	31.8	8.5	-20.5
	Guth	30.6	-8.0	1.3
	Boynton	63.3	-28.4	17.9

Here we have the final stage value for each color and each model:

Sample	Model	Final Stage Value
White	Hurvich Jameson	298.8
	Ingling Tsou	107.5
	Guth	102.1
	Boynton	242.6
Color 2	Hurvich Jameson	78.1
	Ingling Tsou	31.1
	Guth	30.0
	Boynton	74.8
Color 3	Hurvich Jameson	78.5
	Ingling Tsou	29.4
	Guth	29.2
	Boynton	77.4
Color 4	Hurvich Jameson	92.9
	Ingling Tsou	32.0
	Guth	31.1
	Boynton	85.2
Color 5	Hurvich Jameson	91.3
	Ingling Tsou	30.4
	Guth	30.9
	Boynton	77.1

Sample	Model	Final Stage Value
Color 6	Hurvich Jameson	101.9
	Ingling Tsou	34.9
	Guth	32.3
	Boynton	73.9
Color 7	Hurvich Jameson	104.7
	Ingling Tsou	42.3
	Guth	31.2
	Boynton	68.6
Color 8	Hurvich Jameson	97.6
	Ingling Tsou	40.8
	Guth	29.9
	Boynton	66.1
Color 9	Hurvich Jameson	96.2
	Ingling Tsou	38.8
	Guth	31.7
	Boynton	71.6

The results show noticeable differences among the four models in how they process the opponent channels and compute the final stage values. For instance, Hurvich & Jameson's model generally gives higher luminance values compared to the other models. Boynton's model, on the other hand, shows more variation in the red-green and yellow-blue channels.

Hurvich & Jameson model often yields higher final stage values, indicating a stronger response in the opponent channels. The values for the red-green and yellow-blue channels are generally more extreme, suggesting this model may emphasize these differences more.

Ingling & Tsou model produces lower final stage values, which might indicate a more conservative approach to processing color differences.

The results from Guth's model are somewhat in between Hurvich & Jameson and Ingling & Tsou, but it still shows unique patterns in the opponent channels.

Boynton's model has the highest variability in opponent channels, especially in the red-green channel, suggesting it might be more sensitive to variations in color stimuli.