Extending the 1-9 Scale to 1- ∞

- The 1-9 AHP scale does not limit us if we know how to cluster similar objects in groups and use the largest element in one group as the smallest in the next one.
- It serves as a pivot to connect the two. Connect all the groups using pivot elements like this.

- We then compare the elements in each group on the 1-9 scale get the priorities, then divide by the weight of the pivot in that group and multiply by its weight from the previous group.
- We can then combine all the groups measurements as in the following example comparing a very small cherry tomato with a very large watermelon.

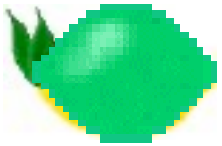
Clustering & Comparison by Size

.07

Unripe Cherry Tomato

.28

Small Green Tomato



.65

Lime

.08

Lime

$$\frac{.08}{.08} = 1$$

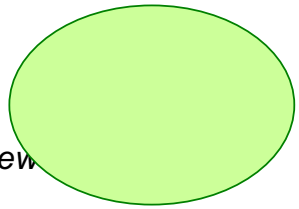
$$1x.65 = .65$$

.22

Grapefruit

$$\frac{.22}{.08} = 2.75$$

$$2.75 \times .65 = 1.79$$

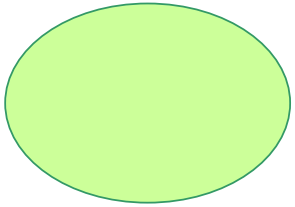


.70

Honeydew

$$\frac{.70}{.08} = 8.75$$

$$8.75x.65 = 5.69$$

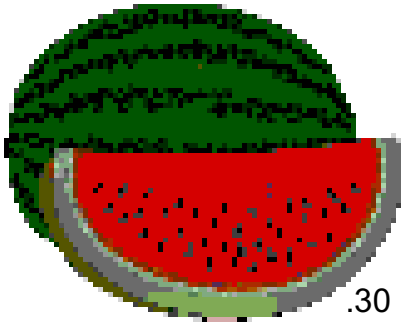


.10

Honeydew

$$\frac{.10}{.10} = 1$$

$$1 \times 5.69 = 5.69$$

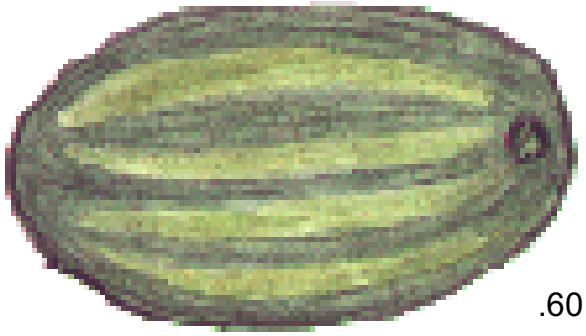


.30

Sugar Baby Watermelon

$$\frac{.30}{.10} = 3$$

$$3 \times 5.69 = 17.07$$



.60

Oblong Watermelon

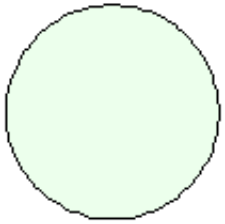
$$\frac{.60}{.10} = 6$$

$$6 \times 5.69 = 34.14$$

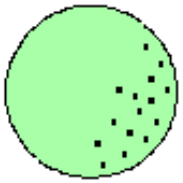
This means that 34.14/.07 = 487.7 unripe cherry tomatoes are equal to the oblong watermelon

Clustering & Comparison by Color

How intensely more green is X than Y relative to its size?



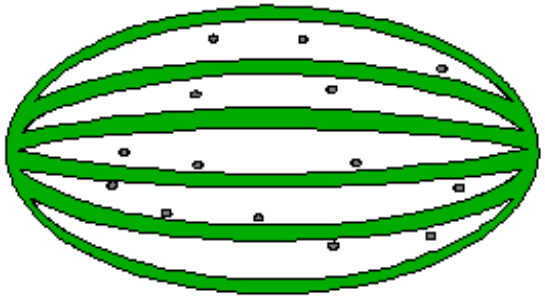
Honeydew



Unripe Grapefruit

Unripe Cherry Tomato

Unripe Cherry Tomato



Oblong Watermelon

Small Green Tomato

Small Green Tomato

Sugar Baby Watermelon

Large Lime

All-in-One Pairwise Comparison Matrix

Form Pairwise Comparison Matrix of Ratios of Sizes Given

	Cherry Tomato	Small Tomato	Lime	Grapefruit	Honeydew	SugarBaby	Oblong	Eigenvector
								
Cherry Tomato	1	.07/.28	.07/.65	0	0	0	0	0.001178
Small Tomato	.28/.07	1	.28/.65	0	0	0	0	0.004712
Lime	.07/.65	.65/.28	1	.08/.22	.08/.70	0	0	0.010925
Grapefruit	0	0	.22/.08	1	.22/.70	0	0	0.030015
Honeydew	0	0	.70/.08	.70/.22	1	.10/.30	.10/.60	0.095415
Sugar Baby	0	0	0	0	.30/.10	1	.30/.60	0.285919
Oblong	0	0	0	0	.60/.10	.60/.30	1	0.571837
							Sum	*1.000000*

The Oblong Watermelon is 0.571837/0.001178 = 485.4 times bigger than the Cherry Tomato

(slight difference in the number from the slide before is due to the greater number of significant figures in the eigenvector calculation)

	Eigenvector
Cherry Tomato	0.001178
Small Tomato	0.004712
Lime	0.010925
Grapefruit	0.030015
Honeydew	0.095415
Sugar Baby	0.285919
Oblong	0.571837
SUM	*1.000000*

The components of the eigenvector belonging to the original groups

Cherry Tomato	0.00118		
Small Tomato	0.00471		
Lime	0.01093	0.01093	
Grapefruit		0.03002	
Honeydew		0.09542	0.09542
Sugar Baby			0.28592
Oblong			0.57184

The components of the eigenvector normalized give original group weights

Cherry Tomato	0.07		
Small Tomato	0.28		
Lime	0.65	0.08	
Grapefruit		0.22	
Honeydew		0.70	0.10
Sugar Baby			0.30
Oblong			0.60