Neuroscience of the Golden Ratio
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Background
The golden ratio was first defined by Euclid (c. 300 BC), a mathematician, but was likely utilized earlier by Phidias (430-495 BC), a sculptor, in his statues and sculptures. Some feel that the designers of the Great Pyramids may have used this ratio well before either of them. Although controversial, the golden ratio continues to permeate into multiple disciplines even today.

Golden Ratio Descriptions in nature many including the nautilus shell, romanesque cauliflower, etc. It is unclear if there is a natural selection for these proportions or if it provides some form of evolutionary advantage. It is also important to note that these examples are approximations to the golden ratio. Also, it is prudent to remind ourselves that although it has a mathematical basis for existing, it is also a human creation or observation.

It is these observations that have been used to describe objects in nature and of human creation. Utilized by artists and mathematicians, it was not until centuries later that scientists and architects used it to create and describe their works.

The Golden Ratio’s popularity is a matter of debate. Some feel it is a self-fulfilling prophecy; where creating objects to the Golden Ratio proportions is popular, possibly because it is familiar. But is this a familiarity to other human made objects or to naturally occurring objects or beings.

Looking beyond why these proportions exist or why they continue to be used, is if these proportions provide a sense of saliency that can used to create satisfying environments. This will involve an interface between architecture and neuroscience.

Discussion
It appears that aesthetic qualities can be monitored neurologically and radiographically using visual input of classical sculptures, a map of what one thinks is beautiful to ugly can be created.

This may be due to an inherent preference for viewing the horizon as a 3/2 rectangle (close to 1.618).

Binocular vision approximates 3/2 rectangle and many of our artificial inputs (TV, monitors, gauges, etc) use these proportions, adding to this concept familiarity or aesthetic of the Golden Ratio.

Does this pattern of familiarity perpetuate to the neuroatomic or neurophysiologic level?

Is the familiarity or aesthetic actually an efficiency of neuronal processing?

Can this aesthetic signal be replicated or duplicated to generate familiarity without redundancy?

Conclusions and Future Directions
There continues to be controversy regarding the aesthetic of the golden ratio. However, neuroscience including neuroimaging, may provide additional insight into why the Golden Ratio is aesthetically pleasing, familiar, or coincidental. Architecture may provide a satisfactory medium to analyze this phenomenon.