

**Homogeneity and structure in the emergence and evolution of visual art:  
The cultural evolution of compressed, interdependent artworks in Reddit Place**

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Cultural evolutionary theory aims to link individual-level processes to population-level patterns via cultural transmission (e.g. Boyd & Richerson, 1988; Kirby, 1999). A consistent finding in the cultural evolution literature is that multiple transmission episodes often result in compression effects (e.g. Kirby, Cornish, & Smith, 2008; Kemp & Regier, 2012): when a set of cultural traits transitions to a more compressed configuration than its ancestral state. Importantly, compression effects can become manifest in two different ways, either via the removal of variation or through maintaining variation and organizing it into structured patterns.

Using a novel, large-scale dataset from Reddit Place, a collaborative art project involving over 1 million participants, we investigate the *de novo* emergence of visual art on a 1000x1000 pixel canvas. All Reddit users could select a single coloured pixel, place this pixel on the canvas, and then wait until a cool-down period had elapsed before placing another pixel. By analyzing all 16.5 million pixel placements by over 1 million individuals, we test whether (a) compression effects are present in Place, (b) this overall compression is driven by variation being reduced or structured, and (c) the canvas becomes increasingly stable.

Our model results indicate that compression in Place follows a quadratic trajectory through time. Through additional measures computed from the 250000 images in our analyses, we demonstrate that compression effects happen through the structuring, rather than removal, of variation. Methodologically, we thus show how different types of compression effects can be distinguished. Lastly, the canvas is shown to become more stable over time. The results suggest that compression in Place emerges through artworks being organized into structured, interdependent patterns; these can be seen as the consequence of a trade-off between preservation and innovation.

## References

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