



Fluvial Apophenia

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Apophenia describes the experience of seeing meaningful patterns or connections in random or meaningless data. Francis Bacon was one of the first to identify its role as a "human understanding is of its own nature prone to suppose the existence of more order and regularity in the world than it finds". Examples include pareidolia (seeing shapes in random patterns), gamblers fallacy (feeling past events alter probability), confirmation bias (bias to supporting a hypothesis rather than disproving), and the clustering illusion (an inability to recognise actual random data, instead believing there are patterns).

Increasingly, researchers use records of past floods stored in sedimentary archives to make inferences about past environments, and to describe how climate and flooding may have changed. However, it is a seductive conclusion, to infer that drivers of landscape change can lead to changes in fluvial behaviour. Using past studies and computer simulations of river morphodynamics we explore how meaningful the link between drivers and fluvial changes is.

Simple linear numerical models would suggest a direct relation between cause and effect, despite the potential for thresholds, phase changes, time-lags and damping. However, a comparatively small increase in model complexity (e.g. the Stream Power law) introducing non-linear behaviour and increasing the complexity further can lead to the generation of time-dependent outputs despite constant forcing. We will use this range of findings to explore how apophenia may manifest itself in studies of fluvial systems, what this can mean and how we can try to account for it. Whilst discussed in the context of fluvial systems the concepts and inferences from this presentation are highly relevant to many other studies/disciplines.