

# Developing a Pattern Language for Science-Engineering-Art-Design (SEAD) Collaborations

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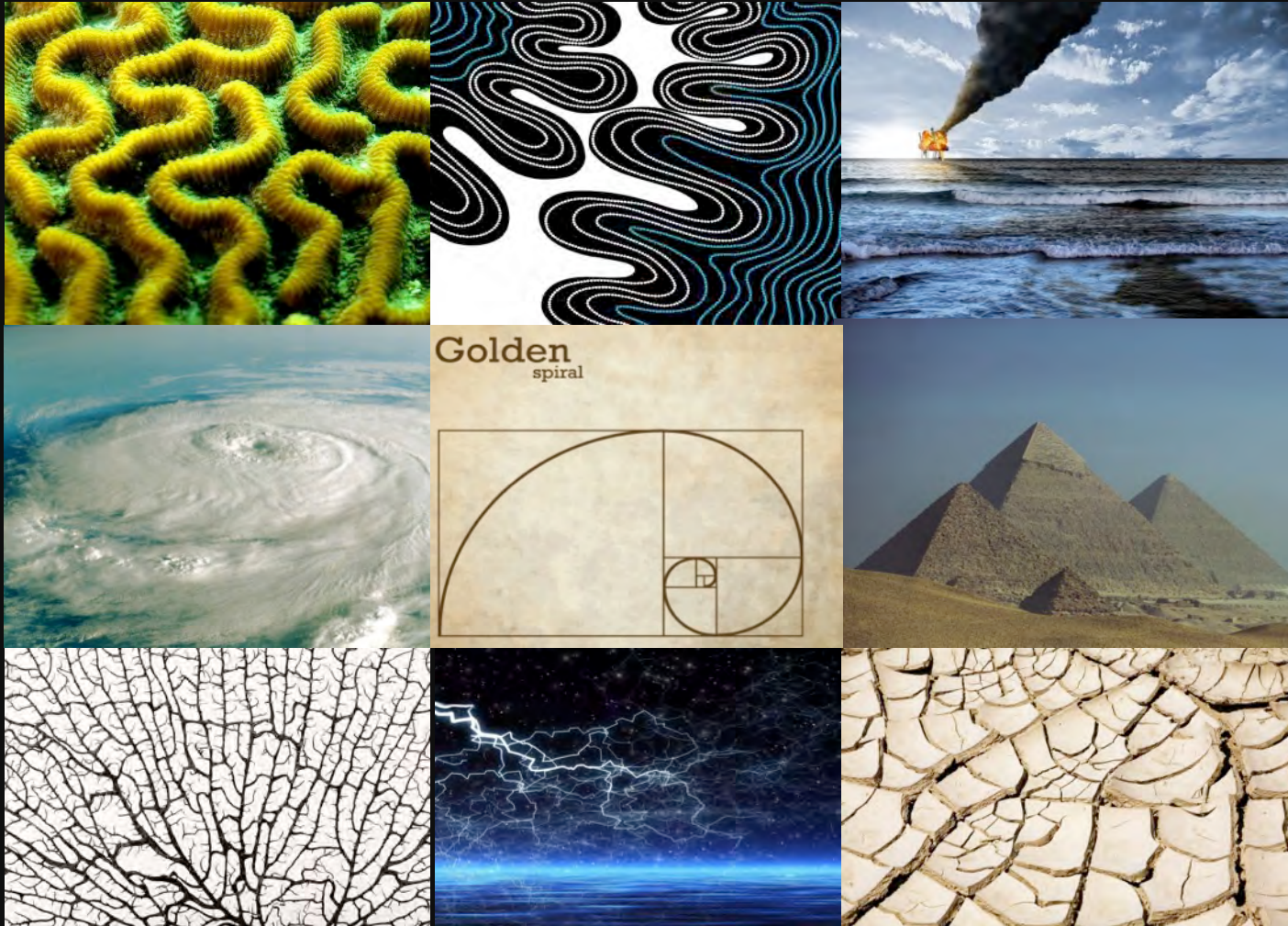


# What Kind of Language?




- Sharing interdisciplinary perceptions raises the challenge of effective communication
- Do words, symbols or numbers represent good candidates for a common language—or not?
- Patterns (both spatial and temporal) are reportedly more easily perceived and discerned by humans
- Scientific descriptions often refer to shapes, geometries, distributions, vibrations, frequencies, and cycles
- Art/design is often described in terms of pattern, rhythm, repetition, proportion, texture, balance, and forms.



# Similar patterns created by different processes...



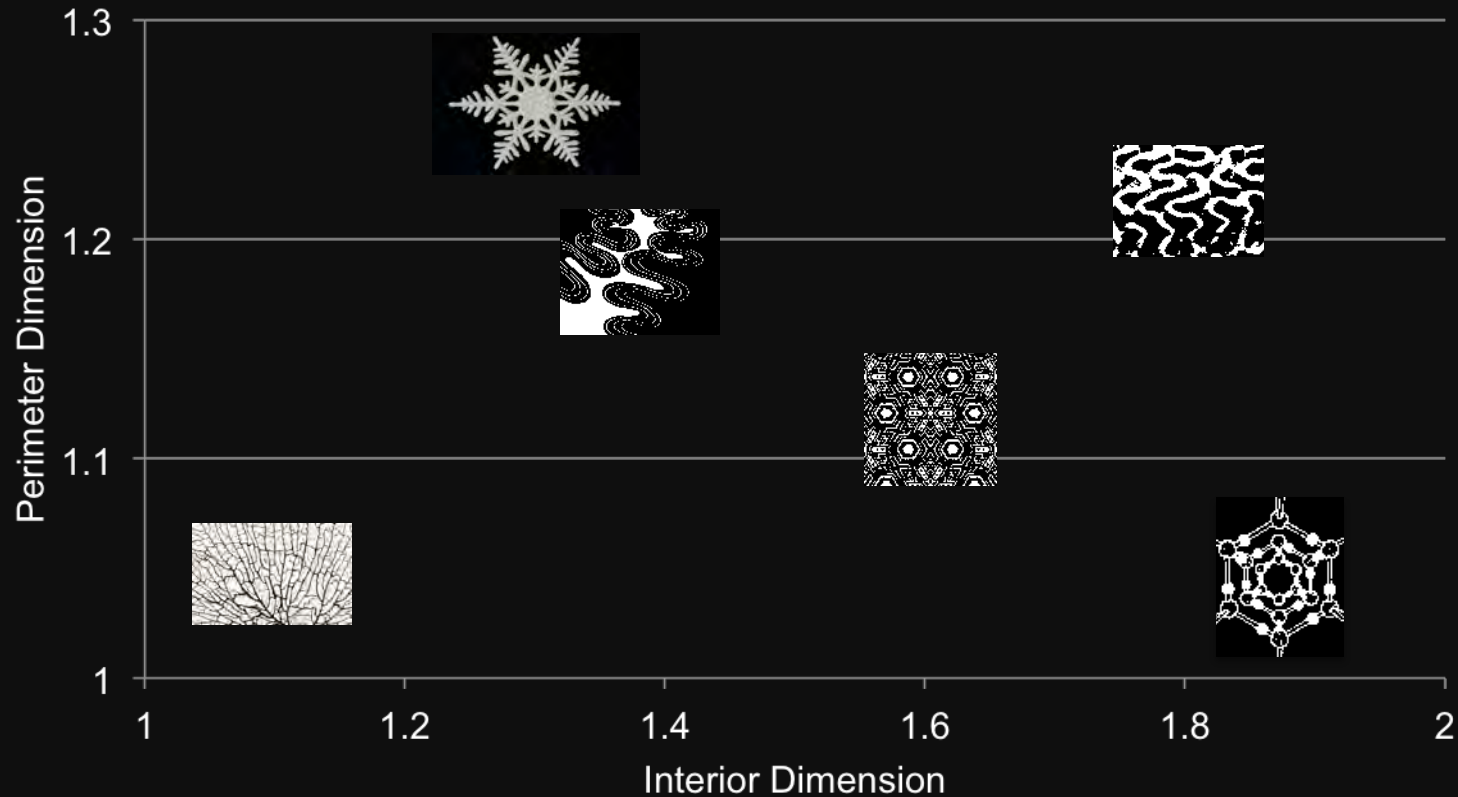
# Identifying Pattern Types by Origin

Natural Pattern	Ideal Pattern	Abstract Patterns
 <p data-bbox="195 908 537 951">Ice on Sidewalk</p>	 <p data-bbox="568 908 954 951">Perfect Snowflake</p>	 <p data-bbox="1031 908 1566 951">Drawings, Design, Music</p>

Three types of patterns identified by Kavanagh et al (2006).



# Identifying Patterns by Fractal Dimension



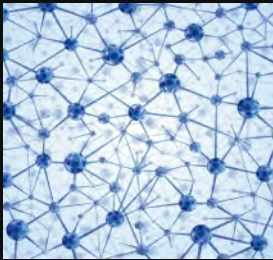
Fractal Dimensions of a Pattern's Interior versus its Perimeter.



# Identifying Patterns by Connectivity



Functional connectivity of the brain based on the interdependence of spatially remote regions



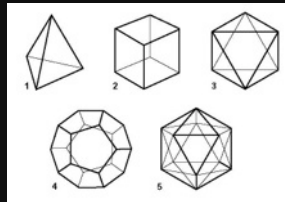
Structural connectivity of molecular water based on the chemical bonding to its nearest neighbors



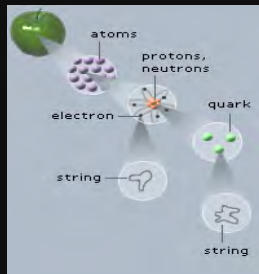
Informational connectivity of social networks or internet based on media type and construction



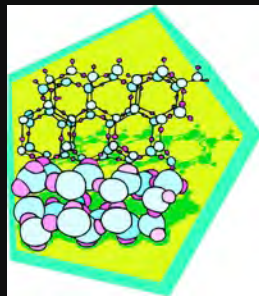
# Other Methods to Identify Patterns



Template Matching that sums the overlapping regions of a subject pattern and a “standard” one



Space Classifying that assigns different regions of the pattern to distinct measurable classes



Syntactical Division that partitions a pattern and then assesses relationships between sub-patterns



# Pattern Communication

- Both art and science can be expressed in terms of spatial and temporal patterns or as network transformations
- Patterns may not communicate science's or art's subtle intricacies, but they can present its essential messages
- Pattern “languages” have been developed for software design, architecture, and other technical applications
- Patterns may be categorized and illustrated to create a common base for users to apply, modify and reference

