The Role of Cognitive Grammars in Documenting Cultural Landscapes: Linking, mapping and interpretation

Figure 1

- Linked layers create spatial, temporal, etc. correlations,
- Correlations require theories or match emic accounts,
- Theories and accounts have to be stored with layers in archives,
- Geo-references (scope) of theories and accounts,
- Geo-references of positive and negative examples,
- Visualization of theories and accounts in interfaces.

Name: Build in low areas

- Environment: #Slope, #Elevation
- Object: #House
- Geo-Scope: #polygon(...)
- Time-Scope: #1600-2020
- Background: #Winter-monsoon, #Wind
- Emic Description1: I believe, that building #houses in #low-areas protects ...
- Emic Description1: For me, this creates a #good-fengshui ...
- Etic Description2: #Wind #Protection
- Testing: Resampling the elevation of houses vs. other structures
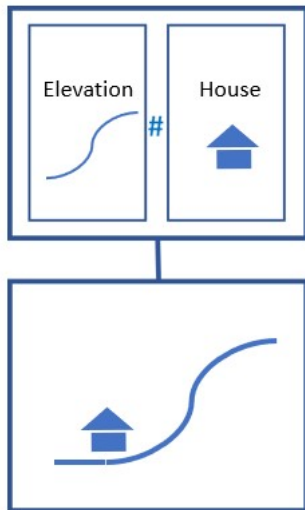
- set of interacting if-then-rules
- conflicting, prioritized rules
- used for generation (architecture, landscape design)
- used for parsing (natural language analysis)
- used for human-to-human communication
- used for cognitive modeling
- formalized as: string grammars, shape grammars, etc.
- grammar as cognitive grammar
- most cognitive representations are spatial representations
- most cognitive representations closely match the outer world
- mismatches are caused by cognitive limitations

- approximation of a culture of Grammar
- largely based on computational principles

Culture

Grammar of Culture

Socio-cognitive

Grammar

Spatial
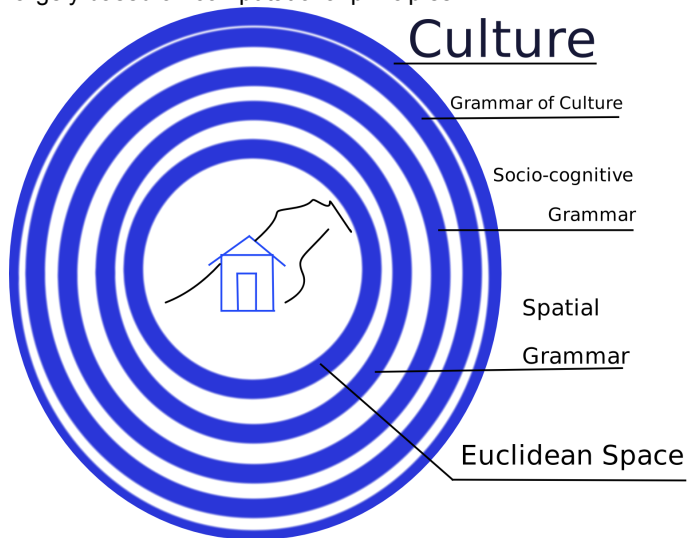
Grammar

Euclidean Space

Leach 1976, Culture and Communication

In what follows I shall assume that all the various non-verbal dimensions of culture, such as styles in

- clothing,
- village lay-out,
- architecture,
- food,
- cooking,
- music,
- physical gestures,
- postural attitudes

and so on are organised in patterned sets so as to incorporate coded information in a manner analogous to … a natural language. I assume therefore it is just as meaningful to talk about the grammatical rules which govern the wearing of clothes as it is to talk about the grammatical rules which govern speech utterances.

Christopher Alexander, normative "Design Patterns" (1977)

hills for building

valleys for crops

❖ ❖ ❖

Keep town and city development along the hilltops and hill-sides—CITY COUNTRY FINGERS (3). And in the valleys, treat the ownership of the land as a form of stewardship, embracing basic ecological responsibilities—THE COUNTRYSIDE (7). . . .
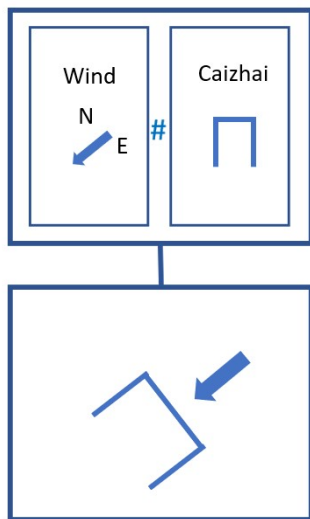
- tagging positive and negative rule compliance in media and data points
- maps/patterns of rule compliance
- cultural interpretation/visualization of maps and media files
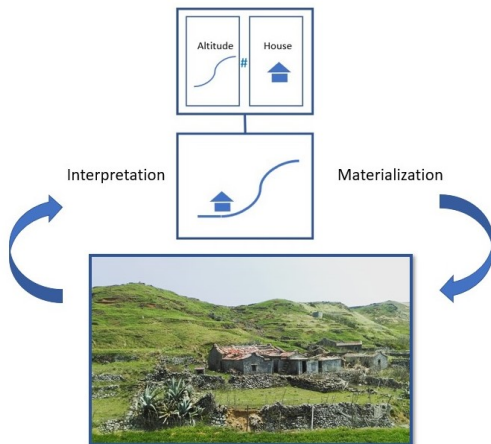
Rule Examples: Turn gardens away from the winter monsoon

Community	Site	N	p-value
Penghu	garden	91	0.145
Hujing	garden	30	0.348
Jiangjun'ao	garden	16	0.0*
Jibei	garden	2	0.0*
Tongpan	garden	4	0.0*
Xiaomen	garden	35	0.055
Yuanbei	garden	4	0.232
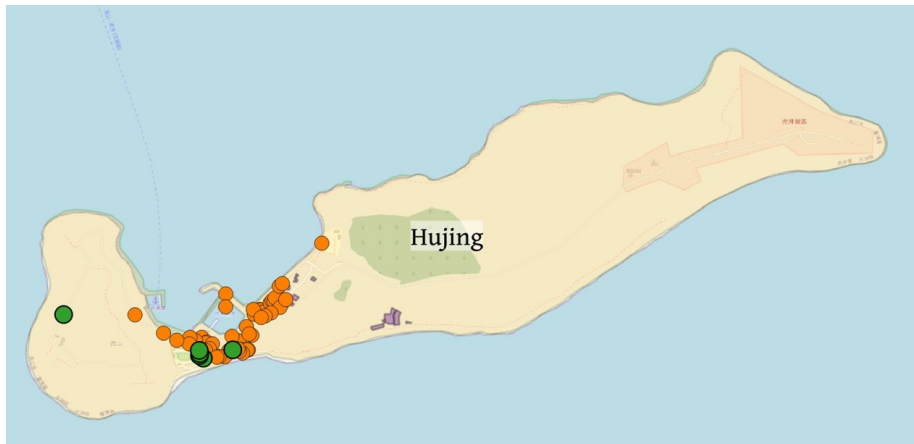
Figure 4

Ordered by p-value (degree of significance)

	Motivation	Rule	p-value
Penghu	winter monsoon	Rule 1	0.0
Penghu	winter monsoon, destruction of crops, erosion	Rule 4	0.145
Penghu	winter monsoon, destruction of crops, erosion	Rule 5	0.194
Penghu	daily life	Rule 2	0.241
Penghu	typhoon, waves, flooding	Rule 3	0.758

- Rework the data, correct geo-references, capture more sites
- Identify the key concepts and their relations in interviews (geography, climate, culture, disaster, risk)
- Associate interviews with rules
- Refine rules through testing and adding contextual features
- Build complex grammar models for each island

- Using a rule-base (grammar) approach, we can effectively model and test environmental conceptions
- Our modeling can accommodate psychological, anthropological and sociological conceptions and theories
- Testing geo-referenced data will show where assumptions that are wildly held are not precise
- Testing geo-referenced data highlights cognitive biases
- Emic and etic rules might be articulated in different languages but eventually share a same reference and motivation
- The combination of theoretical research, extensive empirical fieldwork and a computational approaches might be necessary to bridge the gap in our understanding of the conditions and limits of how culture can adapt to environmental conditions for a sustainable life in traditional communities