

# Structure Preservation and Constrained Transformation

Working note

## Assumption

Admissible transformations preserve identity. Two representations are equivalent if they are related by an admissible transformation preserving identity.

### 1. Local representation

Representations are defined locally. No globally fixed labeling is assumed. Hence, multiple representations correspond to the same underlying object.

### 2. Equivalence structure

Representations related by admissible transformations form equivalence classes. Identity is preserved at the level of equivalence classes.

### 3. Cross-domain realization

Mathematical: transformations over state space

Physical: constrained evolution

### 4. Finite constraint

Representation is bounded. Hence, not all distinctions are preserved.

### 5. Transformation constraint

Let admissible transformations be composed indefinitely. If the transformation space is unbounded, distinguishable representations increase without bound. This contradicts the finite constraint. Therefore, admissible transformation structure is bounded.

### 6. Consequence

Bounded transformation structure implies stable equivalence classes and discrete outcomes.

### Predictive consequence

Unconstrained admissible mappings eliminate equivalence under finite resolution.

### Interpretation

Structure-preserving transformations and bounded mapping spaces are invariant across mathematical and dynamical systems.

(Working note: admissibility-constrained equivalence under finite distinguishability.)