Three types of creativity (Boden 1992)

1. *Combinational:* new combinations of familiar ideas

2. *Exploratory:* generation of new ideas by exploration of a space of concepts

3. *Transformational:* involves a transformation of the search space so new kinds of ideas can be generated.

An alternative typology

- A preliminary extended classification of different types of (computational) creativity

- The goal is to identify different subtypes of creativity

  - Allows characterization, analysis and comparison of tasks

  - Can give guidance for actual systems

- Some emphasis on the *inputs* that systems take

- We use the term "concept" here to denote any creative output

An alternative typology 1/5

Concept Extraction

– Input: an existing representation of a concept

– Output: a new representation of the concept

– Example: extraction of concepts from documents and their subsequent representation as networks

– The creativity in concept extraction could be in the identification of a concept or of its representation, or in the translation process to another representation

An alternative typology 2/5

Concept Induction

– Input: instances/expressions of concepts

– Output: higher-level concepts obtained by generalization

– Example: discovery of music genres by clustering

– Example subtypes:

– *Concept Learning*: supervised activity, concept memberships known (labeled examples) but no definitions of concepts

– *Concept Discovery*: unsupervised activity, concept membership *not* known (unlabeled examples)

An alternative typology 3/5

Concept Modification

- Input: existing concept(s)

- Output: concepts obtained by reuse and modification

- Example: take the idea of a mobile phone and modify the idea to a smart phone

- Example subtypes:

  - *Concept Mutation*: modify *one* existing concept, e.g., by generalization, specialization, or mutation

  - *Concept Combination*: combine *many* existing concepts (e.g. blending) or generalize many concepts

An alternative typology 4/5

Concept Space Exploration

- Input: a search space of concepts

- Output: selected concepts in the search space

- Example: Search for poems of the haiku form

An alternative typology 5/5

Transformational Creativity

– Any of the above types 1-4 where additionally the system modifies its own rules or operations.

Representations of concepts

Different possible representations of concepts

- Definition (declarative, "intension" of the concept)
    - Can be applied/tested on a new instance
- Procedural (generative)
    - Allows generation of a new instance
- Set of all concept members ("extension" of the concept)
    - Or just a set of example members
- Prototype-based
    - Needs a similarity measure, too

P-creativity vs. H-creativity (Boden 1992)

A different distinction between creations:

– *P-creativity* or psychological (or personal) creativity: novel just to the agent that produces it

– *H-creativity* or historical creativity: creativity that is recognized as novel by society

– In machine creativity research, emphasis is on p-creativity, i.e., the system be able to produce something novel to itself.

– H-creativity can then, in principle, be achieved with a database of existing artefacts