

# 'Practical Design Theory

What Works - What doesn't Work - and Why

Dr. Terence Love

21 June 2021

# Practical Design Theory

- Readily usable – no need to interpret – unambiguous and specific
- Apply across all the more than 650 present and future fields of design
- Based on simple easily understood core concepts and definitions
- Create internally coherent bodies of design theory – one theory leads to another
- Integrates with theory from other disciplines on their terms
- Are predictive
- Enable easy direct development of design guidelines

# Nine challenges of creating practical design theory

1. Design theory that applies across all fields of design
2. Flawed foundational concepts and definitions across fields
3. 'Gap' between design research findings and design guidelines
4. Lack of coherency across and between design theories
5. Design theories that are not ambiguous and partial
6. Most design is done by AI / automation
7. Prediction of outcomes is central and primary to design activity
8. Humans cannot predict outcomes for complex situations
9. Design theory distinct from theory in other disciplines

# Domain-free design theory

- Identifying design theories and concepts that apply across all fields of design
- More than 650 fields of design, including:
  - Traditional design fields (e.g. industrial design, fashion design, architecture, engineering design)
  - Self declared design fields (e.g service design, education program design, program evaluation design)
- Proportion of the total design domain
  - Art and Design fields – Graphic Design etc. (5-10%)
  - Technical Design fields – Engineering, computing etc. ( 45-55%)
  - Other Design fields – Education, government policies etc. (45-55%)
- What is conceptually the same across all 650 design fields that is different from all other disciplines?

# Problematic existing theory foundations

- Flawed foundational concepts and definitions across design fields
- Across the design research literature , definitions of foundational concepts such as *design* and *design process* do not stand up to critical inspection
- Basic criteria of a concept are of :
  - Definition is unambiguous and explicit
  - Defines a clear boundary from other concepts
  - Defines relationships with other concepts
  - Fits in a category structure with other concepts that together create an epistemological and ontological whole

# Theory and Guideline 'Gap'

- A 'gap' between design research findings and design guidelines is evident across most design fields.
- Guidelines for professional practices are expected to flow directly from theory – that can predict **outcomes** – an important issue of itself
- Design guidelines are almost completely independent of design theories.
- Instead they depend almost exclusively on theory-less evidence as in for example Interaction Design, UX, Graphic Design and Architecture.

# Coherency between theories

- To make sense and be practically useful theories must:
- Relate to other theories
- Share well developed concepts with other theories
- Exist in the same epistemological and ontological frame as other theories
- In short, theories must be coherent with related theories in the same field and theories in other fields
- Lack of coherence between theories, or between concepts theories depend on is an indicator of theory problems, failures and lack of validity
- Lack of coherency between design theories, and between design concepts points to such theory problems, failures and lack of validity

# Coherency of design concepts and theories 1

- A practical justified body of design theory depends on theories and concepts forming a coherent whole epistemologically.
- From a meta-theoretical perspective it requires that theories form dependent levels in which any theory:
  - Is constructed from and depends on theories and concepts below it
  - Provides the foundations for the theories and concepts above it
  - Is well justified in theory terms and well supported by evidence
  - Has all the essential characteristics necessary for a theory
- At one end of each staircase of theory are the foundations which may be axioms, core definitions, ontological essences
- At the other end of this theory staircase are general theories of design
- For any theory all the other theories in a staircase can be identified, or their empty place identified if they are missing

# Coherency of design concepts and theories 2

All bodies of design theory have levels to their staircase of theory similar to the following

- Ontological definitions (core definitions, concepts, axioms)
- Theories about perception in design activity
- Identification of objects (real and theoretical)
- Theories about the behaviours of real and virtual objects
- Theories about decision-making necessary for creating designs
- Theories about the activities, processes of creating designs
- Theoretical basis of methods for creating designs
- Theories about the internal processes of designers and collaboration between designers
- General design theories
- Epistemological theories about designing

# Design theories that define design activities

- Designs are created by the activity of designing
- Theories about designing must necessarily comprehensively include all aspects of how designs are created
- Most designs are currently created with strong involvement of AI and automation (e.g. Adobe, Autocad, Catia and similar products, digital cameras, web software...)
- However, almost all foundational concepts and theories of design are human-centric and do not include the roles of AI and automation or that designs can be created autonomously by non-human agents such as computer software.
- This means that such definitions of design activities are partial and incomplete and hence faulty

# Prediction is central to design theory

- Prediction of **outcomes** is THE central and primary activity of designing
- The primary aim of design theories is to support the prediction of design **outcomes**
- This uses the distinction between **outputs** and **outcomes** defined in, e.g. Program Logic Modelling
  - **Output** is what is produced by an activity (e.g. a **design** is the **output** of a session of designing)
  - **Outcomes** are the ongoing results in the world of the use of **outputs** (e.g. the **outcomes** of vehicles created from designs include movement of people and goods, pollution, planning problems, wealth for some individuals, global warming, unbalanced societies, loss of community...)
- To be able to **design professionally** requires **prediction** of **outcomes** (or else it is amateur 'guessing')
- The **primary purpose of design theory** is to provide that **prediction** in a way that is justifiable.

# Biological limits to human prediction

- Humans cannot 'in mind' predict outcomes for complex or chaotic situations :
  - **Simple:** situations with low number of elements and relations and up to one feedback loop and insensitive to starting conditions
  - **Complicated:** situations with many elements and relations and up to one feedback loop and insensitive to starting conditions
  - **Complex:** Low or high number of elements and relationships with 2 or more feedback loops and insensitive to starting conditions
  - **Chaotic:** Low or high number of elements and relationships with 2 or more feedback loops and insensitive to starting conditions
- This is primarily a biological limitation
- It is easy to identify and test
- Intuition does not help
- Group consultation does not help
- Implies stakeholder and community participation in design activity is fundamentally faulty in relation to complex situations – ditto design theories in this area

# Unique design theory and concepts

- Ensure design theories and concepts different from other disciplines
- Else, simply use concepts and theories from other disciplines
- Ensure epistemological distinct differences between design theories and concepts and those of other fields such as:
  - Art
  - Engineering
  - Psychology
  - History...
- If not, this implies the field of design is a sub-field of the other discipline, e.g.
  - UX is a subfield of Psychology
  - Graphic Design is a sub-field of Art
  - Design History is a sub-field of History...
- Also implies that the field of Design along with designs and design activity does not exist as a separate field or discipline

# The problem of verb-based definitions of design as an activity

- Across the research literature *design* has been defined as an **activity** , most typically as a **process**
- Over the last, 70 years, the design research literature across all disciplines that has done this has **not resulted in a coherent theory foundation for any of the 650 design fields**
- *In all cases, this verb-based approach fails the tests of:*
  - 1. Being 'necessary and sufficient'*
  - 2. Applying across design fields*
  - 3. Providing a foundational basis for a body of integrated design theory*
  - 4. Having an appropriate role in a general theory of design that addresses all aspects of design theory*
- A fundamental problem with activity-based design definitions is that almost all design fields create designs differently
- Hence any design field–based activity definitions of design are always partial and incomplete

# Basic practical design theory concepts that work across design fields

- *The following definitions of concepts satisfy all of the above challenges:*
  1. *A **design** is a set of instructions how to make or do something*
  2. ***Designing** is the activity of creating designs*
  3. *A **designer** is someone or something that creates designs*
  4. ***Design theory** is theory describing the creating of designs*
  5. ***Design research** is research aimed at producing design theory*

Questions?

Comments?