The Role of Narrative in Design Frames: Demystifying Framing in Design Research through Narratives in the Architectural Design Process

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ORIGINAL RESEARCH ARTICLE

Alaei, Amir Ali, Seyed Abbas Yazdanfar, and Mohsen Faizi. "The Role of Narrative in Design Frames; Demystifying Framing in Design Research through Narratives in the Architectural Design Process". *Soffeh* 36, no. 2 (2026): 47–64. DOI: http://doi.org/10.48308/soffeh.2025.239859.1417

Abstract

Background and Objectives: In response to criticisms of the rationalist approach to ill-structured problems, the design situation was viewed by some design researchers from a constructivist perspective, which led to the concept of framing and frame-making as one of the main activities in the design process. While there is a theoretical foundation for framing in design studies, its concrete understanding remains ambiguous. Meanwhile there is a history of using narratives and stories as a perspective for studying the design process in general. In these studies, narratives are tools that simultaneously guide the designer's thinking and serve as reasoning devices that structure what should be done about the subject of the design. From this perspective, framing seems to be a context that allows different values to coexist in the design without being mutually exclusive, and in the form of co-construction of verbal stories in design. Thus, This research aims to examine the capacity of narrative in the concept of

Received: May 10, 2025
Revised: June 24, 2025
Accepted: July 19, 2025
(Pages: 47–64)

Keywords:
Framing, Narrative, Storytelling, Design process, Design research.

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http://doi.org/10.48308/soffeh.2025.239859.1417

Research Questions:

1. How can a narrative approach be used to clarify what goes on through framing in the design process?

2. What is the meaning of frames and framing in design?

3. What interpretations of framing have been offered to understand the design process?

frames as representational constructs that embody designers' situated knowledge and to find a model for demystifying them.

Materials and Methods: Employing a fundamental-theoretical research paradigm with a qualitative strategy, and based on library-based studies and logical reasoning on top of a general review of design research, the present paper examines the concept of framing from a constructivist perspective. It then attempts to provide a structure for using an often-underexplored capacity of narrative in this context.

Results and conclusion: The study demonstrates the significant potentials of the concept of design framing: a tangible, actionable narrative-based strategy in four interrelated activities. It starts with naming, which takes place in the form of interpreting the situation through constructing a story, followed by the creation of a frame as an inclusive narrative based on the superimposition of stories. The next step is to move towards frames, in the form of solution-oriented stories through the lens of these narrative frames. Finally, and continuously throughout the design process, there is a reflection on design that refines, removes, and adds stories. This process goes on until the inclusive narrative (the last frame) best manages the situation and complexities of the design.

Introduction

An increasing number of studies have been conducted in recent years to examine designers' working methods and analyse design processes in both lab and field settings[1]. One of the most influential concepts in the study design processes is the constructivist concept of framing, which suggests that the main activity in the design process[2] is the construction of a frame. A frame is a viewpoint that allows a designer to encounter a problem in an ambiguous, uncertain, and indeterminate design situation. According to definitions of framing[3], its main function is to define or make sense of a situation. This sense-making allows a person to understand a situation by constructing a mental representation of the important elements of it and speculating a

1. Ilpo Koskinen, et al. 'Design Research through Practice: From the Lab, Field, and Showroom.' IEEE Transactions on Professional Communication 56, No. 3 (2013): 262-263.

2. Bryan Lawson, *How Designers Think*. Routledge, 1980.

3. Donald A. Schön, *The Reflective Practitioner: How Professionals Think in Action*. Routledge, 1983.

4. Donald A. Schön, ibid; Robert Drazin, et al. 'Multilevel Theorising About Creativity in Organisations: A sensemaking perspective.' *Academy of management review* 24, No. 2 (1999): 286-307.

set of relationships, and thereby facilitating decision-making and action[4]. From the perspective of existing studies, adopting a constructivist approach to design appears to have two major consequences: first, frames and framing are at the core of the design process, used by the designer to understand the existing situation and imagine new situations. These frames are not objective reflections of the outside world, but rather structures that are formed through sense-making and giving order to the elements of the world; second, design frames are constantly changing structures as designers interact with givens of the situation. Therefore, framing is a dynamic process that is shaped by interactions between the design world and the design situation[5].

Despite the emphasis on the role of framing in design research and the design process, a visual description of the structure and content of frames has rarely been provided. While such a description would allow frames to be identified and their transformations to be tracked during the design process, the proposed models to describe them remain relatively underdeveloped. The issue is that although frames, as a perspective or viewpoint, allow designers to address a problem, their specific and precise definition remains elusive[6]. While concepts such as point of view or metaphor are useful for communicating the concept of frames[7], they are often too broad and vague to allow for a specific definition. This research, therefore, attempts to address this gap to enable a more in-depth identification and representation of frames for describing and understanding the design process. It is anticipated that such representations and models will allow for the emergence of new perspectives for describing and understanding the design process.

Based on the studies of Donald Schön and building upon the interpretations of scholars[8] such as Bryan Lawson[9], Peter Lloyd[10], Wegener and Cash[11], it is argued that a version of Schön's framing process can be conceptualised as a reflective practice. This act has been translated into the realm of narrative and storytelling for the purpose of disambiguation. Given the aforementioned purpose, this investigation is considered a fundamental-theoretical study with a descriptive-analytical nature. The data collection was achieved through library research, focusing on the history of design research studies and the evolution of design generations, specifically within the two general axes of framing in design and narrative in design. Qualitative strategies and logical reasoning are employed for the method of analysis. The research attempts to provide a structure or suggestion regarding the use of the lesser-known capacity of narrative in relation to the frame. Although this research does not systematically utilise semi-structured interviews, content analysis of their texts, or a data-based theory, observations and transcribed excerpts from verbal interviews with practitioners or professors of architecture are included as examples for scrutiny and comparison with the library-based findings.

1. Theoretical background

After World War II, the problems facing design in the crisis of solving complex problems in Europe and the inefficiency of the traditional view of design led to a shift in the attitude towards it. Formerly considered a process reliant on the 'magical' power of creativity, individual genius,

5. Babak Soleimani. 'Design Frames: A Narrative and Network Approach.' Doctoral dissertation, 2020.

6. Babak Soleimani, ibid.

7. Jon Kolko, *Wicked Problems: Problems Worth Solving*. Austin Centre for Design: Ac4d, 2012; Donald A. Schön, 'Generative Metaphor: A Perspective on Problem-Setting in Social Policy.' Metaphor and Thought (1993): 137-163; Suat Hoon Pee, et al. 'Understanding Problem Framing through Research into Metaphors.' In *2015 IASDR International Design Research Conference*, pp. 1656-1671. 2015.

8. Rianne Valkenburg and Kees Dorst. 'The Reflective Practice of Design Teams.' *Design Studies* 19, No. 3 (1998): 249-271; Norbert FM Roozenburg and Kees Dorst. 'Describing Design as A Reflective Practice: Observations on Schön's Theory of Practice.' In *Designers: The Key to Successful Product Development*, pp. 29-41. London: Springer London, 1998.

9. Bryan Lawson, ibid; Bryan Lawson, *What Designers Know*, Elsevier, Oxford: Architectural press, 2004.

and the artistic sense of the designer, design began to be viewed as a more conscious, regulated, and evaluable process. In response, the theorising of design methods was initiated in the late 1950s and early 1960s. Decades of research have resulted in the proposal of many prescriptive or descriptive models for the methodology and process of design. These are generally classified into three generations by design research scholars[12]: First Generation[13] or the 'analysis-synthesis' models; Second Generation[14] or the 'participatory' models; and Third Generation[15] or the 'conjecture-analysis' model, which is more descriptive[16]. These efforts are related to various paradigms and epistemologies. According to studies spanning more than half a century of design research, two main types of paradigms have been proposed[17] to describe design activity[18]: 1) 'Rational Problem Solving' Proposed by Herbert Simon[19], in which design is seen as a methodical process for finding a solution to a problem; and 2) 'Reflective Practice' presented by Donald Schön[20], where design is an attempt to gain knowledge about the practice existing in intuitive and artistic processes. Criticising the positivist and methodological scientific epistemology, a new epistemology for design practice was proposed by Schön. This was based on a constructivist approach. The point was highlighted by studies and experiences was that design problems—referred to as ill-defined, ill-structured, and wicked—could

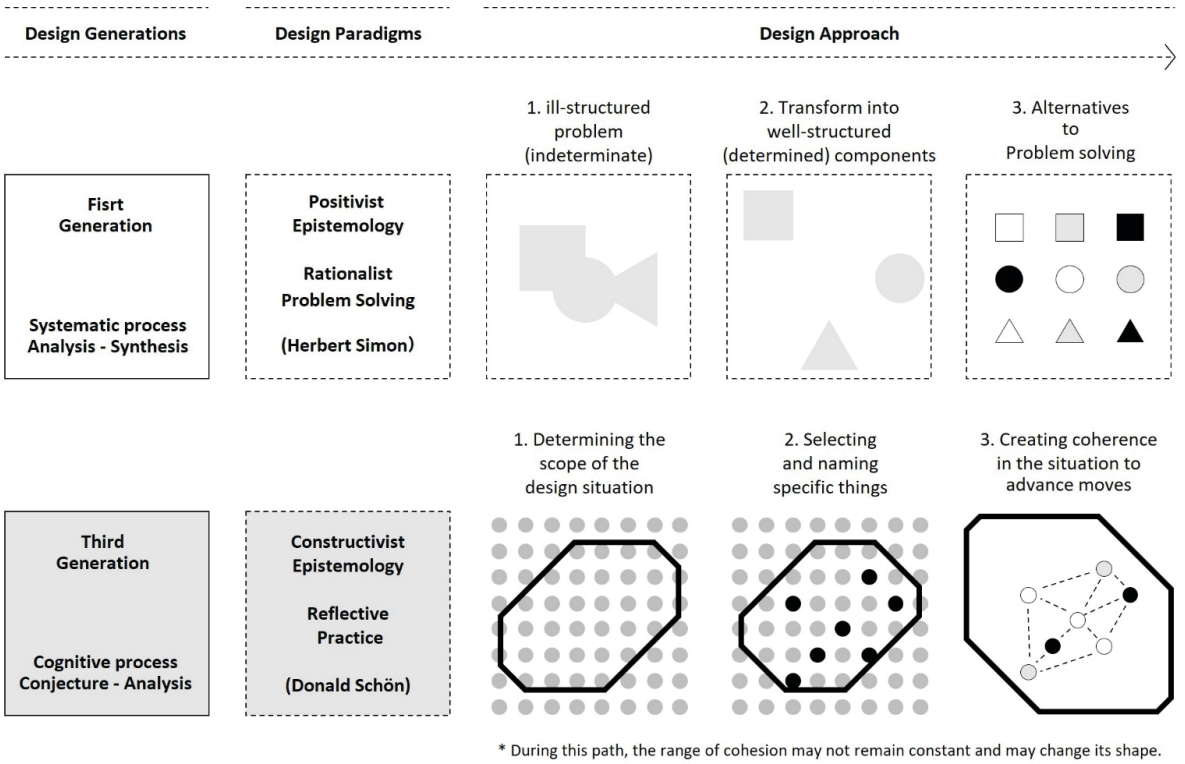


Figure 1. A summary of the relationship between the two design paradigms and the approach to design problems through the lens of each of them, drawing: authors.

10. Peter Lloyd. 'Storytelling and the Development of Discourse in the Engineering Design Process.' *Design Studies* 21, No. 4 (2000): 357-373; Peter Lloyd and Arlene Oak. 'Cracking Open Co-Creation: Categories, Stories, and Value Tension in a Collaborative Design Process.' *Design Studies* 57 (2018): 93-111.

11. Frithjof E. Wegener and Philip Cash. 'The Future of Design Process Research? Exploring Process Theory and Methodology.' In *Design Research Society 2020*, pp. 1977-1993. Design Research Society, 2020.

12. Nigan Bayazit, 'Investigating Design: A Review of Forty Years of Design Research.' *Design Issues*20, No. 1 (2004): 16-29.

not be adequately analysed within a scientific epistemology. Instead, it was found that newer epistemologies offered perspectives closer to the reality of design.

In the context of design, alternative approaches have been seen to focus on a localised problem rather than the overall problem as an abstract entity[21]. It is suggested that the only way to deal with complex problems is to have a localised understanding at any given moment[22]. In this view, the problem is understood as the design situation itself, in which a gap exists between what is and what should be. It has been argued that '*instead of solving wicked and ill-structured problems, one can expect to manage them and, in fact, to open them up rather than solve them*[23].' Thus, the term problem-unrolling can be used to refer to the process by which a designer encounters an ill-structured problem. The ill-structured nature of a design problem necessitates that, prior to any problem-solving activities, a certain amount of structuring or framing of the problem must occur[24]. According to Schön[25], problem framing is the process by which a designer interactively names the elements that will be addressed and frames the context in which they will be addressed. This places the designer in a reflective conversation with the materials of a design situation[26], a process that stems from a reflective practice approach and, under a constructivist epistemology, emphasises problem framing (Figure 1).

1.1. Framing in Design

In Frame Analysis, Erving Goffman[27] states that frames are the way in which situations are made sense of by individuals, serving as the story that might be told when asked about what was occurring. The concept of framing entered the design world most notably through the writings and studies of Donald Schön and his early references to James[28] and Dewey[29]. According to Schön[30], a difficult design situation is framed by designers through the setting of its boundaries and the selection of specific elements and connections that provide it with a sense of coherence. Occasionally, efforts to organise the situation produce unexpected results, which in turn give the situation new meaning. As such, the problem is listened to and reframed by designers.

The concept of frames is considered by Lawson to be the basis and essence of design thinking and the heart of the design process. It is argued that designers hold on to a relatively simple idea early on when faced with a complex problem[31]. When examining the design methods of expert architects, it is often seen that statements are made about how they view the problem. This, which can also be observed in interviews with designers, points to the framing activities of the designers[32]. Also, Cross states that the process of structuring and formulating the problem has been repeatedly introduced as key features of design expertise, and the idea of problem framing seems to best reflect the nature of this activity[33].

These frames are not fixed, predetermined, and separate from their creator, but rather they are posited and dependent on the designer. According to studies, designers, in their reflective conversation with the situation, identify and name the factors of the situation, frame the problem in a specific way, move towards providing a solution, and then evaluate those moves. In this cycle, designers use frames as

13. The first generation of design methodologies, prominent from the 1960s to the 1970s, originated from the positivist paradigm, which is rooted in the natural sciences. Within this framework, design is approached as a systematic process of decomposition and synthesis. A complex design problem is first broken down into smaller, more manageable sub-problems. These sub-problems are then individually solved, and their partial solutions are subsequently combined to form a comprehensive, final solution. This approach is characterised by an objectivist viewpoint, emphasising the use of objective, external data and components. The non-interference of the designer›s subjective mental schemas is considered a core principle, as the formation of an idea is seen as a product of logical induction, independent of the designer›s personal mentalities or cognitive structure. Notable works from this period include those by Christopher Alexander and Bruce Archer.

structures of belief, perception, and value from which they look at the problem and try to respond to it. Framing can be said to be a key and important activity in the design process, to the extent that Schön considers it a major factor in the success of a design process[34]. He and Martin Raine outline four perspectives for looking at frames[35]: 1) As scaffolds and internal structures that support subsequent constructions, 2) as boundaries and limits, 3) as schemata that support interpretation, and 4) as diagnostic/prescriptive stories (a view that Rein and Schön themselves agree with). Indeed, frames appear in part in Schön's studies to provide narrative accounts of how designers change their perception of a design problem[36].

1.2. Narrative in Design

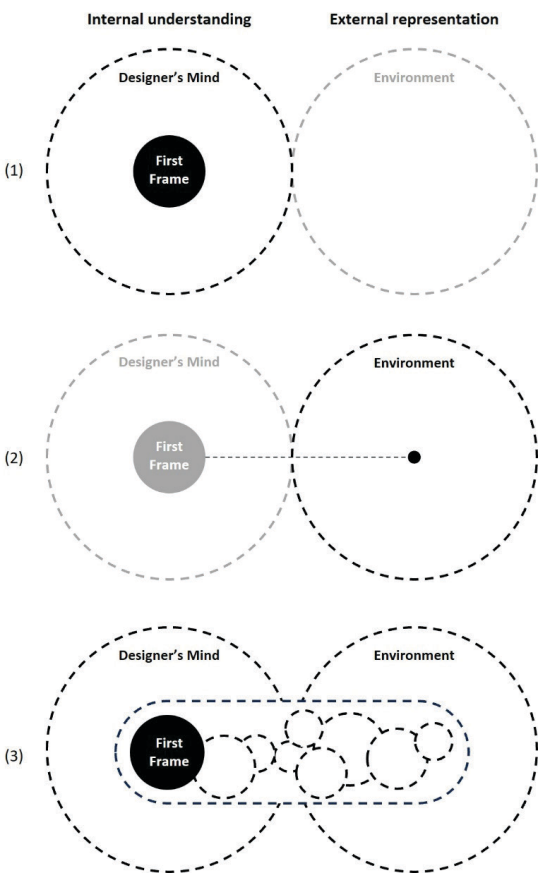
In narratology a narrative is conceptualised as a form of representation that encompasses both story and narrative discourse[37]: 1) The story is the content level, consisting of an event or a series of events, while 2) The narrative discourse is the means by which these events are represented. From this perspective, it is argued that a story is never directly encountered but is instead always mediated through a narrative discourse. Researchers in this domain have therefore depicted the story at the core, with the narrative serving as the outermost membrane of communication with the surrounding world.

According to Manfred Jan, a primary distinction among narrative types is drawn between fictional and non-fictional narratives. Non-fictional narrative is a literary form that emerged in Europe during the latter half of the 20th century, having been formed from a fusion of journalism and fiction. While both narrative types are understood to possess the elements of story and discourse, non-fictional narratives are also said to contain a third determining factor that is absent in fiction: a reference to the real world[38]. Furthermore, it is argued that in non-fiction, the relationship between the reference and the story can become more significant than that between the story and the discourse. Consequently, while the story is of primary importance for fiction (often at the expense of reality), truthfulness is prioritised in non-fiction, even though storytelling techniques may be utilised. From this perspective, it is suggested that architecture, given its external relationships with other forces, more closely resembles a non-fictional narrative (which is grounded in reality) than other genres, such as the novel, which rely more heavily on imagination. Another feature of non-fictional narrative is its connection to creativity. The reality presented in non-fiction is given a personal quality, with the author narrating the truth through various creative techniques in a manner that transcends a mere recounting of events[39]. This manipulation, however, is not intended to falsify reality but rather to highlight certain aspects while consciously diminishing others, often in a non-linear sequence[40]. This approach is considered to be highly analogous to the act of making and looking through a frame.

In architecture, narrative can be instrumental throughout the design process, from the initial stages of enriching an idea to the final decision-making[41]. According to some researchers, its effectiveness can be seen at all stages: at the outset, by helping to identify and define the problem; in the middle, by aiding in the identification of design nodes and the introduction of

14. A shift in design approach occurred in the late 1970s and early 1980s with the emergence of the second generation of design methods, known as participatory models. These models challenged the traditional role of the designer as the sole decision-maker. Instead, design decisions were reconceptualised as a collective endeavour involving the participation of users and stakeholders. In this model, the designer›s function is limited to that of an expert who provides the necessary information for the collective decision-making process. This approach was influenced by concurrent developments in urban and regional planning, where a greater emphasis was being placed on stakeholder participation in the decision-making process.

solutions; and finally, by providing the possibility of testing proposed solutions[42]. From Lawson's perspective, the formulation of a problem appears to have similarities to narrative, and is also related to Schön's concept of problem setting. This is because in explaining this activity, Lawson uses the example of introducing characters and examining their role in a story. Schön had previously described a similar activity as the act of naming the elements of a situation. In this view, the designer, as the director of the design scene or the writer of its scenario, not only identifies the elements, actors, and characters of a work, but also redefines them and assigns them new roles based on their perspective and the knowledge gained from those elements[43].



2. Interpretations of Framing

Based on a broader review of the literature on the subject and historical studies of design frames, three general conceptual locations can be identified[44]. For some, frames are situated within the internal world of cognition, while for others, they are a type of representation external to cognition. For a third group, however, frames are considered to be tools for thinking, defined by their ability to move and shift between the realms of cognition and representation. The distinction between the internal (conceptual sets) and external (externalised representations of a perception) aspects of a frame is therefore a fundamental point of consideration. This is also reflected in the evolution of framing studies; initially, the focus was on frames as a means of understanding and defining situations—that is, as an internal tool for comprehension. More recently, however, the research trajectory has shifted toward viewing frames as an external tool for understanding[45]. The concept of boundaries is mentioned by Dorst[46] in the context of defining frames as tools that exist in a world of actions and intentions (Figure 2). In this view, the designation of a metaphor or pattern of relationships as a frame is entirely dependent on the designer. An externally displayed frame can also be utilised as a tool for thinking about a design problem[47].

Figure 2. Positioning design frames across different studies. Drawn by the authors, adapted from Nick Kelly and John S. Gero, 'Reviewing the Concept of Design Frames towards a Cognitive Model'.

15. The third generation of design method is grounded in constructivism, a philosophical approach associated with the humanities and arts. In this paradigm, the design process is understood to begin with initial hypotheses or ‹estimated design responses›. These initial conjectures are then tested and refined through the application of analytical methods. This approach is heavily dependent on the designer›s mental schemas or schemata, as the design process is understood to be derived from their existing cognitive capabilities and mental structure. The designer›s internal cognitive framework is thus seen as fundamental to the generation of design solutions. Key studies belonging to this generation include the work of Bill Hillier et al., Jane Darke, and Nigel Cross.

16. Hamid Nadimi, 'A Study in the Design Process.' *Soffeh* 9, No. 29 (1999): 94-103 [in Persian].

For example, representations of a design problem are frequently shared and interpreted by design teams in order to develop shared mental models[48]. This perspective is considered crucial for understanding how norms are shared within design teams.

While a theoretical basis for framing exists in the literature, concrete efforts to understand the concept from a constructivist perspective, to map frames, and to examine how their structure is transformed during the design process remain relatively limited. This clarification of the concept can be used to improve the design process from two perspectives:

1) The framing of a design problem is considered to play a fundamental role in design creativity. Previous studies have demonstrated that the act of changing a frame is key to the creation of innovative solutions[49]. It is through reframing that a situation is viewed through new lenses, and solutions are imagined that could not have been achieved with the old frame. However, since frames are embedded in design materials and conversations[50], they can remain hidden from a designer's conscious perspective. Making frames clear and understanding how they enter the design space is believed to open up new avenues for designers to reimagine their understanding of a situation and explore new design environments.

2) Frames can also be considered strategic tools in the design process that facilitate the creation of a shared vision among different members of a design team. As noted in various studies[51], the growing complexity of design problems, the increasing interdisciplinary nature of design teams, and the invisibility of design artifacts have heightened the importance of clarifying the design process. It is believed that by making design frameworks more transparent, a shared understanding of complex and unique design problems can be improved.

In line with these research efforts, four main design activities for reflective practice have been proposed by Valkenburg and Dorst[52]: Naming, Framing, Moving, and Reflection (Figure 3).

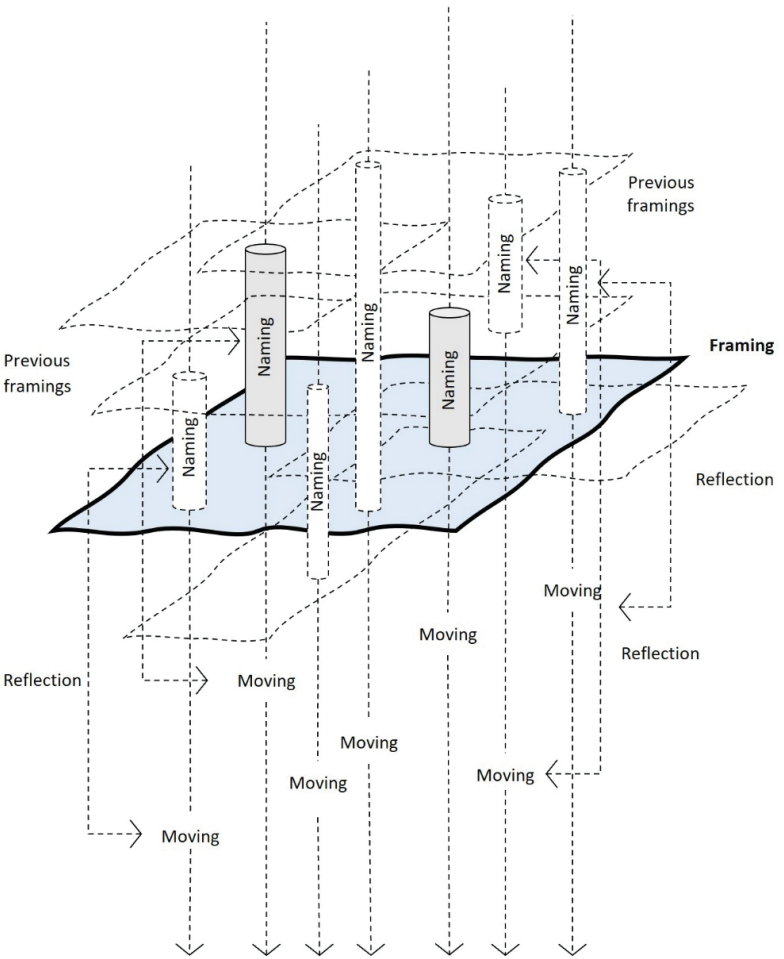


Figure 3. The reflective practice mechanism based on Schön's theories, drawing: authors, adapted from: Rianne Valkenburg and Kees Dorst, 'The Reflective Practice of Design Teams'.

It should be noted that with each reflection on frames and the movements made towards them, the overall structure may be altered, and the process may be faced with reframing. Design activities were divided and examined into episodes[53] based on the protocol analysis study method. In this approach, the four activities were examined as separate stages in order to describe the design process. Research similar to this method was also conducted by Rozenburg and Dorst[54]. However, criticisms have been levelled against this group of studies, which are related to the use of protocol analysis and a somewhat linear conception of activities within the design process. The nature of a reflective practice and how a design is framed are themselves considered to be a sub-section of a larger body of research on design processes, within which various research gaps have also been identified.

More generally, and based on studies by Wegener and Cash[55], more insights into design research have been gained at both the micro and macro levels (Figure 4). However, it appears that fewer approaches to design process research are capable of theorising at a meso-level and thus transcending mere analysis. The challenge and research necessity of such issues are seen as the analysis and theorisation across the entire design process, with an emphasis placed on the meso-levels as mediators of interactions. Of the three major approaches to design research studies—protocol studies, ethnographic approaches, and narrative approaches—the third is considered closer to the nature of design due to its process-based nature.

While protocol analysis studies may be suitable for analysing micro-level design sessions (typically around ninety minutes), and ethnographic approaches for a full, macro-level de-

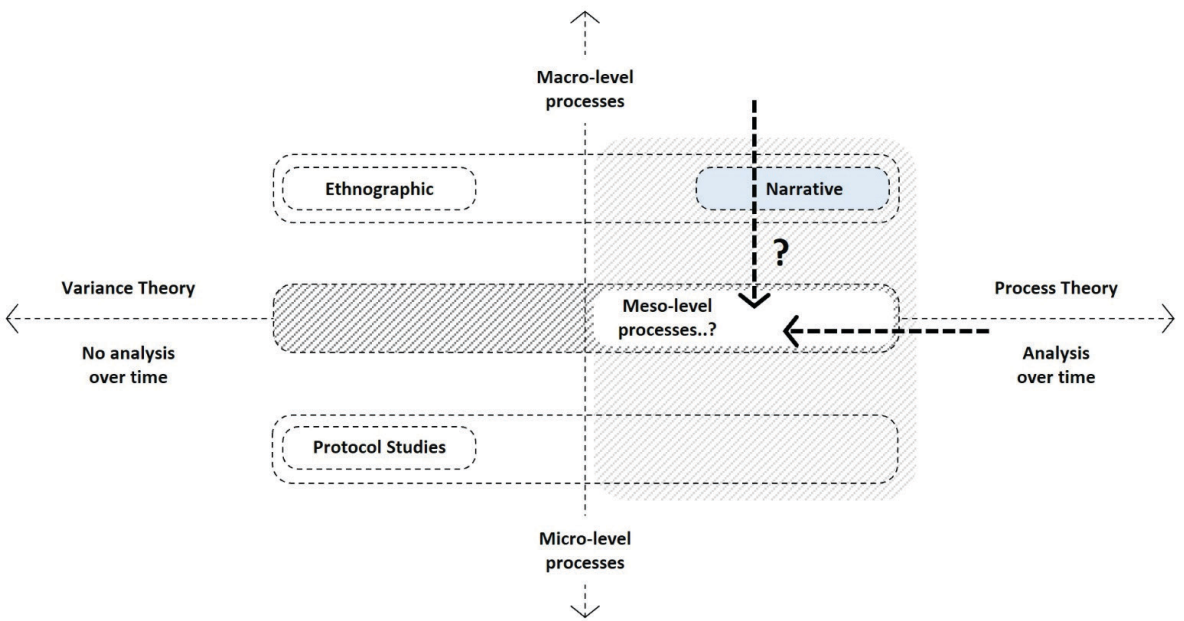


Figure 4. General approaches to design research and the potential of meso-level processes. Drawn by the authors, adapted from Frithjof E. Wegener and Philip Cash, 'The Future of Design Process Research? Exploring Process Theory and Methodology'.

17. Subsequent research endeavours have also sought to integrate these two approaches, with studies, such as the one conducted by Keys Dorset, aiming to achieve a more comprehensive perspective.

18. Kees Dorst and Judith Dijkhuis. 'Comparing Paradigms for Describing Design Activity.' *Design Studies* 16, No. 2 (1995): 261-274.

19. Herbert A. Simon, 'The Sciences of the Artificial.' *Cambridge, MA* (1969).

20. Donald A. Schön, *The Reflective Practitioner: How Professionals Think in Action*. Routledge, 1983.

Approach	Strengths	Weaknesses
1. Protocol studies	Given the inherent analysis of variance in such studies, they are considered more suitable for the testing of existing theory rather than the construction of new theory. These methods are also seen as being suitable for the analysis of micro-aspects of design sessions.	It's challenging to scale up this approach to include a larger number of participants or to cover longer time periods. Furthermore, it's theoretically difficult to relate insights from the micro to the macro level of longer design processes.
2. Ethnographic approaches	In a theoretical context, a wealth of insight is developed, which is useful for theory building. This approach is also considered strong in its ability to facilitate design positioning and explain designers' actions.	A considerable amount of time is devoted to them, which reduces the time available for analysis. When used in design, they can also cause the analysis of the individual's role to be lost, as they were primarily invented to depict collective culture.
3. Narrative approaches	Due to its closeness to the experience of designers, a richness of theoretical insight is developed, which allows for theorising that is both relevant and meaningful. This insight is gained by connecting the dots over a longer design process.	There's a lack of a clear explanation regarding how narrative is embedded in empirical data, especially given the multiplicity of narratives provided by different individuals. While the content is present, the way in which the content and narrative processes influenced one another isn't clear.

Table 1. Review of the strengths and weaknesses of general approaches in design process studies. Drawing: authors, adapted from Frithjof E. Wegener and Philip Cash, 'The Future of Design Process Research? Exploring Process Theory and Methodology'.

sign process (typically several months), what is missing are approaches capable of connecting these forces[56]. Even if data about the design process is collected, the analysis and theorisation of such data either adhere to an analysis of variance—ignoring the elements of the process—or lack the empirical and reflective basis needed for a deeper analysis[57]. From this perspective, it is suggested that narrative approaches are more relevant to the experience of designers. When accompanied by a basis in reflective practice and capable of empirically enabling the location and multiplicity of narratives, these approaches can fill the gap in the middle ground and provide a processual view of what goes on in design. The temporal view of design research taken by narrative approaches is considered to be more aligned with the nature of design processes.

3. Narratives as mediators in interpreting framing

Drawing upon an analysis of Broadbent's methods of form production, a potential is spotted by Lawson for the inclusion of a method similar to narrative design. According to Lawson, Broadbent's analogical methods are considered the most promising of his four. This could lead to the development of a device called the narrative method, which is viewed as an extension of Broadbent's method of deference that transcends its simple analogy[58]. In this method, a

21. Kees Dorst, 'Design Problems and Design Paradoxes.' *Design Issues* 22, No. 3 (2006): 4-17.

22. Marvin Minsky, 'Jokes and the Logic of the Cognitive Unconscious.' In *Methods of Heuristics*, pp. 171-193. Routledge, 2014.

23. Farhad Shariatrad and Hamid Nadimi. 'Problem Framing: The Designer's Way of Tackling Design Problems.' *Soffeh* 26, No. 3 (2016): 5-24 [in Persian].

story can be defined by the designer, or often a design team, which is used to relate the main features of a design to each other. It appears that narratives are, in fact, analogies (whether direct or indirect) that can be combined and repeated to more coherently solve design problems. It has also been noted in Lawson's 2018 book that narrative can be considered a fully elaborated version of analogy, in which a story is told. And it gives form and structure to certain aspects of a plot[59].

The importance of this point is also highlighted in Bryan Lawson's *How Designers Think*, where Chapter 15, 'Design as Conversation and Perception,' is dedicated to the topic[60]. It is suggested that a conversation-like process is used by designers to understand problems and conceive of solutions. A process that involves changing the way the situation is perceived by 'talking it through.' It is as if you have to look around... to find something, and then it suddenly dawns on you[61]. In a professional context, due to its size or complexity, design is often implemented by teams rather than individuals. Sometimes, the nature of the object being created necessitates many areas of expertise, requiring a multidisciplinary design team. In both cases, the design process is understood to proceed, at least in part, through conversations between team members. However, since such conversations are not typically recorded, their importance as part of the design process is often underestimated in design research. The significance of such conversations is only made apparent when designers are studied in actual practice, and interviewed about their process[62]. On the other hand, design can be viewed as a conversation conducted not by a team, but by an individual designer. This idea was first introduced by Donald Schön[63], who discussed how a designer 'has a conversation with a drawing,' which enables new possibilities or problems to be seen. It was later pointed out by Lawson that designers have more recently been using computers, resulting in a conversational interaction with the computer about their designs. The entire idea of design conversations has thus been explored, whether they occur between individuals, between designers and their drawings or computers, or even as reflections that take place individually in the minds of designers. Indeed, this range of conversations and dialogues appears to be related to the category of narrative.

According to Lawson and other theorists[64] with a linguistic background, the base mode of conversation is narrative. While designers employ various conversational styles when communicating, they are often observed returning to a style similar to storytelling. In dramatic narratives, a scene is typically set with a clear description of the situation and the characters. The main characters are generally not named but are given characteristics that allow their words and actions to be interpreted. This process is also seen to be the case in design, where a number of characters are introduced and are said to be important to the narrative of the design. It is then explained by Lawson how, within the design team's conversation, the nature of these characters is explored and personalities are created for them[65]. A process is observed in which objects are introduced as characters, their desired characteristics are defined, and differences in terms of their physical realisation are identified through conversation[66]. Thus, the

24. Vinod Goel and Peter Pirolli. 'The Structure of Design Problem Spaces.' *Cognitive Science* 16, No. 3 (1992): 395-429.

25. Donald A. Schön, ibid.

26. Donald A. Schön, 'Designing as Reflective Conversation with the Materials of a Design Situation.' *Knowledge-Based Systems* 5, No. 1 (1992): 3-14.

27. Erving Goffman, *Frame Analysis: An Essay on the Organisation of Experience*. Harvard University Press, 1974.

28. William James

29. John Dewey

30. Donald A. Schön, ibid.

31. Bryan Lawson, *How Designers Think*. Routledge, 1980.

32. Farhad Shariatrad and Hamid Nadimi, ibid.

33. Nigel Cross, 'Expertise in Design: An Overview.' *Design Studies* 25, No. 5 (2004): 427-441.

34. Donald A. Schön and Martin Rein. 'Frame Reflection: Toward the Resolution of Intractable Policy Controversies.' *Basic Book* (1994).

first important step in the design conversation is defined as identification, which is considered very similar to what is referred to by Schön as naming[67]. However, for Lawson significant elements are not just named, but their very character begins to be explored. This central and detailed process of introducing characters is considered more than simple naming, and for this reason, it is referred to as identification.

From a broad perspective, it is suggested that narratives and stories can be used as a lens through which to study the design process in general, and design frames in particular, in a story-like format. Peter Lloyd refers to this as the storytelling approach[68]. In this approach, the present situation is made sense of, and the future is imagined, through narrative structures. At its core, design is depicted as a process of storytelling that links the present reality of a situation (what is occurring) with imagined possibilities for the future (what could be). In this case, design is understood to be the creation, negotiation, and connection of two sets of stories: 1) past particulars and 2) imagined particulars. While the former structures existing experiences and behaviours, the latter places specific actors, objects, and relationships in an imagined context. The storytelling perspective, which takes into account the constructivist approach, conceives of framing as a process of co-construction of verbal stories. This allows designers to discuss and negotiate opposing values without the need to resolve them. It is worth noting that a relatively emerging paradigm in the practical and professional realm of urban design also considers urban design as a form of persuasive storytelling. In this view, the designer is seen not as an architect-hero, but rather as a conductor or 'curator' who selects and weighs different voices and narrative producers. In other words, the designer is considered a mediator between potentially conflicting narratives in the formation of a design[69].

In the context of design, narratives are considered to be both tools that guide one's thinking about a subject and reasoning devices that shape the proposed course of action. It is also suggested by Schön and Rein that framing is a storytelling act in which seemingly unrelated elements are brought together by designers. In linking elements to form a coherent narrative of a situation, two things are followed by storytelling: naming and selecting. These situation-based stories help designers to structure their understanding of a problem and make connections with it[70]. Compared to Schön's reflective practitioner framework, the first process is considered to be similar to naming (elements of a situation) and the second to moving (towards a solution).

A design frame can be conceptualised as a narrative that connects stories constructed from a situation, allowing for the creation of solutions. In this process, actors (human and non-human) are identified, and a coherent set of connections is established through actions and aggregations between them. Designers may construct multiple stories of a situation before a narrative is initiated, with each story representing a different situation, and a distinct set of actors and actions. Narratives are what connect these stories to create an overarching structure that guides a practical situation. It is important to distinguish between the concepts of story and narrative. A story is the structure that is constructed by designers to give mean-

35. Martin Rein, and Donald Schön. 'Frame-Critical Policy Analysis and Frame-Reflective Policy Practice.' *Knowledge and Policy* 9, No. 1 (1996): 85-104.

36. Donald A. Schön, *The Reflective Practitioner: How Professionals Think in Action*. Routledge, 1983.

37. H. Porter Abbott, *The Cambridge Introduction to Narrative*. Cambridge University Press, 2020.

38. H. Porter Abbott, ibid.

39. Theodore Albert Rees Cheney, *Writing Creative Nonfiction: Fiction Techniques for Crafting Great Nonfiction*. Springer Science & Business, 2001.

40. Theodore Albert Rees Cheney, ibid.

41. Hamid Nadimi, Somayyeh Sharifzadeh and Zakiyeh Tabatabaei, 'The Roles of Narrative Thinking and its Potentials for Architecture Education at Design Studios,' *Journal of Fine Arts: Architecture & Urban Planning*, 24 1 (2019): 85-100.

42. Sylvain De Bleeckere, and Sebastiaan Gerards. *Narrative Architecture: A Designer's Story*. Routledge, 2017.

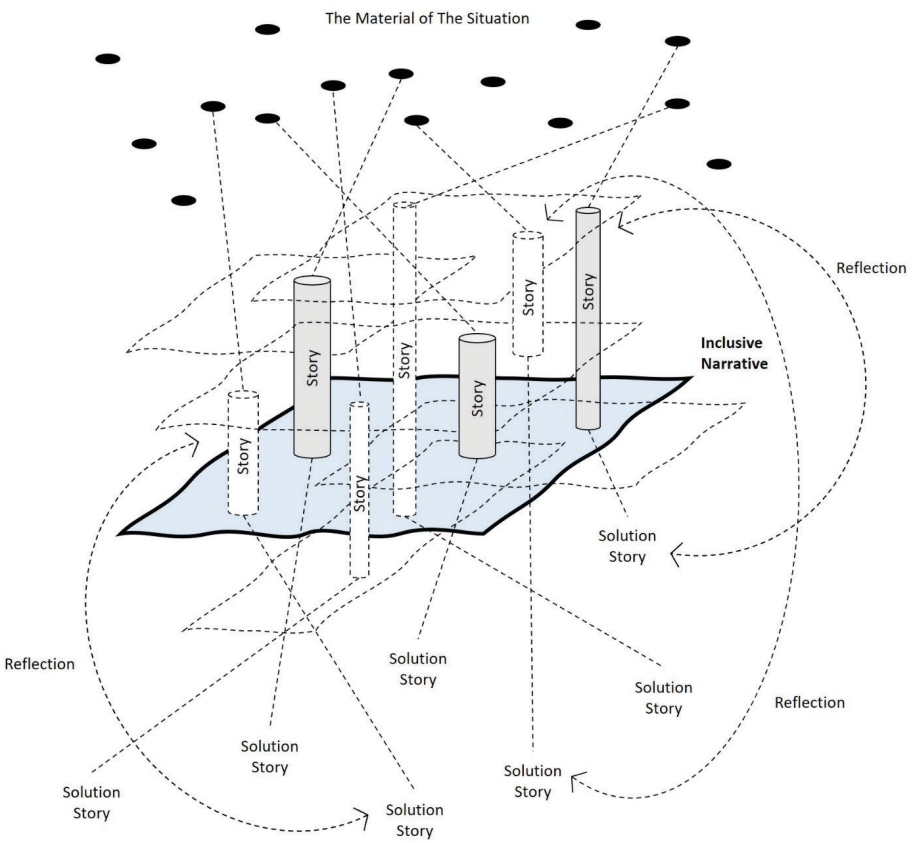
43. Bryan Lawson, ibid.

ing and externalise their understanding of a situation. A narrative, however, is an inclusive structure that connects these stories into a coherent, open-ended, and practical problem. Within the narrative, new stories can be created by designers to move toward a solution. In this way, a hierarchical relationship in the analysis of the design process is created, with narratives at the highest level and stories being connected to them. The narrative becomes the structural unit for describing frames that bring together scattered stories into a coherent and meaningful structure. Now, by distinguishing between stories and narratives, a direct boundary can be drawn between the proposed narrative model and the theory of reflective practice[71]. If the steps involved in reflective practice were to be formulated by Valkenburg and Dorst as follows: 1) naming relevant factors in the situation, 2) framing a problem in a specific way, 3) moving toward a solution, and 4) evaluating moves, based on existing studies, these stages in reflective practice can be reinterpreted as follows (Figure 5):

1) Naming: The interpretation of the situation through story construction.
2) Framing: The creation of an inclusive narrative frame based on these stories.
3) Moving: The creation of stories to imagine solutions within these narrative frames.
4) Reflection: Present in all stages of the design process, as designers are constantly engaged in thinking about the stories and narratives they create. It is important to note that the relationship between story and narrative is a two-way street. While narratives provide structure to stories, they also act as a magnet for new stories that can reinforce or challenge them. New moves will respond to the narrative by reinforcing or challenging it, and designers are seen to be constantly moving between narratives to create new stories or refine existing ones.

Narratives are constructed by designers around stories, which in turn enable the imagining of new situations. They are considered frames that guide a designer's inquiry for new stories and structure their understanding of existing stories. New stories can be attached to a narrative, and existing stories can be detached without disrupting their core structure. From

Figure 5. A conceptual model of the adaptation of the narrative approach to framing and reflective practice by Donald Schön. Drawing: authors, adapted from Rianne Valkenburg and Kees Dorst, 'The Reflective Practice of Design Teams'; Babak Soleimani, 'Design Frames: A Narrative and Network Approach'.



this perspective, design can be analysed as constructive narratives that encompass stories and create inclusive themes throughout the design process.

While a comprehensive examination of narrative frames in the design process and the subtleties of the process itself would require a larger text, a brief excerpt from an interview with an architectural practitioner or an architecture professor can illuminate the current discussion. An architectural practitioner says:

> ...In my experience, anyone can prepare a brief of some kind, but for us, it has often been text. Of course, before the text, there is this talk and conversation about the design; it is as if we are turning the fruit of those talks into text. Because it is in a way the easiest way to exchange and there is the possibility of alignment and agreement on it. We write something and there are words that work. For example, we had a project around Darakeh, for a family who wanted parents and children to each have a unit and of course have a communal life together. Well, we kept thinking about different plans and sectional modes... Somewhere along conversations and meetings, we came up with the word 'house-in-house'. You know, it was like something that they suddenly showed a lot of interest in and it also included our design and idea. The work actually took shape there in a way. It was like it created a basic diagram by itself...[72]

In this example, it can be seen that the design team initially seeks to understand the situation and name its elements in order to reach a common understanding with the client (stage 1). At some point, by putting together different stories, a narrative of the design (house-in-house) is arrived at, and that becomes the frame through which most of the design issues are organised (stage 2). The continuation of the process is actually a series of steps and back-and-forths about the quality and how that narrative frame is made possible (stage 3). If, through reflections during and after, one of the important points of the design was raised at that moment or in the future that could not be answered appropriately within the framework of this general narrative, the frame would break or change shape (stage 4) so that it could also cover that new issue. In another verbal interview, an architecture professor says in a section about how the design was organised through the lens of the frame:

> ... It was a narrow plot of land with three open sides and a tall building behind it. I turned two sets of stairs and lifts and toilets and so on (all of which were supposed to be about two and a half metres wide) into a solid box at the end of the plot and opened the rest to the sides, the whole project was just the floor and then the outer volume also rose a little from the sides. One end turned out to be bulky with the rest being transparent; then I also turned that into a structural element like a chunky wall. It actually became dense both functionally and structurally. But the reality is that when I was looked at this plot of land and the wide view it offered, I wanted to have a rear and three open sides, so I shoved everything to one side, apparently for service elements, namely toilets and stairs, but in reality, I wanted to do this. Those needs could have been met in some other way. Framing per-

44. Nick Kelly and John S. Gero. 'Reviewing the Concept of Design Frames towards a Cognitive Model.' *Design Science* 8 (2022): e30.

45. Farhad Shariatrad and Hamid Nadimi, ibid.

46. Kees Dorst. *Frame Innovation: Create New Thinking by Design*. MIT press, (2015).

47. Jonathan H.G. Hey. *Effective Framing in Design*. University of California, Berkeley, 2008; Andy Dong, et al. 'Investigating Design Cognition in the Construction and Enactment of Team Mental Models.' *Design Studies* 34, No. 1 (2013): 1-33; Mithra Zahedi and Lorna Heaton. 'A Model of Framing in Design Teams.' *Design and Technology Education* 22, No. 2 (2017): n2.

48. Nick Kelly and John S. Gero, ibid.

49. Donald A. Norman and Roberto Verganti. 'Incremental and Radical Innovation: Design Research Vs. Technology and Meaning Change.' *Design Issues*30, No. 1 (2014): 78-96; Kees Dorst, 'The core of 'design thinking 'and its application.' *Design Studies* 32, No. 6 (2011): 521-532.

50. Donald A. Schön, ibid.

haps means processing the problem in a way that fits with the end result that we want, meaning that we probably solve the project from the beginning to the end... We look into the distance, we have seen something, and at the end of the work, we process the problem in a way that is consistent with what we saw at the end of the work. It seems that there is something from the future in framing...[73].

Due to their natural going back and forth during the design process, reflections (stage 4), seem to deal with time in a non-linear manner. Perhaps, in line with what was stated in the above interview, reflections on the design cause the framing to be drawn in a way that is consistent with a desired solution for the future. This kind of temporal view of the narrative is also evident in part of another interview conducted with an architectural practitioner. He says:

... I think sometimes during the design process a narrative pushes through, which is not yet in the current frame but can cause the frame to collapse. Sometimes the designer's description of the design process has changed and this has produced different forms of framing. I think narratives, in this sense, give us the ability to play between frames and kind of bridge them...[74].

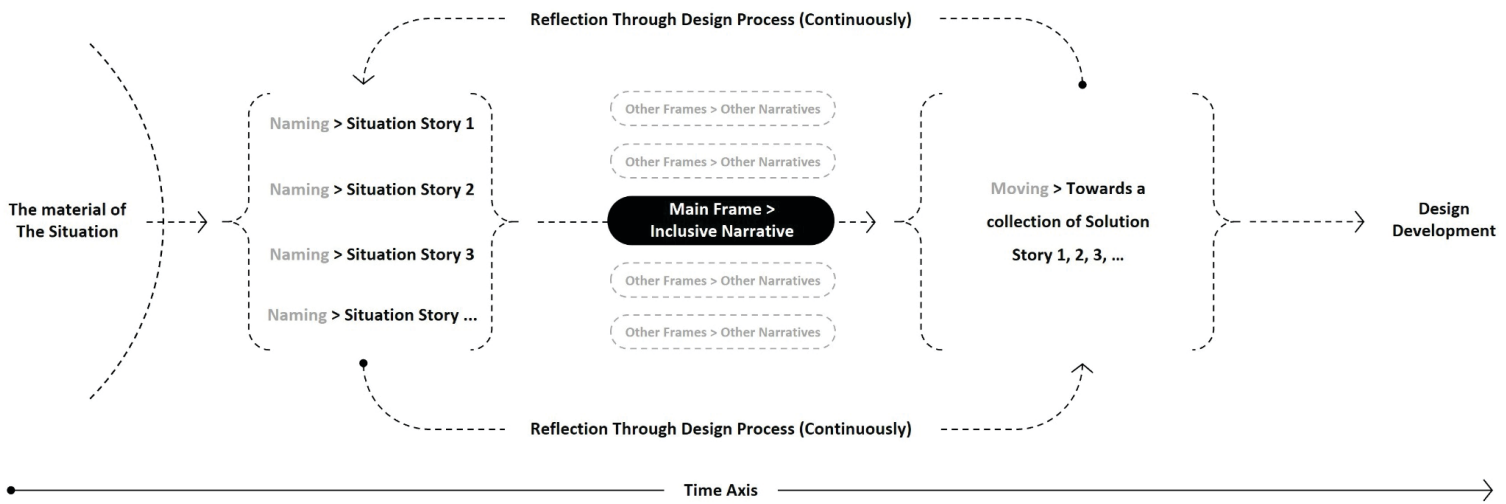
Conclusion

As the boundaries between design disciplines blur, there is a growing need to understand the cognitive structures that enable designers to work effectively on complex problems. Despite the relatively short history of studying designers' strategies for approaching problems, significant efforts have been made to better understand the mental mechanisms at play. Following criticisms of the rationalist approach to design, constructivism has offered a more realistic view of design activity. This perspective shifts the focus from merely solving a problem to a deeper engagement with the design situation, where the goal is to give it some kind of coherence and

51. Jon Kolko, *Wicked Problems: Problems Worth Solving*. Austin Centre for Design: Ac4d, (2012).

52. Rianne Valkenburg and Kees Dorst. 'The Reflective Practice of Design Teams.' *Design Studies* 19, No. 3 (1998): 249-271.

Figure 6. A conceptual model of comparing design framing and its reinterpretation based on the narrative approach, drawing: authors.



structure. This constructivist view leads directly to the framing process: a subject of research to investigate its working mechanisms. The present study aimed to clarify what occurs during framing and design talks by utilising concepts from existing research to provide a theoretical basis for analysing frames. The focus is on their transformation and refinement as a narrative-oriented and storytelling activity (Figure 6). This structure, which is organised on a time spectrum from left to right, illustrates the designer's process. In the initial encounter with the material of a design situation, a reflective conversation (stage 0) is initiated. Through this dialogue, the designer attempts to bring coherence to stories by naming them, thus creating relationships between the design forces. This is done, first, for self-understanding (correct and appropriate perception), and then, to make others understand (stage 1). All these stories can be told when placed in a broader and more comprehensive context called the design narrative (stage 2). At the heart of this narrative, moves are made to advance the design in line with the stories (stage 3). These moves are constantly reflected upon throughout the process. Through this reflection, parts of a story can be deleted or edited, or a new story can be added (stage 4). This stage, due to its cyclical nature, has a two-way direction. With each reflection on the moves, the potential exists for the frame structure to change, in part or in whole, leading to the establishment of a new narrative. The process continues until the design is felt to have reached its most appropriate response for managing the design situation. In this way, such a structure is always accompanied by relative flexibility and is ready to change the story relationships and, consequently, the shape of the overall narrative. The design process continues until the designers and other forces involved in the design create the most appropriate narrative to organise the design issues. After this stage, based on the passage of time, the direction of time moves toward the future in a one-way manner, as the design structure has now gained relative consistency. The continuation of the process is then aimed at implementing the inclusive narrative and design development. It is in this development stage that a reference to and adherence to the inclusive narrative helps to maintain the overall coherence of the design in future decisions.

The aim of this research was to provide a new perspective for educators, students, and practitioners in architecture on the perception of their own and others' framings, thereby enriching reflections on the design process. The continuation of research in this field could be achieved by conducting a series of studies and experiments based on the proposed structure. These studies could be carried out within the context of design workshops, involving both educators and students, as well as design teams in the profession. The research could be facilitated through the utilisation of methods such as observation, interviews, recording, and content analysis, along with the coding of various audio and written narratives. Furthermore, a discussion of the different methods and techniques inherent in each could be undertaken.

53. Within this framework, each episode is conceptualised as a segment in which a specific activity transpires. A system of coding has been established for these activities, where, for instance, a group›s explicit consideration of a task component (problem statement) is coded as naming. In the case of framing, an activity that influences and provides a template for subsequent activities is coded. Because the frame can predetermine these subsequent activities, it has been conceptualised by Valkenburg and Dorst as a container within which other activities may occur.

54. Norbert FM Roozenburg and Kees Dorst. 'Describing Design as A Reflective Practice: Observations on Schön's Theory of Practice.' In *Designers: The Key to Successful Product Development*, pp. 29-41. London: Springer London, (1998).

55. Frithjof E. Wegener and Philip Cash, ibid.

References

Abbott, H. Porter. *The Cambridge Introduction to Narrative*. Cambridge University Press, (2020).

Ameel, Lieven. *The Narrative Turn in Urban Planning: Plotting the Helsinki Waterfront*. Routledge, (2020). https://doi.org/10.4324/9780429290138.

Bayazit, Nigan. 'Investigating Design: A Review of Forty Years of Design Research.' *Design Issues* 20, No. 1 (2004): 16-29. https://doi.org/10.1162/074793604772933739.

Cash, Philip, Stanko Škec, and Mario Štorga. 'The Dynamics of Design: Exploring Heterogeneity in Meso-Scale Team Processes.' *Design Studies* 64 (2019): 124-153. https://doi.org/10.1016/j.destud.2019.07.001.

Cheney, Theodore Albert Rees. *Writing Creative Nonfiction: Fiction Techniques for Crafting Great Nonfiction*. Springer Science & Business, (2001).

Cross, Nigel. 'Design Cognition: Results from Protocol and Other Empirical Studies of Design Activity.' In *Design Knowing and Learning: Cognition in Design Education*. (2001): 79-103. https://doi.org/10.1016/j.destud.2004.06.002. https://doi.org/10.1016/j.destud.2004.06.002.

Cross, Nigel. 'Expertise in Design: An Overview.' *Design Studies* 25, No. 5 (2004): 427-441.

De Bleeckere, Sylvain, and Sebastiaan Gerards. *Narrative Architecture: A Designer's Story*. Routledge, (2017). https://doi.org/10.4324/9781315622118.

Dong, Andy, Maaike S. Kleinsmann, and Fleur Deken. 'Investigating Design Cognition in the Construction and Enactment of Team Mental Models.' *Design Studies* 34, No. 1 (2013): 1-33. https://doi.org/10.1016/j.destud.2012.05.003.

Dorst, Kees, and Judith Dijkhuis. 'Comparing Paradigms for Describing Design Activity.' *Design Studies* 16, No. 2 (1995): 261-274. https://doi.org/10.1016/0142-694X(94)00012-3.

Dorst, Kees. 'Design Problems and Design Paradoxes.' *Design Issues* 22, No. 3 (2006): 4-17. https://doi.org/10.1162/desi.2006.22.3.4.

Dorst, Kees. 'The Core of 'Design Thinking' and its application.' *Design Studies* 32, No. 6 (2011): 521-532. https://doi.org/10.1016/j.destud.2011.07.006.

Dorst, Kees. *Frame Innovation: Create New Thinking by Design*. MIT press, (2015).

Drazin, Robert, Mary Ann Glynn, and Robert K. Kazanjian. 'Multilevel Theorising about Creativity in Organisations: A Sense-Making Perspective.' *Academy of management review* 24, No. 2 (1999): 286-307. https://doi.org/10.5465/amr.1999.1893937.

Goel, Vinod, and Peter Pirolli. 'The Structure of Design Problem Spaces.' *Cognitive Science* 16, No. 3 (1992): 395-429. https://doi.org/10.1207/s15516709cog1603_3.

Goffman, Erving. *Frame Analysis: An Essay on the Organisation of Experience*. Harvard University Press, (1974).

Hey, Jonathan Henry Grenville. *Effective Framing in Design*. University of California, Berkeley, (2008).

Kelly, Nick, and John S. Gero. 'Reviewing the Concept of Design Frames towards a Cognitive Model.' *Design Science* 8 (2022): e30. https://doi.org/10.1017/dsj.2022.24.

Kolko, Jon. *Wicked Problems: Problems Worth Solving*. Austin Centre for Design: Ac4d, (2012).

Koskinen, Ilpo, John Zimmerman, Thomas Binder, Johan Redstrom, and Stephan Wensveen. 'Design Research through Practice: From the Lab, Field, and Showroom.' *IEEE Transactions on Professional Communication* 56, No. 3 (2013): 262-263. https://doi.org/10.1109/TPC.2013.2274109.

Lawson, Bryan. *What Designers Know*, Elsevier, Oxford: Architectural press.

Lawson, Bryan. *How Designers Think (4th ed.)*. Routledge.

Lawson, Bryan. *How Designers Think*. Routledge.

Lawson, Bryan. *The Design Student's Journey: Understanding How Designers Think*. Routledge.

Lloyd, Peter, and Arlene Oak. 'Cracking Open Co-Creation: Categories, Stories, and Value Tension in a Collaborative Design Process.' *Design Studies* 57 (2018): 93-111. https://doi.org/10.1016/j.destud.2018.03.007.

Lloyd, Peter. 'Storytelling and the Development of Discourse in the Engineering Design Process.' *Design Studies* 21, No. 4 (2000): 357-373. https://doi.org/10.1016/S0142-694X(00)00007-7.

Medway, Peter, and Richard Andrews. 'Building with Words: Discourse in An Architects' Office.' *Carleton Papers in Applied Language Studies* 9 (1992): 1-32.

Minsky, Marvin. 'Jokes and the Logic of the Cognitive Unconscious.' In *Methods of Heuristics*, pp. 171-193. Routledge, (2014).

Nadimi, Hamid, Somayyeh Sharifzadeh and Zakiyeh Tabatabaei, 'The Roles of Narrative Thinking and its Potentials for Architecture Education at Design Studios,' *Journal of Fine Arts: Architecture & Urban Planning*, 24 1 (2019): 85-100. http://journals.ut.ac.ir/article_71454.html

Nadimi, Hamid. 'A Study in the Design Process.' *Soffeh* 9, No. 29 (1999): 94-103 [in Persian]. https://soffeh.sbu.ac.ir/article_100094.html

56. Philip Cash, et al. 'The dynamics of design: exploring heterogeneity in meso-scale team processes.' *Design Studies* 64 (2019): 124-153.

57. Frithjof E. Wegener and Philip Cash, ibid.

58. Bryan Lawson, ibid.

59. Bryan Lawson. The *Design Student's Journey: Understanding How Designers Think*. Routledge, 2018.

60. Bryan Lawson, *How Designers Think (4th ed.)*. Routledge, (2005).

61. Nigel Cross. 'Design Cognition: Results from Protocol and Other Empirical Studies of Design Activity.' (2001): 79-103.

62. Bryan Lawson, *What Designers Know*, Elsevier, Oxford: Architectural press, (2004).

63. Donald A. Schön, ibid.

64. Peter Medway and Richard Andrews. 'Building with Words: Discourse in an Architects' Office.' *Carleton Papers in Applied Language Studies* 9 (1992): 1-32.

65. Bryan Lawson, *How Designers Think (4th ed.)*. Routledge, (2005).

66. Bryan Lawson, ibid.

67. Donald A. Schön, ibid.

68. Peter Lloyd and Arlene Oak, ibid.

69. Lieven Ameel. *The Narrative Turn in Urban Planning: Plotting the Helsinki Waterfront*. Routledge, (2020).

70. Martin Rein and Donald Schön, ibid.; Merlijn Van Hulst and Dvora Yanow. 'From Policy "frames" to "framing"'; Theorising a More Dynamic, Political Approach.' *The American Review of Public Administration* 46, No. 1 (2016): 92-112.

71. Peter Lloyd and Arlene Oak, ibid.

72. The authors› verbal interview with an architectural practitioner, November (2024).

73. The authors› verbal interview with an architecture professor, August (2024).

74. The authors› verbal interview with an architectural practitioner, September (2024).

Norman, Donald A., and Roberto Verganti. 'Incremental and Radical Innovation: Design Research Vs. Technology and Meaning Change.' *Design Issues* 30, No. 1 (2014): 78-96. https://doi.org/10.1162/DESI_a_00250.

Pee, Suat Hoon, C. H. Dorst, and Mieke Van der Bijl-Brouwer. 'Understanding Problem Framing through Research into Metaphors.' In *2015 IASDR International Design Research Conference*, pp. 1656-1671. http://iasdr2015.com/proceedings/papers/1656.pdf

Rein, Martin, and Donald Schön. 'Frame-Critical Policy Analysis and Frame-Reflective Policy Practice.' *Knowledge and Policy* 9, No. 1 (1996): 85-104.

Roozenburg, Norbert FM, and Kees Dorst. 'Describing Design as a Reflective Practice: Observations on Schön's Theory of Practice.' In *Designers: The Key to Successful Product Development*, pp. 29-41. London: Springer London, (1998).

Schön, Donald A. 'Designing as Reflective Conversation with the Materials of a Design Situation.' *Knowledge-Based Systems* 5, No. 1 (1992): 3-14. https://doi.org/10.1016/0950-7051(92)90020-G.

Schön, Donald A. 'Generative Metaphor: A Perspective on Problem-Setting in Social Policy.' *Metaphor and Thought* (1993): 137-163.

Schön, Donald A. *The Reflective Practitioner: How Professionals Think in Action*. Routledge, (1998).

Schön, Donald A., and Martin Rein. *Frame Reflection: Toward the Resolution of Intractable Policy Controversies*. Basic Books, (1994).

Shariatrad, Farhad and Hamid Nadimi. 'Problem Framing: The Designer's Way of Tackling Design Problems.'*Soffeh* 26, No. 3 (2016): 5-24 [in Persian]. https://soffeh.sbu.ac.ir/article_100318.html

Simon, Herbert A. 'The Sciences of the Artificial.' *Cambridge, MA* (1969).

Soleimani, Babak. 'Design Frames: A Narrative and Network Approach.' PhD diss., https://research.tue.nl/en/publications/design-frames-a-narrative-and-network-approach

Valkenburg, Rianne, and Kees Dorst. 'The Reflective Practice of Design Teams.' *Design Studies* 19, No. 3 (1998): 249-271. https://doi.org/10.1016/S0142-694X(98)00011-8.

Van Hulst, Merlijn, and Dvora Yanow. 'From Policy 'Frames' to 'Framing'; Theorising a More Dynamic, Political Approach.' *The American Review of Public Administration* 46, No. 1 (2016): 92-112. https://doi.org/10.1177/0275074014541654.

Wegener, Frithjof E., and Philip Cash. 'The Future of Design Process Research? Exploring Process Theory and Methodology.' In *Design Research Society 2020*, pp. 1977-1993. Design Research Society, (2020). https://dl.designresearchsociety.org/drs-conference-papers/drs2020/researchpapers/129

Zahedi, Mithra, and Lorna Heaton. 'A Model of Framing in Design Teams.' *Design and Technology Education* 22, No. 2 (2017): n2. https://ojs.lboro.ac.uk/DATE/article/view/2232