

observer? How do designers interact with them as they design? To what extent can they embody subjectivity, effect, or even intellect? Are they merely representative of the building to be ultimately built, or are they final products in their own right? Can they express certain ideas with greater force than the buildings they presumably represent? What inspires the choice of representational modes and media? When and why are new types of representation introduced? These are some of the questions that the three following chapters explore in very different ways.

According to her own testimony, Penny Yates in Chapter 1 undertakes a “search for the presence of the subjective viewer in design representation.” She leads this search by analyzing artefacts rather than speculating about their role in the design process, although she does refer to architects’ intentions when they are explicitly known and documented, as is the case of some of Le Corbusier’s projects. Yates distinguishes between object-centred representations, which deal well with distance, and subject-centred representations, which are more concerned with depth. Depth, a more profound way of experiencing spatial relations than distance, is what the “perceiving subject” feels, whereas distance is the way in which the “disembodied observer” would describe his or her experiences with the architectural object. Yates uses a large number of carefully selected examples to make and substantiate her arguments. In a long discussion she lays out the difference between one- and two-point perspective, stressing the crucial importance of the viewer’s station point to the three-dimensional perceptions that may be expected. The viewer’s position is also important to the question of symmetry versus asymmetry of representation, a factor that strongly impacts experience – for example, when reading depth off a series of planes in an enfilade of spaces. Yates hints at an inadequacy of computational representation applications which, to date, engage the object and do not depart from what the human subject might sense in a delimited space, as well as outside of it.

In Chapter 2, Gabriela Goldschmidt and Ekaterina Klevitsky expand on what Yates has chosen to leave out: the intentions of the architect as revealed through representations in professional publications. The case they look at in detail is the three design competitions for German museums that the British architect James Stirling and his partners worked on and published in the mid-1970s. The publications included, in addition to conventional drawings, also preliminary sketches and highly abstract down and up axonometric views, which, according to Goldschmidt and Klevitsky, were added for the purpose of elucidating the central design concept. The authors argue that the unusual (for its time) publication of sketches and analytic “axos” signalled a new approach to public architectural representation in the era of postmodernism. The architects, who wanted to present ideas and not just transmit factual depictions of the buildings they designed, offered a pictorial narrative that told the story of these designs that, in this case, was largely the story of public paths and spaces that dominated all three schemes. The analysis presented in Chapter 2 concerns the design concepts evoked by the architects and the pictorial means used to convey them as a narrative that portrays the trajectory from initial thoughts to final plans, with commentary by way of abstracted three-dimensional views. Goldschmidt and Klevitsky conclude that a shift in interest from design product toward design process has led these postmodern architects to reconstruct for the public a memory of the values with which the conception of these projects was invested.

The last chapter in Part I is by William Porter. In Chapter 3, Porter explores how designers establish a discourse between themselves and the objects they are contemplating. Through the use of several examples, he explores how that discourse informs their understanding of objects that are integral to their design process, as well as those that fall outside that process. These objects include what we customarily refer to as “representations,” as well as those we term “objects.” The mode of interaction, he argues, is the same. Given that recognition, objects made for the purposes of design, commonly thought of as “representations,” take on the full significance for the user of any object, whether a means to a design end or not. Thus designers’ objects embody, symbolize, and mean in ways that are identical to the cultural artefacts we identify as buildings or paintings or other “finished” works. In their more highly charged role, it is easier to see how they can interact productively with the designer during the course of design. Indeed, many of these “designer objects,” like the extraordinary sketches of Ludwig Mies van der Rohe or Alvar Aalto and many other great architects, have taken their place as fine works in and of themselves. Porter has chosen to explore these ideas through a variety of episodes drawn from his own experience and that of his students. These include explorations through the voice of the other, through the experience of place and building, through conjectural and reconstructive exercises to understand specific objects, and through the playing of games. Objects may be created that are not integral to the production of the building (or other design), yet are integral to the expression of ideas having to do with it. It is the expressive content of these objects, as well as their representational link to the building related to them, that makes them valuable to the designer as well as to others. It is specifically the nature of the discourse with these objects that will determine the strength of the linkage between them and the designer’s experience, skills, memory, and powers of empathy.

## From the Perspective of Engineering

Mechanical engineering design activities are normally carried out by design teams and not by individual designers. There is a consensus regarding the significance of communication among team members to a fruitful design process: communication is aimed at providing information, presenting, assessing, refining and challenging ideas, and representing design queries and decisions, tentative as well as final. Researchers of engineering design processes stress the notion that communication is a complex operation that involves language, gestures, graphic representation (in the form of drawings) and material objects of various kinds. Different settings may, of course, prioritize different modes of communication among design team members. The type of task, the experience of the designers, and the social relations among them are but some of the factors that may affect communication. The chapters in Part II present studies of design representation in three different settings. First, an educational environment in which students learn how to design (learning by doing); second, in an organizational setting – a typical instance of work in industry; and third, in a specialized case of custom adaptation of engineering solutions to specific, individual needs. Taken together, these papers portray the intricacies and complexities of representation in