> paper and shits all over it before we've actually started thinking and you have to get hold of him and stick him back up there. He is tame, he does behave himself and he doesn't always end up in the project at all, but he's there and we talk to him all the time.
>
> (Lawson 1994)

Radical

The radical constraints may offer the most obvious source for a set of guiding principles in design, but actually it turns out not to be so. The very central purpose and reason for existence of the object being designed will inevitably be at the centre of the attention of any good designer, and so hardly needs any further focus. Of course such constraints are also often so specific and local to the problem that they rarely offer a opportunity for more generic investigation. Some designers, however, do become known for specialising in certain kinds of problems and, thus, sets of radical constraints. Some architects certainly have reputations for designing certain types of buildings such as hospitals, offices or housing.

Of all the constraints, however, perhaps the radical issues are those which most 'get under the skin' of designers. To hear the architect Frank Duffy lecture about office design is to become aware of his depth of study and interest in the subject. This interest has led to a series of publications which have a wider concern than normally expected of an architect (Duffy 1993). Duffy has for many years worked on the design of office buildings but his experience has taken him beyond the mere building to the socio-economics of the workplace itself. The product designers Seymour Powell have been responsible for a growing list of new motorcycles working for Norton, Yamaha, MZ and BSA. The work is innovative and much admired, but a visit to their design practice reveals a deeper interest. The studios are housed in a converted chapel which is set back slightly from the road and usually displays a wide range of motorcycles belonging to the members of the practice. Richard Seymour talks about these machines with an enthusiasm and dedication which makes it clear that they are not just part of his job, but part of his life!

Thus, when Duffy talks about a particular office design or Seymour about a specific motorcycle, it is clear that there is a passion which has underpinned the design process and a set of attitudes which informed it but which transcends any one design.

Formal

The visual composition of objects, and in particular designed objects, is usually of interest to most designers. For some, however, formal constraints can be assembled into geometric and proportional rules which form continuing sets of guiding principles. We have already discussed the work of the classical architects such as Vitruvius and the Renaissance architects such as Palladio and Alberti who studied their systems. We have seen even a modernist architect like Le Corbusier laying down proportional systems, albeit less rigid ones. The use of geometric principles in design has more recently found a new lease of life in the work of some of those interested in the application of computers to design. Here it is possible to introduce these rules in the form of 'shape grammars' to a computer so that it may produce designs which follow the underlying principles of a particular designer or stylistic period.

The power of formal geometry to offer guiding principles to architects was studied for many years at the Martin Centre in Cambridge (March and Steadman 1974). These studies showed how geometry may be used to understand both abstract and concrete formal possibilities. Such branches of mathematics as topology and Boolean algebra and, more recently, fractal geometry can offer designers powerful tools for describing and generating form. In some cases such studies have led to an understanding of how traditional designs work, whilst others simply offer pattern books of ideas. A recent interest in the tesselations and other patterns of Islamic and oriental art has opened up new possibilities, especially for decoration which is beginning to reappear after a period of minimalism.

The use of these geometrical ideas as guiding principles is evident in the work of the architect Richard MacCormac, once a student at the Martin Centre, and famous for a series of highly admired domestic scale buildings often involving some element of repetition such as university halls of residence:

> We look for a clear geometric analogy for the content of the problem. All our schemes have a geometric basis, whether it is the pinwheel arrangement of Westoning, the courtyard system of Coffee Hall flats and Robinson College, the specific tartan grid of the Blackheath houses or the circle-based geometry of Hyde Park Gate . . . Geometry is used as a means of making distinctions between one kind of place and another so that different activities take place in situations which have their own identity and, through use, can increase their distinctiveness.
>
> (MacCormac and Jamieson 1977)