On Gothic Cathedrals and Contemporary Science

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The gothic cathedral is a spectacular achievement of the European Middle Ages. Architecturally, these buildings incorporated revolutionary innovations both in the aesthetics of their design and in their construction. Comparing them to the earlier Romanesque cathedrals, one can observe that the semicircular window arches were substituted with pointed ones. Underneath, the entire weight distribution of the building changed: instead of massive walls, the weight-bearing structures became the buttresses supporting the walls from the outside. This allowed the walls to become much lighter and the buildings higher. Large windows were inserted in non-weight-bearing areas, creating light-filled interior space. Furthermore, fitting the windows with stained glass created interiors where colored light complemented the architecture and highlighted the interior textures (1). Fig. 1 shows one of the northern windows of the Chartres cathedral in France, made in the 13th century. The cathedral was rebuilt in the gothic style after a fire which had destroyed most of the former Romanesque church, and it was consecrated in 1260 by the King of France, Louis IX (who later was canonized as St. Louis). The stained glass provided pictorial versions of the Biblical stories; the one shown here depicts Noah’s Ark. The cathedral still has 152 of the original 186 windows (2).

The light was then seen as a mystical force, creating spaces somewhat intermediate between the earthly and the heavenly. Theological arguments apart, the interiors of the cathedrals were certainly dramatically different from the ordinary dwellings in any locality. These buildings not only physically dominated local landscapes but formed social foci of the communities. Marcel Proust captured the essence of this in his account of the gothic church Saint-Hilaire in Combray, in volume 1 of In Search of Lost Time (3).

The gothic style emerged at the time of the consolidation of the kingdom of France during the reign of the Capetian dynasty (987–1316). The initiation of the new style is attributed to Abbot Suger (1081–1151) of the church of St. Denis, located north of Paris (1, 4).

The church was prominent in France, because it contained the royal tombs and held the coronation insignia. Abbot Suger himself was highly placed politically; he served King Louis VI and then was an adviser to Louis VII (1). He rebuilt and enlarged the old church, adding a new narthex (5) and choir (finished in 1144), and thus made it into an important religious and political symbol. Importantly, he wrote a detailed account of the building process (6).

Over the next 3 centuries many more gothic cathedrals were built in France, Germany, and Italy. It is interesting to look at the attribution of credits for their construction. At the beginning, the Master Masons who built them remained largely anonymous (Abbot Suger, for instance, does not name the architect of St. Denis in his writings); the attribution was either to the local bishops who commissioned them or to the main patrons. Later, perhaps because of the spectacular impact these buildings had made, individual master masons became recognized. The Reims cathedral, for instance, has names of all architects set into its floor. Architects such as the Frenchman William of Sens (died in 1180), who rebuilt Canterbury Cathedral in England after a fire in 1174, became famous. The Parler family of architects was also widely known; Peter Parler’s (1356–1379) bust is in the St. Vitus cathedral in Prague, where his body was also buried (7, 8). Individual attribution became a rule during the Renaissance.

This raises a point relevant to science, which since its beginnings has been intensely individual. From the early scientists, such as Copernicus and van Leeuwenhoek, to the 20th-century investigators, credits for discoveries were claimed by, and given to, individuals. A good number of disputes and several major feuds, such as that between Isaac Newton and Gottfried Leibnitz, demonstrate the importance of this issue for all concerned (9).

The situation, however, might be changing in the 21st century. The complexity of the addressed problems, and the logistic ability to engage large teams in research projects, move science away from individualism to the pattern of community effort, reminiscent of the cathedral-building period.

Projects such as the Human Genome Project, and later programs aimed at mapping of genomes and regulatory networks, involved large groups of scientists in giant data-gathering efforts. Similarly,
within clinical medicine, large trials became complex multinational enterprises. Large teams of researchers had already been operating for quite some time in physics.

According to the International Committee of Medical Journal Editors, the authors of research papers are defined as those who contribute intellectually, take part in drafting a paper, and are prepared to take re-
sponsibility for parts of the content (10). Those who do not fulfill all 3 of the criteria are categorized as collaborators. In the megaprojects, it is the research groups or institutions, rather than individuals, that are most visible; there are usually one or two individual leaders who might have been instrumental in conceiving the project, served as chairpersons of committees, are academic managers, or represent the funding bodies. They are today’s equivalents of Abbot Suger: the prominent role of an individual scientist is being replaced by a leader of teams. Importantly, this might affect how individuals think of their careers in science. Will this type of science attract the same type of person as in the “individual” era? Will the new paradigm repel some talented individuals? Currently we don’t know. What we seem to know though is that, similarly to the construction of gothic cathedrals, large coordinated effort is likely to yield spectacular results.

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References


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