



Abstract of Research Project
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RESEARCH PROJECT:

Resilient Communities. Exaptation concept applied to climate changes as a regenerative process of post-industrial cities. Case study: Perugia

Introduction and state of the art

The research project is focused on the ongoing climate changes and examines how positively respond in the future to the pressures exerted on society and the environment nowadays. Indeed, the scientific community has been denouncing for decades that the following phenomenon has already induced migration and disease, as reported by international organizations such as FAO, IOM, The CMCC observatory of climate policies and futures. These emergencies accelerate the needs of rethinking the urban environment with sustainable proposals and encourage the triggering of resilience mechanisms to counter the impact of climate changes.

The following research proposes the challenge of applying principles of exaptation to the development of an architectural project. The concept of exaptation derives from evolutionary biology and give a name to a massive range of features that are not built by selection for their current role but, thanks to their shapes, they are suitable to produce a specific result. In fact, "they fit (aptus) by a reason of their forms (ex)" and they produce an effect instead of a function (Gould & Vrba, 1982). This topic is not entirely unexplored in historical architecture. Observing the compact medieval Italian city, the morphological and typological characteristics offered by the original structures gave rise to new solutions for the reconversion of the existing urban fabric.

This transformation processes of cities follow what was introduced by the previous biologists in the theory of evolution. It was applied since medieval architecture, when decorative elements were introduced into the compositions by virtue of their shape. Precisely, the architectural term "spandrel", which identifies the triangular space at the corner of arches, represents an added element for purely formal purposes. In biology, the spandrel becomes a phenotypic feature that turns out to be a bioproduct of the evolution, rather than a direct product of adaptive selection (Gould & Lewontin, 1979). The ability to rethink how shapes and characteristics can play different roles and produce effects that are sometimes even better than the elements designed for them, is a characteristic of human creativity.



In this sense, creativity is comparable to the ability of connecting and associating similar images, which makes the human being able to improve mechanisms and experiment with new solutions by adding small daily changes. This process has been codified as the distinctive element between chimpanzees and man, able to switch from analytical thought to associative thinking, which turns out to be the hallmark of human evolution. Relevant importance in the process is given by external factors such as communities. Being in connection with other people activates these mechanisms by stimulating the development of ideas through associative thinking (Heather Pringle, 2013).

Research objectives

The aim of this research is to identify regeneration strategies to reactivate the abandoned and marginalized urban fabric, respecting the development processes which affected cities in the contemporary age. Through a multidisciplinary approach to the project, the will is to apply typical processes of evolutionary biology to the strategic planning of the city. This allows us to analyse consolidated activities of building recovery and urban fabric regeneration aimed to enhancing the opportunities of the existing material.

The case study of Perugia city is the example where methodology will be applied, referring to the post-industrial areas of the urban district. This application helps to acquire knowledge and awareness of the city's architectural heritage, even if it classified of lower quality. In this way it is possible to orient recovery design choices; attention will be paid to industrial areas on a stage of neglect. The aim is to emphasize the strategic and multidisciplinary role of architecture within cities regeneration processes, to suggest radical proposals for regenerative marginal urban spaces practices and to foreshadow scenarios of reconverting plenty of abandoned and residual areas of the urban fabric.

Methodology

The design methodology recovers the concept of exaptation, an evolutionary process in which the morphological characteristics of the urban fabric are reconverted through contamination and functional co-optation processes in order to satisfy functional needs and requirements. Its application in the architectural field originates from the reading of existing shapes and volumes, and allows us to imagine how to reconvert the existing material in the light of new needs required, triggering endogenous reconversion of the urban fabric that take into account its original characteristics.

The architectural system is inspired by the adaptability and self-regeneration of nature. It is proposed as a form of space regeneration by working on redundancy and overlapping of architectural features, which become amplifiers of relationships and opportunities. Importance is given to the hinge spaces between inside and outside, existing and new, scattered throughout the urban fabric; in this sense, they act as stimulators of new uses and functions of the built environment. The concept of "in-between" architecture introduced by Aldo van Eyck in the 1950s, in fact, aims to enhance the buffer zones, defined as "vital between things" because of their relationship between "different worlds and distinct spaces" (Daniela Cerrocchi, 2008).

The historical fabric of the medieval Italian city is scattered with interstitial spaces that need to regain their value. This is determined by the community and its ability to redirect opportunities offered by these places in the light of new development needs and stimulus requirements. In this sense, the concept of resilience is the basis of the design methodology, interpreted by recognized characteristics of adaptability and flexibility, both in nature and in the urban environment. Moreover, technological innovation plays a fundamental role in promoting regeneration processes aimed at increasing sustainability and resilience of urban spaces (Leichenko, 2010). Architectural design is also contaminated by forms and solutions deriving from technical-scientific innovation, promoting technology in favour of architecture to increase the multiplicity of possibilities and opportunities.



Expected results

This research aims to obtain a result methodology of approaching architectural and urban project, which can orient the choices of recovery and enhancement of the existing architectural heritage towards an integration of the latter in the contemporary city, both from an architectural and environmental point of view. The results obtained will intertwine the results from bibliographic researches, as well as those from the design experience applied to the case study, which it will be necessary to extrapolate guidelines to extended to a larger number of cases. Finally, the research will identify a *modus operandi* to be transposed into design practice in order to enhance urban planning activities; they evaluate consolidated urban fabric by increasing its resilience and promote sustainable solutions in order to integrate the environmental heritage.

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