

Conceptualizing the social construction of urban and architectural forms through the typological process

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Abstract. *Process typology theory has proven extremely beneficial in providing refined depictions of the complex structure of the built environment and in proposing challenging intrinsic morphological explanations of processes of 'structuration' as opposed to the external explanations emphasized by other theoretical perspectives. Thus far, typologists have concentrated essentially on environments that are many centuries old. Yet, tumultuous historical and morphological conditions that have arisen more recently challenge the idea of focusing exclusively on internal factors for morphogenetic explanations. This paper discusses the central notions of type and typological process in relation to the action of agents in such a process in order to integrate the role of social 'demands' in urban morphology.*

Key Words: process typology, type, typological process, agents of change

The starting point of this paper was two studies of eighteenth- and nineteenth-century inner suburbs of Québec City (Gauthier, 1997, 2003). These studies were among the first generation of research conducted in North America using the methods of analysis developed by the Italian school of process typology.¹ They illustrate how methods developed by the Italian school to study old urban artefacts could also be beneficial for understanding the morphogenesis of more recently built North American environments. It has been observed, for instance, that typological processes in Québec City are remarkably similar to processes of typological derivation recorded in multi-centuries-old Italian urban tissues (Gauthier, 1997, 2003). However, the physical reality of that city's old suburbs also displays morphological qualities and development patterns not uncommon to those in North America, but distinct from those studied by Muratori and his followers in Europe. The historical conditions prevailing

during the development phase of Québec City's first inner suburbs produced fragmented built environments, for which an orthodox process typology approach, with its emphasis on *morphological* factors, could provide only a partial explanation.

While acknowledging the heuristic value of the process typology's theoretical foundations, this paper explores the theoretical means that would allow process typology to contend with less morphologically consistent built environments and the erratic morphogenetic processes of which they are a product. It posits that such built environments call for a more complete understanding of the social factors that account for changes in urban form.

This paper revisits the core notions of process typology: *type* and *typological process*, as initially developed by Muratori and later defined by Caniggia and Maffei (1979). It argues that there is a disparity between the very broad definitions that these notions have assumed since the early days of process

typology – which accord a critical role to the subjects as part of a subject/object dialectic – and the operationalization of the terms in the context of scientific analysis. When a second generation of researchers developed a scientific morphological approach inspired by Muratori's ideas and methods, they concentrated on the *materiality* of the architectural, urban or territorial objects. In essence, a science devoted to the built environment was established by narrowing the boundaries of the discipline to focus on a limited object of enquiry. The object of analysis implied compromising Muratori's initial philosophical tenets and resulted in a disjuncture between a holistic conceptualization of *type* and a partial operationalization of the said notion.

This paper begins by briefly exploring the genesis of the notions of *type* and *typological process* in parallel with the broader evolution of process typology theory. It then proposes new formulations of the notions *type* and *typological process*, which delimit the role of social factors in the creation of types and in their transmutation. It is argued that, since morphological transformations are induced by changes in social needs, a cross-examination of the morphological *and* social determinants of morphogenesis and the conceptualization of the relations between these two determinants, allow for a fuller explanation of the creation and transformation of the *type* through the typological process. This paper proposes some steps toward elucidating the engine of morphological change by drawing attention to the 'evolvability' of the *type* (to borrow an expression from biology). It stresses that typological transformation could be examined through a theory of built forms – a morphology – concurrently with a theory of practice. Evolutionary changes, as well as more sudden shifts in historical conditions affecting the built environment, are always revealed by corresponding changes in the practices of the agents involved. This theoretical perspective gives way to a broader cognitive approach. The apprehension of the inherited built forms, either in an 'unconscious' manner or in explicit ways, is clearly a cognitive act, and so are building practices, learned by repeating immemorial gestures and/or through formal

training.

Such new formulations are meant, among other things, to provide conceptual tools to contend with built environments erected in times of cultural turbulence, as in the case of nineteenth- and twentieth-century North American cities, where a weak cultural consensus on how to fabricate dwellings, streets, squares, etc., produced scarcely coherent built environments.

The origins and evolution of the notions of *type* and *typological process*

The Muratorian tradition has stressed the existence of rules governing the spatial organization and transformation of the built environment over time and developed the methodological means to retrieve these rules through morphological and typological analysis of the artefacts. Muratori used the term 'reading' to describe his method.

With respect to his analysis of older artefacts, in particular, Muratori brilliantly posited that a regularity of morphological patterns could be attributed to the fact that the successive populations that created and shaped these built environments adhered to a collectively produced code of what to build and how to build it (Muratori *et al.*, 1959; Muratori, 1960). The cultural group that at once builds and inhabits the environment carries mentally the collective codification i.e. the Muratorian *type*, ensuring a mediation between social needs on the one hand, and material culture and technical knowledge on the other, within a given historical period. Muratori stressed that the *type* constitutes an *a priori* synthesis,² a cognitive category present in the mind of the builders and users, prior to their acts of building and inhabiting (Cataldi *et al.*, 1999, p.47).

Muratori owes much of his conception of human culture and history to the neo-idealism of the Italian philosopher Benedetto Croce (Giannini, 1983). His initial conceptualization of morphological transformation is heavily inspired by Croce's radical historicism. Following Croce and Hegel, Muratori's philosophy postulates the existence of an

organized totality that progresses in a coherent manner towards an end. According to Muratori, the totality that constitutes the human culture is subjected to a process of ever increasing rationalization evolving in a teleological fashion. Muratori postulates that the built environment, seen by him as an imprint of human culture, evolves similarly in successive phases, from a sequence characterized by periods of dynamic stability alternating with periods of crisis in collective codification.

Second-generation typologists, such as Maretto, Caniggia, Maffei and Cataldi, departed from idealism and from its essentialist conception of history to work instead at developing a science of the built environment.³ Their contribution consisted in defining more rigorously a number of core notions and translating Muratori's thought into an operational apparatus. This contribution revolved around a few key aspects such as: first, conceptualizing the built environment as a complex system of interrelated elements, which function at different scalar levels; secondly, conceptualizing the built environment as a dynamic system; and, by extension, thirdly, stressing that the built environment system is characterized by relative autonomy. The actual operationalization, however, entailed a prioritizing of the materiality of the built environment as the central object of enquiry.

Maretto, for instance, worked on the question of the inscription of the building type in its larger urban context. He hypothesized that the building type not only synthesizes the material and spatial constraints internal to the building, but also the material and spatial constraints determining the conditions of insertion of the said building into an urban tissue and an urban organism (Gerosa, 1992). In other words, the building type bears in itself, not only the rules governing the intrinsic material arrangement and spatial configuration of the concrete object to which it corresponds, but also the rules of insertion of the said object in a morphological reality of a larger scale. Drawing upon these assumptions, Maretto (1980) was the first to envisage the potential of an inter-scale analysis of the built environment and to develop a complex conceptualization of

morphological scales (Cataldi *et al.*, 1997, p.49). He concluded that the notion of building type is operative in the history of the city (Gerosa, 1992), in that successive building types encapsulate the spatial development principles of a city throughout its history.

Within the group of second generation typologists, Caniggia is credited for having contributed most to translating Muratori's philosophical ideas into a system of operative tools,⁴ through the development of what could be described as a genetic structural approach. Together with Maffei, he wrote the most definitive work on process typology theory and methods: *Architectural composition and building typology: interpreting basic buildings* (Caniggia and Maffei, 2001, original Italian edition, 1979). In this book, Caniggia and Maffei integrated the contribution of their peers with their own impressive theoretical effort. At the centre of their work are the notions of type and typological process. Drawing upon Muratori's work, Caniggia and Maffei formulated an explicit definition of the *type*, presented as:

a system of integrated cognitions, assumed unitarily to satisfy the particular need to which [the] object has to correspond. These cognitions are already an organism, inasmuch as they are integrated, correlated, self-sufficient or complementary notions with a unitary aim. They are already a pre-projection of what the end product will be, albeit prior to the object becoming a physical being (Caniggia and Maffei, 2001, p.50).

Thus, according to Caniggia and Maffei (1979), the type is a cultural model, carried mentally and for the most part unconsciously, which is mobilized by agents when they produce and use the built environment. A building type for instance is 'the concept of a house' that prevails in a given historical and cultural context, and according to which houses are built and utilized. It can be recognized *a posteriori* and consciously revived in the context of scientific enquiry.

Caniggia and Maffei (1979) retained the morphological scales identified by Maretto and hypothesized the existence of a specific typical structure at each scale. Hence, there are

building types that correspond to the scale of the building, *typical tissues* that correspond to the scale of building aggregates, *typical connections between aggregates* that correspond to the scale of the urban settlement and city, and *typical connections between routes, settlements, and productive and urban organisms* at the territorial level.

In conceptualizing the *typological process*, a notion for which they do not provide a synthetic definition, Caniggia and Maffei (1979) hypothesize that the type should be conceived as an all-encompassing synthesis that derives from former experiences, but that acts also as a matrix for future transformations. Types do not surface suddenly, but emerge at the end of a cycle. Caniggia and Maffei talk of a 'phase', that sees a new type deriving from the former to contend with new social needs (Caniggia and Maffei, 2001, p. 55). The passage from one phase to another is marked by the dissolution of the social consensus, of which the *type* is a reflection, and the formation of a new consensus.

The implications of such a complex conceptualization have yet to be fully explored.⁵ Undoubtedly, our understanding of the inherited built environments and of the complexities of their processes of creation and transformation has benefited greatly from such theoretical advances. However, it is argued here that the advent of a scientific process typology paradigm has led to conceptual ambiguities. This is especially the case when considering the wide definition proposed for the central notion of *type*. The all-inclusive and extensive definitions inherited from the early stages of development of process typology theory appear to be somewhat ambitious when abstracted from the Muratorian philosophical system. Even if one agrees, for instance, with the postulate of a collective codification internalized by the subjects with respect to specific house models or models of tissue, it is much more debatable that acting and knowing agents could carry, even unconsciously, a mental model that pertains to an urban organism or a large territory.

Yet another problematic issue arises from the gap between the wide-ranging general

definition given to the notion of *type* and the more modest operational incarnation according to which researchers recognize types by considering solely the physical and spatial features of concrete objects to which types correspond. Such a gap could be attributed to an underlying philosophical assumption that the built environment is a direct expression or 'reflection' of culture. Muratori, for one, stated that the built environment is an imprint of the culture. This assumption follows from a dialectical view of the relation between subject and object, one that posits that subjects externalize themselves in the objects they produce materially or conceptually, and objects in turn frame the subjects' understandings of themselves.⁶ The *type* is the cognitive instance that mediates the subject/object relation in the making of the built environment. Yet the concrete objects that correspond to type are only a partial enactment of this instance. It could be argued that, by concentrating on the materiality of the built environment, typological analysis delivers only one of the constituents of the type: the 'form', which refers, in this context, to the rules governing the spatial configuration and material arrangement of concrete objects. The form is loaded with social content, by definition, but this content is present only implicitly. What falls outside the scope of the enquiry is, among other things, the constellation of social factors that contribute to the emergence and later evolution of a specific type to serve social needs, either functional or symbolic, that arise in a given historical context.

Similar theoretical limitations could be observed regarding the conceptualization of morphological change. Caniggia and Maffei's approach, if almost free of any idealistic content, still defines morphogenesis in teleological terms. It could be argued that in their theoretical propositions, an essentialism of the morphological system has replaced Muratorian philosophical essentialism, so that the existence of transformation processes is stressed without questioning the causes of morphological change other than to associate them with a dialectical process. For example, at a macro temporal level, Caniggia and Maffei

espoused the idea that periods of crisis and periods of dynamic equilibrium alternate in extensive historical cycles, but the authors do not attempt to elucidate the question of what causes or induces the said crises. Similarly, at a mezzo-temporal level, they embrace the view that, by means of the typological process, the social 'consensus' around a type dissolves to give way dialectically to a new collective codification, but they do not hypothesize what propels the morphological transformation itself.

Process typology offers an array of conceptual tools to analyse the effect of morphological constraints on long-term development and to decipher the mechanisms of transformation and conservation of the built environment, thus revealing some essential rules governing its morphogenesis. Together, Muratori, Maretti, and Caniggia and Maffei, convincingly present the typological process as the most fundamental mode by which the built environment is transformed. Acting as a matrix, the type 'predetermines' morphological change, as it simultaneously provides the conditions that make transformation possible and constrains future rounds of change. This theoretical framework is innovative in that for the first time, an explanatory framework of the historical development of the built environment is produced from an 'internalist' perspective. Such a perspective postulates that the built environment, very much like language,⁷ has a recognizable structure of its own and that, accordingly, in the course of its evolution, numerous transformations could find their primary explanation in the constraints and potential for change present within the structure itself.⁸ This advance allowed typologists to formulate morphological explanations for transformations of the built environment instead of resorting to explanatory frameworks based exclusively on external conditions of development, as in the case with most other theoretical perspectives.

The challenge that remains is to depart from an essentialist conception of morphological transformation. To this day, process typology has yet to produce a satisfactory explanatory framework that would aim at elucidating what

constitutes the engine of morphological change, that would provide an answer to the question of 'what exactly causes the built environment to change and puts it into crisis from time to time?'

The engine of morphological transformation

Typologists acknowledge that the built environment is a social construct that is, as such, subject to the social and historical conditions that prevail during its formative and later evolutionary phases. In accordance with this general principle, the conceptualization of type and of typological process have always accounted for broad social 'necessities' as part of the equation in the genesis of types and their transformations through the typological process, but a recognition of the inherent nature of the type as a social and historical product remained at the level of a *petitio principii*. Process typology has not produced an operational theoretical framework that hinges morphogenetic analysis to an analysis of the social and historical conditions that prevail during the production of the built environment. When faced with hectic morphological conditions, such as those prevailing in periods of crisis, such limitations inhibit our ability to explain transformation.

Malfroy brought to our attention the fact that, contrary to the principles of 'organicity' demonstrable in the corpus of Italian cities, the essential characteristics of the genesis of recently built environments are more arduous to tackle: 'the modern city reveals fragmentary patterns of development and a plurality of urban configurations more than it allows one to observe the integrating effect of a teleological process' (Malfroy, 1986, p. 125, translated by the author). In recently-built environments, a high speed of change coupled with a higher level of experimentation and disruptive development practices have produced heterogeneous artefacts, in which the built structures denote a wide variety of specific social, economic, and cultural conditions that have influenced and determined their creation. The challenge consists in developing operative tools to

capture, among the wider constellation of social factors that influence morphogenesis, those that exert the most direct and determinant impact.

A new conceptualization of the notions of type and typological process

Caniggia and Maffei's definition provides a valuable foundation and starting point for taking on such a task. According to their definition, the *type* encompasses both the form and the knowledge pertaining to the fabrication and usage of the concrete objects that correspond to the said form. Defined as a cognitive instance – a 'structure' concurrently internalized by agents and external to them – *type* is a complex concept indeed, the reach of which goes far beyond the strict materiality of concrete objects.⁹ Among other considerations, it can be argued for instance that more than one category of knowledge could be at play in constituting the type. In addition to more spontaneous and 'practical' knowledge, *type* could include more reflexive forms of knowledge, such as those informing purposeful planning and development traditions. Although confined within the realm of material culture, *type* bears some resemblance to sociologist Pierre Bourdieu's central concept of *habitus*, described by him as a 'system of dispositions,' that 'ensures the active presence of past experiences, which, deposited in each organism in the form of schemes of perceptions, thought and action, tend to guarantee the 'correctness' of practices and their constancy over time, more reliably than all formal rules and explicit norms' (Bourdieu, 1990, p. 54, original French edition, 1980). Clearly, this view of *type* suggests that such a polysemic structure cannot be grasped in its totality by a single analysis, but requires that 'schemes of perception, thought and action' be integrated.

Conceptualizing social demand as the motor of the typological transformation

It is necessary to explore conceptual means to account for the social factors at play in

morphogenesis. This can be done by hypothesizing the role of social demand in the development of types based on the assumption that the 'engine' of the transformation of the anthropic environment is social, by nature. Before a diagrammatic depiction of a new conceptual framework is offered, some key terms need to be specified.

Leaving aside natural cataclysms, every morphological transformation is humanly produced. As process typology points out, however, up to a certain point, morphogenesis has an autonomous existence of its own. If certainly not auto-generated or auto-propelled, some morphological transformations obey morphological necessities, as they appear retrospectively to be the environmental response to a social demand, yet confined within a recognizable system of morphological inheritance. I suggest that, in the context of a typological process, these morphological necessities be called 'endogenous determinants'.

If subjected to endogenous determinants, a built environment does not come into being on its own. Architectural and urban forms for instance are a product of their society. Agents exerting control over a morphological instance always perform the transformation. Hence, strictly speaking, in processes of transformation, forms always react to exterior impulses, i.e. 'exogenous determinants'. The external forces exerting an effect on morphogenesis may be described as *social demand on the form*, an expression in which the term 'social' is understood in a broad manner, covering a wide array of collective manifestations: economic, political, juridical, technological, etc. In the context of typological process, the *type* then emerges as the synthesis of both endogenous and exogenous determinants. Figure 1 synthesizes the mechanisms by which *type* develops within the typological process.

The diagram and the theoretical postulates to which it corresponds stress the importance of distinguishing between the *form*, which pertains to the spatial configuration and material arrangement of concrete objects, and the *type*. The *type* within this conceptualization concerns both the form and the social needs that it serves, as well as the socially

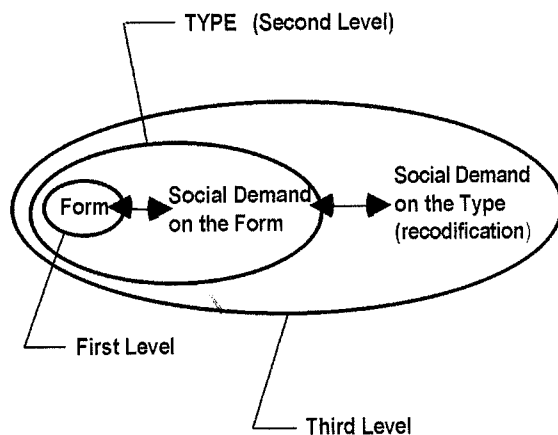


Figure 1. The structuration of built environments.

produced knowledge arising from a dialectical interplay between the two. In this respect, *type* corresponds more accurately to the broader definition originally put forward by Caniggia and Maffei (1979).¹⁰

There are three levels within the diagram that capture the nature of the built environment in the making, i.e. its 'structuration'.

At the first level stands the *form*, which is governed by all the rules commanding the spatial configuration and material arrangement of concrete objects. These rules are the result of a dialectical interplay between material, geometrical, structural and technical constraints, mediated by practical knowledge – the know-how to build and position concrete objects. That is to say, *form* results from the interrelation of what I have described above as *endogenous determinants*.

At the second level stands the *type* itself, as just defined. As a body of abstract rules, the type results from the mediation of both endogenous and exogenous determinants. Within the typological process, exogenous forces that exert pressures on the *form* to adapt are themselves subject to a specific dialectic. This dialectic reflects a tension between new social demands on the one hand, and the inertia of inherited collective codifications, on the other. The collective codifications in question pertain both to forms of knowledge of how to use and create the concrete object and to a broader form of collective knowledge, i.e. *habitus*, which governs gender, family, social

and economic relations, for instance. Thus, the typological process can be portrayed as the outcome of a triple dialectic: expressed in terms of relations between different endogenous determinants, relations between different exogenous determinants, and relations between these two orders of determinants.

This conceptualization of *type* implies that an alteration in the *usage* of a form, even with little or no alteration in the concrete form itself, would, as a consequence of such a dialectical interplay, *de facto* institute a new form/usage relation, and thus a new *type*.

Figure 1 suggests the existence of a third level, that could be labelled a *supra-structural configuration*. This level goes far beyond Caniggia and Maffei's definition and sees a new synthesis emerging from the interplay between the *type* itself, as a social codification, and external social demands exerted on it. In such a context, the *type*, as a synthetic cultural model, can be called into question by practices that are not primarily directed at altering the concrete objects *per se*, which correspond to a specific *form*, but rather at altering the cultural model as a whole, which the *type* represents. The inherited cultural model becomes material to be 'worked upon' by knowing and acting agents. Such an action performed on a 'system of integrated cognitions', to use the words of Caniggia and Maffei, implies recourse to higher order reflexive forms of knowledge than spontaneous knowledge, such as those resorting to instrumental – or even scientific – reason.

An extreme example of such practices is provided by colonial urbanism, where architects and planners freely 'reinterpret' traditional housing according to European housing models and standards.¹¹ Their practices purposefully attempt to introduce new extrinsic cultural models into a local morphological system and, in doing so, drastically alter the set of established relations governing an inherited *type*, thereby contributing to the institution of a new socio-spatial order. Studies have shown how certain traits of such external models were later integrated into local building practices, which, over time, assumed a spontaneous nature when internal-

ized by agents. Santelli (1998), for example, has documented how in North Africa, some spontaneous building practices were actually an expression of inherited local building traditions interwoven with fairly incongruous traits borrowed from western architectural tradition.

It is argued here that local typological processes define both periods of crisis and stability. Types always develop *in situ* and are invariably submitted in their development to the effects of constraints and potential for change in the inherited artefact itself on the one hand, and in inherited models, social practices and *habitus* on the other. During periods of crisis, however, the local building tradition is also submitted to the influence of external models, which are elaborated through purposeful practices either by borrowing from a foreign material culture or as an *ex-nihilo* creation. Hence, if a group of agents such as architects, urban planners or developers propose a model, such a model, or parts of it, could become integrated into a *type*, when generalized in its application and internalized by the local population as a cultural reference. According to such a formulation, a type could come to fruition that owes a significant share of its attributes to an external material culture or to normative practices and prescriptions. That is also to say that some types, as products of a crisis stage and a mixture of many influences, may be loosely grounded in the inherited local building culture in which they have developed and of which they have become a part. I suggest that the new type that could emerge as the outcome of such a process be called a re-codified type.

Studying the role of the agents of morphological change

This conceptualization provides an explanatory framework, the heuristic value of which resides in the ability to actually verify the specific effect of significant social demands and habits on morphogenesis in general, and on the typological process in particular. In other words, the effectiveness of such a framework rests on its prospects for operationalization within scientific analysis.

The difficulty is that a representation of *type* as a collective codification internalized by agents implies that it can be retrieved neither directly nor comprehensively through analysis. The study of various cultural manifestations would provide in each case only a partial and indirect account of collective codification. Morphological analysis for instance retrieves *forms*, which represent only a partial enactment of the knowledge and social habits that crystallize in concrete objects. A deeper analysis requires investigating other channels by which the collective codification manifests itself. This paper argues that social practices constitute one such channel.

The methodological challenge that remains, however, is to distinguish from among the wide variety of social practices that potentially affect morphogenesis, those that play a direct and explicit part in the transformation processes. Habraken (1998) discusses a notion that provides the operational shortcut needed here. In examining the role played by the agents of morphological change, he develops the idea that 'control' defines the central operational relationship between humans and their built environment:

Whenever physical parts are introduced, displaced, or removed from a site, some controlling agent – a person, group of persons, organization or institution – is revealed. Control thus defines the central operational relationship between humans and all matter that is the stuff of built environment. As dynamic patterns of change echo throughout a built environment, they reveal the structure of control (Habraken, 1998, p. 8).

Habraken makes an interesting argument by suggesting that the distinction between the acts of creating and using the built environment could be specious, in that, in both circumstances control is exerted, resulting in transformation. Whether the control involves closing a door or demolishing a neighbourhood, '[e]xerting formal control means transforming, and conversely all transformation denotes control.' (Habraken, 1998, p. 8).

To address the problem from such a



Figure 2. The 'mirror-theories' of the built environment in the making.

perspective is productive. The effects of the practices of agents exerting control over their environment can be recognized in the artefact. When analysis reveals that a morphologically significant transformation has occurred, it is convenient and relatively simple to identify which agents – generally they are groups of agents – were exerting control on the morphological instances affected by the said transformation, and to proceed from there to analyse their practices and the various systems of knowledge they resorted to, in order to pursue their enterprises.

This approach offers the advantage of focusing the analysis first on the actions of agents directly involved in the morphological transformations themselves, as opposed to broader social or economic occurrences. However, this does not proscribe the possibility to step forward and analyse the more complex webs of social relations at play in the making of the built environment and to conduct, for instance, an inquiry into the respective and reciprocal actions performed by agents, in order to study their effect on morphogenesis.

Such an approach reveals, among other things, the various kinds of knowledge and cultural models that are mobilized by agents, more or less unconsciously, and which guide their actions. It provides means to decipher the intricate nexus of spontaneous and 'informed' practices that confront, collide and intermingle within the typological process. The possibility of identifying the practices of agents controlling various components of the built environment – e.g. the building fabric, the subdivisions, or the street layout – leads to the formulation of more specific explanatory hypotheses with respect to particular morphological mutations, either localized or generalized, that puncture or characterize for a longer period of time the ongoing morphogenetic process.

Conceptualizing type and typological process as done here entails that the *type* embeds the knowledge of how to fabricate and to use functionally and symbolically the concrete objects to which it corresponds. Such knowledge, as well as higher order varieties of knowledge, is enacted by the agents' practices and actualized in the course of the *typological process*. This is to say that the *type*, as generated within the typological process, is at the intersection of two interwoven orders of realities – the material realm and social practices – that combine for its occurrence. This calls, in turn, for the mobilization of two complementary and compatible methods of analysis. In the same manner that concrete objects and their *form* can be studied by morphology, the social practices can be studied by a 'praxeology,'¹² a science of the practices. Figure 2 situates the *type* at the meeting point between these two disciplines.

Conclusion

Thus far, process typology has dealt primarily with very old urban artefacts. When studying more recently built urban habitats, typologists clearly encounter new theoretical and methodological challenges.

Process typology has produced valuable tools to study the transformation of built environments and to better comprehend how various outcomes in their evolution are primarily determined by the interplay of morphological constraints and potentials for change, i.e. by conditions of stability and variability (or mutability) ingrained in the system of the built environment *itself*.

My argument here is that such tools could be made even more effective if adapted to cope with pure morphological phenomena concurrently with the wider spectrum of social pressures exerted on the inherited morph-

ological state, which alter it and place it in crisis from time to time. Building on such assumptions, the proposed theoretical framework provides a better understanding of the internal mechanics of the typological process itself, as well as opening up to new explanations of morphogenesis in difficult historical contexts, as in the case of most 'post-industrial revolution' cities. It does so by two means. First, it operationalizes the polymorphous character of the *type* by situating it at the crossroads of two large orders of reality, which are accounted for and encompassed within a cognitive theoretical framework. Secondly, the framework develops specific theoretical and methodological means that allow for a cross-examination of the built environment in the making. This theoretical framework, however, does so by extending the initial premises of *process typology*, placing the built environment itself at the very centre of the theoretical enterprise.

Notes

1. See also Dufaux (2000), Larochelle (1999), Morency (1994), Moretti (1998), Vallières (1999) and Verret (1996).
2. In process typology, the term *synthesis* implies a dialectical process in which, in Hegelian terms, the oppositions are suppressed and surpassed. Hegel uses the word *Aufhebung*, which means 'to deny' and 'to keep' at the same time, to express this idea (Folscheid, 1993). An English term for it might be 'chunking' (Jorion, 1996).
3. Working at the scale of the territory, Cataldi (1977) is credited with having made the first attempt to formulate a scientific theory of the built environment, based on Muratori's philosophy. See also Maretto (1980) and Caniggia and Maffei (1979).
4. See Cataldi *et al.* (1997).
5. Some authors have started to undertake such a task: Gerosa (1998, 1992), Levy (1992) and Malfroy (1986), to name but a few.
6. Using an expression coined by Ernst Cassirer, the geographer M.R.G. Conzen expressed a similar view to the effect that the whole townscape represents an 'objectivation of the spirit' (Conzen, 1981, p. 82).
7. Caniggia has explicitly recognized the

influence of continental European structural linguistics, and more specifically of structural phonology, on his work (Caniggia and Marconi, 1986; Caniggia, 1988).

8. In this article, I use the term *structure* in the sense that structuralist thinkers gave to it: as the manner in which elements are mutually organized within a system (see Benveniste, 1972).
9. Caniggia prefers to resort to a biological metaphor and uses the term 'organism' instead of *structure* to qualify the type.
10. As for the *form*, it now corresponds to the modest operational object that *type* has come to personify in the context of typological studies.
11. See, for example, Çelik (1997) on French architecture and urbanism in Colonial Algiers.
12. The French term *praxéologie* has been coined by Bourdieu (1994).

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