

Listening to the city: a linguistic model of urban development, perception and coding

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This study addresses the problem of modelling urban tissue in such a way that incorporates the behaviour and perceptions of the area's inhabitants. This is done through an analysis of the way in which urban development, perception and coding intersect with the human phenomenon of language. This analysis is followed by a pilot study in which a method is developed for analysing the way a sample of people talk about their urban activities, with the aim of retrieving information about the way that piece of town is perceived and functions. The resulting database forms a model of the composite perceptions of an urban area held by the sample of people interviewed. The findings indicate that the development of such a database could be of use both descriptively and prescriptively, if made accessible to those responsible for urban design decisions.

Introduction

If a historical city cannot cope with the changing human requirements of its residents it runs the risk of becoming merely a frozen icon of its past self. On the other hand, rapid rates of expansion and change can result in a profound sense of alienation from even the recent past. Both sets of problems have given rise to a number of approaches to design guidance that concentrate on the visual integration of new design with what is perceived as local tradition. However, such an approach frequently fails to address a more profoundly alienating phenomenon, namely a distortion of the language of the urban environment that may lead to the erosion of its comprehensibility and a reduction in its depth of significance for its inhabitants.

Such alienation arises partly from a discontinuity between the relatively few corporate agents of change and the far more numerous users of the resulting habitat. In attempts to remedy this breach of continuity, approaches to design guidance have sought to include, as well as the purely visual, concepts of meaning and use.

Lynch (1960) identified concepts such as 'edges', 'nodes', and 'paths' which could be incorporated into both descriptive and prescriptive urban analyses. Although his concepts are predominantly visual, they nonetheless incorporate a strong intrinsic element of function and meaning. Bentley *et al.* (1985) made use and function a dominant element in their analyses; their criteria, such as 'vitality', 'permeability', and 'legibility', being essentially indices of behaviour that in turn have implications for the visual and physical aspects of urban form. At the extreme end of this spectrum of approaches would be that given by Hillier and Hanson (1984) which confines itself exclusively to the way in which the urban environment is used – specifically to the way in which it interacts with human 'movement' – rather than to the way it looks.

The purpose of this study was to develop an approach to urban coding that would integrate the behavioural and physical aspects of urban form. This was done by examining the issue of language, through which our perceptions of our habitat are both mediated and expressed. The resulting linguistic model of our interactions

between ourselves and our habitat was then used to inform a method of analysing the way the users of an urban environment talked about their interactions with it. Such an analysis, I would argue, could become a valuable resource for those responsible for either modifying or emulating that environment, and thus form part of the 'code' for that environment.

The linguistic model

Three aspects of the phenomenon of language have particular relevance to our relationship with the built environment (Liddle, 1994):

1. Fundamental to both the study of the syntax of language and the syntax of the human habitat is the principle of deducing from actual examples, the rules that govern the relationship between the elements of its 'generic global form' (Chomsky, 1965; Hillier and Hanson, 1984).
2. Any system of coding is itself a form of language, being an embodiment of information constraining the future development of a piece of human habitat, in a way that can be understood and responded to, consciously or unconsciously, by successive builders. It is therefore the expression of the syntax of that habitat.
3. Language itself is an essential component of human perception and memory. It allows not only things, but temporal and spatial relations between things, to be expressed symbolically, and, thereby, independently of both time and space.

These three ways in which language impinges on the subject are interdependent. The piecemeal accretion of built form is governed by a syntactical system of rules which modifies it in such a way that the resulting morphology is itself an encoding of the purposes and activities of preceding generations. This in turn functions as a template or 'code' for future purposes and activities, thus facilitating continuity of both form and use. Moreover, both the 'syntax' of our building habits and the way we respond to the code they represent is governed, I would argue, by the uniquely human capacity to use language.

The symbolic representation of things through the use of names, or nouns, enables a more

sophisticated classifying process to take place than in species incapable of symbolic representation. Moreover, the syntactical combination of these nouns with verbs and prepositions allows the relations between things to be expressed, and new and more abstract concepts to be developed. These in turn are then capable of being represented symbolically by abstract nouns.

Three components to the serial process by which undifferentiated stimuli are classified and related to produced new more complex classifications have been recognized in linguistics: the *etic*, the *emic*, and the *tactic* (Pike, 1967). The *etic* refers to the perception of undifferentiated stimuli (whether *phonetic* or environmental); the *emic* refers to the classification of the *etic* stream into discrete entities (as in *phonemes*, or classes of object); the *tactic* refers to the system of rules that govern which combinations of *emic* classes are acceptable within the boundaries of the subject's experience. Thus, the process of producing the *emic* from the *etic* is one of simplification. It reduces the number of informational components into manageable quantities. In contrast, the tactical process involves the combination of the finite number of *emes* into an infinite number of theoretically possible patterns. It is therefore a process of elaboration (De Long, 1980). The result of tactical operation on *emic* categories is therefore to produce another *etic* stream, at a different perceptual level. This is then in turn classified into *emes*, which again in turn can be combined by tactical operation. A further feature of the tactical process is the generation of redundancy, in that of the virtually infinite number of possible combinations, only a proportion will be recognizable in current usage. The resulting flexibility allows for the possibility for creativity.

The production of the *emic* from the *etic* is clearly a powerful information handling tool, allowing us to process not merely linguistic stimuli but the wider barrage of stimuli from our complex and variable environment. Similarly, our ability to recombine the resulting *emic* units into larger units allows us to reorganize both our environment and our perceptions of it creatively yet comprehensibly.

In the environmental context, it is postulated that this *etic-emic-tactic* processing operates in at least three modes of interaction. At the perceptual level, the processing of environ-

mental information involves the production of mental constructs which undergo a constant process of modification in the light of actual environmental experience (cf. Wapner *et al.*, 1980; Piaget, 1954). Secondly, at the level of psychomotor behaviour, responses to the environment result in patterns of activity that are both modified and reinforced by the physical environment. Thirdly, at the physical level, human behaviour produces both temporary and long term alterations to the environment, which in turn modify and reinforce future behaviour. Furthermore, each of these behavioural dimensions operates over a range of scales, at each of which distinct aspects of coding behaviour can be observed. Table 1 represents ways in which the etic-emic-tactic processing sequence may intersect with these three environmental behavioural dimensions.

Custom, function, market pressures, existing fabric and local statute are all among the

human factors contributing to the syntax of a given piece of urban environment. The three modes (perceptual, psychomotor and physical) are thus directly related to each other, in that perception mediates activity, resulting in modifications to the physical fabric. In all three modes of environmental behaviour, the way the different scales interact with each other is an integral part of the whole syntax. If any discontinuity between the levels is introduced, there is a likelihood that the syntax itself will be compromised, and the level of quality and comprehensibility of the environment impaired.

It is thus essential that those who are responsible for major modifications to the urban environment have access to information concerning the syntax of the interactions between that environment and its inhabitants, in order that vital 'software' is not lost when the 'hardware' of the city is modified. The following pilot study tested an approach to accessing that information.

Table 1. Matrix showing intersections between three environmental behaviour dimensions, and the etic-emic-tactic processing sequence

	Etic	Emic	Tactic
Perceptual The processing of environmental information, and the structure of mental constructs The relationship of these to time, activity, status, etc.	Stream of sensory stimuli	Classification discrete concepts: 'the street'; 'the shops'; 'town'; 'home'; 'the supermarket'; 'the park'	Spatio-temporal relationships between entities, perceived as expectations about the location of each. The 'legibility' of the environment
Psychomotor Responses to the environment – activity, movement patterns, social/commercial interactions etc.	Psychomotor activity: e.g. walking; driving; browsing; gardening; meeting neighbours	Subjective purpose of activity: e.g. travelling to work; buying groceries; trimming hedges	Spatio-temporal relation between activities: 'I go down the street and into town to do the shopping'
Physical Alterations to the environment, both temporary and permanent car-parking, stall assembling, garden design, facade modification, tree planting; changes of use	The fabric of the physical environment	Built units/spaces, e.g. windows; houses; plots; blocks; streets; pavements; squares	Rules governing spatial relations between units; acceptable patterns of assembly

Pilot study

This pilot study explored a methodology for retrieving information about a successful environment from its users. Accounts of urban activity collected by means of short, tape-recorded semistructured interviews were used to construct a database of terms and concepts by which users of an urban environment structure their perceptions of it. Such a database could serve as a kind of 'thesaurus' for that locality, with an index by which a designer or planner could look up relevant concepts, and then interrogate the database for further information. Furthermore, such a database in itself would compromise a 'coding' of the composite perceptual structure of that environment in the experience of a sample of its users.

Eight people were interviewed in the Town Square, Ealing – a piece of open pedestrian space in the middle of the Ealing Broadway Centre. The place was chosen as it is generally considered to be a successful shopping centre in a well-liked area of London. It therefore recommended itself as an appropriate place for a pilot study that was attempting to elucidate the syntax of a successful piece of city.

Accounts of urban activity were elicited from the interviewees. The question 'Can you tell me what you are doing today in Ealing?' was followed up by successive questions based on their subsequent remarks, and allowing for digression and comment as the interviewee saw fit. Transcripts were made and entered into a database (*Clarisworks* 1991).

Each transcript was subdivided into phrases, each defined by a subject plus its verb, and each phrase was represented by a separate record in a file entitled Phrase database. Each record consisted of the following fields:

- *interviewee number* identifying the interviewee
- *phrase number* identifying each phrase within that interview transcript
- *original phrase* containing the phrase itself
- *subject of the verb* (who or what was/did...)
- *adverb* (how was it/was it done)
- *verb* (what was/was done)
- *adverbial preposition* if any (as in come out; get off)
- *object* if any (what was it/was it done to)
- *prepositional phrase* (e.g. in; out of)

- *where?* (where was it/was it done)
- *preface* in which to enter any prefatory remarks such as 'Well...' or 'You know, ...'
- *infinitive* in which to enter the infinitive form of the verb, for ease of eventual alphabetical sorting.

By selecting and sorting the contents of appropriate fields, it was then possible to produce alphabetical indices of all the nouns, verbs and prepositions used in the interviews. These indices could then be used to initiate keyword searches in the original phrase field. At its simplest, therefore, the entering of such transcripts into a database allowed for the rapid retrieval of all phrases referring to any keyword the user happened to be interested in.

In addition, the database could be interrogated to show associations between, for example, a particular place or type of place and others used in its connection, thus revealing something of its spatial and temporal relationships.

Such interrogations proved interesting in their own right, but also became the bases for the construction of a second database, designed to codify these relationships between nouns as indicated by the verbs and prepositions. This database was entitled the Index database, and each record consisted of fields entitled:

- *name* (noun or noun phrase)
- *what* (class, if any, to which it belongs)
- *where* (place, if any, where it is located)
- *cross references* (as found from further interrogations)

Each noun or noun phrase used by a speaker was taken to indicate the availability to the speaker not only of the class indicated by that specific use of the noun or noun phrase, but also of the broader classes implied by it. The broader class or classes were therefore given a separate record. For example, one speaker 'went past a chemist'; both the generic word 'chemist', and the noun phrase 'a chemist' referring to a particular shop, were entered in separate records.

Each record was then examined, and if the name was self-evidently a sub-class of one or more of the other names in the index, those names were entered in the *what* field. For example, 'Boots' is both a shop, and a chemist. These judgements were made subjectively, but conservatively, and

with close reference to the context in which the names were used.

If the name could be located in one or more of the other places in the index, those places were entered in the *where* field. For example, 'The BT Shop' could be located in both 'Ealing Broadway' where it has a frontage, and 'The Ealing Broadway Centre' of whose building it forms a part. These judgements were made with reference to the context in which the names were used, and a map.

The *cross reference* field provided the opportunity to build up an increasingly valuable cross-referenced index.

The Index database thus formed a composite model of the conceptual structures held by the sample concerning the locality.

Results

The three dimensions of linguistic mechanisms in environmental perception outlined earlier, namely conceptual, psychomotor and physical, all received some elucidation from the data collected in this pilot study. At the perceptual dimension, for example, the word 'shop' unfolded into such classes as 'fixed shop'; 'market stall'; 'clothes shop'; 'supermarket'; 'fashion shop'; as well as specific instances of these. What also emerged was that referents not able to be precisely located, such as 'shops' or 'green spaces' tended to denote rich classes of things, whereas names of things that could be precisely located such as 'the iron horse' (a bronze sculpture) tended to denote items that were a highly specific, narrow class. However, the two properties were not mutually exclusive: 'market stalls in the Ealing Broadway Centre' could be precisely located, yet comprised a diverse range of types.

As regards the psychomotor dimension, interrogation of the database revealed what sort of prepositions and verbs are associated with what sort of place. For example, as one would expect, streets and roads tend to be associated with prepositions implying movement – *up*, *down*, *along*, *through*. An association with the prepositions *past*, or *round*, suggested that the place mentioned is an important way-marking feature.

Places associated with a number of different types of prepositions, for example *along*, *in*, and *to* may suggest a place that is rich in function and meaning. The Ealing Broadway Centre, for example, was thus revealed as being perceived as a route to other places, a location of other places, and as a destination in itself, suggesting that it has succeeded retaining some aspects of a conventional street as well as those of a self-contained mall.

As regards the physical dimension, relationships between verbs and their direct or indirect objects could be examined. The most instrumental verbs – those that implied direct interaction with their object, e.g. 'collect some photographs' – were compared with the least instrumental – those that implied a passive relationship with their objects, e.g. 'pass the church'. As one might expect from a study of shoppers in a shopping centre, the most instrumental verbs are those to do with the transactions of shopping. Locatable nouns – names of places – were the objects of the least instrumental verbs, reflecting the asymmetry of the interactions between the urban shopper and his/her environment. However, had the interviewees included stallholders, buskers – and perhaps the sculptor of the 'iron horse' – a more powerful two-way relationship with the fabric of the town might have been revealed.

Discussion

This pilot study suggested that at an analytical level, data collected by this method of linguistic analysis are useful indicators of urban quality. As such, they may provide valuable input for prescriptive guidelines. To use some of the criteria of urban quality cited by Bentley *et al.* (1985), the database suggested the following indicators of urban quality:

1. Both richness and variety in the urban environment may be indicated by the multiplicity of referents that are both broad classes and highly locatable, as evidenced by a multiplicity of entries in both the *what* and *where* fields of the Index database.
2. Bentley *et al.*'s criteria of vitality and personalization may be indicated by the extent to which instrumental verbs (that imply physical interaction with their object) are used in connection with locatable nouns – places.

3. Legibility might be indicated by the clarity of the classificatory hierarchy found in the Index database, a quality perhaps the inverse of the qualities indicated in 1.
4. A measure of permeability may be provided by an examination of the relationships between verbs of movement, propositions and places.
5. Lastly, the robustness of an environment may be indicated by the complexity of cross-referencing within the database. Insofar as the complexity in the syntax of the database indicates complexity in the syntax of the environment itself, it may suggest the capacity of that syntax to produce redundant combinations with which to accommodate change.

An approach based on the one used in this pilot study might therefore be of use, for example, in informing the briefing process for new development. Unlike conventional questionnaires, the open-ended interviews allow the interviewees to 'set the agenda', while the systematic syntactical analysis of the transcripts provides a way of codifying that agenda into a manageable and useful body of data. The resulting database would provide information, firstly, as to what elements those interviewed considered important, and secondly, as to desirable spatial and functional relations between those elements.

The sequential searches that produced some of the initial analyses in the pilot study were empirical, interactive searches that with further work could be condensed into more automatic

computerized processes. It may be possible to adapt such processes to form decision-making flow-charts for use during a design process, in order to reproduce or conserve the qualities of the urban tissue studied.

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