

# DEIXIS, INDEXICALITY AND POINTING AS HEURISTIC GUIDES FOR ENACTIVE LISTENING: ROUTE DESCRIPTION, CUE ABSTRACTION AND COGNITIVE MAPS

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## ABSTRACT

Listening to music calls forth a construction of meaning as the result of an interaction with the sound. This process of sense-making can keep pace with the unfolding through time but it can keep distance with respect to the sonorous unfolding as well, allowing the listener to deal with music both at the level of sensory experience and at the level of imagery and representation. As such we argue for an enactive approach to music cognition that brings together the experiential and cognitive points of view. We provide the concept of pointing as a heuristic tool for sense-making, both as a primitive marking system and as a mechanism of selection. It allows us to use deictic devices which locate individual elements in context and stress the field of pointing rather than the symbolic field of cognition. Deictic elements, further, are related to the concept of indexicality which entails processes of singling out, as is obvious from the use of pragmatic anaphora which allows us to refer back and forward in a text. In order to do so we must have access to the flow of discourse as a whole, where parts may be re-taken up and anticipated. It invites the listener to build route-descriptions and cognitive maps which allow him/her to navigate mentally through the music and to compare the actual sounding elements with their projections in imagery.

## 1. INTRODUCTION

This paper tries to bring together the concepts of deixis, route-description and cognitive maps as applied to the process of listening to music. These conceptual tools can be related to the experiential and enactive approach to music cognition, which is rooted in our biological embodiment and which stresses the relations between knowing, perception and action. It allows us to deal with music both at the level of sensorimotor integration - as a kind of reactivity to the perceptual input - and at the level of imaginary projections (Reybrouck 2001b). Listening, on this view, is a conservative process that keeps pace with the sonorous unfolding, as well as a kind of symbolic play that allows us to perform mental operations on the perceived elements.

## 2. LISTENING AS EXPERIENCE

Music is not merely something 'out there' which is presented to the senses. It is something which is heard and which calls forth listening strategies that foster the transition from sensory stimulation to perceptual processing. A central issue in this approach is the process of listening as an experience. It involves sensory experience as well as conceptualization. As such it relies on continuous decoding and discrete labeling, stressing both the richness of the sensory flux and principles of cognitive

economy. There is, however, a difference between a mere discrete succession of isolated elements and the relational continuity that grasps the sonorous unfolding in its entirety. It is the major distinction between listening to music 'in time' and 'out of time'. The former entails the actual location of individual elements in context, the latter provides the global overview.

### 2.1. Deixis and deictic devices

In order to make these claims operational we propose to introduce *deictic elements* in our descriptive vocabulary (Jarvella & Klein 1982). Deictic terms are words that pick out or point to things in relation to the participants in a speech situation. They are related to the notion of *indexicality* and the notion of *pointing* and its correlates, and are used in the same way as Bühler talks about 'pointing words' as opposed to 'naming words'. They stress the role of the actual situation and the typical context of utterance in providing socio-spatio-temporal anchoring. Listeners can use their current situation for anchoring referential acts in space and time, constituting the centre of a system of coordinates. As such they refer to a deictic field of language whose zero point - the Origo - is fixed by the person who is speaking (the 'I'), the place of utterance (the 'here'), and the time of utterance (the 'now'). As such we can distinguish between personal, spatial and temporal deixis. What matters, then, is the field of pointing rather than the symbolic field of cognition (Bühler 1934).

### 2.2. The act of pointing

The act of pointing is a primitive marking system for singling out the noteworthy. It can emancipate itself from an object-oriented movement (merely grasping) to an act of pointing as an internal reconstruction of an external operation (mentally pointing to something). Such an act of pointing mostly begins with the emergence of a kind of *quality* in combination with an insistent particularity (e.g. 'this is important', 'that is difficult'...). As such it is a heuristic guide for sense-making which allows us to conceive of perceptual elements in terms of salience, value, valence and semantical weight, somewhat related to the mechanism of cue abstraction (Deli ge 2001) which focuses attention on salient elements that are prominent at the musical surface and summarize the sequences from which they arise. As such they provide key structures that play a foreground role in the musical work and help to grasp its design. They allow the listener to build a model of the *itinerary of musical information* (Deli ge 1992). In order to do so he or she may construct a certain number of fixed points in that environment, a procedure somewhat reminiscent of Tolman's method of *cognitive map* formation (1946), which is sufficiently general for being applied to listening to music.

### 3. DEICTIC ELEMENTS IN MUSIC

The concepts of deixis and deictic devices can be applied to the process of dealing with music. The notion of *referential schema* is very important here. It allows an operational description of space/time moments and their relations to the a reference point. Deixis, in fact, is centred with the position of utterance as the centre of the act of communication and the time of utterance as the time of coding.

#### 3.1. Temporal and spatial deixis

The concepts of *temporal* and *spatial deixis* are likely to be important here. Taking Lakoff's metaphorical treatment of time as space (Lakoff 1993: 216) we can understand time in term of things (entities and locations) and motion, with the present time at the same location, future times in front of and past times behind the observer who functions as the deictic centre. As to the motional aspect there are two possibilities: times are entities that are moving with respect to the observer or the observer is moving with respect to time. The distinction is related to the observer's listening strategies and his or her 'windows' on the time-line and the more 'conceptual' or 'experiential' way of listening. What matters here is the difference between a kind of 'panoramic' listening with the music unfolding and the listener as a stationary centre, as against the scanning of the temporal unfolding. The former represents the music at a glance, reducing the sequential aspects to a simultaneous image, the latter keeps pace with the discrete particulars and idiosyncrasies of its unfolding.

#### 3.2. Route-descriptions and cognitive maps

It is possible to use these conceptual tools in order to guide the listener in his/her involvement with the music. Music, in fact, can be considered as a sonorous unfolding through time, where the listener goes from 'here' to 'there' (Klein 1982). Trained listening could be stimulated by asking the listener to work out *route-descriptions* of different kinds. The basic idea, here, is to describe how to go from a starting point to a destination. Route-based techniques, further, allow the listener to navigate mentally through the music: to retrace or infer a route, to estimate the distance between the start and end nodes of a route or of the segments that make up that route, and to estimate the direction between the start and end nodes of the route or between various locations along the routes length (Kitchin 1997). In order to do so, the listener needs a kind of cognitive representation of the area in question. This is, in fact, a *cognitive map* which is the outcome of the structuring of previous and actual experiences, and which can be used as a guiding tool for dealing with music. Two options are possible here, somewhat analogous to the distinction between primary and secondary plans in providing route descriptions (Klein 1982): the primary plan involves the localization of a starting point and destination. Building up this primary plan may be done in advance, or step by step (advance or stepwise planner). It is a first condition for a successful route description. The organizing principle of the secondary plan is that of an 'imaginary journey' through the primary plan from the starting point to a destination. During this journey certain points of the primary plan are selected and marked. This series of 'fixed points' form the skeleton of this description. (Klein 1982).

Cognitive maps are interpretative frameworks of the world which exist in the human mind and which affect actions and decisions as well as knowledge structures. The cognitive map of space, e.g., is a physically unobservable structure of information which is held in the mind and which represents spatial knowledge (Kuipers 1978). Such a spatial map can be defined as the body of knowledge of a large-scale environment constructed by integrating observations gathered over time, in order to find routes and determine the relative position of places (Downs & Stea 1977).

The related concept of *cognitive mapping* can be defined as the mental structuring process leading to the creation of a cognitive map as an overall mental image or representation of the space and layout of a setting (Arthur & Passini 1992). It involves a tentative map, which indicates routes and paths and environmental relationships (Tolman 192). Cognitive mapping research, further, focuses upon how individuals acquire, learn, develop, think about and store data relating to the everyday geographic environment and the actual knowledge acquired (Downs and Stea 1973). This information is useful to planners, mobility specialists and navigation aid designers but it is obvious that it can be helpful for the development of listening strategies as well.

As to the assessment of cognitive map knowledge, we can distinguish between tests that measure aspects of *route knowledge* (retracing, distance, direction) as against *configurational knowledge* (where places are located in relation to each other) (Kitchin 1992). The distinction is somewhat related to the distinction Tolman (1948) has drawn between strip-maps and comprehensive-maps. The narrower and more strip-like the original map, the less will it carry over successfully to the solution of a new problem. The wider and the more comprehensive the original map, the more adequately it will serve in new set-ups.

#### 3.3. Hallmarks and cues

Building up cognitive maps entails the extraction of hallmarks and putting them together in some coherent way. Its utility is best demonstrated through tasks that demonstrate the map in action, such as *wayfinding* in a complex environment. Two strategies are possible here: the individual can use his/her cognitive map knowledge to guide the actions or he/she can use the cues in the environment (Kitchin 1997).

The simplest way of constructing a cognitive map is to use the landscape landmarks. Common elements of the countryside (mountain, hill, rock, stone, valley, stream, island, lake, cottage; wood, field, grass, meadow, hedge, bush, path, cliff, coast, beach, dune, see...) and outdoor objects (mailboxes, traffic signs, trees) are some examples. But every possible object of pointing can be useful here (objects, places, directions, actions, events ...). It is even possible to conceive of them not merely in terms of 'perceptual attributes' but also in terms of 'functional qualities' and 'action words' (Mazet 1991).

The whole domain of cognitive map construction can be applied to dealing with music. It is related to the domain of data collection and analysis techniques, from the simple (e.g. a sketch map) to the complex (e.g. multidimensional scaling). The listener, then, can be considered as a navigator who is trying to find his/her way in a sounding environment. It is known that fewer landmarks are

selected by bad navigators than by good ones and a navigators' bad performance can be attributed to the inability to acquire enough information from the environment. Listening strategies, therefore, are related to the problem of acquisition of a cognitive map and its application in the process of navigation. In order to make these claims operations, we must consider the cues the listener extracts from the sounding environment. Much is to be expected here from the descriptive vocabulary of cognitive mapping research in 3D virtual environments (Rameshsharma & Mowat 2001) and the problem of wayfinding in large-scale virtual environments.

## 4. REFERENTIAL SCHEMAS AND DEICTIC SPACE

The problem of wayfinding brings us to the concepts of local deixis, deictic field and route descriptions. Each of them stresses the role of a referential schema which allows an operational description of space/time moments and their relations to a reference point. It allows us to keep pace with the unfolding of the sonorous unfolding and to be able to give an adequate identification of the place and time in this unfolding. This is, in a way, the identification problem in deictic reference which entails the setting up of a common deictic space and a basic reference point or origo.

### 4.1. Deictic space

*Deictic spaces* generally are set up by summing up all possible denotata of local deictics or localities (e.g. rooms, streets, cities, countries), but the denotata need not be localities. They can be abstract places in a train of thought as well, as deictic spaces are sets of elements (the possible denotata) provided with some structure (an order or a topology). One has to make a distinction, however, between 'real' and 'analogical' deictic spaces, as in using a score or another graphical representation. Two spaces are involved here: the map and the geographic space represented by the map. The map functions as an analogue, and by pointing to an element of the map, we can refer to the analogous place in the 'real space'. (Klein 1982).

It is possible to conceive of music as a deictic space and to use this conceptual tool for guiding the listener in his/her involvement with the music. The listener, in fact must go from 'here' to 'there', and in order to do this, he/she must work out a *cognitive map* or *route-description* of the music he/she has heard. This cognitive maps may be differently structured for different listeners, but even if it is vague, incomplete, or even wrong in some respects, it may be very informative as to the way how an individual listener structures his/her own routes and how the attention may be focused on different objects. It allows a factual description of actual hearing strategies, but it provides operational tools for interfering in these strategies as well.

### 4.2. Catadeixis, anadeixis and anaphoric terms

To apply route-descriptions to the listening process can be handled in *anaphoric* terms. The concept of anaphora is used traditionally

for referring back (catadeixis) to things just treated (this, that...) or things that are to be treated immediately (anadeixis) (Ehlich 1982). In order to do this, however, we must have access to the flow of discourse as a whole, where parts may be re-taken up and anticipated. To quote Bühler: *Ö[the] whole must be accessible to sender and receiver, so that a wandering is possible, comparable to the passing of one's gaze over an optically present object. ... The adequate production and reception of any piece of music, for example, requires not exactly this, but something similar.Ö* (Ehlich 1982: 2)

### 4.3. Sensory snapshots, space-nodes and views

In order to make these claims operational, we propose a strategy which is centred on the concept of defining place as a sensory snapshot. A place is *Öwherever you are when you experience a given sensory imageÖ* rather than simply a set of Cartesian coordinates (Pinette 1994). To create a cognitive map, then, the representation should involve the capturing and organizing of sensory snapshots, together with a spatial information gathering strategy. A possibility for doing this is the 'Space Structure Diagram' which represents large-scale spaces using graphs (Ramasharma & Mowat 2001). In this conception of constructing virtual environments, space may be subdivided into functionally distinct regions, each of which is referred to as space-node, and which allows transitory relationships between them. Transit-boundaries provide interfaces between two space-nodes, with the possibility to enter (entries) and to exit them (exits). Views, further, are special points of views that reveal salient or landmarked sensory data of interest to the navigator within a given space-node. It is immediately clear that the generation of exits, entries and the creation of views allows us to capture and organise the pictorial representations of the virtual environment and to create a cognitive web. The application of this strategy to the problem of navigating through the music, however, still has to be done.

## 5. PERSPECTIVES

In this paper we have argued for an enactive approach to music cognition. The way how listeners extract landmarks and cues out of the perceptual flux is not merely dependent upon the perceptual attributes of the sound. Even important are the intentions of the listener who selects and delimitates at will, relying on functional signification rather than on perceptual qualities (Reybrouck 2001a). It is possible, however, to interfere with these extraction strategies and the whole area of cognitive mapping can be very fruitful for this task. We see as a challenging area for future research the elaboration of a kind of musical cartography with as basic questions the 'elements' which are represented, their 'expression forms' and the 'relations' between these elements. The problem is related to configurational techniques and to the representational format which may be analogous and continuous or symbolic and discrete. It is possible, in fact, to deal with music both continuously and intermittently, and to navigate mentally through the sounding structure. The whole technique of cognitive mapping and sketch mapping, in combination with graphic methods of representation and other kinds of visual interfaces, is likely to be very suited for this task.

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