Approaching the Acoustic Dimension in Cartographic Theory and Practice: An Example of Mapping Estonia(n)

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The opportunity to integrate the acoustic dimension into multimedia cartographic products bears a high potential for the creation of appropriate teaching and learning materials. For the study of linguistic features in the Estonian language – especially grammatical aspects – an audio-visual e-learning application, which is based on the technical means of Adobe® Flash®, has been created in the Geography Department at the Ruhr-University Bochum, Germany. The communication system of this tutorial is especially focused on some features of the acoustic dimension. Using references from various academic disciplines, this paper comprises three main objectives: the presentation of the application’s didactic concept, the description of the functionalities and correlations of the visual and acoustic dimension within the communication system and, finally, the disclosure of a catalogue of study questions that came up during the application’s planning, implementation and reflection phase. These possible questions for future research on cartosemiotics and theoretical cartography are mainly related to the, by now, scientifically unheeded acoustic dimension within the framework of the communication system of polysensory cartographic representations.

Keywords: theoretical cartography, grammapping, multimedia cartography, cartographic communication, e-learning, Estonian

1. Introduction

In scientific debates on the motivation of learning a foreign language, a significant philosophical aspect that connects foreign language acquisition to space is often not considered: tophilia, the love towards places. Following Bachelard’s idea of being in harmony with places – “des espaces aimés” and “des espaces louangés” (Bachelard, 1957, p. 17) – learners usually regard language as a valuable feature of the certain place(s) they are interested in. In order to combine the linguistic features grammar, pronunciation, intonation, vocabulary and orthography (Köller, 2009) with the geographical peculiarities of a specific place, “a centre of meaning constructed by experience” (Tuan, 1975, p. 152) where the learned language is spoken, it is, therefore, important to integrate aspects of geography into the curriculum. Making use of the tools and techniques of geovisualisation yields a diverse range of media representing the spatial reality to humans. Interactive maps, satellite imagery and digital 3D-models are examples of such up-to-date media. In addition, these products are interesting sources for the teaching and learning of both linguistic features and geographical facts at the same time (Edler, 2010; Edler & Dodt, 2010).

Using a selection of references from various disciplines, this paper aims to accomplish three main objectives. It (i) outlines the didactic concept of an interactive multimedia grammapp, “a map that not only contains geospatial facts but also combines them with grammatical phenomena of a specific language” (Edler 2010). This electronic product of multimedia cartography is based on Adobe® Flash® including the use of its versatile script language ActionScript and has been created in the Geomatics / Remote Sensing Group of the
Ruhr-University Bochum, Germany, for the purpose of creating e-learning material for the teaching of the Estonian language on a beginners’ level. After a brief introduction to the thematised grammatical characteristics of the Estonian language, the four didactic stages of the grammar are described with a specific focus on the user.

After displaying the didactic peculiarities, this paper (ii) is furthermore intended to present the application’s communication system which is relying on intertwined poly-sensory features – visual / graphic and acoustic / auditory variables, in this article also named signs and signals. Here, the functionalities and correlations of the visual and acoustic dimensions are highlighted. The aim is to indicate that the opportunity to include the acoustic dimension into multimedia cartographic representations bears a high potential to allow the user an easier cognitive “acquisition of space-related knowledge” (Wolodtschenko, 2003, p. 1977). Whereas research in theoretical cartography and, especially, cartosemiotics seems to be insistently and almost exclusively focused on the visual dimension – even after the beginning of “the phase of interdisciplinary and global interaction” in 1990 (Freitag, 2008, p. 59) – this article should, at least, hint at the opportunities of the acoustic dimension to be integrated into research in theoretical cartography.

In connection with that, this article (iii) reveals specific questions for future research in cartosemiotics and theoretical cartography. These questions came up during the planning, implementation and reflecting phases of the application. They are, furthermore, mainly focused on the acoustic dimension in (multimedia) cartography. Not only are they meant for displaying that, in cartographic theory, semiotics should develop from a science of signs to a science of sign(al)s but also for underlining the idea(l) (Wolodtschenko, 2008) that, nowadays, cartosemiotic research should renounce the ideological past and rather focus on the peculiarities and diversity of the communication dimensions.

Prior to the reading of the remaining chapters, the authors recommend the readers to explore the application, which is available here:
http://homepage.rub.de/dennis.edler/eesti_1.html

2. The didactic concept of the application

In the study of Estonian as a foreign language, the cognitive acquisition of motion events from one location to another, including the proper application of the singular forms of the “inner locative cases” Ilative, Inessive and Elative as well as the “outer locative cases” Allative, Adessive and Ablative (Tuldava, 1994), may imply some difficulties (Pajusalu et al., 2008). If a speaker of the Estonian language talks about his plans of making a journey, for instance, from Tartu (source) (in)to Püssi (goal) (Fillmore, 1977; Jackendoff, 1990) he or she might probably say: Ma lähen Tartust Püssisse. If he or she, though, changed the source into Jõgeva and the goal into Narva, the sentence would be: Ma lähen Jõgevalt Narva. Reading or rather listening to these two different sentences, native speakers of satellite-framed language like English, German or Swedish, in which “motion events are typically expressed via manner of motion verbs plus goal-marking adpositions” (Beavers, Levin, & Tham, 2010, p. 331; Talmy, 1975, 1985, 2000), might probably wonder about the changing suffixes in the geographic names that indicate the same semantic role.
In the fifth chapter of the Estonian textbook *E nagu Eesti* (Pesti & Ahi, 2002), which is designed for Russian, English, German and Finnish native speakers, students are invited to learn specific geographic names of Estonia in connection to the correct application of the inner and outer locative cases. Here, the students are not only provided with relatively little grammatical instructions but also with a map-like black and white sketch of Estonia, which allows them to get a first impression of the spatial distances between Estonia’s major cities. To further develop Pesti and Ahi’s approach of introducing the students to the rules of the inner and outer locative cases in combination with geographic names, an interactive multimedia cartographic tutorial, using the potential of both cartographic signs and signals, has been developed and created.

The most significant peculiarity of this application is the option to use the acoustic dimension, in addition to the visual dimension, in order to communicate the relevant information to the user. A selection of the publications comprising examples of geovisualisation in which the acoustic dimension is deeply involved can be found here: (Back, 2003; Edler, 2010; Fisher, 1994; Kornfeld, 2008; Lammert-Siepmann & Edler, 2010; Mills, 2005; Morrison & Ramirez, 2001; Müller & Scharlach, 2002; Müller et al., 2001; Schiewe & Kornfeld, 2009).

According to the Modality Principle in multimedia learning, it is recommendable to combine pictoral information with spoken text to make the cognitive acquisition easier – so called Modality off-loading. If additional information and messages contained in written text are displayed simultaneously with other signs of the visual channel, it may lead to an overload of what requires being visually taken up by the learner (Mayer, 2009; Mayer & Moreno, 2003; Moreno & Mayer, 1999; Mousavi et al., 1995; Penney, 1989).

![Figure 1: The Setting after Starting the Application](image-url)
The reduction of the written text on the screen, furthermore, makes a product of visualisation by far more attractive (Müller & Scharlach, 2001). Based upon these findings, the communication process in the grammap of Estonia(n) comprises four learning stages in which different information are gradually communicated to the learner. Moreover, the information are not only communicated in four serial stages but also in two different sensory levels, the acoustic dimension and the visual dimension (see table 1).

Table 1: The Didactic Concept of the Multimedia Application

<table>
<thead>
<tr>
<th>No.</th>
<th>name</th>
<th>learner’s action</th>
<th>communication</th>
<th>overall teaching aim</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>pre-stage</td>
<td>active listening to instructions of pedagogical agent</td>
<td>auditory (English)</td>
<td>A) Linguistic Features</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1. Grammar</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Elative, Illative, Ablative, Allative, Comitative</td>
</tr>
<tr>
<td>2</td>
<td>orientation stage</td>
<td>map reading</td>
<td>visual</td>
<td>2. Pronunciation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>esp. declension of place names, means of transports</td>
</tr>
<tr>
<td>3</td>
<td>testing stage</td>
<td>a) setting parameters of journey</td>
<td>visual</td>
<td>3. Intonation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) activating play button</td>
<td></td>
<td>of statements describing the fictional journey</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c1) active listening to / processing native speaker recording</td>
<td>auditory (Estonian)</td>
<td>4. Vocabulary</td>
</tr>
<tr>
<td></td>
<td></td>
<td>while</td>
<td></td>
<td>city names, county names, means of transport</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c2) watching / processing journey animation with pictogram</td>
<td>visual</td>
<td>5. Orthography</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>city names, county names</td>
</tr>
<tr>
<td>4</td>
<td>repetitive application</td>
<td>repeating “action” of testing stage with different parameters</td>
<td>auditory (Estonian) &amp;</td>
<td>B) (Applied) Geographical Skills</td>
</tr>
<tr>
<td></td>
<td>stage</td>
<td></td>
<td>visual</td>
<td>1. Estonia’s Geospatial relations</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Distances within the country, relation of number of inhabitants</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C) Cartographical Competence</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1. Map Reading skills</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>learning to decode auditory and visual signs, to extract / to filter information</td>
</tr>
</tbody>
</table>

After starting the tutorial, the user is confronted with the setting illustrated in figure 1. In order to get the instructions how to deal with the application, the user is supposed to click on the Intro-button in the left-upper corner. Having done this, the instructions are given by an invisible “virtual pedagogical agent” (El-Khoury et al., 2005; Haake & Gulz, 2008; Kritzenberger, 2004; Richard et al., 2006), an artificially established intelligence that communicates with the user through the auditory channel. This virtual guide is implemented to carry forward the didactic approach of motivating the learner. The enthusiastic intonation of the instructions, as a feature of the audio animation, should arouse the learner’s attention (Dransch, 2007) and can be reached by only a few implemented acoustic gestures (Raffaseder, 2010). This audio
instruction is given in English, the contemporary *lingua franca* of international business, science and technology. Since the communication process of sending messages from a sender to a receiver through the auditory channel relies on the “segmentation problem” of combining single phonemes to units (Goldstein, 2002, pp. 471-474), both the choice of words and the intonation of the agent require being well-conceived (Raffaseder 2010: pp. 53-56). Apart from the characteristics of the message, it is also recommended to consider the characteristics of the delivery, the listener and the environment (Wilson, 2009). To give a widely known example of listening errors in conversations, so called “slips of the ear” (Yule, 2010, p. 161), Ellis’s novel *American Psycho* (1991) contains a nice passage where the anti-hero, a serial killer, understands “murders and executions” instead of “mergers and acquisitions” (see further Wilson 2009: p. 13). Of course, the grammar of Estonia(n) is far away from any kind of killing intentions, however, this example shows the danger of misunderstanding auditory messages.

After this *pre-stage*, the second stage (*orientation stage*) is made up of the user’s diligent map reading. In other words, the user is asked to decode the system of graphic signs with the aim of becoming aware of the geo-spatial relations and distances between the represented Estonian cities. In addition to the process of gaining topographic information, he or she should especially extract the information represented by the circular symbols having different sizes and colours. The digital map key, which can be activated and deactivated by clicking the button in the bottom left-hand corner of the map surface (see fig. 1), should be a good help to understand what kind of object categories of the spatial and linguistic reality are represented by the two different graphic variables. Whereas the locations of the circular symbols on the map surface represent real topographic information – in this case the locations and spatial relations of some Estonian cities – the colours of the symbols represent a specific category of grammatical cases of the Estonian language that are applied to the geographic names of these locations. The red coloration signifies the respective geographic names blending in with the *Elative* (-st) and the *Illative* (-sse) whereas the green colour indicates a change of the name adding the suffixes of the *Ablative* (-lt) and *Allative* (-le). The complementary contrast of the colours red and green emphasises the morphological and grammatical discrepancy. The two cities Tallinn (from Tallinn: *Tallinnast*; to Tallinn: *Tallinna*) and Narva (from Narva: *Narvast*; to Narva: *Narva*) are classified as *irregular* to the other categories and their representative symbols are accompanied by a white symbol colour. While the colour of these polythematic circular symbols indicates grammatical phenomena, the symbol size, as another element of the six graphical variables (Bollmann & Koch, 2002, pp. 350-352), refers to a (human) geographical fact, which is the approximate number of inhabitants. The general question whether these examples of abstract map symbology (Hüttermann, 1998) are associative and fitting solutions to represent grammatical facts and topographic as well as demographic information at the same time should not be discussed here. This question is, however, an interesting topic for future cartosemiotic research.

After the user has thoroughly studied the map through visual information, the third stage (*testing stage*) particularly involves the processing of auditory information underlined by graphic animation. The learner uses the three graphical user interface widgets, to the left of the map surface, to define the following features for a fictional journey through Estonia: 1. starting place, 2. transport vehicle, 3. destination – from the top to the bottom (see fig. 1). After clicking the play button, native speaker recordings are played according to the chosen parameters in the combo boxes. While carefully listening to the native speaker recordings of the sentences that were chosen by user interaction, the user is supposed to process the pronunciation – and also intonation – of complete sentences in which the locatives are correctly applied. In other words,
the user is primarily confronted with an approach of contextualised grammar learning through the auditory channel. The study of the linguistic features pronunciation and intonation, which also serve as auditory ‘tools’ used to put across the grammatical knowledge, as well as vocabulary and orthography are subordinate. In the example of figure 2, the user can listen to the following sentence: *Ma sõidan autoga Viljandist Pärnusse* (engl. *I go by car from Viljandi to Pärnu*). In addition to the pronunciation, a pictogram of the selected vehicle is automatically moved from the starting to the finishing place of the journey (see figure 2); the speed of the movement relies on their distance.

![Figure 2: Sõitma autoga Viljandist Pärnusse – Going by car from Viljandi to Pärnu](image)

The fourth and final stage of the learning process is the *repetitive application stage*. The user is asked to repeat the process of the third stage as well as to apply it to all cities and grammatical classes respectively. The focus of this stage is the achievement of, especially, the primary and secondary teaching aim, regarding the linguistic features.

3. **The correlations of the visual and acoustic dimensions in the single stages**

While the preceding chapter is focused on the learner and, in general, on the didactic concept behind the ‘grammapical’ application, this chapter highlights the communication process. Here, the functionalities and correlations of the visual and acoustic dimensions are displayed. In the course of this, the potential of incorporating aspects of the acoustic dimension into multimedia cartographic applications is indicated.
During the pre-stage, in which the learner is asked to listen to explanations how the tutorial works, the communication – apart from visually identifying the button used to activate the audio instructions – is only based on the user’s decoding of audio signals. The audio signals used here make up a first audio unit or rather audio message that works as an impulse to enable and to guide the user’s proper decoding of the systems of the graphic signs and audio signals in the upcoming stages. As mentioned above, the intonation of the instructions also has a motivating function.

In contrast to the pre-stage, the orientation stage is characterised by the user’s extracting of topographic information as well as his or her right understanding of the grammatical and demographic information represented by the circular symbols. These steps of map reading rely on pure communication through the visual channel. Having activated the map key, the constellation of the visual sign system on the screen is static and not influenced by any further multimedia features. Although this stage has the function to give an impulse for activating the auditory messages in the next stage, it is comparable to the reading of a printed thematic map.

Whereas the human’s visual perception of the environment requires active and target-oriented focussing, the conscious as well as unconscious processing of auditory signals through the sense of hearing is, effectively, omnipresent. Due to this understanding which bears a high potential for future cartographic and cartosemiotic research, spatial perception is acoustically dominated (Raffaseder 2010, pp. 19-20). Following this idea, which was also adumbrated by Ackerman (1990) and Tuan (1993), the term remotely sensed map should be put into a new context that is far away from airborne and spaceborne sensor systems. Whenever multimedia cartographic products comprise stages in which the communication only takes place through the visual dimension (monosensory) and the visualisation on the screen, therefore, is comparable to a printed cartographic visualisation, the ‘felt distance’ between user (interpreter) and the represented information to be transferred is higher than in a multimedia cartographic product that also involves the acoustic dimension into the communication process. The more visual-based and static the (multimedia) cartographic product, the more ‘remote’ is the direct involvement of the user including his or her ‘sensing’ of information within the communication process between user [interpreter], cartographic representation [signs and signals] and categorised reality [referent] (Hruby, 2006, 2009; MacEachren, 1995; Nöth, 2000; Peirce, 1932).

In terms of the functionalities and, especially, correlations of the visual and auditory level in the single didactic stages of the tutorial, the testing stage is more complex than the two preceding ones. Since, at this stage, the user is invited to choose one of ninety combinations by defining the three aforementioned parameters, he or she has a direct impact on the constellation of the adaptive system of signs and signals that make up the process of audio-visual knowledge transfer. Depending on the user’s interest and his or her corresponding interaction, different auditory messages can be activated. These units of signals have the function to put across linguistic knowledge about Estonian grammar, pronunciation and intonation. The knowledge about the other linguistic features, vocabulary and orthography, are contained in graphic or rather textual signs on the map surface and within the combo boxes in the map margin. Furthermore, the auditory messages are backed up by redundant visual animations with the aim of relieving the cognitive learning process.
It is not only common sense but also “a long history of research on verbal learning” that agrees on the fact that presenting the same material twice ensures a higher learning success than just presenting it in one way (Mayer 2009, p. 141). Whenever a fictional journey is configured and activated in the grammar of Estonia(n), the cognitive input for the user takes place in a specific time sequence in which the systems of numerable, geometrically-related graphic signs and unlasting auditory signals are constantly and dynamically changing. Here, the “temporal animations” (Kraak, 2007, p. 318) are used to visually display the motion event that is simultaneously transferred acoustically, which promotes the learning success (Baggett, 1989; van Dijk & Kintsch, 1983; Mayer & Moreno, 2003; Rey, 2009). It should be stressed that in this example of a multimedia cartographic representation the acoustic dimension plays a superordinated role to transfer space-related – especially linguistic – knowledge.

According to the fact that the final repetitive application stage features the didactic role of being the iterative application of the testing stage to deepen the learner’s knowledge about the spatio-linguistic objectives, the communicative situation does not arouse new topics to be analysed here.

4. A catalogue of questions for future research

“Sound, in other words, provides us with more choices for representing ideas and phenomena and thus more ways in which to explore and understand the complex physical and human worlds we inhabit” (Krygier, 1994, p. 163). This quotation is Krygier’s last sentence in a valuable and often-quoted article, in which the author highlights the importance of paying attention to the acoustic dimension. With this article, Krygier also published a first approach to define a typology of abstract sound variables. MacEachren (1995: 288), furthermore, classifies Krygier’s approach to be “at a level similar to that of Bertin’s [(1967)] graphic variables”. Vasconcellos (1996), who invented six tactile variables, should also be mentioned at this stage. Based upon Krygier’s definition of a specific feature set to explore the acoustic dimension in theoretical cartography, Antoni et al. (2004) published a French online-article in which the functions of sound in multimedia cartography are classified into four categories: 1. sound can represent a visual variable, 2. sound can be used to guide the user’s attention on the map surface, 3. sound can act as a narrative element to embellish map reading, 4. music can create a particular atmosphere. Nevertheless, this interesting approach, which indirectly seizes on the idea that sound either works as a source of information or a source of entertainment (Riedl, 2000), has not been further developed. Another approach to categorise how sound can be combined with maps was made by Bidoshi et al. (1999). Here, sound is rather regarded as a source of information.

Two years before the aforementioned publication by Krygier (1994), Blattner et al. (1992) stated that sound was just in its beginnings of being explored as a feature of communicating information with maps, an idea that was also stressed by Peterson (1995). Although sound and sonification were obviously meant to be further explored in theoretical cartography and its neighbouring disciplines, this development has – with only few exceptions – never really occurred since the mid-nineties of the last century. Fairbairn et al. (2001) published a “research agenda” of representation forms and its relations to cartographic visualisations. In here, the authors remarked: “Expanded multimedia interfaces and their multi-sensory representations (visual, auditory, haptic) are now commonplace: once again the opportunities for and mechanisms of information representation and transfer to the user must be studied” (Fairbairn et al. 2001, p. 17). This comment, which mirrors the state of the art in research about poly­sensory cartographic representations, is also underlined by Jacobson (2002), Scharlach (2002) and Wolodtschenko (2008).
The recently published – in English 2009 and in German 2010 – ICA Research Agenda on Cartography and GI Science also calls for new research on the acoustic dimension in cartographic theory:

“Understanding cartographic communication is the starting point for both map design and usability analysis. Cognition and visual perception have been analysed in order to get theoretical basis for map design rules. Perception of maps leads to information acquisition and learning about the topic. Research in psychology and physiology, which cartographers should be aware of, continuously reveals new knowledge about the human perception processes: it would seem valuable to follow this and ensure that visual perception, as well as audio and tactual perception is taken into account. Learning theories based on contemporary approaches to perceptual studies also support map design and map use research.” (Virrantus et al. 2009, 5)

Reflecting this brief ‘history’ about the acoustic dimension in theoretical cartography, it has to be stressed that scientific approaches should be made to discuss and to clarify how the acoustic dimension theoretically fits into the framework of the – omnipresent – multimedia cartography. In addition to this general and fundamental topic, a catalogue of specific questions that came up during the creation process of this multimedia grammap is given here.

1) When talking about electronic products of (multimedia) cartography that involve the acoustic dimension, are the terms cartographic visualisation and cartosemiotic visualisation appropriate? Should there rather be a term that is not immediately associated with only visual cartographic representations?

2) How can Peirce’s (1932) idea of the triadic correlation between referent [object/category], sign [cartographic representation] and interpretant [user/cognition] be applied to the auditory level within cartosemiotic models?

3) In educational applications of multimedia cartography, could a different weighting of the visual and acoustic dimension bring out advantages for different types of learners? In terms of sensory perception, is the acquisition of space-related knowledge easier for people who prefer the auditory learning style when a product has a stronger focus on the acoustic dimension? If yes/no, is it the same with people belonging to the visual learning type? What about people who preferably learn through tactile perception?

4) Within the communication system of audio-visual cartographic representations, can the visual dimension underly the acoustic dimension? If yes, in what situations – or even when – is the system of graphic signs more redundant than the system of auditory signals and vice versa? Can the relevance of the different dimensions, then, be generelly balanced, measured and classified? If yes, can these data be illustrated in, for instance, two-dimensional graphs: x-axis time (within stages); y-axis: relevance?

5) Following the idea that spatial perception is acoustically dominated, what is, in general, the potential of digital acoustic cartography?

6) Can not only graphic signs but also features of non-visual data dimensions, such as audio signals, have a geometrical reference within multimedia cartographic representations? (see also Krygier 1994)

7) If graphic signs are used in multimedia cartography to activate auditory signals, what are the recommendations for their designs? How can those graphic signs be made associative?
8) Are there better solutions than coloured circular symbols to represent grammatical features in cartographic representations used for teaching purposes? How can the representing symbols be optimised to be associated with linguistic features?

9) Can the idea of grammapping be applied to printed products of cartography? Could, for instance, the lenticular foil technique, especially its flip technique, bring out printed grammaps? (see further: Buchroitner & Wälder, 2004; Dickmann, 2010; Dickmann et al., 2009)

10) Are there other disciplines that can nowadays animate the scientific discussion of developing cartosemiotics and theoretical cartography? Could, for instance, the spatial turn, as a modern paradigm shift in the humanities, bring out interesting debates and approaches for the development of theoretical cartography? Could researchers from disciplines like cultural and social sciences, literary studies or/and philosophy bring in additional or entirely new input about the meaning and representation of signs in cartographic products? Does, for instance, the idea of spatial turn that space is a construct, in other words, a result of social interactions of human beings, prompt questions about the representation of space and reality? (see further: Agnew, 2005; Bird et al., 1993; here especially Chambers, 1993; Hallet & Neumann, 2009; Harvey, 1993; Döring & Thielmann, 2008; Gulson & Symes, 2007; Warf & Arias, 2009)

11) What potential for the empirical cartography is hidden behind all these questions? What could possible results bring out for cartosemiotics and theoretical cartography?

5. Sound in theoretical cartography: a dimension to be explored

Although the presented grammap of Estonia(n) only covers a very limited range of the very complex Estonian grammar, it might have exemplified that multimedia cartography has a high interdisciplinary potential. The idea of audio-visually representing grammar and applying it to features of the represented reality of Estonia’s – and Ireland’s (Edler 2010) – topography, shall be a beginning to open an interdisciplinary ‘cartographic toolbox’ for linguists and language teachers on the one hand and cartographers on the other hand. At present the authors are preparing a thesis in which the concept of mapping linguistic features is subsumed under the umbrella term life-mapping. This term does not only cover the mapping of grammar (grammapping or gram-mapping) but also the mapping of the other linguistic features pronunciation (prono-mapping), intonation (into-mapping), vocabulary (vocab-mapping) and orthography (ortho-mapping).

Aside from the general idea of mapping linguistic features, the description of the application’s conceptual peculiarities should have indicated that the combination of the visual and the acoustic dimension can be used to compose modern and multifaceted cartographic material for educational purposes. The principle of multimedia learning, which is to combine auditory and visual information or rather animations, while – at best simultaneously – communicating them to the user, ‘acts as spokesman’ to more strongly integrate the acoustic dimension into future cartographic – and also non-cartographic – applications for the real and virtual classroom.

Having mentioned the potential for the practical implementation of the auditory features, there is also a need to work on further research topics on the role and functions of the acoustic dimension within the framework of theoretical cartography and its neighbouring study fields. Since each cartographic product is individual and characteristic in its own way, it is, of course, a complex issue to deduce general rules, concepts and theories. Nevertheless, the description of
the peculiarities within the communication system of the multimedia grammar has indicated the diversity of the topics to be approached scientifically. The brief 'history' of the acoustic dimension in theoretical cartography as well as most of the eleven questions given in the preceding chapter not only reinforce the need for research on the acoustic dimension in cartographic theory but also show that theoretical cartography and, especially, cartosemiotics should not be only a science of signs. The quantitative revolution caused by the invention of multimedia requires rethinking the topics to be explored in future cartographic and cartosemiotic research. The eleventh question furthermore points to the connection between theoretical and empirical cartography. It should also be considered that the more empirical research is done, the better theory can be proven.

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7. References


