Radio: Borderless and selective
On the use *codes* in radio broadcast
Jacob Thøgersen

The universal radio
In the beginning of the 21st century, the Internet may be heralded as the great bringer of free information to all, but in the earlier parts of the 20th century this role appointed to the great new invention, the radio. In Denmark, the earliest experiments with radio broadcasting started as private initiatives in the 1910s and 1920s. By 1925, the state took over responsibility for the broadcasting of radio and established Den Danske Statsradiofoni (The Danish State Radiophony). Thereby, a monopoly was built which was maintained until the 1980s.

There was a clear pedagogical aim with establishing a state radio. The radio was seen as a means for public education and public announcements, much more than mere entertainment. The radio was seen in a double sense as "nation building": It strengthen the internal coherence of the nation that all listened to the same broadcasts, and it was seen as building the nation's character that all had access to learned lectures and fine culture.
By 1940, when the broadcasting company celebrated its 15th anniversary by publishing a book, the Prime Minister, Thorvald Stauning, wrote in the preface about the foundation for the state radio:

> "[…] der skabtes en Statsinstitution, fri for al Spekulation, Reklame og privat Interesse, en Institution alene beregnet paa at yde sin Tjeneste for Landet og Folket og som Bindeled ud til Verden" (Breidahl & Rée 1940: 5f).

> *A state institution was created, free from speculation, advertising and private interests, an institution intended solely to serve country and people and to act as a link to the outside world*.

It was a prime concern that the entire nation could be reached through radios, and that all had access to the broadcasts. In Stauning's words:

> "Statsradiofonien anlagdes paa at faa forbindelse med alle Hjem i Landet og i Virkeligheden med mange Millioner Hjem uden for Landets Grænser" (Breidahl & Rée 1940: 5).

> *The National Broadcasting Company was established to connect with all households in the country and in fact with millions of households outside the borders of the country*.

It is clear that the rhetoric used about radio was one of *universality*, *inclusion* and *openness* – not unlike the rhetoric used about the Internet some 60 years later. There are good technological reasons for discussing radio in terms of universality. Radio waves, of course, do not respect border, be they national, regional or social. There is no network and no cables to connect to, unlike the telephone and, until recently at least, the Internet. And the radio was always envisioned as *broad*casts. Unlike the telephone which we see as a medium for one-to-one communication, the radio was always a means of mass communication and sharing of content.

What is interesting, then, is to highlight some of the ways in which radio is not and was never *universal*, *inclusive* and *open*, i.e. some of the features which make radio *not* accessible to all. Investigating these will lead us further to consider some of the strategies that are being used, sometimes deliberately, to counteract the inherent *universality*, *inclusion* and *openness*.

Radio waves: Access to the broadcasts

Firstly, it is interesting to ask oneself if radio waves did really have the universal coverage suggested. Did they "connect with all households in the country and with millions of households outside the country" or were some listeners excluded from listening? When the state radio started in 1925, in fact only the capital, Copenhagen, and its surroundings had a decent signal. By 1927, a radio transmitter was built in Kalundborg in the geographical center of the country (see Figure 1); and from then, universal coverage is assumed. In 1935, this was supplemented by another transmitter on the western outskirts of Copenhagen, Herstedvester, to benefit Copenhagen and its surroundings where densely built areas compromised radio reception (see Figure 2).

In spite of the ideals, when looking at measurements of the field strength in the year, Figures 1 and 2, it is obvious that some parts of the country received a much stronger signal than others. Even the weakest signal measured should be sufficient by today's standards, if they were also at the time, we will leave for others to determine. Suffice it here to point out that although radio was intended to cover all Danes, some Danes apparently were prioritized. The capital area in the far east of the country receive strong signals from both transmitters, whereas the northernmost and westernmost parts as well as Bornholm which is placed in the top right corner of the map, but is geographically in the southeast of the country, receive much weaker signals.

[Figures 1 and 2]

How then about the "millions of households outside the borders of the country"? Figure 3 illustrates where Danish shortwave broadcasts were being received. The small dots mark one receiver, the larger collect 10 receivers, the colored bands mark the areas of strongest field. Two things are interesting to notice: Firstly that quite a lot of the receivers are in areas northwest of Denmark, The Faeroes, Iceland and Greenland. All of these were at the time colonies, and as such they take an intermediary role between "all of the households of the country" and the "millions of listeners outside the country". Most of the other receivers are in the Americas, and a few are in Australia. With the rather patchy short wave coverage and in a 1940s world with a population of about 2.5 billion, Stauning's vision of "millions of listeners" is maybe a little overly optimistic…

[Figure 3]

Even if people have access to the broadcasts, that is not necessarily the same as having the opportunity to listen to them. After all, few people have the option to set aside all other chores only to listen to the radio. We are lucky enough to have information on listener habits from roughly the same period, namely from 1952 (see Figures 4-6).

[Figures 4-6]

Each set of three figures show one occupational group: Farmers and farmhands (Fig. 4), workers in Copenhagen (Fig. 5), and housewives in the cities (Fig. 6). For each group, the top graph shows their habits on weekdays, the middle one shows Saturdays, and the bottom one shows Sundays. On the horizontal axis of each graph is shown the hours of the days, on the vertical percentages of the group as a whole. Each graph shows two lines, the top one shows how many from the group are awake at a given time, the bottom one shows how many listen to the radio. The diced area, in other words, show how many are awake *without* listening to the radio. As you can see, all groups listen to the radio on weekday mornings, but at slightly different times, workers at 6, farmers and housewives at 7 or 8. Many more farmers, however, listen to the radio at noon, where hardly a worker listens to it. Everybody, it appears, listen to the radio in the evenings, though more in the cities than in the country-side. The farmers have almost the same routine

all seven days of the week, whereas the workers listen much more to the radio in the weekends, especially Sundays. On Sundays, housewives share the same pattern as their worker husbands; on the other days of the week they listen remarkably much more to the radio than do the other groups. In the absolute peak times on Saturday nights between 80 and 90 % of all groups listen to the radio.

These patterns again raise questions about the universality of the radio, because it may be that all have access to the radio, but it is certainly not the same as saying that everybody listen to the radio all the time, or indeed that they listen at the same time and to the same programs. It is in other words possible to have universal radio coverage and only one radio channel available, and still have fragmented media use where "all of the households of the country" rarely form the united listenership envisioned.

The main point of this paper, however, is not how access to the radio waves is limited, but rather how through various devices, access to the *content* of the broadcast is restricted. Even when the radio waves and the radio receivers do their part, access to the information may be limited. As a cover term for the different ways in which this happens, intentionally or unintentionally, we use the term *code*.

Codes

To explain what we mean by code, we will first have to define what we mean by a coded message. A coded message is formed in a way that it is understood only by the intended recipient(s). Casual over-hearers etc. will not receive a message at all or will misinterpret the message as meaning something different than its true intended meaning. A *code*, then, is a relationship between the transmitter and the ratified recipient(s). Using this very general definition of codes, all radio broadcasts are of course by their very nature encoded, i.e. as e.g. electromagnetic signals. As such all radio communication is based on the transmitter sending a coded message and the recipient decoding. *Codes*, *encoding* and *decoding* thus are central elements in information theory (Shannon & Weaver 1949) and are a *sine qua non* of radio broadcasting. Although fundamental for radio, or indeed *because* they are fundamental, they are not what interest us. The transmission codes become invisible, because only *if* a channel is secured with successful application of codes, is there any transmission at all to analyze. The *codes* we focus on here are not quite as fundamental to the very ability to transmit radio, but they are just as ubiquitous.

To better understand how codes are also used as devices of exclusion, a look at Goffman's (1981) *Participation Framework* may be helpful. Goffman discusses the different status participants may have in a communicational event: Some listeners are *ratified*, i.e. their participation in the communication is acknowledged, other listeners may be *unratified*, e.g. overhearers, eavesdroppers etc. When codes are being deliberately used in broadcasts, there intended function is to single the ratified listeners from the unratified listeners, thus establishing a channel between the transmitter and only some of the potential recipients. The work of WW2 codebreakers could be explained as that of peeking through the wall erected between ratified and unratified listeners. Goffman further distinguishes between *addressees* and non-addressees, a very useful distinction in media where you often have an addressee (e.g. an interviewee) who is in fact secondary to the ratified non-addressees (the listeners). Just like the listener roles are analyzed by Goffman, so is the speaker roles. A speaker may be *principal*, *author* or *animator* of his text. Often he or she will be all of these, but they need not be. This is particularly relevant to the media, e.g. in newscasts, where the person speaking (the animator) is rarely the one who composed the message (the author) and never the one responsible for it (the principal).

Let us try to show how an awareness of codes may be relevant in the analyses of radio broadcasts.

Coded broadcasts: The language as code

In 1944, Denmark was occupied by Germany. On 19 September the following message was broadcast. The recording was supplied by the Danish National Broadcasting Corporation (DR). According to archival resources, the broadcast was picked up in Britain and recorded by the BBC. Today it exists as two record-sides.

Alt tydede på en opløsning af retstilstanden, og man drev Danmark frem mod bolsjeviseringen. Det lykkedes en forbryderisk underverden at vinde så megen indflydelse i det offentlige liv, at den med resultat kunne proklamere generalstrejke og andre alvorlige forbrydelser af den offentlige orden imod befolkningens sande interesser.
En besættelsesmagt fra et land, som i den alvorligste time kæmper for sit liv, kan ikke længere tillade en sådan udvikling. Dens interesse ligger i opretholdelsen af ro og orden. Besættelsesmagten ser sig derfor nødsaget til at foretage en omorganisering af det danske politi. Indtil denne omorganisering er bragt til ende, indføres der derfor fra i dag, den nittende september nitten hundrede og fireogfyrre klokken tolv nul nul, politimæssig undtagelsestilstand over hele Danmark. Hele det danske politi sættes indtil videre ud af funktion. I overgangsperioden sørger den tyske besættelsesmagt for ro og orden. De ønsker at yde den velvilligt indstillede del af befolkningen enhver tænkelig beskyttelse mod forbrydelser.
[...]
Alle handlinger som tager sigte på at forstyrre genindførelse af ro og orden vil blive hensynsløst bekæmpet.

To the reader who doesn't understand Danish, it should be quite clear how this proclamation is encoded – it is encoded in a language. At first glance it may seem trivial to note that a verbal message is encoded in language, but the trivial fact has some quite interesting consequences. If we again revisit Stauning's vision of reaching "all households in the country and millions abroad", firstly, it is plain to see that the millions abroad are reduced drastically when the broadcast is in Danish – which it practically always is. Secondly, also the intention of reaching all "households in the country", experience some dramatic challenges. Although Denmark was and is by international standards a remarkably homogeneous society in terms of language and culture, there always were people living in the country who do not understand Danish. By adhering to an implicit policy of monolingual broadcasting, everyone not understanding Danish is defined as not belonging to "all households". This is the fact no matter if the people are short-term ex-patriots, permanently settled immigrants, indigenous linguistic minorities (e.g. German speakers) or they are the peoples of the (then) colonies (Greenland, the Faeroes and Iceland). If the use of the common code of Danish is used to build national coherence, it is also used to exclude the "fringe" citizens who are not speakers of the country.

To discuss the various uses of codes in the text, we will need to break the language-code, i.e. translate the text to a shared code, English.

Everything pointed towards a disintegration of the state of law, and Denmark was pushed towards Bolshevization. A criminal underworld succeeded in gaining so much influence on the public life that it could successfully proclaim a general strike and other serious crimes against the public order and the true interests of the public.
An occupying power from a country which in the darkest hour fights for its life, can no longer allow a development like this. Its interests lie in maintaining peace and order. The occupying power therefore finds itself forced to undertake a reorganization of the Danish police. Until this reorganization is concluded, a state of emergency for the whole of Denmark is declared as of today, the nineteenth of September nineteen forty-four at twelve o'clock. The whole of the Danish police is relieved from its duties. In the transitional period, the German occupying power will take care of peace and order. They wish to extent all thinkable protection against crimes to the well-disposed part of the public.
[...]

All actions which aim at disturbing the restoration of peace and order will be ruthlessly fought down.

In bilingualism studies, the term *code* is also used. Here *code* refers to a language or a dialect which can be distinguished from other *codes*. Bilinguals will always switch between the codes they have access to and which they share with their interlocutors. One interesting dynamics of *code-switching* is in diglossic situations, i.e. bilingual situations in which all speakers share the same languages but these languages are used for different functions. In these one of the languages will often take on a symbolic meaning of solidarity and intimacy (the *we-code*), another code is ascribed the symbolic meaning of status and power (the *they-code*) (Gumperz 1982). Classical examples are the use of Hindi and English in India or the use of standard and dialects in e.g. Norway.

The use of linguistic codes have a double function. On the one hand they work in securing a channel to the recipient, i.e. they convey a message. On the other hand, they function *indexical*, i.e. they ascribe identities to the speaker and the listener. By uttering a message in Danish you not only convey that message to an audience, you also define yourself as a speaker of Danish, and your listeners as competent recipients of Danish. Combined with a strong ideology of the unity of people, state and language, in effect, you are defining yourself and your listeners as Danish – Danish functions as a we-code. It constructs non-Danish speakers as alien, and it builds unity between transmitter and receiver.

In the sense that Danish is used as a we-code, there is an interesting contradiction between the message and the code in which it is transmitted: Even though the message is we-encoded, the content is clearly *not* that expressed by an occupied country, but rather that expressed by an occupying force – as clearly stated. Where the *animator*, then, ascribes to himself a Danish identity and may try to build rapport with his Danish listeners, it is clear that the true originator of the message, the *principal*, is an outsider. One could claim that the we-code is a fictional one, and that the symbolic value of a shared code is being exploited for propagandistic ends. The message appears to be more "you-coded" than it is we-coded.

Codes within codes: The discourse as code
The linguistic codes do not stop with decoding the language. Even if you have access to the semantic content of the message, it is still clear that there are messages hidden underneath the immediate surface of the text. The text, like any text, uses a specific *discourse*, a system of representing the world through language. Like all other discourses, it is accessible only to listeners who share certain presuppositions, and it attempts to establish its own presuppositions. Looking just at the very first sentence: "Everything pointed towards a disintegration of the state of law, and Denmark was pushed towards Bolshevization", we doubt that anyone today fully understand the significance of the word "Bolshevization" – or indeed that the contemporary listener would. It is clear from the context that "Bolshevization" is a negative process. It is clear also that the principal of the message assumes the evaluation of "Bolshevization" as negative to be a shared presupposition. The merits of "Bolshevization" are not debated, whereas the introduction of a state of emergency is deemed a reasonable response to "Bolshevization". It is of course also clear that "Bolshevization" has something to do with the Soviet Union and with international communism, but the exact workings of a "Bolshevization"-process are not spelled out, and need not be for the message to serve its purpose. The message, then, rests on the pretence that it shares linguistic codes with its listeners while it does as much to push its own presuppositions onto the recipient. In short, words encode value; no choice of word is value-free, just think of the classical example of "terrorist" vs. "freedom fighter". The ways in which state broadcasters propagated certain ideologies through their choice of discourse was widely studied in Scandinavia in the 1970s and 1980s by the school of (Marxist) ideology criticism (e.g. Mortensen 1972). Furthermore, the comprehensibility of the broadcast news by ratified listeners has been analyzed.

Poulsen (1988) showed that it is far from obvious that listeners understand the news simply because they comprehend the language they were read in.

More significantly, this text seems to hold two messages, one on a superficial level and another one on a deeper, subtext, level. On the surface the text speaks of: "a criminal underworld" which exerts "crimes against the public order and the true interests of the public" resulting in "disintegration of the state of law", and how "Denmark was pushed towards Bolshevization". Conversely, the occupying power is constructed as the protector of the public: its "interests lie in maintaining peace and order", it "finds itself forced to undertake a reorganization of the Danish police" and it "wishes to extend all thinkable protection against crimes to the well-disposed part of the public". In sum, the stability of the country was under attack from alien interests, the occupying force is the protector of the people. On a deeper level, the message proclaims introduction of martial law. The Danish government no longer possesses police authority, and the every-day life of the Danish citizens is overshadowed by the occupying military forces in a way it wasn't before. This is a proclamation of the velvet glove coming off, one might say. It is interesting to see how the "deeper" layers of the text seep through in the last line: "All actions which aim at disturbing the restoration of peace and order will be ruthlessly fought down". If the rest of the message is composed to imbue confidence and understanding from the general public, the last line is composed as a full-on threat to potential trespassers. We believe that the message is intentionally encoded in such a way that the general public receives (or at least the more naïve parts of the general public) receive a message of goodwill, whereas any critical opposition will receive a message of a superior power willing to use any means necessary.

Wartime propaganda messages are of course a very special case, but we believe the praxis of encoding value in ones choice of word as well as encoding ones message in a way that only some will unearth the true implications is everywhere. As a case in point, just look at partisan news stations' coverage of national politics in e.g. the USA. Left-leaning channels will have a different set of terms from right-leaning channels. And what one channel may use as neutral term, may for the other be used as a scare on a par with the use of "Bolschevization" above. The use of different discursive codes, then, functions to separate "us" from "them" while at the same time maintaining and expanding on the differences.

But also outside of politicized broadcasting is different discursive codes used to identify listenership. The shipping forecasts which were common in Danish radio and probably in all national radios of all countries with a significant fishing fleet is one example; but once you start noticing codes they are everywhere. A typical Danish shipping forecast will contain weather description in Beaufort and locations like Dogger and Helgoland. To the regular listener, these are completely opaque terms. Exactly the same may of course be said of highbrow programs on fine culture. In a program a review by give reference to authors, works or philosophical ideas that are equally opaque to the non-schooled listener. In such ways technical discourse, whether it is fisherman's terms or the cannon of high culture become *codes* that separate the ratified from the non-ratified listeners[1]. Having good taste, then, can be a code. But codes are not only used to discriminate between people of different knowledge, also more private messages are encoded to create exclusive groups of "those who get it." A long-running program was "Giro 413" a program where listeners donated money to charity in return for getting their greetings read out and their song played on the radio. Traditionally listeners would write that "guests had passed the hat around" to collect money to Giro 413, but gradually a set of codes evolved where listeners expanded on the "pass the xxx around", e.g. "guests passed granny's old hat around" etc. For these *codes*, of course, the message is secondary, what is fundamental to this use of code is to discriminate between the ones who participated (and who can

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[1] Curiously, cultivation was explicitly used as a gate-keeping device in the broadcasting corporation. When speakers were employed, they were tested for their knowledge of fine culture. Not knowing Beethoven's symphonies or Strindbergs's plays made one unwanted as an official presenter.

commemorate the event), i.e. those who *get it*, and the ones who did not participate and are not in the know[2]. The practice of airing messages that are only transparent to those in the know is of course also common among radio DJs, in particular in non-corporate radio. Just think of greetings to people mentioning their nick name or first name only, or references to shared experiences.

Secret codes in broadcast

One thing initiated this discussion of *codes* more than anything else: As mentioned, the sound file was supplied by the DR. When we first listen to it, it appears to be "polluted" with various noises. Another channel can be heard in the background – one playing classical music. This is not very surprising given that it is not a studio recording, but a reception from Britain. More noticeable, though, are beeps at 4000 Hz that start almost exactly simultaneously with the news reading, and last for a large part of it. At first they appeared to be just random noise, but after a while we got suspicious that they might be intentional, and attempted to decode them as Morse. This proved successful. The strings of beeps did indeed conform to Morse, and the first couple of groups read A – C – H – T – U – N – G, clearly the beginning of a message, and not random noise. The full Morse transcript reads:

> achtung es folgt text tempo 70 vvvvvvvvvv ii ii dieses eichverfahren ist s. 183 ausfürhlichtr erläutert. 1 kathodenstrahlenröhren. 2 wirkungsweise. abb. 38 bringt man im innern einer glühlampe gegenüber dem = en regle generale, on ne repro duit dans les proces = verbaux 150 que l'insertion an

There appear to be a couple of errors in it in "auführlicht(r)", "repro()duit" and possibly also "kathodenstrahl(en)röhren" and "inner(e)n". The numbers "1" and "2" are both followed by the sign "–.– – .– " which we haven't been able to decode. The sentence "en regle generale…" we found in a treatise on radio telegraphy from 1913 the other text strings, although decipherable, are a complete mystery.

Truth be told, we have no idea what the message is. It flows uninterrupted in the same pitch and tempo, leading us to think that it is intended as a coherent message, but what the message is, and who sent it, and who the intended recipient was, is a mystery. Any ideas on this will be very welcome! No matter what this particular message is, and no matter if it was sent by the same transmitter as the spoken message as a parallel text or it is a different transmitter flooding the Danish broadcast (which is probably more likely), it is unquestionable that Morse transmits exist and that secret messages are broadcast. Examples of broadcasts in Morse are of course the early Marconi radiotelegraphy, and famous examples of coded messages being broadcast are for example that Franco's coup in July 1936 was initiated by the call "Over all of Spain, the sky is clear", and from a more local perspective, the BBC sent coded messages to Danish partisans using the form "We bring greetings to…". More recently, the Conet project (http://www.irdial.com/conet.htm , http://en.wikipedia.org/wiki/The_Conet_Project) has brought attention to the European "Number transmitters" which send out numbers believed to be coded messages to spies. Some of these transmissions are spoken, others are in Morse.

Coded messages sent in Morse are interesting once one become fascinated by codes because they are codes within codes in numerous qualitatively different layers. Firstly, Morse is of course a code. It is a simple digital system in which a string of short and long beeps and pauses denote arbitrary numbers and letters in the alphabet. In order for Morse to convey meaning, transmitter and receiver must hold the same Morse key. Morse is however an *open* code – anyone interested in deciphering Morse messages can learn the key. Knowing the code and deciphering the symbols is only the first step to cracking the message though. Because Morse encodes messages in higher layers. In the text above, some of the letters encode a

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[2] Thanks to my colleague Jacob Kreutzfeldt for directing my attention to Giro 413.

message in German, some encode a message in French, and as it was argued above, languages are also codes. Furthermore some of the deciphered Morse symbols seem to encode "arbitrary" strings of letters and numbers, e.g. "abb 38", "s. 138" and the string of v's and i's. It would seem that these strings require decoding through a secret key – most likely what is known as a one-time pad. And looking more closely at the French and German texts, it actually seem that they do too. The sentences are in themselves nonsensical fragments, it seems likely that they have a second-layer translation which only the intended recipient can translate. Figure 7 shows a graphical sketch of these layers upon layers of code.

[Figure 7]

The different layers highlight different aspects of codes. Codes can be *open* (as Morse) or *closed* (as one-time pads); codes can be *visible* in the sense that everybody can see that there is a code (like Morse or language) or they can be *invisible* (like discourse codes or hidden messages like "Over all of Spain…"); codes can have *high redundancy* in the sense that the next sign can be extrapolated and lost signs can be inferred, or they can have *low* or *no redundancy*. An example of the first is human language: When you see the letters A – C – H – T – U, there is a good chance that the next will be NG. With the codes "abb" and "183" (if indeed they are codes), there is no immediate chance of knowing inducing the third sign from the first two. The latter system of course saves bandwidth, but the first has an inbuilt failsafe and is far easier to remember… Interestingly, the interpretation of text's "spelling errors" depends on the view of the code as one with high redundancy or one with low redundancy: In the first "ausführlichtr" is presumably a deviant form of "ausführlicht", in the second it is a different message.
There are interesting hybrids of language codes and secret codes. Famously the USA in the WW2 used native speakers of Navajo to transmit messages using their language, in effect encoding it in a code they knew no enemy would be able to crack.

Conclusion
Now, our aim with this paper is of course not to suggest that there are secret spy codes in all broadcasts – although it would be interesting if there were… Our suggestion is rather that codes are ubiquitous in broadcasts whether we intend them or not, and that they function to make broadcasts exclusive to the ratified recipients only. We highlighted some different codes: *Languages* and *dialects* act like a code; programs are typically in only one language, and stations typically broadcast all or the majority of their programs in one language. Effectively they limit access to their programs to all who don't share knowledge of the language. This does not always seem to be intended, but this is the result. *Discourse* act like a code. It encodes messages in a rhetoric which may seem transparent and neutral to the transmitter with a certain (ratified) recipient in mind. But to those who don't share time and place or cultural values with the recipient, they may be neither transparent nor neutral. When we today look at the rhetoric of the mid-1940s it is not immediately clear what was meant by "Bolshevization" and how it acted like a scare the way it did. And looking at contemporary messages it is clear that e.g. reports from different political backgrounds are anything but neutral, to the point that they are incomprehensible. Finally, the more exotic secret "spy" codes highlight some of the features which we claim are relevant to think about when thinking of codes in more general terms: Are the codes *open* or *closed*, *invisible* or *visible*, *redundant* or not etc. We believe that the function of codes is twofold: It *excludes* non-ratified listeners and it *identifies* some listeners as ratified and others as not. Different uses of code will bring these two aspects into focus in different measures. For the spy codes, exclusion of non-ratified listeners (i.e. the enemy) is paramount. The DJs casual greeting of his friends using nick names, clearly works mainly to show exclusivity and strengthen bonds. The use of (national) languages and discourse as codes is interesting in that it more often than not has neither objective but none the less succeeds in excluding some listeners and underlining them as excluded.

References

Breidahl, A. & K. Rée (1940): *Danmarks Radio – den danske Statsradiofoni gennem 15 Aar*, Copenhagen: Chr. Erichsens Forlag.

Christiansen, E., K. Rée & J. Rosenkjær (1950): *Statsradiofonien 1925-1950*, Copenhagen: Gyldendal.

Geiger, T. & T. Agersnap (1952): *Kortfattet rapport vedrørende Radioundersøgelsens resultater*, Copenhagen: Statsradiofonien.

Goffman, E. (1981): *Forms of talk*, Philadelphia, PA: University of Philadelphia Press.

Gumperz, J. (1982): *Discourse Strategies,* Cambridge: Cambridge University Press.

Jørgensen, H.C. (1984): *Statsradiofoniens teknik*, Copenhagen: Danmarks Radio.

Mortensen, F. (1972): *Kommunikationskritisk analyse af 22-radioavisen*, Kongerslev: GMT.

Shannon, C. & W. Weaver (1949): *A Mathematical Model of Communication.* Urbana, IL: University of Illinois Press.
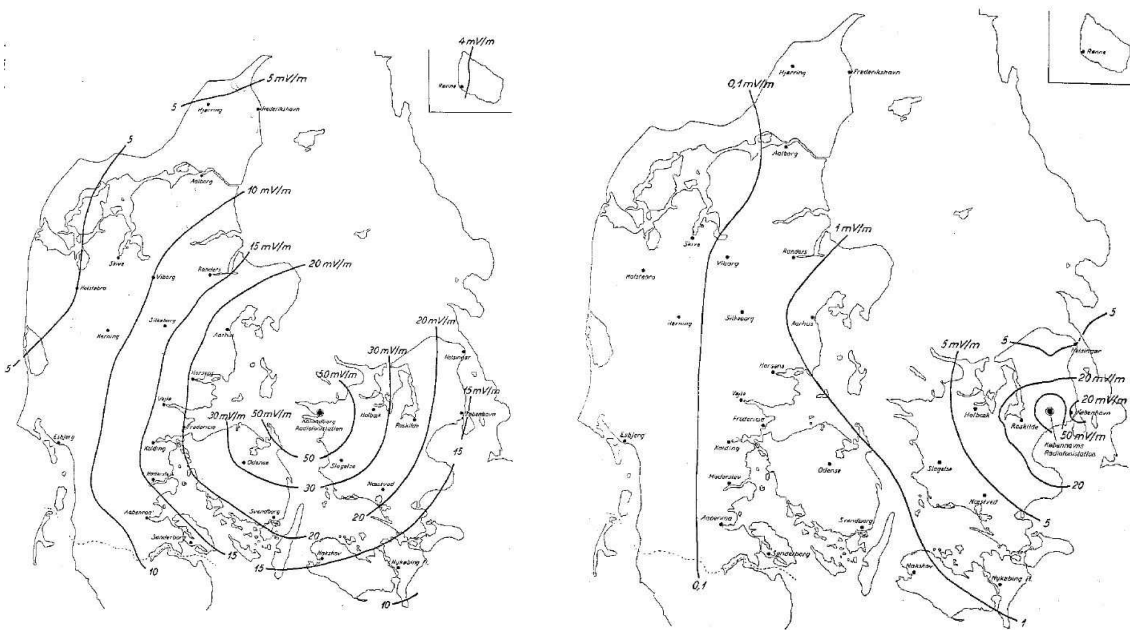
Figure 1: Field strength measurements, 1941, Kalundborg (Jørgensen 1984: 105f)
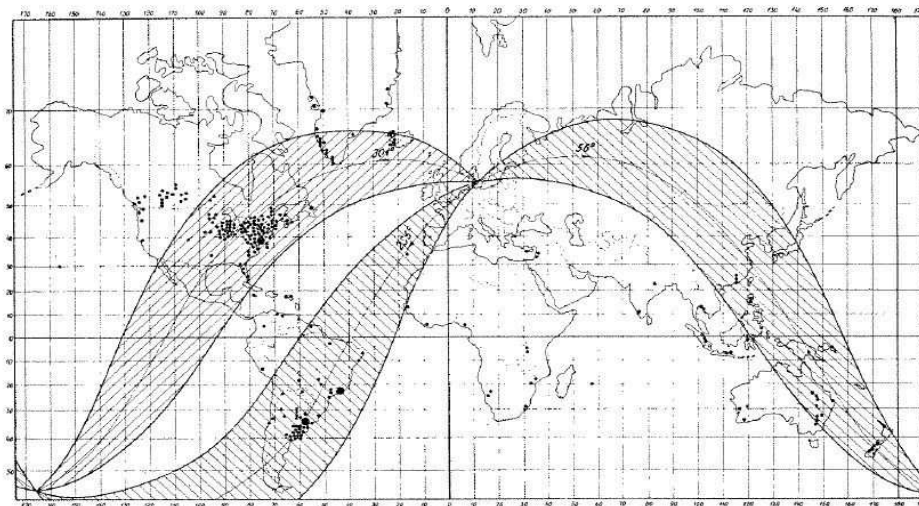Figure 2: Field strength measurements, 1941, Herstedvester (Jørgensen 1984: 105f)

Figure 3: Field strength of the shortwave broadcasts, 1938 (Christiansen, Rée & Rosenkjær 1950: 354)
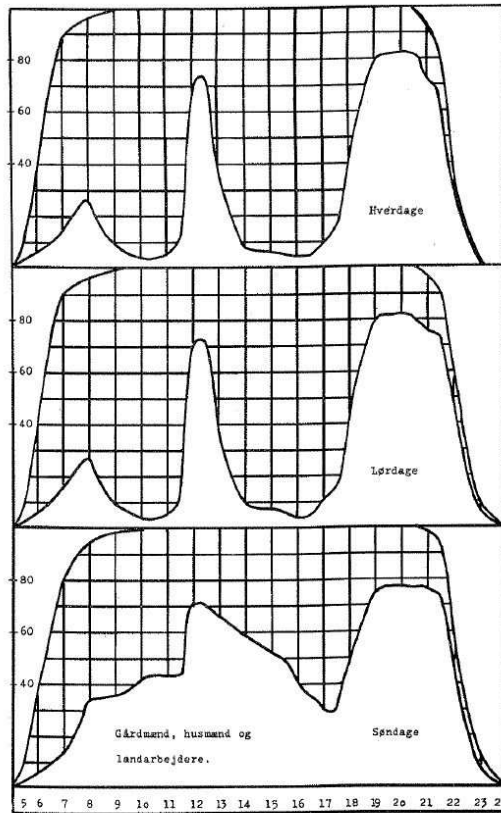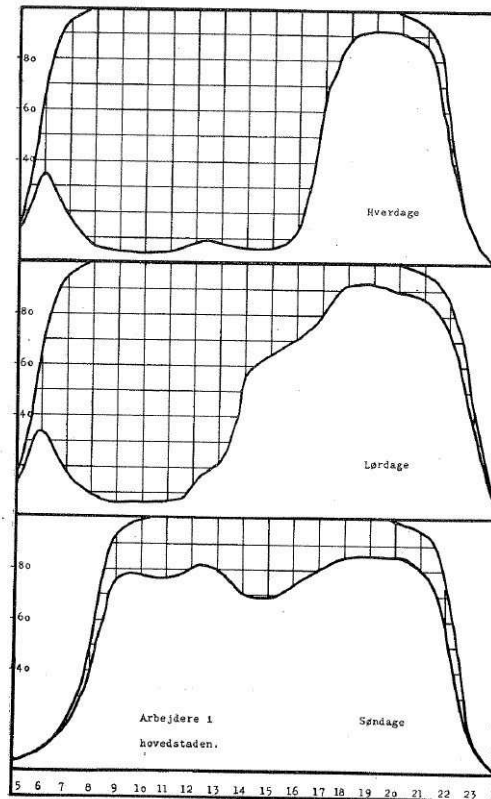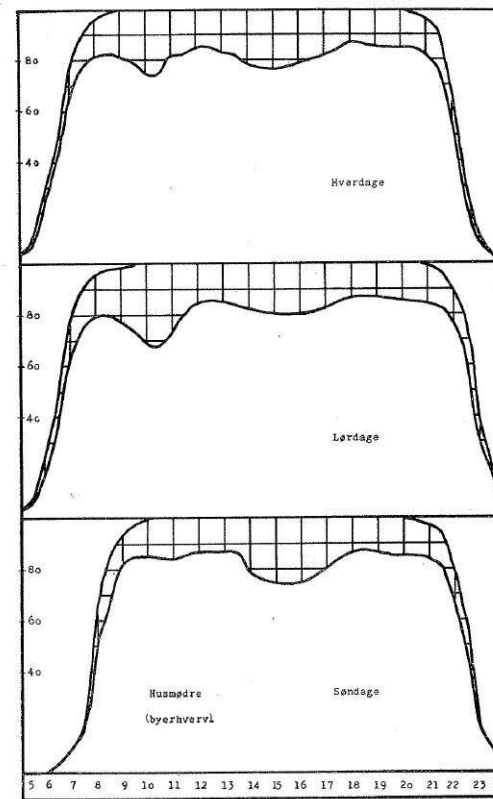
Figure 4: Listener habits, Farmers and farmhands

Figure 5: Listener habits, Workers in Copenhagen
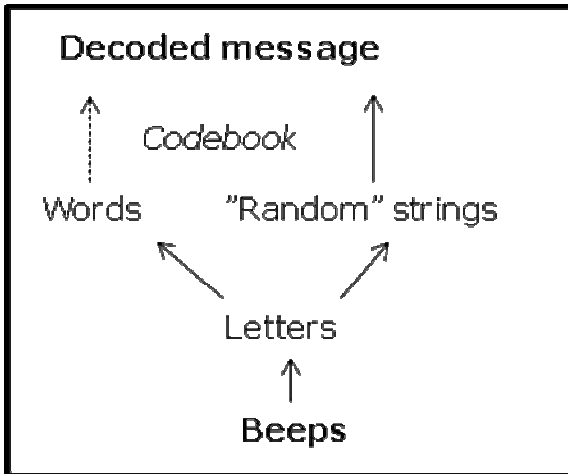
Figure 6: Listener habits, Housewives in the cities

Figure 7: Layers of code in a Morse message