Calculating Medical Uncertainties:

Enactments of the HPV vaccine
in Läkartidningen

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Calculating Medical Uncertainties: Enactments of the HPV vaccine in *Läkartidningen*

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Abstract
In Science and Technology Studies (STS) it has been argued that medical knowledges and practices have been increasingly influenced by economic theories, methods and devices. This study takes this as a point of departure to investigate meetings between medicine and economics in the Swedish medical journal *Läkartidningen*. Utilizing ANT inspired theories it explores how the HPV vaccine is enacted relationally to sociotechnical arrangements of health economic devices and methods as well as to other health technologies such as the Pap smear and the HPV test. It is shown how problematizations of the Swedish cervical cancer screening programme in *Läkartidningen* allow for a space of calculability that performs the HPV vaccine and the Pap smear as possible to contrast, compare and coordinate through health economic calculations. It is also argued that uncertainties of how to balance individual and population vaccination protection create a space of calculability that enable calculations of gender and herd immunity.

**Key words:** the HPV vaccine, the Pap smear, health economics, spaces of calculability, enactment devices, economization
Introduction

In Science and Technology Studies (STS) research it has been highlighted how medical knowledges and practices have been increasingly influenced and transformed by economic theories and devices (see Sjögren, 2006). The present study takes this as a starting point to grapple with the presence of health economic devices, methods and theories when the HPV vaccine is discussed in the Swedish medical journal *Läkartidningen*. In studies discussing an increased influence by economics over medicine practice and health care, studies have made use of Michel Callon’s framework of economization to grapple with the performative capacities of economic and knowledge and devices; how the presence of economics in medical practices can be understood as an effect of arrangements configured during an economization process. Hence that this is something that is done and created (see Çalışkan and Callon, 2009; 2010). However, drawing upon studies carried out by Tein Zuiderent-Jerak (2009) and Ebba Sjögren and Claes-Fredrik Helgesson (2007) I think it is important to study transformations of healthcare as not merely about an increased focus upon economics but rather how these intersect and/or are in tension with medical and political values, knowledges and devices. Therefore, in the present study I highlight meetings between economic and medical devices, technologies, methods and knowledges in *Läkartidningen*’s discussions of the HPV vaccine.

The study focuses on how the HPV vaccine is relationally enacted into being, how it is realized relationally to different entities. Hence, it deals with relational materiality (see Law, 1999: 4). I make use of Actor Network Theory (ANT) inspired work – especially economization theories – to explore how the HPV vaccine is enacting into being through sociotechnical arrangements, meaning the work put in by different entities to enable and enact the HPV vaccine. Accordingly, I assert that the HPV vaccine does not exist by itself; instead it is crafted and assembled in and through relations (Law, 2005: 54, 59). In this sense, technologies – the HPV vaccine as well as others - are not discrete entities. In this study I aim to address this question by asking what heterogeneous and complex relations, technologies, devices and knowledges that enable and enact the HPV vaccine in *Läkartidningen*. Hence, I focus on the performativity of different sociotechnical entities by means of exploring how the HPV vaccine is shaped and what it is enacted to be. I examine how medical technologies, devices and entities such as the Pap smear, the HPV test and Genital Warts are interrelated to
health economic theories, methods and devices and how all these different entities allow for enactments of the HPV vaccine.

Aim and Research Questions

The aim of this study is to find out how it could be possible to use ANT inspired theories to grapple with different materialities and technicalities linked to the HPV vaccine. I make use of a case study of how the HPV vaccine is enacted in *Läkartidningen* through sociotechnical arrangements of different technologies, devices, values and knowledges as a way of getting more knowledgeable about how it could be possible to study the HPV vaccine as relational materiality.

I ask the following three questions:

1) How is the HPV vaccine enacted in *Läkartidningen*?
2) How is the HPV vaccine linked to other technologies, devices, values and knowledges in *Läkartidningen*?
3) How could it be possible to make use of ANT inspired theories to grapple with the HPV vaccine?
A Short Background to the HPV Vaccine and its Swedish Context

The vaccines Gardasil and Cervarix are used to prevent type 16 and 18 of the sexual transmitted disease human papillomavirus (HPV) which together are estimated to cause 70% of cervical cancer cases per year (MPA, 2010). There exist over 100 different types of HPV. 14 types are proved to cause severe cytological abnormalities, precancerous lesions and cervical cancer (NBH, 2008: 14). HPV is transmitted through genital skin to skin contact and both men and women transmit the virus (NBH, 2008: 71).

After the approval of Gardasil and Cervarix in the US in 2006, due to their status as the world’s first “cancer vaccines”, these two vaccines have been hailed by physicians, public health practitioners and the popular press as constituting a major advance in public health (Braun and Phoun, 2010: 39). Both vaccines have been widely marketed and promoted in Sweden after their approval by the Swedish Medical Products Agency (MPA) – Gardasil in 2006 and Cervarix in 2007 (MPA, 2012). Since 2010 it has been decided to include the HPV vaccine in the Swedish vaccination programme for children and will soon be prescribed for girls in 5th to 6th grade. Due to this, the Swedish state has also decided to purchase one of the two vaccines. At first it was decided that the vaccination should start already in 2010 (MPA, 2012). At this time, the Swedish state decided to purchase Gardasil, developed and launched by the pharmaceutical company Sanofi Pasteur. However, the pharmaceutical company GlaxoSmithKline (which developed Cervarix) decided to lodge an appeal against the decision. In January of 2012 – after several appeals from both of the pharmaceutical companies – it was decided that Gardasil should be purchased and distributed through the Swedish vaccination programme. This dispute over the national procurement has been debated and covered in Swedish media. As this study will show, it has also been discussed in Läkartidningen.

In Sweden it has also been a debate regarding direct to consumer (DTC) advertising and the HPV vaccine. In Sweden, advertising for prescription pharmaceuticals directed to the consumer is allowed when it comes to vaccines against infectious diseases such as HPV (MPA, 2012). This has resulted in extensive DTC advertising for the HPV vaccine, especially for Gardasil. As with the national procurement, the DTC advertising has been discussed in Sweden – this for instance in Läkartidningen.
Previous Research: the HPV vaccine in STS and Sociology

As a way of arguing for the relevance of my approach, I will discuss some of the STS and sociological research carried out about the HPV vaccine. In particular I will discuss two predominant aspects of previous research: the HPV vaccine as gendered and the HPV vaccine as part of an ongoing transformation towards individualized risk and health in Western societies. I will discuss these two different, but often interconnected themes of previous research by means of showing what I draw from them and why I in this study have chosen a partly different theoretical approach.

The HPV Vaccine as a Gendered Technology
In previous research it has extensively been discussed how the HPV vaccine is permeated with meanings of gender/sex (Casper and Carpenter, 2008; Mara, 2010; Thompson, 2010; Mishra and Graham, 2012) and how advertising campaigns and policies are reproducing gendered and heteronormative discourses and social relations (Polzer and Knabe, 2009; Connell and Hunt, 2010; Mamo et al, 2010; Vardeman-Winter, forthcoming 2012, Mara, 2010). Several studies have investigated how gendered discourses, norms or assumptions are inbuilt in the HPV vaccine. In particular, these studies often focus on how gendered assumptions evident in for instance HPV vaccine policies or advertisements construct the HPV vaccine as a “girl’s vaccine” – as a gendered technology directed towards the girl body. Accordingly, these studies are concerned with questions about what discourses and normativities construct girls as natural and given targets, users or consumers of the HPV vaccine. They frequently focus on how identities, subjectivities and subject positions are constructed by such policies or advertisements. In common these studies assert that the HPV vaccine for different human actors or discourses serves as a tool to govern and regulate adolescent girls and/or their parents in gendered ways. For instance Thompson (2010) makes use of a feminist poststructuralist approach to discuss how gendered discourses evident in Gardasil policies govern and control adolescent girls through constructions of gendered subject positions. Another example is Mara (2010) who discusses how Gardasil is produced as a girl vaccine through heteronormative assumptions that reproduce discourses about women and girls as in need of protection.
The HPV Vaccine as an Individualized Risk and Health Technology

The same studies which discuss the gendered and heteronormative implications of the HPV vaccine also discuss the HPV vaccine as a part of what is understood as contemporary transformations of biomedicine towards an individualization and commercialization of risk and health responsibilities. Often the HPV vaccine is discussed as being part of an imperative of health or a moralization of health that exhort girls to manage risk as a way of anticipate future health (Polzer and Knabe, 2009; Connell and Hunt, 2010; Mishra and Graham, 2012). Hence, in these studies, it is stressed how health and risk responsibilities are individualized; the adolescent girl (and sometimes her mother or parents) is produced as morally responsible for managing cervical cancer risk through use or consumption of the HPV vaccine.

Since these studies often employ a similar theoretical framework, I will broadly discuss some of the strands of thought in these frameworks. Previous research about the HPV vaccine often makes use of the biomedicalization framework developed by feminist technoscience scholar Adele Clarke with colleagues (see Clarke et al, 2003, 2010; Clarke and Shim, 2011). Whilst medicalization theorists often emphasize how individuals are put under medical control due to medicalization processes, the biomedicalization framework stresses broader technoscientific transformations, connected to an “emergent biopolitical economy of health, illness, life, death, and medicine” (Clarke et al: 2010: 22). In line with this, it traces a shift from “enhanced control over external nature” (medicalization) to “the harnessing and transformation of internal nature, often transforming 'life itself'” (biomedicalization) (Clarke et al: 2003: 164).

Another, similar, theoretical framework that frequently is employed in previous HPV vaccine research is contemporary theories of biopolitics, understood in line with what Nikolas Rose (2001, 2007) entitles “politics of life itself”.¹ Rose argues that contemporary biomedicine can be found in the convergence of individualized risk and a molecularization of life. He stresses that contemporary biomedicine has its focus on life at the molecular and biological level, something which has brought about productions of what he discusses as novel risk and molecular based biopolitical subjectivities. Today, he asserts, individuals have to understand, and take responsibility for, their lives and bodies through a somatic, biological and molecular gaze.

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¹ Clarke and Shim pay attention to the multiple parallels between the biomedicalization framework and Rose’s notion of “politics of life itself” (2011: 182).
To illustrate this point, a good example of a HPV vaccine study making use of both Clarke et al’s and Rose’s approaches is a study carried out by Laura Mamo, Amber Nelson and Aleia Clark (2010). In their study of US direct to consumer advertising for the HPV vaccine Gardasil, they argue that the HPV vaccine is a part of a biomedicalization of health that produces adolescent girls as responsible to manage cervical cancer risks “in the name of health”. It is asserted that the advertisements have “life itself” as its target, something which produces gendered “risk-based, genomics-based, epidemiology-based, and other technoscience-based identities” (Mamo et al, 2010: 124).

**Homogeneity or Heterogeneity**

Most of the above discussed studies tend to treat the HPV vaccine as a technology that reflects, and is a product of, social relations and/or gendered discourses. In this sense, the majority of previous research does not first and foremost focus on the HPV vaccine itself. Rather the vaccine is assumed to reflect for instance gendered power differentials or broader biomedical transformations towards individualized and commercialized risk and health. Due to this, it is seldom highlighted or explored how the HPV vaccine potentially actively transforms and affects social, political and economic relations. Instead of highlighting the transformative capacities of the vaccine itself, discourses, power relations and social processes are assumed to work through the vaccine. For instance, Mamo et al (2010) discuss how the HPV vaccine in the US became “the right tool for the job” without actually stressing how the HPV vaccine actively contributed to this.

An exception is however research performed by Monica Casper and Laura Carpenter (2008, 2009a, 2009b). In these studies, they assert that the vaccine invokes and transforms society and politics; hence they focus on the capacity of the HPV vaccine as an active transformative actor. However, studies have not discussed how the HPV vaccine itself is an effect of sociotechnical performative practices or doings. In the same way, studies have not explored or discussed how different technologies, artifacts and/or devices take part in the formation of the vaccine. Consequently, when the assumptions or discourses behind the vaccine are discussed, technologies or other nonhuman entities are not discussed or taken into account. I believe this assumption that the HPV vaccine only is produced by, and serves to reproduce, social (gendered) relations or broader biomedical transformations neglects important aspects of what is going on. I believe this tends to have a homogenizing effect; everything is to be understood as parts of ongoing discourses of individualized risk and health and/or heteronormative
discourses. By utilizing ANT inspired work in this study I want to see what happens if I attend to the HPV vaccine differently. Instead of seeking a singular biomedicalization discourse, I want to explore how “the single is counterbalanced by the heterogeneity of multiplicity” (Law, 2000: 18). To be able to grapple with heterogeneity in Läkartidningen I believe I need to attend to articulations concerning both human and nonhuman entities.
Theory: Enacting the HPV Vaccine through Medical and Economic Knowledge, Technologies and Devices

4.1. A Multiplicity of Perspectives and Interpretations or Multiple Enactments

In two articles about the US cervical cancer screening program Adele Clarke and Monica Casper (1996, 1998) make use of the concept of boundary object to emphasize a multiplicity of interpretations and perspectives to enable a study that has the complexity of a range of medical and technical practices, human and nonhuman actors and social worlds as its focus. Focusing on the classification and standardization of Pap smears, they argue that classification systems serve as boundary objects, as “objects that inhabit several intersecting worlds and satisfy the informal requirements of each of them” (Clarke and Casper, 1996: 603). Attempting to map all the important actors of the screening program, they stress how the Pap smear is “framed around interpretive struggles over classification and its purposes” (Clarke and Casper, 1996: 603). As a boundary object, the Pap smear allows interpretive flexibility within an internationally standardized system (Clarke and Casper, 1996: 613).

Hence, Clarke and Casper make use of an interpretive and perspectival approach to be able to stress the complexity and heterogeneity of the Pap smear. Utilizing the boundary object concept, they assert that the Pap smear is differently interpreted by different actors (Clarke and Casper, 1998: 257). As John Law and Vicky Singleton (2005) stress, this kind of perspectival approach is common in studies of objects. In a similar vein as they highlight in the case of alcoholic liver disease, the HPV vaccine could be grappled with by using the boundary object concept. It could be explored if it could be understood as “as a crossing point between different patients, physicians and all the other relevant social groups, a reality that is flexibly interpreted in order to shape the transactions between those groups” (Law and Singleton, 2005: 334). However, once again in line with Law and Singleton, I want to explore where it gets me to utilize an ontological approach: I want to investigate the performativity of sociotechnical arrangements; how entanglements and disentanglements realize the HPV vaccine.

To illustrate this, I will broadly contrast Clarke’s and Casper’s study with that of Vicky Singleton and Mike Michel (1993) and Singleton (1993). Adopting an ANT approach Singleton and Michel show how the cervical cancer screening programme in the UK enacts
both a clear, singular, definite practice that follows the explicit policies of the government and other practices, less coherent but more multiple and dispersed. Singleton (1998) argues that the screening programme in this sense is characterized by a multiplicity of identities that makes a co-existence of stability and instability possible. She discusses this as an ambivalence that in fact is necessary for the continued existence of the screening programme; she argues that the actor-network grows and stabilizes itself not because the links are all drawn together, but rather due to the fact that they are inconsistent. Hence, Singleton (and Michel) argues that there exist two cervical cancer screening programmes: one messy and one discrete. In this study I want to make use of this insight to investigate the messiness and multiplicity of the HPV vaccine (how the HPV vaccine is enacted into being), this in contrast to study different interpretations that would make up the HPV vaccine as flexible but still stable.

**Enactment Devices and Coordination between Objects**

Mol criticizes what she entitles perspectivalism for multiplying the observer but leaving the object observed untouched and alone (Mol, 1999: 76; Mol, 2002: 12). She proposes a different approach that foregrounds the practices, materialities and technicalities that enact objects into being. In a similar way as Mol, I will particularly focus on the specific tools or devices that help to achieve distribution of different objects. I will discuss how the HPV vaccine is linked relationally to other objects, technicalities and materialities.\(^2\) Especially I will discuss how the HPV vaccine is linked to the Pap smear, the HPV test and to health economic devices and methods (especially cost-effectiveness devices). In highlighting technicalities and materialities involved in processes that make the HPV vaccine come into being, hopefully a study that emphasizes how the HPV vaccine is not merely a product of social relations and/or gendered discourses is possible.

\(^2\) In the end of this paper, in a concluding discussing part, I will raise some ideas about how it perhaps could be possible to also make use of Mol’s and Law’s idea about multiple objects, that is how multiple versions of an object that goes under the same name is enacted in different practices. Using Mol and Law, I will discuss how it perhaps would be possible to discuss how coordination or coexistence of different versions of the HPV is enacted in *Läkartidningen*. Hence not only how the HPV vaccine is enacted in relation to the Pap smear and to health economic devices but also how coordination and distribution allow for multiple versions of the HPV vaccine.
Economization Processes and Health Economic Enactment Devices

I investigate how health economic methods, theories and devices can be understood as arrangements configured during an economization process of health care; meetings between medicine and economics are done, they are carried out (cf. Çalışkan and Callon, 2009, 2010). Related to the HPV vaccine, this includes that I focus on how the HPV vaccine is shaped as having something to do with health economics. Especially, when including health economic devices in the analysis, I can discuss how “devices and artifacts contribute actively to making the realm that constitutes the action itself as a possibility” (Çalışkan and Callon, 2010: 4, 11).

Callon asserts that calculativeness is made possible through calculating devices, methods and theories (Callon, 1998: 23) and that entities must be made calculable in order to be calculated (Callon and Muniesa, 2005: 1229). Drawing upon this, in this study I will particularly focus on the presence of health economic devices, methods and theories in the articulations about HPV vaccine in Läkartidningen: how they allow for calculations of the HPV vaccine. I discuss them as enactment devices that help creating what Callon and Muniesa (2005) and Zuiderent-Jerak (2009) discuss as spaces of calculability. As Callon and Muniesa argue, to be calculated, entities that are taken into account have to be arranged and ordered in a single space. I use this to discuss how Läkartidningen allows for different calculative spaces that, in turn, make possible calculable sociotechnical arrangements of different entities (2005: 1231-1232). In this sense, I discuss how health economics in Läkartidningen constitutes an arena (incorporating several calculative spaces) that allows for enactments of the HPV vaccine as calculative. I also explore how spaces of calculability possibly enable calculative comparisons and coordinations between the HPV vaccine, the HPV test and the Pap smear.

I draw upon the concept of market devices (but will instead talk about enactment devices) as discussed by Fabian Muniesa, Yuval Millo and Michel Callon. They discuss a market device as a “simple way of referring to the material and discursive assemblages that intervene in the construction of markets” (Munisesa, Millo and Callon, 2007: 2). Hence, market devices are objects with agency that can “qualify and render calculable, and therefore make economic valuation possible” (Sjögren and Helgesson, 2007: 236). Crucially, the constitution of “material devices are part and parcel of the processes of economization” (Çalışkan and Callon, 2009: 384). Making use if this, it is possible to investigate how economic theories, artifacts and devices configure the HPV vaccine in economic terms but also how this is (dis)entangled with medical knowledges and technologies. I can therefore explore how the
HPV vaccine is enacted simultaneously as something calculative and non-calculative though sociotechnical arrangements.

In this study, hence, I aim to make use of an economization approach to enable discussions of how enactment devices serve to translate the HPV vaccine as economically calculative. This is in line with the approach of a study carried out by Ebba Sjögren and Claes-Fredrik Helgesson in the context of health economics and medicine in relation to the qualification and classification of pharmaceuticals in Sweden. Essentially, they investigate how “qualification of objects is an integral part of making them calculable” (Sjögren and Helgesson, 2007: 216). They analyze how a sociotechnical process of economization is coordinated with “ostensibly non-economic qualities of the drugs being evaluated” (Sjögren and Helgesson, 2007: 229). This attention to the intertwinements of economics and non-economic qualities is helpful when talking about qualifications and calculations of the HPV vaccine.
Method: Textual Analysis

Studying the Social Organization of Texts
In this study I am inspired by Dorothy Smith’s (1978) version of textual analysis. Smith suggests a method that stresses the importance of analyzing the social organization of a particular text in authorizing its facticity. She argues for the importance of analyzing which organizational features of the text enable to read it as a factual account of a situation, happening or experience. Herein, social organization is used “in a sense which leaves the question of planning or purpose open” (Smith, 1978: 24). Especially, Smith asks what organizational features of the text give rise to a reading of it as a factual account; hence how the organization features of the text are constructing the account as the right way of understanding what is taking place and/or what something should be understood as. In this sense, “to describe something as a fact or to treat something as a fact implies that the events themselves – what happened – entitle or authorize the teller of the tale to treat that categorization as ineluctable” (Smith, 1978: 35). This allows for a textual analysis that focuses on, what Smith discusses as, the preliminary instructions that are given in the text for how to read and understand it (Smith, 1978: 33). Drawing upon this approach, I am enabled to leave questions of the authors’ intention or intentionality out from the analysis. Instead I can focus on enactments done in, and through, the text.

When I carried out my analysis, I made use of Smith’s notion of contrast structures to grapple with the work that is done by specific words and articulations in Läkartidningen (cf. Smith, 1978: 44). I looked for words, sentences, objects that in the texts (i.e. the articles) are positioned as standing in contrast to each other. Whereas Smith first and foremost talks about how human actors are constructed in particular ways in texts, I have used her theory to also talk about objects such as technologies and devices. In this sense, I found that “cost-effectiveness” and “health economic evaluation” often are contrasted with “uncertainties” and that “the HPV vaccine” is contrasted with “the Pap smear”.

I have also investigated how, for instance, values, categories, devices and technologies are linked to each other in the text (even though, it should be said, contrast structures also are a particular way of linking things together). In this sense, I have made use of Smith’s (1978)
notion of contrast structures, but I have used it as only one possible example of how objects are enacted in relations—not as the only way.

Drawing upon the focus in ANT inspired work on relational materiality and the relationality of entities, I have focused on how technologies and devices in the articles are enacted and/or constructed through relations that link them together (Law, 1999: 4). This includes how links and connections are done, how they are made. This is also about how different things, orders or practices co-exist. This is what Annemarie Mol and Jessica Mesman in an ANT inspired article about method discuss. They investigate how different orders (discourses, networks modes of ordering, logics) co-exist (1996: 433). Instead of asserting that one order always is contrasted with another (which in my study could be that the practice of the HPV vaccine is contrasted with that of the Pap smear or that economics is contrasted with medicine), they assert that there are multiple, complex orders that are linked in different ways. Hence, co-existence is not only done through a dichotomy between, for instance, order and chaos (Mol and Mesman, 1996: 433-434). This is fruitful for my analysis to be able to investigate, the possible complexities taking place when economics meets medicine in Läkartidningen. Instead of merely studying, for instance, how economics is contrasted with medicine, I can grapple with it in more multiple terms.

Analysis and Material: The HPV Vaccine in Läkartidningen (2002-2012)

In this study I have used the Swedish medical journal Läkartidningen to enable an explorative study that focuses on how especially doctors discuss the HPV vaccine. My choice of material is also made due to that I believe that articles about the HPV vaccine in Läkartidningen enables a case study that makes it possible for me to get an idea of how different medical and economic theories, technologies and devices are linked together in the context of the HPV vaccine in Sweden.

By searching for the words “HPV vaccine”, “Cervarix” and “Gardasil” in Läkartidningen’s online database, I started my analysis with reading through all articles that I could find that discussed the HPV vaccine. After I had realized that the HPV vaccine almost all the time was related to the Pap smear and the cervical cancer screening programme, I decided that I also needed to read articles that discussed the screening programme. By using the additional
search words “cervical cancer”, “cervix cancer”, “Pap smear” and “HPV”\(^3\), in total I found around 100 articles dated from 1990 to 2012. After I had carried out a first overview reading of the whole material I decided to stick with the articles explicitly discussing the HPV vaccine, however with the new knowledge about the debates around the screening programme and the Pap smear in the back of my head. In total, the material I have analyzed in this study is 35 *Läkartidningen* articles dated from 2002 to 2012. The length and type of the articles varies. Some articles are up to six pages, other consist of only 100 words or so. The material involves scientific articles, debate articles, replies to debate articles, short notices and summaries of medical studies. I believe this variety of articles has been fruitful for the study as it reveals a heterogeneity regarding arguments and accounts concerning what the HPV vaccine is all about in Sweden. The majority of the articles are written by doctors (often gynecologists) but some are written by journalists working for *Läkartidningen* or from managers from pharmaceutical companies.

For the sake of the analysis, and guided by Smith’s idea about how the social organization of the text is carried out, how a specific account is authorized and the idea about contrast structures, I constructed different themes that I found important in *Läkartidningen*. These themes are things such as “economization”, “the HPV vaccine as a cancer vaccine”, “health economics”, “public health values”, “commercialization” and “debates about gender”. Many of these themes are in the articles interrelated – such as that public health values are linked to debates about which gender(s) should be vaccinated.

The material consists of text material. I explore how materialities and technicalities are visible and enacted in texts and through texts. In this sense I do not engage with health technologies and devices “directly”. Instead I study *Läkartidningen* as an arena that makes it possible for me to get an idea of how, and what, technologies and devices are at work in relation to the HPV vaccine in Sweden.

\(^3\) Naturally, I searched for the words in Swedish. In Swedish: “HPV-vaccin,”, ”Cervarix”, “Gardasil”, ”livmoderhalscancer”, ”cervixcancer”, ”HPV”, ”cellprovstagnning”, ”cellprov”.
Results: the HPV Vaccine in Läkartidningen

Mol argues that objects are being done and that this doing depends on “everything and everyone that is active while it is being practiced” (2002: 31). In this study I make use of this to discuss how the HPV vaccine depends on other technologies and devices. In this vein, to foreground these different entities reveal how the vaccine is “never alone” (cf. Mol, 2002: 30-31). Mol also discusses how it is possible to switch attention between different objects when performing a study. When discussing the body as multiple she explains that this should not be understood as switching from a part of the body to the body as a whole, but to “move the camera sideward and focus it on another object” (2002: 124). The analysis section of the present study is carried out in line with this. First I will attend to how health economic devices help enact the HPV vaccine, then I will move on to discuss how two other cervical cancer health technologies are enacted relationally to the HPV vaccine: the Pap smear and the HPV test.

The HPV Vaccine Enacted as a Preventive Treatment against Cervical Cancer

When the HPV vaccine is presented in Läkartidningen, it is often discussed as a preventive treatment against cervical cancer. This can be viewed as obvious, but since HPV also can cause other diseases ostensibly it is not. It is often discussed in terms of “a cancer vaccine”, a “cervical cancer vaccine” or a “vaccine against HPV which causes cervical cancer” (see e.g. Örn, 2005; Dillner et al, 2006). This is in line with previous research about the HPV vaccine which has shown how it is framed as a cervical cancer vaccine rather than as a vaccine first and foremost against a sexual transmitted disease (see Mamo et al, 2010; Aronowitz, 2010). As these studies also have made evident, it is a possible to enact it as a genital warts and an anal or penis cancer vaccine (see e.g. Epstein, 2010). Hence, enactments of the HPV vaccine as a cervical cancer vaccine are something that is carried out, they are done.

In the first articles that mention the HPV vaccine it is enacted through possibility and hope; as a promising preventive technology that hopefully in the future can prevent cervical cancer (see Dillner, 2003). In these articles the HPV vaccine is enacted in relation to cancer, and especially to ontological assumptions about the nature of cancer. The possibility to prevent cancer serves as a self-evident argument for the necessary of the vaccine. In this sense, in one article, the assertion “can we forbear to offer a vaccine against an infection that causes
cancer?”⁴ (Dillner, 2003: 3390) is contrasted with the uncertainties of the vaccine’s cost-effectiveness. In the same article is other non-cervical cancers discussed as expected to being reduced in amount even if cervical cancer is treated as the main target for the vaccine:

Except the correlation between [HPV and] cervix cancer is the correlation between vulva-anus-, penis- and tonsil cancer significantly well established. These cancer forms are mainly caused by HPV16 which is a HPV type which figures in almost all vaccines that currently are under development. The vaccines’ effect against these non-cervical cancers is therefore the foremost expected health outcome of the vaccine (Dillner, 2003: 3390).⁵

In this way, the HPV vaccine is enacted as a cancer vaccine. Especially, enactment of a reality in which cancer is an issue that is “on top regarding what the society wants to put resources on” (Milerad, 2007: 1760)⁶ allows for the HPV vaccine to be done as a necessary preventive treatment against cancer, especially cervical cancer (and indirectly against other cancers as some sort of “bonus effect”). This also makes it possible to link the HPV vaccine to cervical cancer. This, I believe, is possible through combining the possibility of cancer prevention with health economic devices of cost-effectiveness. Hence, the HPV vaccine is enacted as a technology that primary has something to do with cancer.

**Enacting Spaces of Calculability – Economizing the HPV Vaccine**

Over the whole period (2002-2012) the HPV vaccine is, in Läkartidningen, discussed through use of health economics concepts, devices and methods. In other words, spaces of calculability are enacted in Läkartidningen in which economic calculation tends to have a predominant place (Muniesa et al., 2007: 4). Before the vaccine was approved in 2007, this is especially done through calls for the need of health economics assessment and, in particular, through calculations of cost-effectiveness. In essence, this enacts the HPV vaccine as calculable, as a calculative technology. Following Çalışkan and Callon (2009) I assert that an economization process is evident; the HPV vaccine is done as something that is possible to calculate through health economics. Crucially, it is rendered and enacted as something that is possible to perform calculations about and around.

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⁴ “Kan vi låta bli att erbjuda vaccin mot infektion som orsakar cancer?” (Dillner, 2003: 3390)
⁶ “Ett vaccinationsskydd mot cancer […] ligger troligen i topp bland vad samhället är berett att satsa resurser på” (Milerad, 2007: 1760).
Before the approval of the HPV vaccine in 2007, it is stated several times in Läkartidningen that it is necessary to evaluate and/or investigate its health economic consequences (see Dillner, 2003; Borgström, 2006, Bistoletti, 2006). This constitutes a space of calculability in Läkartidningen in which uncertainties regarding effectiveness can be estimated and valued. Through this articulation, the economic devices and theories built in this statement are made invisible and are taken as a given. What health economics is and how it is made possible (how it is done) is not explained. In this sense health economics is treated as a black box in line with how black boxing has been discussed in the field of STS; the methods and devices employed in, and through, health economics are made invisible and are not discussed (see Latour, 1987). Instead it is merely stressed that decision regarding the HPV vaccine is dependent on cost- and benefit analysis, health economic studies and/or evaluations and cost-effectiveness assessments (Gunnarsdotter, 2006; Bistoletti, 2006a, 2006b; Borgström, 2006; Dillner et al, 2006). In this sense, in Läkartidningen statements such as “scrutinous health economic analyses are needed” (Dillner et al, 2006: 3379) are made, without any clarification about what this would imply.

In the call for a need for cost-effectiveness analysis, the vaccine is often discussed through a balancing between population protection and an individual infection control level. For example, in one article it is asserted that:

The vaccine’s effect must be evaluated. […]. From a public health point of view, protection against the infection is the most important thing, this due to the fact that a successful elimination of the infection from the population protects both individuals who are not protected by the vaccination and individuals who are not vaccinated at all” (Dillner, 2003: 3391).

However, this is made linked to health economics; the balancing between the population and the individual level is articulated in terms of cost-effectiveness. It is stated that “to make cost-effectiveness evaluations of the vaccine possible, it is probably a necessity to carry out

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7 ”Noggranna svenska hälsoekonomiska analyser behövs” (Dillner et al, 2006: 3379).
8 ”Vaccinseffekten måste utvärderas. […]. Från folkhälsosynpunkt är dock skyddet mot infektion det viktigaste, eftersom man vid framgångsrik eliminering av infektionen ur befolkningen även skyddar såväl individer som inte blivit skyddade av vaccinationen som helt ovaccinerade individer” (Dillner, 2003: 3391).
intervention studies that are directed to the whole population”9 (Dillner, 2003: 3391). In this sense, the vaccine is enacted through the use of a combination of articulated public health values and the enactment device of cost-effectiveness. Cost-effectiveness is articulated as linked to public health goals of protection of the population; the vaccine is enacted to be a population protection technology though the use of health economics. By rendering herd immunity and population control calculable, the nature of HPV vaccine interventions are enacted as a result of economic calculation practice.

In Läkartidningen, health economic devices and methods are linked and interconnected to non-economic qualities and values. Both calculation of economics and other non-economic values are evident. Sometimes these different values meet, sometimes they do not. In Läkartidningen, cost-effectiveness serves to translating non-economic qualities calculable. A case in point is the use of the enactment device of “quality-adjusted life years” (QALY) through which cost-effectiveness is calculated. In Läkartidningen the Pap smear and the HPV vaccine are compared through the use of QALY as a measure for cost-effectiveness. As Helgesson and Sjögren argue, QALY can be considered as a calculative tool taken from health economics as a way of comparing pharmaceuticals on the basis of their (relative) cost-effectiveness (2007: 216). They stress that “the core idea [of QALY] is to take into consideration the effectiveness of treatment in terms of both quantity of life and quality of life” (2007: 220). Related to the HPV vaccine in Läkartidningen, QALY helps configure the HPV vaccine in economic terms. Crucially the way this takes place has an impact on how the HPV vaccine is translated into something calculative; QALY is a part of a sociotechnical arrangement that enables and enacts the HPV vaccine. I will discuss this more through outgoing later on in relation to debates about gender as well as choice of vaccine (Gardasil or Cervarix) to the national procurement.

Debating Gender, Counting Cost-effectiveness and Herd Immunity

In further exploring both the shaping of the HPV vaccine as economically calculative and how this is intertwined with non-economic qualities and values, I will now turn to discussions in Läkartidningen concerned with debating whether both boys and girls or only girls should be the direct target group for the HPV vaccine. As was shown in the previous section, the

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HPV vaccine is often enacted through balancing between the population level and the individual one. Essentially this takes place through constructions of spaces of calculability. Through such a space, calculations of gender are made possible. In Läkartidningen, questions regarding gender are constructed in relation to questions about both cost-effectiveness and what often is discussed in terms of herd immunity, which is a form of immunity that occurs when vaccination of a significant portion of a population (or herd) provides a measure of protection for individuals who have not developed immunity. In these articles the discussions in Läkartidningen differ partly from what previous HPV vaccine studies have shown. Whilst these studies have argued that the vaccine is constructed and promoted as a vaccine that protects the individual rather than the whole population or herd, in Läkartidningen discussions of how to enable herd immunity are predominant when gender is explicitly discussed (cf. Aronowitz, 2010; Berlinger and Jost, 2010).

The choice of gender(s) is often discussed in terms of something that needs to be evaluated and estimated, as an open question waiting for the knowledge production of health economics to find the right answer (see e.g. Borgström quoting Tegnell, 2006). This is often articulated in terms of uncertainties of effectiveness or as possible outcomes based on the findings of future research (that is asserted that needs to be carried out to enable more certainty). This interlinks the HPV vaccine with both gender and health economics. This is important since this performance of gender and health economics turn the HPV vaccine into a gendered technology. Thus, the HPV vaccine is not inherently gendered, in contrast this is something that needs to be done, enacted. For instance, as response to the question whether both girls and boys should get vaccinated the doctor Joakim Dillner answers:

All studies indicate that vaccination of only girls is cost-effective from a lifesaving point of view, *irrespective of how one counts*. The transmission of the virus is stopped more quickly if both gender are vaccinated, but it could be discussed whether it is cost-effective enough, therefore it will be up to the profession and the communicable disease control to decide that (Gunnarsdotter quoting Dillner, 2005: 2926, my emphasis).10

In this way, girls and gender are linked to vaccination through articulations of (the need for) calculations of cost-effectiveness. But it is also related to values about disease and virus

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10 “Ska både flickor och pojkar vaccineras? – Alla studier pekar på att vaccination av endast kvinnor är kostnadseffektivt ur en livräddande aspekt *oavsett hur man räknar*. Spridningen av viruset stoppas snabbare om båda könen vaccineras, men det är diskutabelt om det är tillräckligt kostnadseffektivt, så det blir upp till professionen och smittskyddet att avgöra” (Gunnarsdotter citerar Dillner, 2005: 2926, min kursivering).
control, which in this situation can be understood in terms of population control. Gender is calculated relationally to hopes for herd immunity through health economics.

In *Läkartidningen*, it is never discussed why the choice is between girls only or girls and boys. In this sense, the gendering of the HPV vaccine is done through enacting the vaccine as inherently related to girls. Importantly the gender discussed is not a gender of bodies but of populations. It is gender calculated and enacted through epidemiology and statistics. Epidemiology and statistics turn the HPV vaccine into a gendered technology (cf. Hirschauer and Mol, 1995: 377; Mol, 2002: 127-131). In this way, herd immunity performed as relationally to uncertainties of gender (understood as gender of a population, gender as a statistic category) allows for a calculative space that enacts the HPV vaccine as a gendered population protection technology.

**Vaccinating only girls or boys also?**

In several articles it is asserted that boys should *also* be vaccinated. In these articles, the vaccine is often discussed through a balancing between the individual and the population. However, it is first and foremost articulated that boys need to be vaccinated due to the possibility for immunity on a population level (herd immunity) (Lehtinen et al, 2003: 3410; Öhn, 2005; Ohlin, 2008). For instance, in one article, it is asserted that boys need to be vaccinated since this is “the only way to enable a general protection” (Ohlin, 2008: 1465)\(^{11}\), i.e. herd immunity. In another, it is asserted that “for the sake of the HPV infection this implies that if one has the goal to eradicate certain carcinogenic HPV types (eradication), boys also need to be vaccinated” (Lehtinen, 2003: 3410)\(^{12}\). Hence, HPV vaccination is made present through enacting vaccination as a gendered population protection technology. In these examples, the inclusion of boys in the vaccination programme is performed as something certain and as a necessity. However at the same time in the articles this is problematized; often uncertainties of the links between effectiveness and target group of the vaccine are made visible and discussed. In this sense uncertainties are estimated, calculated and counted on; calculations of cost-effectiveness through estimations of gender and herd immunity are linked to articulated uncertainties of the HPV vaccine. Importantly, these uncertainties allow for a space of calculability in which gender and herd immunity can be calculated upon. For instance, in one article written by Peter Örn uncertainties of (cost)-effectiveness and herd

\(^{11}\) “Det är enda sättet att få ett allmänt skydd” (Ohlin, 2008: 1465).

\(^{12}\) “För HPV-infektionernas del innebär detta att man som mål uppställt utrotnades av vissa cancerframkallande HPV-typer (eradiktion) måste också pojkar vaccineras” (Lehtinen, 2003: 3410).
immunity are explicitly interlinked to the question regarding vaccination of both boys and girls or not:

Currently we lack threshold values; how large amount of the population needs to be vaccinated to give an effect on the whole population? Moreover, it would take at least 50 years before the whole population is protected, this due to the fact that vaccination needs to be done before the first time of infection if it is going to have any effect. This leads to the next question formulation: In what age should women get vaccinated? […] And according to me should boys also get vaccinated to enable immunity on a population level13 (Örn quoting Strander, 2005: 1867)

Simultaneously as some articles in this way are discussing the need for boys to be included in the vaccination programme, one article explicitly states that it is “unprofitable with HPV vaccination for young men” (Wikström, 2010: 22)14. In the article, findings from a US study are discussed in which QALY has been used:

The authors have estimated the cost per each gained year of life (QALY). Therefore, a low ratio shows good cost-effectiveness. Estimations have been carried out estimations based on different scenarios. Consideration has been taken to different degrees of vaccination coverage. First and foremost have decrease in cervix cancer and effect from other HPV related genital dysplasia and secondary on HPV 6 and HPV 11 associated disease (genital warts and juvenile respiratory papillomata) been estimated. Participation in the screening programme has been assumed. […] If vaccination coverage and life-span is counted by 75 percent, complete effectiveness through vaccination of girls results in a cost-effectiveness ratio that is less than 50.000 dollar per QALY, this compared with only screening for cervix disease. If boys also are vaccinated the ratio will be 100.000 dollar per QALY, this also if a majority of the HPV related diseases, such as non-cervical cancer forms and genital warts, are taken into account. […] It is concluded that it would be too expansive and not cost-effective to include young men in the national vaccination programme. However, a large uncertainty is still predominant in several areas and in the future is it possible that new knowledge can change these guidelines (Wikström, 2010: 22).15

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14 “Olönsamt med HPV-vaccination av unga män” (Wikström, 2010: 22).
15 “Författarna har räknat på kostnad per vunnet kvalitetsjusterat levnadsår (QALY). En låg sådan kvot visar alltså på bra kostnadseffektivitet. Man har gjort beräkningar utifrån olika scenarier. Hänsyn har tagits till olika grader av vaccintäckning. Primärt har man räknat på minskning av cervixcancer och påverkan av andra HPV-relaterade genitala dysplasier och sekundärt på HPV 6- och HPV 11-association sjukdom (kondylom och juvenil respiratorisk papillomatos). Deltagande i screeningprogrammet har förutsatts. Om man räknar på 75 procent vaccintäckning och livslång, fullständig effektivitet vid vaccinering av flickor blir kostnadseffektivitetskvoten mindre än 50 000 dollar per QALY jämfört med endast screening för cervixsjukdom. Om man även vaccinerar pojkar blir kvoten i stället oftast mer än 100 000 dollar per QALY, även om hänsyn tas till ett flertal HPV-relaterade sjukdomar såsom icke-cervikala cancerformer och kondylom. […] Man konkluderar att det
In this example the screening programme and the HPV vaccine are made comparable through the use of the enactment device QALY. As Helgesson and Sjögren argue, “QALYs establishes an economic space which constitutes in and of itself a powerful economization device” and “QALYs forges some comparability between qualifying practices” (2007: 220). This space of calculability that renders the HPV vaccine and the screening programme comparable also allows for enactments of the HPV vaccine as defined by health economics. By translating entities such as gender, Genital Warts and other non-cervical diseases economically calculable, the HPV vaccine is enacted relationally to the screening programme. In the next section I will further discuss how the HPV vaccine is enacted relationally to other materialities and technicalities, but for now it is important to mention that calculating gender and herd immunity is partly made possible through making the HPV vaccine comparable to the screening programme.

In other articles, it is argued in a similar vein that only girls need to be vaccinated through interlinking the HPV vaccine with claims about population level protection. In one Läkartidningen article it is stated that “all studies indicate that vaccination of only girls is cost-effective from a lifesaving point of view, irrespective of how one counts” (Gunnarsdotter quoting Dillner, 2005: 2926, my emphasis). In yet another article it is argued that fewer disease-carrying girls will also decrease the degree of infected boys, something which in turn will generate cost savings outside the vaccinated population as well (Rylander, 2010: 1689). In contrast to the articles about the boys, here the HPV vaccine is enacted as a vaccine targeting girls. It puts the responsibility for decreasing the infection levels on girls; this responsibility is turned into something gendered. However, at the same time calculations of vaccine effectiveness and gender are still done in terms of (hopes for) herd immunity, hence a protection including both men and women. This debate about choice of gender makes the vaccine present as a vaccine for population protection. However, it also reveals an ambiguity regarding how to count and calculate interventions making such protection possible. This is really a question about how to utilize cost-effectiveness calculations; what measures to use and what units to include. Hence, the debating regarding whether girls only or boys also should be vaccinated is enabled through calculations of uncertainties.
The HPV Vaccine, the Pap smear and the HPV Test – Coordination and Coexistence

As I have discussed in relation to enactment devices utilized from the field of health economics, the HPV vaccine is enacted into being through sociotechnical arrangements. In the previous section I discussed how gender was counted and valuated through balancing uncertainties of cost-effectiveness and herd immunity. In having this focus I tried to show how the uncertainties of gender allowed for qualifications and calculations of the HPV vaccine. In this section I will discuss and grapple with another aspect of this. By attending to how the HPV vaccine in *Läkartidningen* is enacted to a large extent relationally to other technologies employed to prevent cervical cancer (the Pap smear and the HPV test), I focus on how HPV vaccines are made possible through arrangements of different health technologies. Therefore, I will focus on the HPV test and the Pap smear by means of foregrounding some health technologies that the vaccine’s existence depends on.

Nevertheless, as I showed in the last section, since health economics devices and theories, are prominent also when the HPV vaccine, the HPV test and the Pap smear are compared and/or related, I will discuss how an economization process of the HPV vaccine is dependent on entangled or disentangled health technologies (the Pap smear and the HPV test) and health economic devices.

In *Läkartidningen*, the HPV vaccine is enacted against a backdrop of ongoing debates between health professionals about the effectiveness and coordination of the cervical cancer screening programme and, particularly, the Pap smear technology as an essential part of the screening programme (see e.g. Bistoletti, 2006). Frequently the vaccine is discussed as a possible complement, and sometimes as an alternative, to the Pap smear. I believe that enactments of the HPV vaccine depend on problematizations of the screening programme, articulated in *Läkartidningen*. I consider that problematizations of the screening programme allows for a space of calculability that makes enactments of the HPV vaccine as an alternative or complement to the screening programme possible; the HPV vaccine is calculated relationally to the Pap smear. In turn, these problematizations are made possible through health economic devices and methods that are implicated in articulations that assert that evaluation of the screening programme and coordination between the Pap smear and the HPV vaccine are necessary. To be able to discuss the meetings between the screening programme and the HPV vaccine, I will begin with a short discussion of how the screening programme is problematized in *Läkartidningen*. 
Contradictory articulations regarding the screening programme take place in articles also discussing the HPV vaccine in *Läkartidningen*. In these articles, debates regarding the state of the screening programme are carried out between different doctors. In these debates, the screening programme is discussed as in need of improvement, rationalization and evaluation and, in other articles, as “so effective that it will be a challenge trying to outscore it” (Andrae and Strander, 2006: 1639)\(^\text{17}\) and that “screening pays of – not only measured in health but also counted in money” (Örn, 2005: 1867)\(^\text{18}\). In this sense, in some articles, it is argued that the screening programme is highly messy, unstable and unorganized (Bistoletti, 2006b, Bistoletti et al, 2008) and in other articles it is considered well-functioning, stable and organized (Andrae and Strander, 2006; Örn, 2005) (cf. Singleton, 1993; 1998). In this sense, in one article Bistoletti argues that:

The problems are the Pap smear’s relatively low test sensitivity\(^\text{19}\) and the regional low frequency in participation. […]. Therefore, everyone agrees that there is need of improvements of the Swedish cervical cancer screening programme. Better follow ups and health economic evaluation of the screening programme should have highest priority, as well as the integration of the new technologies of HPV-testing and HPV-vaccination in a future preventive programme” (Bistoletti, 2006b: 1630).\(^\text{20}\)

Debates about what the state of the screening programme is, are often discussed through articulations of problems with what is termed “overtreatment” (which, in turn, is due to, “the relatively low test sensitivity” of the Pap smear), that is preventive treatment of women having cytological abnormalities that in fact never will be developed into cervical cancer. Overtreatment is articulated as a problem that causes unnecessary economic costs for the society as well as psychical and medical complications for women. Related to both psychical and medical complications, often “women’s anxiety” is articulated as an inevitable effect of the Pap smear. In this sense, in one article it is argued that:

\(^\text{17}\) “Det svenska screeningprogrammet är så pass effektivt att det blir en utmaning att överträffa” (Andrae and Strander, 2006: 1630).

\(^\text{18}\) “Screening för cervixcancer lönar sig – inte bara mätt i förbättrad hälsa utan även räknat i pengar” (Örn, 2005: 1867).

\(^\text{19}\) In relation to the Pap smear, the term low sensitivity denotes the amount of women identified through a Pap smear examination who will never develop cancer in the future. Hence in *Läkartidningen*, it is argued that many women who never will develop cervical cancer are treated for cytological abnormalities that due to low sensitivity of the Pap smear are classified as potential cancerous.

\(^\text{20}\) “Problemen är cellprovet relativt låga testkänslighet och den regional låga deltagarfrekvensen. […]. Alla är väl därför överens om behovet av att förbättra det svenska cervixscreeningprogrammet. Bättre uppföljning och hälsoekonomisk utvärdering av screeningprogrammet bör ha högsta prioritet liksom integrationen av de nya teknologierna såsom HPV-testning och HPV-vaccination i ett framtida preventionsprogram” (Bistoletti, 2006b: 1630).
The biggest gains with prophylactic vaccination do not only concern prevention of invasive cervix cancer, there are also expected extensive decreases in the amount of women who need to be treated for cytological abnormalities. Many young women are today subject to overtreatment due to the present version of the Pap smear screening, something which brings about stigmatization and unnecessary treatments which have medical and psychological complications. [...] The politicians are now forced to consider whether the HPV test and the vaccine are going to be funded through taxes and be an integrated part in cervix cancer prevention interventions. As a decision basis, extensive cost-effectiveness analyses and health economic model studies are needed (Bistoletti, 2006a) 21.

As this quote illustrates, women are not only positioned in Läkartidningen (as a homogeneous singular group) on gendered lines as in general being anxious (even though this ostensibly seems to be the case), it also makes present the Pap smear as a technology that evokes seemingly humanized emotions. Hence, overtreatment and anxiety are discussed as somewhat built in the Pap smear; these things are articulated as a necessary effect of the constitution and capacities of the health technology in case. This also implies that the discussions of overtreatment entangle health economics with ideas about emotional and physical health. For instance Peter Bistoletti, Sonja Andersson and Bo J Johansson argue that the problem with overtreatment is that it is expensive and creates unnecessary womanly anxiety (Bistoletti et al, 2008: 56).

This can be contrasted with another article in which health economics is used to argue for the screening programme as economically and medically profitable (Örn, 2005: 1867). In yet another article, it is asserted that “a strategy for population prevention must be utterly well thought-out, long-term organized and be continuously evaluated. The Swedish cervix screening programme is so effective that it will be a challenge trying to outscore it” (Andrae and Strander, 2006: 1630). In this sense the “hard to outscore” screening programme is linked to “a strategy for population prevention” that is well thought-out and well organized. Hence, the screening programme is discussed as very well-functioning – this in sharp contrast to the articles stressing the Pap smear’s problems with overtreatment.

21 “De största vinsterna med profylaktisk vaccination ligger inte bara i prevention av invasiv cervixcancer utan även i den förväntade kraftiga minskningen av antalet kvinnor som måste omhändertas på grund av cellförändringar. Många unga kvinnor utsätts med dagens cellprovscreening för överbehandling, vilket innebär stigmatisering och onödiga behandlingar med medicinska och psykologiska komplikationer. [...] Politikerna blir nu tvungna att ta ställning till om HPV-test och vaccin skall finansieras via skatter och bli en integrerad del i cervixcancerpreventionen. Som beslutunderlag krävs omfattande kostnad-effektanalyser och hälsoekonomiska modellstudier” (Bistoletti, 2006a).
This divergence regarding how the screening programme and the Pap smear are constituted reveals how the screening programme in some senses is problematized in Läkartidningen. The constitution and capacities of the Pap smear and the screening programme at large are on some level opened for debate, something which makes visible ambiguity regarding the state of the screening programme. The screening programme is configured as both stable and unstable and organized and unorganized. Hence, it is problematized. However, at the same time the health economic methods and devices employed to point at these problems (or, in some articles, non-problems) are not. When discussing the state of the screening programme, articles do not discuss how to utilize health economic evaluations, what devices to choose or what these evaluations should or could bring about (see Bistoletti, 2006; Bistoletti et al., 2008; Dillner et al., 2006). Instead, the screening programme is (sort of) problematized through ostensibly black-boxed health economic devices and methods. Health economics are taken as a given and the technicalities and materialities involved are silent.

In Läkartidningen, the effectiveness or the lack of effectiveness of the screening programme are often utilized as arguments for the need (or non-need) for HPV vaccination, the HPV test and health economic evaluations of both the screening programme, vaccination and test (Bistoletti et al., 2008; Örn, 2005; Andrae and Strander, 2006). Significantly, to evaluate is equalized with trying to make the screening programme more cost-effective. In this sense medical knowledge production based on health economic studies are simultaneously enabling and enacting problematizations of the screening programme and the HPV vaccine as a solution for the articulated effectiveness problems of the Pap smear. Importantly, I believe, in utilizing health economics to problematize the screening programme, a space of calculability is shaped that makes discussion of the HPV vaccine possible as a complement.

In one article, the Pap smear is discussed as problematically subjective. It is understood as subjective due to the fact that different people interpret differently what a potential cancerous cell is. This is partly asserted to be caused by a lack of coordination and national guidelines (Bistoletti et al., 2008: 105). In this example, the HPV vaccine is enacted relationally to the subjective technology of the Pap smear; the HPV vaccine is envisioned as bypassing problems

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22 This is reminiscent of articles in Läkartidningen that do not discuss the HPV vaccine but the screening programme. In these articles it is often argued that one of the problems with the screening programme is that interpretations of the results from a Pap smear examination are subjective and varied.
understood as subjective ingredients built in the Pap smear. In this way, in this article it is stated that “HPV vaccination will make it possible to rationalize the Swedish screening programme” (Bistoletti et al, 2008: 56). In the same article it is later asserted that the health economic gains of HPV vaccination is that it will allow for screening later in life and more seldom. Health economic gains are significantly related to both medical and psychological gains. Through integration or complementation of vaccination it is assumed that it will be possible to avoid overtreatment, something which unnecessarily frightens women (Bistoletti, 2008: 56). In turn, it is argued, that this will bring about a decreased risk for cervical cancer which would allow for longer intervals between screenings, something which in turn would be more cost-effective. Hence, health economics, gendered assumptions about women’s anxiety and medical hopes for cancer prevention are entangled, enacting the HPV vaccine as a less subjective technology for cervical cancer treatment than the Pap smear. In this example, the health economic device of cost-effectiveness and the calls for health economic evaluation link the Pap smear, the HPV test and the HPV vaccine together. However, this is partly done through comparison between them; creations of contrast effects articulate the Pap smear as subjective and the HPV vaccine and the HPV test as not.

In other articles, however, the HPV vaccine and the Pap smear are linked through coordination between them; they are made as complementary to each other. For instance, in one article using health economic methods to evaluate and compare the Pap smear and the vaccine it is stated:

Essential health economic gains can be made [if a vaccination programme is introduced], e.g. in the form of saved evaluation and of abnormal findings found by a Pap smear examination and decreased cancer treatment costs. […] Coordination between vaccination and screening is necessary. The gynecological Pap smear must be kept and it is still necessary to improve it, this if the goal to prevent cervix cancer should be possible. It is important that both individuals and actors from the health care sector understand that the introduction of a vaccination programme is a complement that will not replace screening (Dillner et al, 2006: 3379).

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23 “HPV-vaccination kommer att göra det möjligt att effektivisera det svenska screeningprogrammet som ska förebygga livmoderhalscancer” (Bistoletti et al, 2008: 56).
In this vein, health economics is used to argue for a fruitful coexistence of the vaccine and the Pap smear. Through health economics these two health technologies are made as compatible with each other. The Pap smear alone is problematized through asserting that the HPV vaccination and the Pap smear are understood as enabling effective cancer treatment. Thus, the HPV vaccine is shaped relationally to the screening programme. Hence what I am saying is that enactments of the HPV vaccine in Läkartidningen depend on the problematizations of the quality and state of the screening programme (its subjective ingredients, the problems with its coordination). Thus, in Läkartidningen the HPV vaccine is not first and foremost performed as a replacement for the Pap smear. In this sense, in this context it is not enacted as the right tool for the job as have been argued in other contexts (cf. Mamo et al, 2010). Instead it is articulated as a component that could be integrated in the screening programme and/or used as a complement to the Pap smear. Above all, it is enacted as something which would improve the quality of the screening programme. As it is stated in one article: “vaccination against HPV is a new effective tool that will be the first step in a chain of interventions utilized for cervical cancer prevention” (Andersson, 2011: 529).

Ambivalent Processes of Economization and Commercialization – Intertwinements of Medicine, Ethics, Morality and Economics

As I have argued, the HPV vaccine is enacted through spaces of calculability, something which is a crucial ingredient in an increasing economization of the health arena (cf. Sjögren and Helgesson, 2007: 216). Health economic devices of cost-effectiveness calculations and qualifications help enacting the HPV vaccine as a something calculative; uncertainties of its (cost-)effectiveness allow for calculations through rendering non-economic entities and qualities such as gender and herd immunity economically calculable. As I have also shown, this also takes place through comparisons and coordination with the Pap smear. However, simultaneously with an evident economization process, this process is also problematized and criticized in Läkartidningen. In this section I will attend to these problematizations and criticisms, especially focusing on how an increased focus upon economics is discussed as implicating increased commercialization. In particular I focus on how economics are articulated in relation to, or intertwined with, medical knowledge, ethics and morality.

25 “Vaccination mot HPV är ett nytt effektivt verktyg, som kommer att utgöra första steget i den kedja av åtgärder som ingår i prevention av livmoderhalscancer” (Andersson, 2011: 529).
In *Läkartidningen* a range of articles discuss the HPV vaccine in terms of both medical knowledge and health economic knowledge. As I have shown, often medical and economics knowledge are entwined as cost-effectiveness is stated to have both medical and economic implications. Other times, however, these different knowledges are highlighted as potentially being in tension with each other. This is first and foremost made in two different ways. Firstly in relation to direct to consumer (DTC) advertising of Gardasil in Sweden, secondly in relation to assessments of whether Gardasil or Cervarix should be purchased by the Swedish state.

In the case of DTC advertising, articulations of vaccination and public health are often contrasted with commercialization processes. For instance, in one article entitled “HPV – a very political vaccine”, “public health” is explicitly contrasted with “private wealth” (Milerad, 2007: 1760). In the same article it is asserted that “whether public health would benefit from this expensive vaccine to the same degree as the economy of the company is being put into question” (Milerad, 2007: 1760). In another article, DTC Gardasil advertising is criticized and used as an example of an increasing commercialization of health care. In this article parents (also presented as citizens) “who do not have enough medical knowledge” (Linnersten, 2008: 2121) are contrasted with a commercialized pharmaceutical industry. Herein, parents are understood as put into a difficult situation when it comes to making the right choice as the DTC ads include medical knowledge that they do not, and should not, understand. It is argued that this information should come from health professionals and not as in DTC advertisements from pharmaceutical companies (Linnersten, 2008: 2121). In yet another article it is argued that “young woman are lulled into a false state of security” through vaccination campaigns (Ranes, 2012). In all these examples, commercialization (understood in these articles as a process profiting private economic welfare and marketization of health care) are contrasted with medical and public health values. In these articles, the HPV vaccine is enacted as a commercialized consumer choice, something which is contrasted with “public health”, “young women”, “parents” and “prevention of cervical cancer” (Linnerstad, 2008; Ranes, 2012; Milerad, 2007). In this sense, an economization process is problematized in *Läkartidningen*. By linking vaccination with public health and population protection, the HPV vaccine as a consumer choice is problematized and criticized. This is also evident in another previous discussed section of an article by Bistoletti, in which he asserts that:
The politicians are now forced to consider whether the HPV test and the vaccine are going to be funded through taxes and be an integrated part in cervix cancer prevention interventions. As a decision basis, extensive cost-effectiveness analyses and health economic model studies are needed. The alternative is that only those who have the knowledge and money to consume HPV testing and vaccination will be able to do so (Bistoletti, 2006a).26

In some articles discussing the national procurement of Gardasil or Cervarix, health economics is contrasted with prevention of cervical cancer. Tellingly, one article is entitled “Cervarix or Gardasil: health economically optimized procurement or cancer prevention?” (Axelsson, 2011: 2212)27. In this article it is stated that “the people who purchase the vaccine in Sweden and the UK have to ask themselves whether we should strive for health economical optimization or cancer prevention” (Axelsson, 2011: 2212)28. Hence, health economics, and an economization process of health care affecting practices of the HPV vaccine, is questioned. In this way, when the HPV vaccine is enacted as a consumer choice, public health is understood as endangered when it meets health economics. Significantly, the HPV vaccine is in this case enacted as something that has to do with public health, medicine and cancer prevention and not economics.

The HPV vaccine is linked to ethics and morality in Läkartidningen. This is evident throughout the whole period I have analyzed. However it is ambivalent how this is done. In contrast to articles contrasting health economics and commercialization with public health and ethics, some articles utilize health economics to calculate and assess what is ethical. For instance, in one article arguing that the decision to purchase Gardasil instead if Cervarix for the vaccination programme is against “good science, ethics and moral” (Thor and Flaten, 2011: 2383)29, health economics valuations are used to argue for the ethically dubious elements of the decision. In this example Cervarix and Gardasil are contrasted, and made comparable, through entwinements of ethics, medical knowledge and economics. I will now turn to discuss the debates around the national procurement of the HPV vaccine.

26 “Politikerna blir nu tvungna att ta ställning till om HPV-test och – vaccin skall finansieras via skatter och bli en integrerad del i cervixcancerpreventionen. Som beslutanderegler krävs omfattande kostnad-effektanalyser och hälsoekonomiska modellstudier” (Bistoletti, 2006a).


29 “God vetenskap, etik och moral” (Thor and Flaten, 2011: 2383).
Gardasil against Cervarix – Debating the Swedish National Procurement and the Cost-Effectiveness of Genital Warts

As I have hinted in the previous section the debate regarding whether Gardasil or Cervarix should be purchased by the Swedish state is discussed extensively in Läkartidningen. These discussions entangle and disentangle Gardasil, Cervarix, genital warts and health economic assessments and valuations. As I also have mentioned, there is an ambivalence concerning the role of health economics in this. As was shown in the previous section, in some articles’ discussion of the purchasing of the vaccine health economics is contrasted with cervical cancer prevention. Yet in other articles, health economics is utilized by means of calculating which vaccine would bring about the best cervical cancer prevention.

What these articles crucially are debating is the severity and nature of genital warts. A divergence regarding whether the disease is an innocuous disease or not is evident in Läkartidningen. I believe this divergence allows for an economic space in which calculations of the HPV vaccine are performed, this due to the fact that cost-effective assessments are carried out by means of arguing for the quality of Gardasil versus Cervarix. First and foremost calculations and qualifications of Gardasil and Cervarix are performed through inclusion of nonmedical and noneconomic values into health economic assessments of the nature of Genital Warts. In this way, in one article written by Eva Rylander entitled “immediately economy behind the choice of HPV vaccine – Sweden misses the chance to “exterminate” genital warts” it is argued that the more expensive vaccine Gardasil is both medically and economically preferable due to the fact that it has been proved that it provides protection against genital warts as well as cervical cancer. She stresses that “Genital Warts cause both cosmetic and psychological troubles and can cause itching and therapy resident fissures that are very painful for both women and men when having sexual intercourse” (Rylander, 2010: 1689). She continues by mentioning health economic estimations carried out by the NBH that show that “genital warts cost 50 million every year [for the Swedish society]”.

Thereafter she asserts that “sometimes it is talked about “innocuous warts that disappear by themselves”. But if that was the case then patients would not seek health care for 50 million Swedish kronor yearly” (Rylander, 2010: 1689). Hence, in this article “cosmetic and

30 “Kortsiktig ekonomi bakom val av HPV-vaccin. Sverige missar chansen att ”utrotta” kondylom” (Rylander, 2010: 1688).
31 “Kondylom orsakar ofta stora kosmetiska och psykiska bekymmer och kan ge klåda, sveda och terapiresidenta sprickor som är mycket smärtsamma vid samlag hos såväl kvinnor som män” (Rylander, 2010: 1688).
33 Det talas ibland lite slarvigt om ”ofarliga vårtor som försvinner av sig själva”. Men i så fall skulle patienter inte söka sjukvård för 50 miljoner kronor årligen, sannolikt ännu fler (Rylander, 2010: 1689).
psychological troubles” are linked to health economic estimations and statistics. The article concludes with asserting that “in a few years’ time the gains of the vaccine are supposed to carry its own costs. With fewer disease-carrying girls the incidents of genital warts infected boys and men will be fewer, something which will result in cost savings outside the vaccinated population, too” (Rylander, 2010: 1689)34. Crucially, in this example non-economic values such as ??? are linked to both Genital Warts and gender, something which allows for calculations of the cost-effectiveness and nature of Genital Warts; calculations differentiate Gardasil and Cervarix (they are made comparable). Through this, Gardasil is enacted as superior to Cervarix. One reality wins (Mol, 2002)

In this sense, health economic estimations are utilized by means of arguing for the severity and effects of genital warts both regarding cosmetically, psychological and physical implications. This does not only serve to enable a comparison between, and qualification of, Cervarix and Gardasil, it does so by translating things such as cosmetic and psychological troubles economically calculable. In this example, a valuation of genital warts through economics helps enacting Gardasil as more (cost-)effective than Cervarix. Hence health economics makes it possible to compare HPV vaccines; it separates them and makes them comparable. However, naturally there is an important difference here from what I previous discussed as the shaping of the HPV vaccine and the screening programme as comparable. Whilst the Pap smear and the HPV vaccine were articulated as possible to make coexistent, Gardasil and Cervarix are in Läkartidningen enacted as mutually exclusive (cf. Law and Singleton, 2005: 342; Mol, 2002: 35). Hence, it makes a difference how the HPV vaccine is enacted; there are a difference between the HPV vaccine as dependent on the Pap smear and the HPV vaccine enacted through making Gardasil and Cervarix mutually exclusive.

In one other article written by a commercial and a medical manager from GlaxoSmithKline, the health economics are used to dispute the purchasing of Gardasil instead of Cervarix. Whilst the last article argued for the severity of genital warts as a way of asserting that Gardasil should win over Cervarix, this article asserts that the calculations performed in that decision were in fact made in an inadequate way. What are debated are what figures and methods should be used to valuate and compare the two vaccines. After the second re-

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34 Inom några år kommer kostnaderna för vaccination att bära sig själva. Med färre smittbärande flickor sjunker kondylomfallen även hos pojkar och män, vilket ger kostnadsbesparingar också utanför den vaccinerade populationen (Rylander, 2010: 1689).
examination of the national procurement, and the second national procurement, GlaxoSmithKline asserts that:

The Swedish Association of Local Authorities and Regions (SALAR) has carried out a second national procurement of vaccine against cervical cancer. This time SPMSD’s (Sanofi Pasteur MSD) vaccine Gardasil was chosen instead of GSK’s (GlaxoSmithKline) Cervarix. GSK has, after much consideration, chosen to demand a re-examination of the procurement. The most important reason is that the county council’s procurement unit accepted a different calculation procedure for Gardasil than the one they requested. The vaccines are therefore valued as giving an equivalent protection against cervical cancer, something which is not correct. […] GSK has explicitly requested a clarification from SKL’s and the County Council of Stockholm’s (SLL) procurement unit regarding what data SPMSD has used. […] We can conclude that the valuations that have been done regarding Gardasil’s protection against cervical cancer have been based on totally own, by SPMSD chosen, statistics as well as other effect measures than the requested. This […] does not feel worthy a national procurement or compatible with good science, ethics and moral. In practice, SKL has accepted substantial differences from the original evaluation method. […] By using a, for them, more favorable source for calculating incidence of oncogenic HPV types SMMSD succeed in turning the effect of their vaccine with more than 5 (!) percentage points, something which was directly determinate for Gardasil winning the procurement. […] Of course it is possible to discuss what prevalence numbers should be used to estimate the vaccines’ effect, but in a direct comparison, naturally the same prevalence numbers should be used for both of the vaccines (Thor and Flaten, 2011: 2383).35

In this quote, GlaxoSmithKline disputes how the making of Gardasil and Cervarix as comparable through health economics is carried out. Constituting an economic space, it is possible in Läkartidningen to use health economics as an enactment device to put into question the accuracy of the measures used in the valuation process; it is asserted that measures and statistics that are different in fact have been compared when making Gardasil and Cervarix comparable. The article links this to non-economic values; to use other numbers than those that were required is put in contrast to “good science, ethics and moral”, something

which, in turn, is asserted to create “questions regarding procurements in the future”. In this sense, “the function and the responsibility of the doctor profession when it comes to procurements” (Thor and Flaten, 2011: 2383) are articulated as a question that needs to be considered in relation to the unscientific, unethical and unmoral in comparing non-comparable measures and units. In this sense, in this article, economization processes are not contrasted with ethics and morality (as was the case when health economics in other articles were linked to an increased commercialization of health care); instead, specific forms of calculations are questioned through entangling health economics with non-economic values.
Concluding Reflections and Discussion

Some Concluding Points about HPV Vaccine Enactments in Läkartidningen
In this study I have made use of ANT inspired work to discuss how the HPV is enacted in different ways in Läkartidningen. I have focused on how other technologies, methods and devices are related to the HPV vaccine through sociotechnical arrangements in Läkartidningen and how these different entities allow for calculative spaces which enact the HPV vaccine as calculable. I have showed how this is performed in different ways and in relation to different entities such as the cervical cancer, genital warts, the Pap smear, the screening program and the HPV test. By utilizing the concept of enactment devices, I have especially tried to focus on how health economics (in particular, cost-effectiveness devices) are linked to the HPV vaccine, the Pap smear and the screening program in different ways. I have discussed how the HPV vaccine is economized; how it is enacted as something economically calculative.

I have also argued that problematizations of the screening programme allow for a calculative economic space in which the HPV vaccine is articulated as a possible compliment to the Pap smear that will make the screening programme more effective, objective and less subjective. In relation to this I have aimed to show how black-boxed health economic devices and methods serve to render the HPV vaccine as comparable to the Pap smear but also how it is articulated that the two technologies preferably should be made coexisting and how they need to be coordinated. Hence, how health economics takes part in the shaping of them as compatible with each other.

I have shown how gender and herd immunity are calculated through health economics. In this example, I discussed how a balancing between the population and the individual level is made possible through linking herd immunity, gender and cost-effectiveness to the vaccine. However, I have also stressed the contradictory elements and ambiguousness in how these links are made as Läkartidningen reveals how uncertainties of herd immunity are translated into clashing ideas about choice of gender(s); sometimes it is concluded that vaccinating girls and boys are the only cost-effective solution that will make herd immunity possible, other times the same argument are used for the conclusion that only girls should be vaccinated.
Crucially this debate about gender enacts the HPV vaccine as a gendered technology for the population.

I have highlighted how economization processes are problematized in *Läkartidningen*. In some articles the meeting between medicine and economics are articulated as problematic since, it is argued, this brings forward an increased commercialization of health care. In these examples the vaccine is often enacted as a consumer choice. However, whether the HPV vaccine should be a consumer choice is problematized since the vaccine is articulated as something that should not be distributed by pharmaceutical companies or be about economics. Simultaneously as the HPV vaccine in this way is articulated as a consumer choice it is also articulated as a technology for cancer prevention. Economics and commercialization are sometimes contrasted with cancer treatment, population vaccination, public health and medicine. By linking the HPV vaccine to economics it is sometimes enacted as a consumer choice. In turn, by linking it with public health it is enacted as a population vaccine.

I have also discussed how Gardasil and Cervarix are made comparable through health economic calculations and qualifications. Especially I highlighted how nonmedical and noneconomic values (such as, what is articulated as, cosmetic and psychological troubles) in *Läkartidningen* are included in health economic valuations of the nature of genital warts. The debate about the nature of genital warts reveals that genital warts in *Läkartidningen* are made into different things (innocuous and not innocuous, expensive for the society and not expensive) through rendering the disease calculative. In turn, calculations of genital warts allows for calculations of the HPV vaccine; Gardasil (which is proved to be effective against both cervical cancer and genital warts) is positioned as in contrast to Cervarix (which only is preventive against cervical cancer) through the making of genital warts as calculative. Importantly, this debate enacts the HPV vaccine through making Cervarix and Gardasil impossible to coordinate; they are articulated as mutually exclusive. Here the vaccine is enacted as both a cancer vaccine and as a Genital Warts vaccine.

**How to Move on: Reflections on Multiplicity**

Making use of ANT inspired theories, and especially ideas about relational materiality, enactment devices and economization processes I have been able to grapple with how it could be possible to study the HPV vaccine as enacted relationally to other entities. Utilizing this approach I believe I have been enabled to highlight aspects of the HPV vaccine that are
seemingly silent in previous HPV vaccine research. In particular, it has allowed for an analysis that has aimed at foregrounding the sociotechnical arrangements that is a part of the shaping of the HPV vaccine. In this sense this study has not been focused on what is enacted by the HPV vaccine (as Casper and Carpenter do). In contrast, I have attempted to discuss how the HPV vaccine is made possible by different devices, technologies, knowledges, methods and values, hence how the HPV vaccine is enacted. In this way, I have talked about contradictory and ambiguous enactments of the HPV vaccine enabled by entangled and disentangled entities. I have also talked about coordination and coexistence between different objects such as the HPV vaccine and the Pap smear. But I have carefully tried to avoid talking about multiplicities and multiple objects (in the way Mol and Law discuss it). Since I still do not know if it would be possible to make use of the idea about multiple objects to grapple with the HPV vaccine in Läkartidningen, I have tried to leave multiplicities out from the analysis. However, now I will try to attend to this question explicitly.

Based on the material in Läkartidningen, would it be possible to talk about the HPV vaccine as being a multiple object in Mol’s and Law’s definition of the term? In this sense, would it be possible to explore how the HPV vaccine is enacted in multiple versions by a multiplicity of different subjects and objects and how these enactments allow for coordination and distribution between, not only the HPV vaccine, the Pap smear and health economic devices, but also between different versions of the HPV vaccine? This would be a study focusing on the multiplication of a single (technology) and the coordination of this multitude into singularity (Mol, 2002: 82). Utilizing this idea, I could explore different (but overlapping) versions of the HPV vaccine enacted through different practices. This leads to an essential question: would this be a fruitful approach in my study? What would my analysis gain from making use of this idea?

In the previous section I discussed how I, in this study, have shown how the HPV vaccine is enacted in different ways in Läkartidningen. I asserted that it is enacted as a complement to the Pap smear, as a gendered technology for the population, as a consumer choice, as a population vaccine, a cancer vaccine and a genital warts vaccine. One thing that could be concluded from this could possibly be that when the vaccine is linked differently to different technologies and devices, it is also enacted and done differently. This, I guess, is in line with how Mol (2002) discusses the body multiple; ontologies of the vaccine seems depend on what is relationally enacted to. For instance, I could possibly argue that, in Läkartidningen, the
HPV vaccine enacted through epidemiology depends on statistical methods and is done as a gendered population vaccine through public health values about herd immunity, whilst the HPV vaccine enacted when DTC advertising is discussed is done as a commercialized consumer choice (cf. Mol, 2002: 36).

Mol discusses how multiplicity is coordinated into singularity (an object is multiple, but not fragmented or in plural; it is less than two but more than one) (Mol, 2002: 55, 70). She foregrounds how technicalities and materialities allow for different versions of an object to be coordinated which allows for them to coexist and not clash. For instance she shows how different treatments of atherosclerosis enact different atherosclerosises; “the two measurement techniques do not assess the same disease” (Mol, 2002: 68). Returning to the HPV vaccine, it is perhaps possible to argue that, for instance, the HPV vaccine as multiple is sometimes coordinated into singularity through linking health economics with public health (especially since public health often is discussed as having to with medical values, cancer prevention, population disease control)? Is the HPV vaccine valuated and qualified by QALY the same as the HPV vaccine understood in terms of herd immunity? When are public health and health economics coordinated, when are they clashing?

But what about different practices? Mol asserts that an object is multiple since it is enacted in different ways in different practices. But how to define and demarcate different practices in Läkartidningen? Could public health, health economics and commercialization processes be considered as constituting different practices in my material? In Läkartidningen it indeed seems like these different things are sometimes entangled and do co-exist pretty smoothly. For instance, health economics are utilized to calculate on herd immunity (which could be linked to a public health practice). But sometimes clashes between the practices (if they are could be discussed as different practices) are evident; public health (and sometimes health economics) clashes against commercialization processes when both the national procurement and the DTC advertising are discussed.
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