Anaesthetists and Professional Excellence

*Specialist and Trainee Anaesthetists' Understanding of
their Work as a Basis for Professional Development,
a Qualitative Study*

BY

JAN LARSSON

Dissertation presented at Uppsala University to be publicly examined in Fåhraeussalen, Rudbecklaboratoriet, Uppsala, Friday, October 1, 2004 at 13:15 for the degree of Doctor of Philosophy (Faculty of Medicine). The examination will be conducted in Swedish.

Abstract
Larsson, J. 2004. Anaesthetists and Professional Excellence. Specialist and Trainee Anaesthetists' Understanding of their Work as a Basis for Professional Development, a Qualitative Study. Acta Universitatis Upsaliensis. *Comprehensive Summaries of Uppsala Dissertations from the Faculty of Medicine* 1369. 66 pp. Uppsala. ISBN 91-554-6023-2

Why do some anaesthetists perform a better job than others? Why do some trainees grow faster in their professional role than others? These are important questions when the education of anaesthetists is so topical. Research in work pedagogy has shown that competence is related to the way professionals understand their work; the two first interview studies of this thesis are about understanding work. *Study I* shows that specialist anaesthetists understand work in four different ways, representing four aspects of work. Some of them have a comprehensive understanding, seeing three or all four aspects of work, whereas others have more restricted understandings. In *Study II*, trainees expressed similar ways of understanding work, some comprehensive, some more restricted. It is important that trainees develop competence in all aspects of work. Therefore, trainees need not only to develop competence by *deepening their present understanding*, but also by *change of understanding*, an important but difficult step in competence development.

Reflection is important in professional training. The reflection process should encompass all aspects of work, to enable trainees to develop a broad competence. However, only anaesthetists with a comprehensive way of understanding work have the prerequisites for facilitating trainees' reflection in all aspects of work.

Study III, focussing on the learning environment, shows that two important principles of professional training are often violated for trainee anaesthetists: making use of the trainee's curiosity and reducing trainees' stress level. Trainees very much need support from well educated mentors.

Teachers should not only facilitate trainees' development of competence but also support young trainees to develop into anaesthetists who enjoy work. *Study IV* shows that some experienced anaesthetists still enjoy work very much after years of practice. Their advice about how to get to terms with work should be shared with young trainees.

Keywords: Professional training, competence, anaesthesiology, phenomenography, phenomenology

Jan Larsson, Department of Public Health and Caring Sciences, Health Services Research, Uppsala Science Park, Uppsala University, SE-75185 Uppsala, Sweden

"The core of anaesthesiology is the awareness that anaesthesia is a state between life and death; it makes you take it really, really seriously"
(Torsten Gordh Sr, the first anaesthetist in Sweden, interviewed at the age of 96)

"When I was in internal medicine or surgery I was nervous, true, but not really scared because I knew that when things looked really bad, you could tell the nurse in the emergency department 'Get the anaesthetist, quick!' Now I'm the anaesthetist".
(Inexperienced anaesthetist, anticipating his first night on call)

"The experienced nurse anaesthetists are well trained to take care of the normal uncomplicated anaesthetics. And for the difficult cases your need an experienced specialist anaesthetist. Sometimes I really feel I'm of no use"
(Young trainee anaesthetist)

"The core of the anaesthetist's work – to be the last outpost when other resources fail and the patient's life's in danger"
(Consultant anaesthetist)

List of Papers

This thesis is based on the following four articles, which will be referred to in the text by their respective Roman numerals:

I. **Professional artist, good Samaritan, servant and co-ordinator: four ways of understanding the anaesthetist's work.**
   Larsson J, Holmström I, Rosenqvist U
   Acta Anaesthesiologica Scandinavica 2003; 47: 787-793

II. **Trainee anaesthetists understand their work in different ways: implications for specialist education.**
   Larsson J, Holmström I, Lindberg E, Rosenqvist U
   British Journal of Anaesthesia 2004; 92: 381-387

III. **Being a young and inexperienced trainee anaesthetist: a phenomenological study on tough working conditions.**
   Larsson J, Rosenqvist U, Holmström I
   Submitted

IV. **Enjoying work or just stressed by it? How anesthesiologists experience difficulties at work.**
   Larsson J, Rosenqvist U, Holmström I
   Submitted

Reprints were made with the permission of the publishers.

Contents

I. Introduction

"Just checking the infusion rate to see that it's correct" the young anaesthetist answered when I asked what he was doing. Half an hour earlier I had left an experienced anaesthesia nurse with the anaesthetized patient and everything seemed alright. To me it still looked alright when I re-entered the operating room and found the young doctor there, relieving the nurse for lunch. He was studying the PDR* intensely, calculating carefully, considering the patient's weight and age, and said, almost triumphantly: "Yes, the dose of remifentanil is a little too high; I will take it down a bit."

As a young consultant I could almost feel as if I were being accused of negligence. I thought of my tutor who had taught me, and who was still teaching me anaesthesiology – he would never have done anything like that. He seldom worried about details; sometimes he could even seem a bit careless. Still, people around him always felt calm and confident, because when things went wrong, he really knew what to do. The same week I assisted that same young doctor when he was finishing an anaesthetic and the patient was a little slow to emerge from anaesthesia. "But now, what's wrong? He should've woken up by now" the young doctor said worried, looking at his watch, almost as if accusing the patient of not behaving correctly. I remember thinking about how differently people go about their work, almost as if it weren't the same job. Today I would say that these two anaesthetists, the young one and my tutor, understood their work in different ways; and that is what this thesis is about - understanding professional work.

Why do some anaesthetists perform a better job than others? And why do some trainee anaesthetists grow faster into their professional role than others? When looking for the answers to such questions, focus has traditionally been on attributes such as knowledge and skills. The anaesthetist's work does require comprehensive theoretical knowledge as well as practical skills. Acquisition of these attributes does not, however, guarantee proficiency in the anaesthetist's complex clinical work. Modern research in work pedagogy has shown that competence is linked to the way professionals understand their work[1]. To create a good learning environment, teachers of anaesthesiology therefore must know what learners understand about the professional role into which they are to grow. Besides, teachers must be aware of the different ways anaesthesia work can be understood.

---

* PDR = Physicians' Desk Reference (svenska: FASS)

Three observations initiated this research project: 1) Most anaesthetists do their work in a good enough way, some do it excellently and a few do it inadequately. Differences in knowledge and skills do not explain this variation in clinical competence. 2) Anaesthetists with the same training and the same work tasks do their work in quite different ways. 3) The time it takes for trainee anaesthetists grow into their professional role varies greatly.

Seeking answers to the questions that arose from these observations, I turned to the practising anaesthetists themselves, because I was convinced that their narratives would have something important to teach me.

Aims

The overall aim of this doctorial thesis was to explore how anaesthetists understand their work in order to explain 1) why anaesthetists act so differently at work, 2) why the range of competence is greater than the range of visible knowledge and skills, and 3) why trainees differ so much in how quickly they grow into their professional role.

Specific aims

1. To explore and describe variation in the ways experienced anaesthetists understand their work.
2. To explore and describe variation in the ways work is understood by trainee anaesthetists.
3. To study what difficulties trainee anaesthetists and qualified anaesthetists experience at work.
4. To discuss how the phenomenographic theory of awareness could be applied to anaesthetists' professional training

Outline of the thesis

There are two main focuses of this thesis: first, anaesthesiology and second, learning and teaching. The aim of the two chapters following this introduction is to enable all readers to follow the lines of reasoning, whether their main interest is educational or medical science. First, there is in Chapter II a brief introduction to anaesthesiology for those not familiar with this medical speciality, and after that, Chapter III outlines the concept of professional competence for those medical professionals who (like myself before starting this project) seldom give a thought to educational science.

In Chapter IV, there follows a description of the two qualitative research approaches used in the thesis. This chapter contains statements that to some may appear blurred and overly philosophical, but the reader is urged not to

let this prevent further reading. Qualitative methods, in spite of seeming indistinct or even non-scientific to many quantitative researchers, can give new insights into many everyday medical problems[2].

Chapter V is a description of anaesthesiology but from a perspective not often used. Based on interviews with practicing anaesthetists (Paper I), a work map is created, which describes anaesthesia work from the anaesthetists' perspective.

Chapter VI is about learning anaesthesiology. A study on how young trainee anaesthetists understand their work (Paper II) is reported, after which follows a discussion on how to use phenomenographic learning theory for professional learning.

To learn a profession one needs not only ambitious learners and committed teachers but also a good learning environment. Chapter VII contains a report on difficulties as experienced by trainee anaesthetists (Paper III), telling us what ought to be done to facilitate good learning. In Chapter VIII specialist anaesthetists describe experiences of difficulties at work; this report (Paper IV) also contains advice to trainees from a small group of satisfied anaesthetists who experience no difficulties at work.

In Chapter IX there is a discussion on alternative interpretations of the results from the two phenomenographic studies (Paper I and II). Applying the phenomenographic theory of awareness on anaesthesiology, some conclusions of interest can be drawn; these are presented. There follows then a discussion about rigour, an important and difficult issue in qualitative research. Finally, an analysis of how the questions in the aims section have been answered sums up the thesis.

II. Background

Anaesthesiology – a young speciality in medicine

The Greek word *anaisthesia* means "no feeling"; anaesthesiology is the science about giving anaesthesia. The art of giving anaesthesia was born in Boston in 1846, when William Morton demonstrated the effectiveness of ether as an anaesthetic agent[3]. The invention of surgical anaesthesia was a prerequisite for the rapid development of surgery in the 20th century. For a long period, surgeons were responsible for giving anaesthesia in most hospitals. In Sweden anaesthesiology became a medical speciality in 1940, when the first Swedish anaesthetist[*], Torsten Gordh Sr was appointed at Karolinska Hospital in Stockholm[4].

Today the work field of anaesthesiology has expanded and the name of the speciality in Sweden is Anaesthesiology and Intensive Care, describing the two main fields of the anaesthetist's work. In the operating theatres the anaesthetist's main task is to ensure that patients can be operated on, safely and without pain. In the intensive care units, anaesthetists are responsible for diagnosis and treatment of vital function derangement in very sick patients, e.g. ventilator treatment for patients with serious lung disease. Anaesthetists also have a central role to play in trauma care and in the treatment of acute and chronic pain.

Most Swedish anaesthetists have a work schedule of 40 hours a week. The on-call work that comes on top of the regular office work is usually only partly compensated by days or weeks off. The rest is paid as money, the consequence of which is that most Swedish anaesthetists spend more than 40 hours a week at the workplace. During on-call work the field of work expands considerably and anaesthetists may then have to take care of cases which they are confronted with very seldom, e.g. anaesthetizing small infants or taking care of patients in the ICU with complicated derangements of vital functions.

---

[*] A physician practicing anaesthesiology is in Great Britain referred to as an *anaesthetist*. In the US as well as in Canada the word *anesthesiologist* is used. In this thesis the term *anaesthetist* will be used.

Anaesthesia nurses and the Scandinavian model of anaesthesiology

Traditionally in Sweden, specially trained nurses do much of the anaesthesia work. The physician anaesthetist is usually responsible for two or three operating theatres at a time, taking part in the start and end of anaesthesia and otherwise whenever problems arise. The rest of the time, the anaesthetized patient is cared for by the anaesthesia nurse. In Great Britain and in most European countries, physicians do all the anaesthesia work, whereas in the US both models exist. This is a field where an intense debate is going on, both in Great Britain and Sweden[5-7]. Trainee anaesthetists in Sweden can profit much from working with experienced nurse anaesthetists, but may be at the risk of jeopardizing their professional authority and self-esteem.

Training of anaesthetists in Sweden

After 5½ years of university studies and 1½ years of internship, physicians in Sweden enter their specialist training. In Sweden, as in the European Union as a whole, the minimum time for specialist training is 5 years of full time work[8]. During the whole training period, each trainee anaesthetist has a personal tutor, usually a consultant anaesthetist. The training programme is goal-directed and when the goals are reached, trainees get their certificate as qualified anaesthetists[9]. Trainees are encouraged to try to pass part I of the European Academy of Anaesthesiology examination even if this is not compulsory. Part 2, an oral examination, is usually passed after having qualified as a specialist anaesthetist.

Professional training – science, art and wisdom

The first person to discuss the problem of training people for certain work tasks was the Greek philosopher Socrates. In his description of the ideal state, written down by his pupil Plato[10], one important issue was to select the right people for certain important professions. Plato defined medicine as an empirical art, stating that in medicine there is enough scientific data to predict outcome with some certainty, in contrast to painting and music[11]. Aristotle, the son of a physician, was the creator of a philosophy of practical work, placing medicine among the practical sciences. According to Aristotle, inexperienced people need rules to follow, whereas a person with practical wisdom (*phronesis*), acquired through experience, such as a skilled physician, will focus on what is special in each situation[11].

The industrial revolution and the fast growth of scientific knowledge during the 20th century gave strong support for technical rationality as the domi-

nant way of problem solving. The position of medicine as an academic profession became very strong. Passing over scientific knowledge to students was considered the number one task for medical universities. *Episteme* (theoretical knowledge) came to dominate medical education. There was little room for medicine as an art, *techne*, in the positivist paradigm[12].

The influence of the professions in the Western society grew fast during the second half of the 20th century. However, the shortcomings of professionals, including physicians, to handle many of the complex problems in modern society became more and more conspicuous. Problems that confront professionals were shown to be characterized by uncertainty and lack of information[13]. The habit of regarding patients as objects on whom physicians could apply their knowledge and skills, was called into question; it was argued that instead patients must be treated as individual subjects[14]. This led to a new way of viewing the training of physicians, with more emphasis on reflection on clinical situations.

Successful training to handle everyday clinical problems takes much more than the mere passing over of scientific knowledge[12]. Medicine as science – general, factual and objective – does not fulfil all needs of clinical practice[15]. Medical education needs *episteme* and *techne* and *phronesis*.

III. Professional competence

Competence – an elusive concept

The original meaning of the Latin word *competentia* is agreement, coincidence. Competence at work then would signify agreement between a person's capabilities and the demands of the work tasks. A competent professional is one who performs a job well enough. So, who does a good job? What first springs to mind is to define good professional work in terms of the result of the work, teachers being judged by the results of pupils in their classes, surgeons by the results of operations they perform etc. There are, however, two problems with this way of defining competence at work:

The first problem emanates from the fact that in many professional organizations, the result of work, i.e. to which degree expectations or needs of clients or patients are fulfilled, depends on a whole system functioning well. The outcome then cannot be immediately linked to the performance of the individual professional. Instead, good work performance means to contribute to the hospital or clinic fulfilling patients' needs. In that case, professionals' competence is better judged from the way they are observed to do their work[16].

There is also a second problem with the outcome-based definition of competence, linked to the problem of measuring the result of work. In a market system, consumers can choose freely between products, evaluating which product best fulfils their needs. However, testing physicians to find the best one to cure you when you are ill is for the individual an impossible (and even dangerous) undertaking. The alternative to evaluating *the product* is then to guarantee the quality of the *producer*[17]. "The medical act is worth what he who has performed it is worth; his intrinsic value is a function of the socially recognized quality of the producer."* From the patients' perspective,

---

* This fact was admitted by health authorities in France as early as in the years after the revolution of 1789, when the idea of Liberty was so spread in all areas of society. A number of deaths assigned to medical maltreatment by incompetent "doctors" had forced authorities to find other ways of assuring the quality of the care delivered by physicians[17].

the appropriate claim then would be that health authorities guarantee the competence of medical professionals. And so we return to the elusive notion of competence.

Even though the concept of competence is difficult to capture, it is an aspect of professional work that we perceive and often discuss. A characteristic feature of those aspects of a phenomenon that we perceive is a dimension of variation, and, no doubt, professional competence varies: some professionals certainly stand out as experts whereas others are regarded as less competent.

I will now discuss competence from two perspectives: first, the characteristics of good work performance and second, the capabilities that professionals need to perform well at work.

Expert professional work performance

What characterizes expert professionals? All learners start out at the novice's level, learning the simple rules and guidelines of their work[18]. Their ambition is to handle routine situations, avoiding serious mistakes[19]. Sooner or later, most professionals go on to the next competence level, acquiring knowledge and skills that can be found in lists of attributes in the teaching programmes of many professions. Some professionals will remain at this level, getting more and more experience from routine work, restricting their field of work in order to keep work tasks within the frame of routine procedure. Others proceed to the expert level.

To take the step to expertise, professionals must be willing to work at the edge of their capability, keeping alive their curiosity about the consequences of their actions[20]. The ability to handle new, difficult situations by reformulating unclear problems to make them solvable is important. Expert professionals appreciate the value of being exposed to such problems. Understanding the learning process is also essential: professionals, to stay experts, must be willing to keep on reconstructing their knowledge, accepting that continuous learning is a prerequisite for expert professional competence[21].

Skills and knowledge

Traditionally, programmes for specialist education in medicine have been based on lists of attributes. Consequently, in many countries the curricula for specialist training in anaesthesiology contain detailed lists of knowledge and skills that trainees are expected to acquire before they qualify as specialist anaesthetists. However this "check-list approach" has been criticised of not taking into consideration the necessary (and difficult) step of transforming attributes into the context of work[22]. Instead, skills should be trained in the context of real clinical work in order that trainees learn to react appropriately to unexpected situations[23].

Non-technical skills

Anaesthetists also need other capabilities in addition to knowledge and skills. This becomes obvious when teachers of anaesthesia try to describe the competent anaesthetist. A number of other attributes, named "non-technical skills", must be included to give the whole picture[24]. These skills include decision-making, handling information and working in teams, either as leaders or team-members[25].

Competence - from acquisition of attributes to understanding work

The traditional (and still most common) way of regarding competence is based on a rationalistic research tradition, assuming that competence is composed of a set of attributes that professionals use to accomplish a set of work tasks. Developing professional competence then means to define two entities: first, work is defined as a list of work tasks; second, competence is defined as a list of attributes that professionals must acquire to be able to accomplish work tasks[26].

However, according to an analysis of competence at work based on hermeneutic phenomenology[26], the attributes used by professionals are not separate from the work tasks. Instead, there is an internal relationship between the attributes and the professionals' experiences of the work. Which attributes professionals acquire and how they develop competence is related to the way they understand the work. *Understanding work* thus has got a central role to play. Developing new competence by *change of understanding* is an important step. It is also a demanding step, because when professionals develop competence, they start from their actual way of understanding work, and usually they only refine their present understanding. Therefore, the great steps in competence development by change of understanding will take place only if the professional's present understanding somehow is challenged[1, 27, 28].

Sandberg in a study on engine optimisers, mapped engineers' different conceptions of their job, how they understood and experienced their work[29]. He showed that engineers with the most comprehensive understanding of work were judged to perform best. Engineers with a more narrow understanding of work described engineers with a broader understanding as more competent but could not explain why these colleagues were more proficient.

Klemola and Norros in a study on interactions between anaesthetists and patients in the operating theatre, found two distinct types of practice: interpretative habit of action and reactive habit of action. From interviews it was inferred that the two groups also differed more generally in their conceptions of the work[30]. Interpretative habit of action was characterized by recognition of the uniqueness of each patient, and reactive habit of action was based on a deterministic implementation of a pre-operative plan. Anaesthetists from the

first group made more appropriate decisions when managing anaesthetized patients, adapting the anaesthetic to patients' individual physiological reactions and anticipating when changes in anaesthetic depth were needed[31, 32].

Hence, the ways professionals understand their work are evident in their narratives about it, in their way of performing, and in how they strive to develop new competence.

A characteristic feature of proficient anaesthetists is the ability to act quickly in difficult and often messy situations. This requires a kind of competence that comes from years of experience, internalizing formal knowledge after having used it in clinical situations. This has been called tacit knowledge and will be described in the following section.

Tacit knowledge

In the traditional, reductionist view on competence, the best way of understanding a complicated phenomenon is to reduce it to its component parts and, to this, add a set of rules, explaining how the parts relate to each other. For a long period of time, this view has dominated in medical education and focus has been on factual knowledge: principles, theories and facts presented in textbooks and formal lectures. To this was added technical knowledge: factual knowledge put into practice, skills learned in clinical practice. However, the complex challenges of medicine demand a more complex approach[15]. Focus must be turned to a third aspect of knowledge, a type of knowledge acquired through training, experiencing and reflecting, making the professional confident in the daily practice[33]. This aspect of knowledge has been named tacit knowledge.

Tacit means silent. Tacit knowledge is knowledge that is not, or cannot be, described. Polanyi, in *The Tacit Dimension*, explains the process of learning as a stepwise process, where the shift to a higher level of knowing or understanding happens as a change of perspective[34]. This qualitative shift of knowledge or understanding cannot be described explicitly without losing some of its core quality. In Polanyi's terminology, tacit knowledge is structured in two terms, *proximal* and *distal*. The proximal term is only known in the appearance of the distal term. In performing a body movement, we are aware of the individual muscle moves (the proximal term) only in terms of the intended movement (the distal term). The distal term expresses the meaning of the tacit knowledge. To make something function as the proximal term of tacit knowledge, this "something" must be included in us. That is, we must dwell in it. This process of things getting to function as the proximal term in tacit knowledge is called interiorization.

According to Polanyi, if we observe that which constitutes the proximal term of tacit knowledge, closely and in detail, it may lose its function. The expert nurse who "never fails when putting in an intravenous line", may fail when asked to demonstrate her skill (the distal term) to a novice, describing

each detail of her or his technique (the proximal term). Furthermore, a scientific theory is known truly only after it has been interiorized by being used to solve problems several times; this tacit knowledge cannot be replaced by extensive formal description.

Novice anaesthetists, confronted with patients with serious circulatory problems, are still novices however well they have learnt their lessons in basic science and physiology; the physiological theories must be interiorized by repeated use, solving clinical problems. Therefore, trainees cannot expect teachers to explain in detail how expert anaesthetists get to the solutions of clinical problems. Instead they must identify themselves with their seniors, trying to see the problem solving process from their perspective. Learning thus requires trainees' confidence in senior anaesthetists, based on an open and confident atmosphere among anaesthetists.

Assessment of competence

Anaesthetists' professional competence is easy to recognise but difficult to assess. A prerequisite for good clinical practice is scientific knowledge, the intellectual capacity to make valid medical judgements and the technical expertise to implement such judgements[35]. Good practice requires sound clinical reasoning, important but difficult to assess. Experienced clinicians are often themselves unable to explain how they reason in difficult clinical situations. We can observe the result of anaesthetists' reasoning, namely the way they act, but not their thinking. If we ask them, they are not able to put words to all that has led them forward to their clinical decisions. They rely on informal or tacit knowledge[34].

Thus, we recognize competence when we see it, but when it comes to measuring competence, we often get into difficulties[16, 24]. Still, we need methods to assess anaesthetists' professional competence. Trainees must get feed-back to know if their professional learning is progressing well. The formal qualification as a specialist anaesthetist must guarantee a minimum standard of professional competence. Trainees' skill in performing medical procedures can be evaluated by consultant observation[36] or by registering outcome, i.e. the result of the procedure. New methods for testing clinical problem solving have been developed. In OSCE (objective structured clinical examination) trainees are exposed to standardized live simulations of clinical situations[37]. This type of checklists, however, has been criticized for being a blunt instrument for evaluating professional expertise[38].

By observing the trainees' performance, both skills in clinical situations[36] and in simulators[39, 40] can be evaluated. However, assuming that understanding work is central to competence, assessment should focus more on assessing understanding. It can be done by questioning trainees about a variety of

clinical experiences, important to anaesthesia work. The answers should be analysed from the perspective of defining different aspects that the trainees have discerned in the described situations. By reflecting on their own answers together with teachers, the trainees can learn from them. Teaching and assessment go hand-in-hand[41].

IV. Methods

The Greek word *phainomenon* means that "which appears". By *phenomena* we mean objects as they appear to us (in contrast to the "objects themselves"). Studying phenomena is a common undertaking in scientific research. If one wants to study phenomena in the world around us, it can be done in several ways. One can study the phenomena as representations of real objects in the real world. The researcher then aims at describing the objects as closely as possible to what the objects really are. This is how most researchers in science (including medicine) understand research. The existence of the real world is taken for granted and research is about objects in this world.

An alternative research approach is to study phenomena as they come to people through their senses, by way of their perception. The existence of a real world with real objects is then considered a metaphysical question, to which we shall never have an answer. This question is therefore suspended, and the researcher instead concentrates on exploring phenomena as they appear to people. The aim of the research is often to describe the essence of the phenomenon. This research approach is represented by phenomenological inquiries, widely used in humanistic sciences.

Finally one can study how people experience a phenomenon. The investigation, then, is not directed at the phenomenon, but at people, how they experience and understand the phenomenon under study. This research approach is represented by phenomenography, initially used for research in education but in the last decade also widely used in health care research[42-44].

In this thesis I have used both phenomenographic (Paper I and II) and phenomenological (Paper III and IV) research approaches.

Phenomenography

For the first two studies of this thesis, a phenomenographic research approach was used. Phenomenography was introduced in the 1970s by an educational research group at the Göteborg University[45]. The research object of

19

phenomenography is *way of understanding*, *what* interviewees talk about and *how* they talk about it, when interviewed about a phenomenon in the world. Data are usually collected by in-depth interviews, which are tape recorded and transcribed word-for-word. The researcher analyses the transcripts, looking for different ways of understanding the phenomenon. Numerous empirical studies have shown that a phenomenon is understood by a group of people in a limited number of ways[46]. Based on similarities and differences, the interviewees' ways of understanding are grouped in *categories of description*. All the categories of description put together are called *the outcome space*, representing also the relationship between the categories.

Ways of understanding

A phenomenon comes to a person's consciousness by way of her senses and the perception process. A *way of understanding* constitutes a relation between the subject and the phenomenon and is the result of a meaning-creating process. A phenomenon can in theory be perceived in an infinite number of ways. However in the process of constituting meaning only a limited number of ways of understanding will result. The ways of understanding have both "what" and "how" aspects. The "what" aspect tells us what is in the subject's focus; the "how" aspect describes the constituted meaning.

Categories of description

The categories of description are the researcher's abstractions of the ways of understanding and refer to a collective level. They describe the different ways the phenomenon *can* be understood, some categories being based on ways of understanding expressed in more than one interview.

Outcome space

All the categories of description, the outcome space, constitute the result of a phenomenographic study. Usually the different categories in the outcome space are related to one another in a hierarchical way. The hierarchic structure of the outcome space can be inferred from the data or it can be the result of the researcher's analysis.

   The only world that we can talk about in a meaningful way is the conceived world, the world of phenomena as they are understood. If we could

---

* In phenomenographic reports other terms are also being used: way of seeing, way of experiencing, understanding, conception. These terms will be used interchangeably in this thesis.

perform an ideal phenomenographic study, presenting the complete variation and the relations of all the ways a phenomena can be understood, it could then be argued that the outcome space *is* the phenomenon[46, 47].

First and second order perspective

Most research activity of scientists is directed towards describing and understanding phenomena in the world; this approach is what phenomenographers call research from *a first order perspective*. Among scientists there is, at a certain point in history, a common agreement on how basic concepts of science should be understood. Usually, but not always, these understandings are shared by teachers[48].

   The researcher's attention could, however, instead be directed at people, how they understand or experience phenomena of the world (e.g. how university students understand a scientific concept they are supposed to learn about); the researcher then takes a *second order perspective*. Knowledge about the different ways learners understand the objects of learning is essential for teachers, because learning should preferentially take its starting point in the students' understanding[49]. Therefore, the focus on a second order perspective make the results of phenomenographic studies important to those involved in educational programmes in universities or in professional life.

Why phenomenography?

One aim of this research project was to study the *variation* in the ways anaesthetists act in similar situations. According to theory, people's different ways of acting are related to the ways they *understand* a phenomenon[29]; investigating how anaesthetists understand their work therefore was considered a promising undertaking. Phenomenographic studies are directed at exploring the variation in the way people understand a phenomenon and therefore phenomenography was considered a suitable research approach for the first two studies of the thesis.

Phenomenology

When and in what ways do anaesthetists feel that work is too difficult? Study III and IV were designed to describe how trainees and experienced anaesthetists respectively, experience difficulties at work. For these two studies, a phenomenological approach was considered most appropriate. Phenomenology as a philosophical method was founded by the German philosopher and mathematician Edmund Hussler in the beginning of the 20th century[50, 51]. Hussler, in his extensive writing on phenomenology, introduced a number of

philosophical terms, some of which have been adopted by qualitative researchers and are widely used in reports on qualitative inquiries: life-world, intersubjectivity, essence, reduction, epoché, and bracketing. I will briefly explain these terms.

Life-world and intersubjectivity

Objects in the world are given to people through their senses. The appearing objects, the phenomena, are manifested as experiences by the acts of perception. A person, experiencing the phenomena of the world around her or him, creates a world, the world that she or he lives in. Husserl named this world, the experienced world, the *life-world*[52].

Phenomenology has been criticized for leading inevitably to a solipsistic attitude[53], i.e. a person can be sure only of what she herself experiences; her life-world is all there is to her. Husserl's answer to this was that a person can perceive other individuals not only as objects but also as other subjects. The experiencing of other subjects makes intersubjectivity possible. The phenomenal world, the world of appearing objects, therefore is a shared world and the truthfulness of a statement about a phenomenon can be judged by other subjects[54].

Epoché, bracketing and reduction

Taking for granted that there exists a real world, a world behind the experienced phenomena, is a predominant view in most people's day to day life. It is also a common assumption (usually implicit) in natural sciences, including medicine. Husserl's term for this unreflected assumption about the existence of a real world was *the natural attitude*. A necessary step in phenomenological investigations is to suspend this "natural attitude". This is not to say that the natural attitude should be forgotten or eliminated but it should be put aside, *bracketed* as the mathematician Husserl named it. *The epoché* is the term for this phenomenological "view-turn".

In phenomenological studies the aim is to describe the phenomenon as it is given in the subject's experience. To achieve this, the researcher should set aside theories and her or his own expectations about the phenomenon. The term for this is the *psychological reduction*[55].

Essence and eidetic variation

The aim of phenomenological inquiries is often declared to be the identification of the essence of a phenomenon. By essence we mean the properties that make the object what it is, no more, no less. The method described by Husserl to capture the essence is the "eidetic variation". The phenomenon is changed by adding and excluding properties; thereby the researcher can find

the invariant structures that make the phenomenon the type of phenomenon that it is. For instance, to identify the essence of "a professional anaesthetist" means to identify properties necessary for a person to be an anaesthetist, properties that cannot be excluded or changed, because if they were, the person would not be an anaesthetist anymore.

To sum up, we experience the world around us through the perception of appearing objects, a life-world is created in each of us and we can also, to some extent, experience the life-worlds of other subjects.

Phenomenology in qualitative research

The empirical data in phenomenological studies usually consist of open interviews, transcribed word for word. Using an interpretative analysis, the researcher can get an increased understanding of how the informants experience the phenomenon under study[56]. It is important to adopt a phenomenological attitude to the text, striving to enter the life-world of the interviewees and holding back one's own pre-understanding or prejudices about the phenomenon as well as theories and models. By means of the eidetic reduction we may be able to describe the essence of the phenomenon. The result of a phenomenological inquiry is often less abstract and structured than a phenomenographic one, but instead will present more of the nuances of experienced life[57].

Why phenomenology?

Traditional sciences have not been concerned with the lived experiences of people because these are largely immeasurable and difficult to observe[58]. However, teachers of anaesthesia must pay attention to trainees' lived experience of stress and difficulties at work. Doing so they will also benefit from knowing more about how qualified anaesthetists experiences difficulties. These are the study objects of Paper III and IV. These two studies are about "being an anaesthetist" (in contrast to the first two studies, where the object of investigation is "understanding the anaesthetist's work"). This means that we want to get access to the life-worlds of the physicians. Using in-depth interviews, qualitative researchers can get to understand better people's experiences of a phenomenon. By means of a phenomenological analysis of the interview texts, it is possible to get access to the richness and flavour of the life-world that is lost in the more downright phenomenographic analysis.

V. Anaesthesiology from the anaesthetists' perspective (Paper I)

Role descriptions

Educational plans for anaesthesiology are usually dominated by lists of knowledge and practical skills[59]. This is not enough to guide young trainees who need to understand more about their future professional role. An alternate approach to the development of professional competence is role descriptions[60]. In some countries a different way of describing the work task of specialist physicians has been introduced. In Canada and Denmark the set of attributes has been replaced by a number of professional roles for the specialist physician, e.g. medical expert, communicator, and manager[61, 62]. In the role descriptions, anaesthesiology is represented as a relation between the subject (the anaesthetist) and the phenomenon (the work)

Second order perspective

Descriptions of the profession of anaesthetists usually seek the answer to the question "What is anaesthesiology". The question can be put differently, namely "How do experienced anaesthetists understand what anaesthesiology is", using what in phenomenography is called a *second order perspective.* In this way one can learn about anaesthesiology from the anaesthetists' perspective, getting a deeper and more comprehensive picture of the profession. One can also find out about variations in the ways anaesthetists understand their work.

A phenomenographic study, describing anaesthesiology from a second order perspective and using role descriptions, constitutes the first part of this thesis.

The interviews

Nineteen qualified anaesthetists in three Swedish hospitals were interviewed with in-depth interviews, seeking the answers to three questions: 1) When do you feel you have been successful in your work? 2) What is difficult or what hinders you in your work? 3) What is the core of your professional anaesthesia work? Phenomenographic analysis was performed thus: those passages in the interview where the interviewee gave answers to the three main ques-

tions were identified. In these passages we investigated *what* was in the focus of the anaesthetists' attention and *how* they described their way of working. For each interview, we made a preliminary description of the anaesthetist's way of understanding the work. Next, the descriptions were grouped into categories, based on similarities and differences. For each category a common description was formulated and a suitable metaphor assigned to convey a more intuitive understanding of the content of the category[63]. Finally, each interview was read once more, looking for passages where the interviewees expressed ways of understanding work besides their predominating ways.

Four categories of understanding the anaesthetist's work

Four ways of understanding work were discovered: (A) Give anaesthesia and control the patient's vital functions; (B) Help the patient, alleviate her pain and anxiety; (C) Give service to the whole hospital to facilitate the work of other doctors and nurses, caring for severely ill patients; and (D) Organise and direct the operating theatres to make the operations list run smoothly.

Anaesthetists thus understand their work in very different ways. As people's ways of understanding are expressed in their actions, it can be assumed that anaesthetists also differ in the way they act at work. Some, with only one aspect of the work in focus, will have a very restricted work field, whereas others, with a more comprehensive understanding of work, can choose between three or four aspects to put into focus and will have a greater action repertoire. There did not seem to be a development towards a more comprehensive understanding over time among the studied anaesthetists. The distribution of ways of understanding among the interviewees is shown in Table 1.

Table 1. Nineteen qualified anaesthetists' predominant (++) and less dominant (+) ways of understanding the anaesthesia work.

Interviewees	"Professional artist"	"Samaritan"	"Servant"	"Co-ordinator"
male (<5)	++			+
male (5-10)	++		+	+
male (10-15)	++			+
male (10-15)	++		+	
male (15-20)	++			
female (>20)	++			
male (<5)	+	++		
male (<5)	+	++	+	
male (<5)	+	++		
male (5-10)	+	++	+	
male (10-15)	+	++		
male (>20)	+	++		+
male (<5)	+	+	++	
male (<5)	+	+	++	
male (>20)	+	+	++	+
male (5-10)	+		+	++
female (10-15)	+	+		++
male (10-15)	+	+		++
female (>20)				++

Numbers in brackets: years of practice after qualification as specialists in anaesthesia and intensive care

How the categories are related – the outcome space

The result of a phenomenographic study is not only the categories discovered, but also the relations between the categories, which is investigated in the last step of the analysis. The four categories of understanding *and* their internal relations constitute *the outcome space*.

In this study there is a logic relation between understandings (A), (B), and (C). Anaesthetists with understanding (B) want to help the patient to go through operation and anaesthesia safely. In order to do so, anaesthetists must, for example, control the patient's vital functions, that is – they must also bring aspect (A) into focus. The opposite is not the case; it is perfectly possible to focus on controlling the patient's vital functions without focussing on the patient as an individual. This hierarchy is supported by the distribution of ways of understanding; none of the anaesthetists with understanding (A) as the dominating one has understanding (B) as a non-dominant understanding. In an analogous way it can be shown that understanding (C) also incorporates (A) and (B).

A map of the anaesthetist's work can be created to illustrate the relations between the categories of description in the outcome space

.

(C) "Servant" In focus: The hospital system with doctors and nurses, caring for and curing the patients	
(D) "Co-ordinator" In focus: The operations ward, producing opera-tions	(B) "Samaritan" In focus: The patient as an individual subject, with his/her pain and anxiety
	(A) "Professional artist" In focus: The patient's vital functions and the medical process of anaesthesia

Figure 1. The anaesthetists' work map, representing the collective
understanding of the work in a group of Swedish anaesthetists

VII. Learning anaesthesiology (Paper II)

How do you learn a profession? If it were only a question of acquisition of attributes such as knowledge and skills, the learning process would be fairly straightforward to understand and describe. However, knowledge and practical skills do not *per se* guarantee clinical competence. In many clinical situations the anaesthetist's first task may be to define the problem to be solved. Professional competence then requires a different kind of knowledge, often called tacit knowledge. Even if we cannot describe this knowledge with words, we can observe the action of the competent professional. To help the trainee to develop such tacit knowledge is a great challenge in teaching anaesthesiology.

If we thus accept that tacit knowledge is a crucial component of professional competence, focus in training anaesthetists should be more on understanding work[1]. To learn anaesthesiology, trainees must be able to reflect on situations, experienced at work, because reflection is an important part of the learning process. The way a situation is perceived will determine the content of the reflective process. Teachers, who are consciously aware of the different aspects of the anaesthesia work, can stimulate trainees to define the different aspects of a situation to focus on when reflecting on their experiences. Thereby teachers can facilitate young trainees turning unstructured work into learning experiences.

To that end, teachers of anaesthesia must know what learners understand about the professional role into which they are to grow; and the teacher must be aware of the different ways anaesthesia work *can* be understood.

Therefore, the aim of the second part of this thesis was to map the different ways trainee anaesthetists understand their work.

Anaesthesiology as understood by trainee anaesthetists

The interviews

Nineteen Swedish trainee anaesthetists in four university hospitals and two middle-sized county hospitals were interviewed in a phenomenographic study. The questions were the same as in Study I for experienced anaesthetists. Phenomenographic analysis was performed.

Trainees' understanding of work – six categories

Six categories of descriptions were found: (A) give anaesthesia according to a standard plan; (B) take the responsibility for the patient's vital functions; (C) minimise the patient's suffering and make the patient feel safe; (D) give service to specialist doctors to facilitate their care of the patients; (E) organize and lead the operations ward and team; and (F) develop own competence, using the experience from every new patient for learning.

Four of these were identical or similar to the categories found in Study 1 on specialist anaesthetists but expressed less distinctly. Two new categories were discovered: (A) give anaesthesia according to a standard plan, the *novice* and (F) develop own competence, using the experience from every new patient for learning, the *learner*.

Understandings A and B are about managing the anaesthetized patient in the operating theatre. Five trainees with understanding A described managing anaesthesia as a procedure with a protocol to follow. This is the first stage in the development of professional competence, the *novice*[64], which probably most anaesthetists pass at the beginning of their training. Most trainees instead focus on the patient's physiology when managing the patient in anaesthesia (understanding B).

The four trainees with understanding (C) have the patient as an individual in focus and feel responsible for making her feel safe. This also includes managing anaesthesia in a safe way. Understanding (C) can be considered as a hierarchically higher understanding than (A) and (B). Understanding (C) incorporates understanding (A) or (B), whereas the reverse is not true. This is supported by the fact that 7 of the 10 trainees with understanding (A) or (B) do *not* have understanding (C); it is possible to focus on the medical process of anaesthesia without taking into focus the patient as an individual. The distribution of ways of understanding their work among the interviewees is shown in Table 2.

Table 2. Distribution among 19 trainee anaesthetists of the six ways of understanding their work

Inter-viewees	(A) Follow protocol	(B) Balance physiology	(C) Care for the patient	(D) Serve other specialists	(E) Lead operating team	(F) Learn from practice
Male (16)	++				+	
Female (2)	++					
Female (16)	++				+	
Male (4)		++	+	+		+
Male (16)		++	+	+		+
Male (10)		++	+			+
Male (14)		++		+		
Male (17)		++			+	+
Female (3)		++			+	
Male (4)		++				
Female (9)	+		++		+	
Male (3)		+	++			+
Female (16)		+	++		+	
Female (4)		+	++			+
Female (24)		+	+	++		+
Male (21)		+			++	
Female (5)		+	+		+	++
Female (12)		+		+		++
Female (3)	+					++

Predominant (++) and less dominant understandings (+). Numbers in brackets: months of practice in anaesthesia

The result of this study has educational implications. The next section of this chapter is about how phenomenographic results can be applied in professional training. Phenomenography started out as an empirical educational project and has continued by developing a theoretical framework about learning and understanding. This theory of learning and how it could be used for training in anaesthesiology will be described briefly.

Competence development by change of understanding

A phenomenon or a situation can be perceived in different ways, i.e. different aspects of the phenomenon can be focussed on. When a person perceives a phenomenon, one aspect of the phenomenon will come into focus (or the foreground), in a process of creating meaning. The result of this process is a way of understanding. A phenomenon can be understood in different ways, different aspects can be brought into focus and meaning can be created in

different ways. All the ways a phenomenon can be understood constitute the phenomenon.

A person often understands a phenomenon in only one way and learning often takes place predominantly within that understanding. Learning within an understanding is actually by far the most common everyday way of learning. However, professionals take the great steps in competence development when they change their understandings[1]. This type of learning is much rarer, less known and more difficult to achieve. To explain why that is so, two ways of relating to the world and to the self must be discussed briefly.

One way of seeing the world, the most common in the Western world of today, is the "natural attitude": there is the "real world" and there are our, more or less imperfect, inner mental pictures of this world. In other words, there is a dualistic relation between world and man. A different way of relating to the world is the phenomenological non-dualist attitude, according to which man and world are one. A person's consciousness is created by the person perceiving the world and the world is created by the person experiencing it.

The "the natural attitude" is by far the most common attitude. In this attitude, the world that a person perceives (in a more or less correct or comprehensive way) is the real world. Consequently, to change the way of understanding a phenomenon in the world is for most people counterintuitive, for it would mean to change the world.

To achieve a change of understanding, the learner must have an approach to learning, where she or he actively seeks the meaning of the phenomenon. Such an approach has been named a deep learning approach. In the following sections I will discuss, first the concept of deep and surface learning, and then a theory on how changes of understanding come about.

Deep and surface learning

In the literature of educational science, two main approaches to learning have been described: surface and deep learning. This concept was based on studies by phenomenographic researcher in the 1970s on university students[65]. They found that the students understood the meaning of reading a scientific text in two qualitatively different ways, resulting in different learning outcomes. The two ways of learning were described as 1) surface learning, directed at memorizing factual knowledge and extrinsically driven (e.g. by the wish to get a job), and 2) deep learning, aiming at understanding the meaning behind the text and intrinsically driven by internal goals.

Variation facilitates change of understanding

Deep learning often means to change understanding, which constitutes a great challenge in competence development[66, 67]. Still, such changes are necessary if trainee anaesthetists are to develop their competence to master all aspects of work.

To achieve a change of understanding, a new, hitherto unperceived aspect of the phenomenon must be brought to the learners' focus of awareness. What, then, can bring the new aspect to focus, i.e. make it perceptible? One answer is variation: aspects that have a dimension of variation are easier to see[68]. In a learning situation where only one aspect of the work contains variation while other aspects are kept stable and recede to the background, the learner will have the best chance to focus on this aspect. Furthermore, a shift of focus will often be accompanied by a shift of meaning[69]. It is therefore important that the teacher is aware of the different aspects of the work and of variations that can help to bring each of these aspects into focus. Table 3 shows the different categories of description from the study on trainee anaesthetists and variations that can help to bring a certain aspect into the trainees' focus of awareness.

Table 3. Trainees' understanding of anaesthesia work, categories of description

Category	What? Aspect in focus	How? The meaning of work	Variation that brings the aspect into focus
(A)	The procedure of giving anaesthesia	Follow the protocol	Methods of giving anaesthesia and ways of monitoring patient
(B)	The medical process of anaesthesia	Monitor and balance physiological parameters	Physiological parameters
(C)	The patient going through operation and anaesthesia	Minimise risk and suffering, calm and comfort patient	Patients' apprehension before operation, pain and suffering after operation
(D)	Surgeons and other specialist doctors, caring for patients	Give service, adapt anaesthesia to surgeons' needs	Other doctors' need of service and assistance
(E)	Operations ward and team	Organize, survey and communicate	Work-load, need of immediate action
(F)	Trainees' own competence and skill	Get exposed to challenges, reflect, get feedback from experienced colleagues	Difficulties in performing procedures, experienced anaesthetists' ways of managing anaesthesia

Trainees with the "novice" way of understanding work may serve as an example of how the variation theory can be applied in specialist training. These trainees describe managing anaesthesia as a procedure with a protocol to follow. This is the first stage in the development of professional competence, which most anaesthetists probably go through at the beginning of their training. The teacher of anaesthesia should be concerned if this understanding is still the predominating one in trainees who are not at the very beginning of their career. To facilitate these trainees' change of understanding, teachers can arrange for them to perform several anaesthetics using the same method. This dimension of anaesthetic work (the different methods which can be used when giving an anaesthetic) will then remain invariant and, hopefully, recede to the background of the trainee's awareness. The chance of the novice trainee focussing on the variation of the patient's physiological parameters instead will increase, thereby creating prerequisites for a change of understanding.

Comparing specialists' and trainees' ways of understanding work

Comparing the work maps of trainees and specialists, one is struck by the resemblance. All the four categories of the specialists are present among the trainees, although expressed in a much less distinct way. The proportions are also strikingly similar, even if no conclusions can be drawn from these small qualitative studies. One difference is the *novice* way of understanding in the trainees' group, representing the beginner's way of handling the medical process of anaesthesia. The fact that there were no specialist anaesthetists with the *novice* understanding may be explained in two ways: first, there is a dimension of variation (physiological parameters) in the "medical process of anaesthesia" aspect, with a strong potential of bringing this aspect into the foreground. Second, anaesthetists that stay *novices*, will probably be looked upon as non-competent and will presumably leave the speciality of anaesthesiology.

The traditional view on learning, focusing on attributes such as knowledge and skills and sometimes metaphorically represented by meccano building (by adding bits and pieces and securing them together, the building grows bigger and bigger), does not fit in well with these findings. Instead, the similarity between trainees' and specialists' ways of understanding work suggests another way of describing professional learning: the trainee has, from a very early stage, the whole picture of the work, but it is a blurred picture. During professional development, the picture gets clearer and more distinct, in a way similar to when focussing a binocular. The process bears a resemblance to the systematic inference described by Dewey:

Systematic inference, in short, means *the recognition of definite relations of interdependence between considerations previously unorganized and disconnected...* (Italics by Dewey) [70]

We now know, that some anaesthetists end up with a very restricted way of understanding work, i.e. they have a narrow field of vision. This may be due to their excluding some aspects of work or fields on the work map. Alternatively, they may have started with a narrow field of vision and never changed to more comprehensive ways of understanding. Other anaesthetists, keeping a spotlight sweeping over the whole map, will develop more comprehensive ways of understanding work; they will have more aspects of work in conscious awareness. As teachers, they will have a greater repertoire of aspects to choose between when reflecting on clinical events together with trainees.

VIII. Creating a good learning environment (Paper III)

A good learning environment presupposes appropriate working conditions. If anaesthetists are to become and stay competent at work, it is necessary that good conditions for learning at work are created for all anaesthetists, both trainees and experienced anaesthetists.

A profession such as anaesthesiology cannot be learnt entirely from books. Proficiency in performing a number of practical procedures is one aim of specialist training in anaesthesiology. Trainees have to perform, repeatedly, procedures where their risk of failure is great. This creates an ambiguity in many trainees: either do the best for the patient, i.e. leave the procedure to someone more experienced, or take the risk of failure, causing discomfort or even harm to the patient. This ambiguity can be overcome only by support from experienced anaesthetists in whom patients *and* trainees have confidence.

Clinical competence, however, is not only knowledge and skills. One of the characteristics of the proficient physician is the capability to solve problems in complicated clinical situations. This capability can be learnt only through meeting such situations, handling them and reflecting on them afterwards[12]. Such situations are often a great challenge to the physician, because they can be unclear and full of ambiguity; it can be difficult even to formulate the problem to solve. Still, trainees must have the confidence to meet these situations without fear or stress to learn from them. Reports about the working conditions of junior doctors tell us that, because of overstress and lack of support, the prerequisites for a good learning environment are not always met[71, 72]. To be able to improve the learning environment we should know what difficulties inexperienced trainees experience in their work. This was investigated in a phenomenological study (Paper III).

The difficulties of being a young trainee anaesthetist

The interviews

In the interviews of study II one of the open questions put to the 19 trainee anaesthetists was "What is difficult or what hinders you in your work?" Those parts of the interviews where trainees talked about difficulties at work

were analysed with a phenomenological approach, seeking the essence of the difficulties experienced by the trainees. A stepwise technique of analysis described by Karlsson was used[56]:

After reading all interviews to get acquainted with the text, the text was divided into "meaning units" (MU), based on where there were shifts in meaning. Each MU was transformed from the interviewee's everyday language to a language relevant to the research question. For each interview preliminary themes were identified. The themes of all the interviews were compared and combined to comprise a general structure of the phenomenon. During this step we returned to the interview transcripts and readjusted some themes. A description of the essence of the phenomenon was formulated.

The hardships of young anaesthetists

The essence of difficulties at work expressed by the trainee anaesthetists was the feeling of deep insufficiency and loneliness, caused by high demands in a difficult professional role (Fig 2). The trainees often lacked the support they needed and some of them described an extremely disharmonious work situation, often with demands for several simultaneous work efforts. Actually none of the trainees of this study objected to challenges, but the feeling of being left alone was difficult for them. They wanted someone experienced to be somewhere in the background to give them moral support and confidence. For beginners in anaesthesia there is an ambiguity inherent in problem situations, sometimes causing an internal conflict:

> "Well, one part of me wants to flee away from these problem situations but at the same time I know that I won't learn to master this job without experiencing complications, when things are difficult and I fix the problem…but, yes, sometimes I feel like, leave me alone today, don't test me today…" (Young trainee anaesthetist)

Working under pressure — **Lack of support**

Not used to routines

Difficult decisions

Lonely and inadequate

Too little knowledge

Feeling helpless
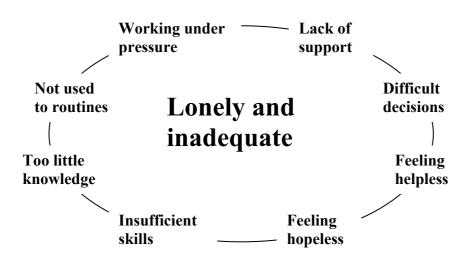
Insufficient skills — **Feeling hopeless**

Figure 2. Difficulties at work experienced by 19 trainee anaesthetists

The important message from the young anaesthetists in this study is their feeling of being exposed to great difficulties with too little support, which makes them feel stressed and forlorn. In this work situation, some basic principles of professional training are violated[73]. First, in a stressful environment very little learning occurs, and even if one aim of training is that trainees should learn to act well in stressful situations[74], the necessary competence is best acquired if their stress is reduced by support from seniors. Second, training should occur when there is a need to know more, to take advantage of the trainees' curiosity. As clinical situations that are important for learning happen at any hour, educational support is a task for all experienced anaesthetists.

To become experts in anaesthesiology, trainees must address anaesthetic problems at the upper limit of the complexity they can manage[20], and they must do so without endangering patient safety. Furthermore, trainees like all learners, must experience own competence; they must be allowed to succeed often. When creating a good learning environment, emphasis therefore could be on a system of individual mentors for the trainees. These senior anaesthetists must not only be familiar with the results of modern research in teaching and learning, but they also should understand the trainees' psychological

situation as beginners in anaesthesia: the ambiguity between the ambition to learn the job by doing difficult things and the fear of doing harm to patients. If most senior anaesthetists understand this, trainees should get better support, even when on call.

IX. Making good clinical teaching in anaesthesia possible (Paper IV)

To be good teachers and mentors, anaesthetists should feel safe and satisfied at work. They must have energy left over to be able to focus on trainees' needs of support. So, what is the work situation for specialist anaesthetists? Several reports about the working conditions of anaesthetists tell us that the work situation is far from ideal[75, 76]. This causes stress-related health problems for anaesthetists and may also hinder them from being good mentors and teachers of anaesthesia. Paper IV is a qualitative study of problems at work experienced by specialist anaesthetists.

How anaesthesists experience difficulties at work

The interviews

This study takes its departure point in the interviews of 19 anaesthetists presented in Paper I. One of the questions in these interviews was "What is difficult or what hinders you in your work?" In most interviews this question opened up a conversation that was difficult to use for the phenomenographic analysis. The interviewees talked about what it is to be an anaesthetist rather than about their understanding of work. These parts of the interviews were used for a phenomenological study (Paper IV).

In the analysis we used a stepwise technique. After having read through the interviews, each text was divided into meaning units (MU) and the MUs were transformed to the researcher's language. Preliminary themes were sought in each interview. After comparing all interviews and putting together themes found in several interviews, we ended up with 16 preliminary themes. In a discussion with a co-researcher these 16 themes were analysed for similarities and differences, and categorized into main themes.

Experiences of difficulties at work

Four main themes of the anaesthetists' descriptions of difficulties at work were identified:

(A) There are no external obstacles to doing a good work. Being an anaesthetist is, strictly speaking, not difficult; (B) Anaesthesiology is inherently

difficult; it's a job for the expert; (C) The anaesthetist's work is often diffi-cult and tiresome because of hard working conditions; and (D) Other doc-tors, especially surgeons, sometimes disrespect anaesthetists.

   Most interviewees talked about difficulties belonging to more than one of the four themes. (Table 2)

Table 4. Difficulties at work experienced by 19 Swedish anaesthesiologists.
x=theme present; xx=theme expressed repeatedly; (x)=theme only touched

Inter-viewee's under-standing	Years of practice as specialists	No difficul-ties expe-rienced	Anaesthesio-logy is diffi-cult in itself	Hard work-ing condi-tions	Disrespect from other doctors
(A)	0-5			xx	x
(A)	5-10		x		
(A)	10-20				xx
(A)	10-20		(x)	xx	x
(A)	10-20	x			
(A)	>20			x	
(B)	0-5		(x)		x
(B)	0-5		x	xx	
(B)	0-5			x	
(B)	5-10		x	x	
(B)	10-20	xx	x		
(B)	>20			xx	x
(C)	0-5		xx	x	
(C)	0-5		x	xx	x
(C)	>20	x			
(D)	5-10	x	(x)	(x)	
(D)	10-20		x	(x)	
(D)	10-20		(x)	xx	x
(D)	>20		x		

Understanding: (A) Prof.artist; (B) Good Samaritan; (C) Servant;
(D) Co-ordinator (refers to Paper I)

Coping with problems of anaesthesia work

A small group of anaesthetists (four people in this study of 19 specialists) expressed very clearly that they are content with their job: for them it is in no way difficult to be an anaesthetist. These four anaesthetists were interviewed once more. The aim of the second series of interviews was to understand better the practical wisdom underlying their ways of handling difficult situations. The interviewer tried to focus on the three types of situations that were reported by other anaesthetists to cause difficulties at work (an inherently difficult job, hard working conditions, and disrespect from surgeons). The interviews were based on four open questions:

1. Have you reflected on how to live well with this work, which many anaesthetists find so difficult?
2. Tell me about experiences or situations where you felt that it was difficult to be an anaesthetist and which have made you think about how to live with this work. Or, tell about a situation that was difficult but when you, all the same, felt well as an anesthesiologist.
3. You have explained that you see no external obstacles for doing a good job. Was it always like that for you or has there been a change over the years?
4. Getting to terms with the job - how do you do that? If a young trainee anaesthetist asked you this question, what would be your advice?

The interview analysis showed that these four anaesthetists are confident that they do a good enough job; few others would do it in a significantly better way. They have reconciled themselves with their work tasks: "If I do my best it will be good enough". They know the limit of what health care can do for people. When workload is too heavy, they can solve this problem by letting others do some of the work; they know and trust junior colleagues and nurses. Finally, in medically difficult situations it is all right for them to ask for support from colleagues, without fear of losing prestige. Notwithstanding all this, they all have high demands on themselves and still keep working with their technique and knowledge. They know that they can always handle the first minutes in critical situations as well as almost anyone. For them, competence is something evolving forever, but focus has gradually changed from abstract theory to knowledge and skills that can be applied to concrete clinical situations.

Enjoying anaesthesia work, advice to trainees

As already discussed, senior anaesthetists, who tutor trainee anaesthetists, should facilitate trainees' development of competence in all aspects of anaesthesia work. However, teachers are also obliged to help young trainees to develop into anaesthetists who enjoy work. To enjoy work promotes the well-being of doctors *and* of patients[77]. Some of the anaesthetists of this study seem to experience ongoing serious problems, whereas others, in the same clinic and with the same work tasks, live very well with their anaesthesia work. To foster job satisfaction by conveying to young anaesthetists what these content anaesthetists tell us about their ways of relating to work, is also an important task for teachers of anaesthesia. Their advice can be summed up thus: Think over your own reasons for choosing anaesthesiology as your speciality. You should like the practical work and you must be able to appreciate the variation in work intensity, and adapt to the, sometimes necessary, high tempo of work. Try to learn about your own limitations and accept that you will fail now and then. Accept challenges as opportunities for learning. Finally, learn about what health care can do and what it cannot do for your patients.

These are aspects of work that cannot be learnt from textbooks. Instead, we must rely on the apprenticeship model of specialist training[78], with mentors playing a central role.

Being a mentor – an important role for the experienced anaesthetist

Adopting the role of mentors, senior anaesthetists should try to comprehend what it means to be a young and inexperienced anaesthetist and should promote coping strategies for difficult clinical situations. One important message from the young anaesthetists in Study III is their feeling of being exposed to great difficulties with insufficient support. At the same time difficult cases bring opportunities for learning. Experienced physicians rely on their tacit knowledge, founded on years of experience, to solve difficult clinical problems[79]. Trainees must be confronted with such problems, and therefore a mentor should always be behind their back, easy to access. In this way the mentor can bridge the gap between trainees' ambitions to learn and their internal ethical rule not to harm patients. The anaesthetists whom we need are here, in our clinics: the following is an excerpt from an interview with a very experienced consultant anaesthetist, reflecting on his professional role:

> "Well, what's the core of the anaesthetist's work? I would say that it has been
> different things during my life as an anaesthetist. What I think is most impor-

tant nowadays for me is the pedagogical task, to convey to trainees how I think one should work with anaesthesia, the knowledge I can contribute so that the young ones get a good start of their careers as anaesthetists…it is very stimulating to work in this way…trying to convey a type of philosophy, the essence of anaesthesia…"

Experienced anaesthetists should be encouraged, in the spirit of Hippocrates, to "hand on precepts, lectures and all other learnings...to those pupils duly apprenticed"[80]. In fact, to educate and support mentors and teachers of anaesthesiology may be the single most important step towards improving anaesthesia training[81].

X. Discussion

Do the anaesthetists' narratives reflect the ways they act at work?

The method used in Study I and II is common in phenomenographic research: collecting data by interviews, analysing the data and drawing conclusions about how people think and act. By using this method I implicitly propose that certain conclusions can be drawn from an inquiry based on interviews: how people relate to a phenomenon, how they act, and even how their way of acting could be affected. This research approach thus rests on two assumptions that need to be discussed: 1) people's ways of understanding a phenomenon are expressed in their talk and 2) people's ways of understanding are reflected in their way of acting.

Are the conceptions expressed in the narratives?

Do interviewees say what they mean? Are their meanings their genuine meanings and not only reflections of the on-going discourse in the professional society? The likelihood that interviewees say what they genuinely mean is increased if they discuss how they act in specific situations rather than talk at the level of what one should do. Therefore, the interview questions of the phenomenographic studies were not about opinions and the interviewees were not asked to explain - why this? or - why that? Instead, the interviews were about lived experiences and the interviewer encouraged interviewees to deepen their narratives by probing questions. The interviewees' ways of understanding work thus emerges from their narratives on lived experience, and (for some interviewees) from their own reflections on work experiences.

Are people's ways of understanding reflected in their way of acting?

How a person will act in a certain situation can, of course, never be predicted. However, by means of a phenomenographic inquiry, we can get in-

sight into a person's practical wisdom, which lets us understand the chain of grounds of action underlying the intention by which people chose their way of acting[82]. Giorgi, in an everyday setting, found a complete harmony between what interviewed people expressed to the researcher and their manifest actions[83].

It has been claimed that people's ways of acting is predominantly guided by socio-cultural factors[84]. However this is not a valid objection to the conclusions of phenomenographic research; the conceptions are relations between the subject and the phenomenon, the discursive context being part of the experienced reality[57].

Different understanding – different ways of giving anaesthetics?

The most conspicuous result presented in paper I is the difference between the six anaesthetist with the *good Samaritan* way of understanding work and six others with the *professional artist* understanding. The *good Samaritan* understanding means to see patients as subjects whereas the *professional artist* understanding means to focus on patients mainly as physiological objects. This difference in physicians' ways of relating to patients has been observed in other specialties; seeing patients as subjects has been named *patient centredness*.

Anaesthesiology is often considered a technical speciality with emphasis on physiology and pharmacology and it could be questioned if patient centredness is at all important for the practice of anaesthesiology. The six *Samaritan* anaesthetists of Study I experienced patients as subjects, having a patient-centred perspective, in contrast to the six *professional artist* anaesthetists, who saw patients predominantly as physiological objects.

I was interested to see if there was any difference in the ways these two groups of anaesthetists talk about giving anaesthetics. To that end I read again those parts of the interviews, where the talk was about working with the anaesthetized patient[*], marking words or expressions that the interviewees used to describe how they acted when giving anaesthetics. Words and expressions with the same or similar meaning were grouped together and the number of anaesthetists who used the different expressions was registered (Table 5).

---

[*] all the *Samaritan* anaesthetists in their interviews also talked about the anaesthetized patient with his or her physiology, even if this was not their predominant way of understanding work

Table 5. Anaesthetists' descriptions of giving anaesthetics

Expression	Professional artists (n=6)	Samaritans (n=6)
Physiology, pharmacology, vital funcions	5	3
Difficult/thrilling challenges	4	2
Practical work with own hands	2	2
Solve problems	2	2
Elegant, beautiful performance	2	0
Quick decisions and reactions	1	1
Satisfaction with work	0	2
Attend the process, know what is going on, often go into the operating theatres	0	3
Identify risks beforehand, be prepared with alternative action plans	0	5

Anaesthetists, who have in their focus the patient as an individual subject, talk about preparing themselves beforehand to have a strategy ready in case of complications. On the other hand, anaesthetists who do not focus on the patient as an individual do not talk about safety issues but instead about exciting challenges and about performing difficult procedures elegantly.

Safety is a major objective of anaesthetic practice[74]. Patients facing surgery are, when it comes to anaesthesia, mainly concerned about safety[85]. The result of this small preliminary study indicates that anaesthetists who see patients as subjects pay more attention to safety issues. This finding merits further investigation.

The outcome space – could there be different work maps?

The results presented for each of Studies I and II are presented as a setup of categories of descriptions. A critical discussion of these results should treat

two issues: 1) Are there more categories? 2) Should all the described catego-
ries be included?

Are there more categories?

In Study I, on specialist anaesthetists, four categories of description were
discovered. These four categories were also found in Study II, on trainee
anaesthetists, but in this study, two more ways of understanding work were
discovered: *the novice* and *the learner*. Are these two aspects of work absent
among specialist anaesthetists? Rereading the interviews of Study I with this
question in mind, I have found that the answer is no, both these aspects can
be found among specialist anaesthetists but nowhere as a predominant way
of understanding work[86]. So, why are these two aspects not described in
Study I? To explain this, two different methods of phenomenographic analy-
sis will be briefly outlined.

In the first method, a way of understanding is formulated for each inter-
viewee. This method has been described by Dall'Alba[47] and by Sjöström and
Dahlgren[87]. The ways of understanding of all the interviewees are compared
concerning differences and similarities and sorted into groups. For each
group, the researcher formulates a category of description.

The other method has been described by Marton[47]: the researcher first
marks utterances of interest in all interviews. The selected quotes are then
put into a data pool, the researcher thus leaving the individual interviewees
at an early stage of the analysis. Within the pool of quotes, statements are
brought together into categories, based on similarities and differences.

I used the first method of analysis and therefore the result of Study I does
not include aspects of work that do not represent the dominant way of under-
standing for any of the interviewed anaesthetists. By using the second
method of phenomenographic analysis, or by increasing the number of inter-
viewees, I might have discovered these two aspects of work already in Study
I. If the study aims to describe professional work with all its aspects, these
two categories should be added.

Should all categories be included?

One of the categories of Study I, the *coordinator*, was a cause of much con-
cern during a long period of analysis work. When the results were first pre-
sented in a research seminar, I had formulated two categories instead: the
commander and the *team leader*. One of the anaesthetists had the *team
leader* as his predominant way of understanding work and three of them
were *commanders*. The seminar participants could not see any basic differ-
ences between the *commander* and the *team leader*. After long discussions, I
accepted to make one out of the two categories, the *co-ordinator*.

Yet there is a difference. The *team leader* anaesthetist in his interview described his work task as leading the team of 2-5 people supporting the patient's vital functions. When the patient's vital functions are threatened and the resources in the operating room do not suffice, having an anaesthetist who is aware of this aspect of work can be of vital importance for the survival of the patient. The *commander* anaesthetists, on the other hand, sometimes focused on the workload of the operating rooms, on the production of operations. It is an important task, but not of immediate concern for the survival of the patient and not necessarily done by an anaesthetist. Actually, in some hospitals, this work is done by a nurse coordinator.

This problem is an example of the phenomenon under study not being clearly enough delimited or defined. In the early phenomenographic studies, the design was more of an experimental setup. There could be no doubt about what was the phenomenon under study. However when more general phenomena are studied, one problem can be that the interviewees think and talk about different phenomena. In this case it could well be argued that the *commander* anaesthetists sometimes talked about a different phenomenon, a different work that is not necessarily done by an anaesthetist.

What anaesthesiology can learn from phenomenography

Phenomenography started out as an empirical method investigating pedagogical problems. Several new insights into educational matters have emerged. Some of the more influential ones have been the concept of deep and surface learning, the variation of learners' ways of experiencing the same phenomenon, understanding as a basis of competency at work, and finally the phenomenographic theory of awareness and the variation theory.

The phenomenographic approach to competence development and university learning is holistic[88] and there is much to support its use in postgraduate professional training. If we really take phenomenography seriously, applying its basic concepts to anaesthesiology, there will be some interesting and important consequences. Below I will describe three of them.

Anaesthetists handle clinical situations according to how they see them

Anaesthetists meet many different clinical situations every day. In each situation there are a number of different aspects that they can focus on. Probably all experienced anaesthetists would agree that the essence of the anaesthetist's professional role is to monitor the patients' vital functions, controlling and balancing their physiology. This aspect of work is absolutely vital for anaesthetic work; an anaesthetist who is not able to apply basic

knowledge of physiology and pharmacology to solve the different clinical everyday problems will not be able to stay in the speciality.

However, in many situations, it is imperative that the anaesthetist can take other aspects to the fore. To be able to do this expertly, anaesthetists must not only be consciously aware of all aspects of their work, but they must vary the way of being aware depending on the situation at hand. I will give three examples from the anaesthetist's everyday work.

A dangerous situation arises if the patient during surgery unexpectedly starts bleeding massively. The patient's blood pressure may get dangerously low because of acute hypovolemia*. This is basic physiology; the anaesthetist does not have to be an expert to understand that the patient should be given transfusions of blood and other colloids. Instead, expert competence will be shown by the anaesthetist who can bring the *coordinator* aspect into the fore, taking command of the situation. Some immediate steps should be taken by her or him: alert everybody that there is an emergency situation, inform the surgeon that it is at the moment impossible to keep pace with volume replacement, ask for an extra nurse to take care only of blood transfusions. The anaesthetist's main task is to stay in the middle of the scene, seeing to it that everybody knows what to do.

Another example: if the surgeon has got into difficult technical problems during an abdominal operation and asks the anaesthetist to get the patient better muscle relaxed, this is the opportunity to bring the *servant* aspect to the fore. If the patient is not well relaxed, the anaesthetist should get him relaxed. If, on the other hand, the anaesthetist feels that the patient is already well relaxed, this is not the time for arguing with the surgeon. The best working conditions for the surgeon in trouble (and, most important, the best result for the patient) are guaranteed by the anaesthetist assuring the surgeon that all is being done to facilitate her or his work.

Finally, in a prehospital setting with several victims of a traffic accident, there is a place for the protocol-guided way of acting, what we have called the *novice* way of understanding work. Expert anaesthetists in this situation see that they have got two aspects to focus on: one is the *co-ordinator*, prioritizing and commanding the medical team. The other one is *working by the protocol* (the metaphor *novice* is inappropriate here): treat the patient in a standardized way according to the trauma protocol in which everybody in the emergency team has been trained.

Combining different views thus means a richer way of understanding work and offers a greater variety of available ways of acting. Different clinical situations demand different aspects to be put into the fore. To do this appropriately, the anaesthetist should be consciously aware of all aspects of work.

---

*Hypovolemia = insufficient blood volume, jeopardizing delivery of blood to vital organs

Discernment is a function of the variation experienced by the trainee anaesthetist

In complicated situations, different aspects compete for the anaesthetist's attention; it is not easy to focus on several aspects simultaneously. The expert anaesthetist can choose, consciously, the most important aspect(s) on which to focus. How about young anaesthetists then, do they have all necessary prerequisites to see all aspects of work? No, usually not; and, what is more, too high demands, reported by many trainee anaesthetists, can force them to systematically exclude some aspect(s) of anaesthesia work. This will hinder their professional development within these aspects of anaesthesia work.

Anaesthetists' ways of understanding work emanate from the different aspects of work that they discern. For a certain aspect of work to be in the anaesthetist's awareness, it must be discerned as an aspect. This requires that the anaesthetist can see the dimension of variation within that aspect. This lays the basis for learning in anaesthesia. Trainees must be helped to focus on all aspects of work (but not at the same time) when reflecting on their work experiences.

Consequences of the non-dualist ontology.

The rationalist view of the world is that there is one world and it is the real world. Talking about anaesthesia work, there would be one work: a set of attributes and a set of work tasks, which can be observed and manipulated as desired by teachers and managers. Consequently, all anaesthetists go to the same work, meet the same work and are affected (in good or in bad ways) by the same work.

However, according to phenomenography, we only have access to the conceived world, the world as we see it. The world as we conceive of it is affected by us conceiving of it. There are consequences of this on an individual and on a collective level. On the individual level it can be inferred that anaesthetists who understand their work in different ways, do not have the same work: they go to different jobs, they do not develop competence in the same way, they act differently; and they are affected by their work in different ways. Moreover, all these differences are consequences of their having different jobs. However, almost each anaesthetist is convinced that the anaesthesia work, as she or he understands it, is anaesthesiology.

On a collective level, a somewhat counterintuitive consequence of the phenomenographic view on the world of professional work is that anaesthesiology is the anaesthetists' collective way of understanding anaesthetic work. Based on this collective understanding of anaesthesiology, there is an intersubjective normality that governs anaesthetists' perception of work phenomena, i.e. how they see, understand, and make sense of phenomena at

work. On the other hand, the collective understanding is ever changing; and all anaesthetists contribute in some way to this on-going change of anaesthesiology.

Rigour in qualitative research

The question of rigour in qualitative research must be addressed differently than in quantitative research. Whereas quantitative research aims at refutation or confirmation of a hypothesis, qualitative research aims at a deeper understanding of a phenomenon. Validity and reliability will have different meanings in these two research approaches. Reliability has even been judged inappropriate in qualitative research because repeatability can never be achieved[89].

Some researchers have replaced the traditional quantitative criteria for rigour with new research criteria for *trustworthiness* (this term replacing *rigour*) in qualitative research[90]. *Internal validity* has been replaced by the term *credibility*: by means of a clear description of data collection and analysis, the truthfulness of the findings can be made credible to the reader. Instead of by *reliability*, consistency of research results is guaranteed by *dependability*, an indicator of solidly performed research including adaptations in the research process to changes in the study environment. Furthermore, as *objectivity* cannot be an aim of qualitative research, neutrality of the research process is instead defended by *confirmability* by showing that findings are not the result of poorly performed analytic work but solidly founded in the data. Finally, the applicability of the research result is expressed, not as *generalizability*, but as *transferability:* by describing the context of the study, the researcher can give the reader the prerequisites for deciding whether the results are relevant in other situations.

The usefulness of uniform criteria of rigour has been questioned by Schwandt. He has criticized the quest for definitive criteria of being founded on a dream of scientific certainty that can never be fulfilled in humanistic research. Instead of applying sets of criteria of rigour, qualitative researchers should look at "how to cultivate practical reasoning" and to "the practices, consequences and outcomes of our ways of deliberating"[91]. This view of rigour has, in its turn, been criticized by Morse et al for laying the responsibility of judging the reliability and validity of a completed research report on the reader, instead of the investigator guaranteeing the trustworthiness of a scientific study during the whole research process[92]. Instead they suggest that the terms reliability and validity be kept in qualitative research.

Whatever stance is taken in this matter, one important issue is the question of openness. The methods of data sampling and analysis should be described clearly and in detail, enabling readers to make their own judgements about the credibility of the findings.

Are the results trustworthy?

The main issue concerning rigour in all four papers of the thesis is the validity of the interview data, a question that has got two aspects. First, do the interviewees express genuine, own thoughts and reflections on experiences of work, or do their statements only reflect the on-going professional discourse or even, when talking about working conditions, the rhetoric of the union of medical doctors? To increase the quality of the interview data in this aspect, the interviewer strived, by probing questions and encouraging comments, to stimulate the interviewees to expand and deepen their descriptions of experiences in their work. In this way, the interviews did not have the character of going through a questionnaire; instead, the conversation was kept circulating around the three main questions (page 24), and the interviewees' descriptions usually became more vivid and expressive towards the end of the interview.

The second aspect of validity is to what extent all the interviewees talked about the same phenomenon all the time, a problem inherent in the technique of open research interviews. The primary interview data, the transcribed interview texts from the researcher's perspective, contain much redundancy. To assure validity in this aspect, it is important that the selection of the parts of the text that are to be used for deeper analysis is done scrupulously. Therefore, the texts were read and reread several times. In all the four studies, a co-researcher participated in this phase of the analysis work, co-reading all the interviews, to assure that the text parts used for analysis reflect interviewees' experiences of the study phenomenon.

The issue of reliability in the phenomenographic studies (Paper I and II) would, in the mainstream quantitative research tradition of anaesthesiology, be dealt with by asking whether an independent researcher, performing a similar study, would achieve similar results. However, because the categories of descriptions are constructed by the researcher, replicability in this aspect is not a reasonable demand. On the other hand, once the categories have been described, reliability can be tested by other researcher using them. In Study II this was done by two qualitative researchers reading the interviews after the categories had been defined, placing each interview in one category. For 5 of the 19 interviews, the categorisation differed (in four of these, two researchers had chosen the same category). Each of these interviews was discussed again until there was agreement on category (negotiated consensus).

One aspect of reliability is whether the result of an open interview is a replicable representation of a stable inner life-world of the interviewee; or if it is just a flip of the coin how the conversation goes. This concerns the quality of the research interview. In the interviews I strived to be an active listener, holding back my own interpretations and opinions and keeping focus on the study phenomenon. If one wants to increase reliability of this kind of

inquiry, repeated interviews is one option, albeit too resource demanding to be extensively used. In Study IV a second interview was done with four of the interviewees in order to get a deeper discussion on one question. The second interviews were done 2-4 years after the first and the interviewees had received no feed-back reports from the first interviews. The ways all four anesthesiologists expressed themselves in the second interview were very similar to the first one, which supports the reliability of interview method used.

One important point in working with the issue of rigour in qualitative studies is the question of openness. The methods of data sampling and analysis should be described clearly, enabling readers to make their own judgment of the credibility of the findings. In all the papers of this thesis, the research process is, therefore, described in detail and the result is illustrated by excerpts from the interviews.

Researching in your own field, good or bad?

Researchers must know something about the phenomena about which they formulate their research questions[93]. Research is always done against the researcher's background of the researchers pre-understanding of the phenomenon under study. I am an anaesthetist; by performing research on the anaesthetist's work I have put myself in the position of starting a research project with a great burden of pre-understanding. On the other hand, had I not been an anaesthetist, the problems concerning the professional role and the working conditions of anaesthetists would not have been such strong incentives for me to do research in this field.

Anaesthetist researching about anaesthetists – advantages

Getting access to the hospital world is not easy; this is a well-known fact for researchers. Physicians tend to look with suspicion at people who want to study them at work. It is a common belief within this profession that only physicians can understand physicians. In a way it is true. The language of physicians contains not only a wealth of medical terms but also many expressions, referring to common situations in clinical work, where you must be an insider to understand the meaning. So, being an anaesthetist I had the advantages of an easy access and the prerequisites for understanding the narratives.

Anaesthetist researching about anaesthetists – risks

A comprehensive pre-understanding of the field of research carries with it some obvious risks. The researcher may search for what she or he expects to find, asking interviews questions that direct the attention to fields where the

researcher expects to find what she or he is looking for. As a member of the community of anaesthetists, I also may have avoided issues that might threaten the self-esteem of my own professional group. Finally, when writing the reports, I ran the obvious risk of omitting important facts, self-evident to anaesthetists but important for other readers. To avoid these pitfalls I have had frequent discussions, individually and in seminars, with other members of our research group, where I am the only anaesthetist and where most members are non-physicians. Still, it is unavoidable, and maybe not merely disadvantageous, that this research project is very much characterized by my professional background.

Future research

How do anaesthetists think about clinical situations and how do they act? In this thesis I propose that the ways anaesthetists act are related to how they understand work. I also propose that anaesthetists may discern different aspects of similar clinical situations, depending on how they understand work. This proposition lends itself to further studies, where observation, video-taping and video recall interviews can be used to study anaesthetists' ways of acting and which aspects of work that anaesthetists discern and focus on.

Qualitative studies are by necessity small and the possibility to generalize results is limited. However, the results of phenomenographic studies are usually well structured and a hierarchical relation between categories of description makes it possible to treat results as ordinal data. This opens up possibilities for larger scale, quantitative studies.

In Study II on trainee anaesthetists, about fifty per cent of the interviewees do not express that they experience learning as an aspect of their work. One possible explanation is that some trainees consider professional competence as something that comes to you automatically just by doing anaesthesia. However, a prerequisite for reflective learning is that the learner is aware of and takes control of his or her learning. This merits further studies, aiming at exploring the different ways trainees understand professional learning. It would also be of value to study if making trainees acquainted with the work map of anaesthetists (paper I) can facilitate their reflection on what the job is about?

Conclusions

In the introduction I listed three observations, which initiated the work process that has finally resulted in this thesis. Corresponding to these observations, there are in the *Aims* section three *why*s, concerning 1) differences in the ways anaesthetists act at work, 2) differences in anaesthetists' compe-

tence, and 3) differences in the time necessary for trainees to grow into the professional role. The *Aims* section was one of the last parts of the thesis that I wrote, a fact that is more common than admitted in this type of work. Notwithstanding this somewhat embarrassing fact[*], the original observations underlying the research questions have for many years stood out to me as challenging and somewhat paradoxical. I will now explain why.

As an anaesthetist, I have been struck by the differences in the ways anaesthetists handle quite similar situations. Furthermore it is a common observation that trainees, passing through their training programmes and ending up as competent anaesthetists, do this at quite different rates. Finally there is the observation of what in quantitative research are called the outliers: most anaesthetists do a good enough work, but some are regarded as extremely proficient and those around who recognize their proficiency cannot explain why these professionals are so competent. There is also the reverse problem, rare in my experience, of those who do not perform well enough in spite of sufficient knowledge and skills. Trying to understand, I realized that there must be something more to it than what we traditionally have included in the concept of competence. The urge to understand these challenging paradoxes prompted me to take on this project.

Have I got the answers? In a way, yes. These initial observations are not anymore paradoxical to me; I have, for myself, possible answers to all the *why*s. However, only for one of the three questions is there enough in my studies to argue that my explanation holds. The other two questions need further studies. I will sum up my results concerning the three questions.

Why do anaesthetists act differently at work?

Why do anaesthetists who meet the same situation, handle it in such different ways? They do this because they do not meet the same situation. In the first Study I have shown that anaesthetists see and understand their work in different ways. Consequently, when they are confronted with a situation, they perceive it in very different ways. Each anaesthetist constructs a "work world" that is meaningful to them; the worlds of different anaesthetists are different but overlapping worlds and, not surprisingly, they act differently, because how a person acts is linked with how she or he experiences the situation at hand.

How can we explain differences of competence?

Most anaesthetists do a good enough job, some are considered as experts but some, admittedly very few, do not perform well enough. How can we ex-

---

[*] Actually this is a normal order of progress in creative work, "The goal emerges from the work itself"[20]

plain these differences? (Only differences in knowledge and skills cannot explain them as we have already pointed out) We should look at the second aspect of the result in Paper I (the first aspect being the variation of conceptions of work among anaesthetists), namely the description of the anaesthetists work. The anaesthetist's work has at least four different aspects. To be proficient in anaesthesiology means to be able to handle unusual and complicated situations. The anaesthetist facing such a situation should preferably make a conscious choice of aspect or aspects on which to concentrate. To be able to do that, she or he must be consciously aware of all aspects of work, all the ways the work *can* be understood, and she or he must be aware of them simultaneously (but not in the same way). Anaesthetists with such a comprehensive way of understanding work have got the best prerequisites to act appropriately. What is more, they can use clinical experiences to further develop competence in all aspects of work.

This explanation of differences of competence is probable, but it is only inferred from the results. Although there is some evidence in previous research, it remains to be proven that more comprehensive ways of understanding are directly related to higher competence at work.

Why do trainees grow into their professional role so differently?

Growing into the professional role is not only a question of acquiring formal knowledge (knowledge that can be found in textbooks) and practical skills. Trainees also must learn the different ways work can be understood. Otherwise they will not develop informal knowledge through applying formal knowledge in all aspects of work. To develop competence in all aspects of anaesthesia work, trainees need to change their way of understanding work by reflecting on everyday work situations. Only specialist anaesthetists with the most comprehensive understandings will have the prerequisites for encouraging trainees' reflections on all types of clinical experience. This is important, because anaesthesiology can be learnt only by experiencing work (including difficult situations) and reflecting on it. Furthermore, reflection should focus on one aspect of work at a time to be effective. Giving the differences in the ways both trainee and specialist anaesthetists understand their work, it is not surprising that trainees differ in how fast they grow into their professional role. This is however a statement inferred from the study results and ought to be investigated in more depth by intervention studies.

Summary

Study I shows that anaesthetists understand their work in four different ways, representing four aspects of work. Some ways of understanding are more comprehensive, incorporating three or all four aspects of work, whereas oth-

ers cover only one or two aspects. There does not seem to be any development to more comprehensive ways of understanding work during years of experience. It can be assumed that anaesthetists with a more comprehensive way of understanding work have a greater repertoire of actions than those with a narrow understanding.

Study II shows that trainee anaesthetists understand their work in similar ways as specialists. Two additional ways of understanding are *the novice* (managing anaesthesia by following protocols) and the *learner* (use work experiences to learn new things). Trainees can develop competence by *deepening their present understanding*, the most common, everyday way of learning, and also by *change of understanding*, Change of understanding is an important but difficult step in competence development through which anaesthetists will become aware of new aspects of work and thereby enlarge their action repertoire.

Educational research has shown that reflection[12, 94] is important in professional training. Trainees thus must learn the habits of reflective practice[95] and their reflection on clinical experience should be facilitated by senior anaesthetists. The reflection process should encompass all aspects of work. However, only senior anaesthetists with a *comprehensive way of understanding work* will be able to focus consciously on the appropriate aspect of any clinical experience.

Learning should occur when there is a need for knowledge, to make use of the trainee's curiosity. Furthermore, very little learning occurs when the level of stress is high. *Study III* shows that these two principles of professional training are often violated for trainee anaesthetists. Reducing trainees' stress level and educating mentors could improve the learning environment in anaesthesia clinics.

Teachers' responsibility is not only to facilitate trainees' development of competence. They should also support young trainees to develop into anaesthetists who enjoy work. *Study IV* shows that some experienced anaesthetists still enjoy work very much after many years of practice. Their advice about how to get to terms with work should be shared with young trainees.

Finally, patient centredness may be important also for anaesthetists. A small study on how the anaesthetists of S*tudy I* talk about giving anaesthetics reveals a striking difference between anaesthetists with different ways of understanding. Those who experience patients as subjects (*samaritans*) seem to pay more attention to patient safety than those anaesthetists who see patients predominantly as physiological objects (*professional artists*). This merits further study.

XI. Acknowledgements

I want to express my sincere gratitude to all who have helped and encouraged me in my work on this thesis:

My tutor, Urban Rosenqvist, for being so enthusiastic about this research project even when I was hesitant, for gently guiding me into the field of qualitative research, for making research enjoyable, and for always being at hand to encourage me.

Inger Holmström, my co-tutor, for being such a great support, especially in methodological issues, for promptly reading all my drafts, even the first lousy ones, and urging me to keep on writing, and for being a good friend and co-researcher.

Lars Wiklund for supporting my research in a field far away from mainstream anaesthesiological research.

Eva Lindberg for long, inspiring discussions about science and philosophy, for helping me to find the structure and essence of my ideas.

Margareta Sanner for important advice on how to proceed with my interview studies.

Sharon Rider for helping me to get some insight into phenomenology and the philosophy of science.

Gloria Dall'Alba for valuable comments on my manuscripts.

Ulrika Winblad-Spångberg, Anna Sarkadi, Eva Henriksen and all other members of the group for health services research for valuable comments and interesting discussions.

Dorte Kjeldmand for sharing with me experiences of being a doctor doing research on doctors.

Ragnar Berfenstam and other participants in the Tuesday seminars of the department, for engaging discussions.

Stellan Hagman, for giving me the best introduction to anaesthesiology that anyone could get.

The late Nils Häger, for teaching me practical anaesthesia, always ready to show how to perform all possible anaesthetic procedures.

Ulf König, for teaching me the theory of anaesthesiology, always ready to explain how matters stand, and always willing to sit down for never-ending intriguing discussions.

Torsten Gordh Jr for showing great interest in my project and for co-reading some of my drafts.

Björn Svensson, for making it possible for me to sneak off from Main theatres now and then to "do some research".

Margit Robeson and Lolla Billås for practical administrative assistance.

Steve Scott Robson for helping me with the English writing.

My interviewees, specialist anaesthetists and trainee anaesthetists, for willingly setting aside time to talk about the work as anaesthetists.

My loving mother and father, who always encouraged me to read, starting as early as 1949 by presenting me at Christmas with a book about a red-haired, philosophical, and rebellious girl in the South Seas[96]. Probably I forgot to thank you. I do it now – thank you!

Karin, my life companion, for believing in my writing a thesis, for our long talks about the ups and downs of anaesthetic work in the evenings at the dinner table, and for cheering me up when writing became just too tedious. Our children, Mårten, Elin, Linus and Emmamalin, for being exactly what you are, and for reminding me and Karin at the dinner table that there is more to life than anaesthesiology.

XII. Summary in Swedish

Sammanfattning på svenska

Varför gör vissa narkosläkare ett bättre arbete än andra? Varför växer vissa ST-läkare snabbare in i sin yrkesroll? Målet med denna avhandling har varit att finna svar på dessa frågor för att därigenom ge en bra grund för förbättringar av narkosläkarnas specialistutbildning, som just nu är ett så aktuellt ämne. Ökade krav på sjukvården med bl.a. ett allt större antal operationer på äldre och ofta svårt sjuka patienter, har gett narkosläkarna en nyckelroll när det gäller att säkerställa god vårdkvalitet på våra operations- och intensivvårdsavdelningar. Narkosläkarnas arbete är komplicerat, med krav på förmåga att arbeta under tidspress och att kunna hantera även situationer, som präglas av stor osäkerhet. Önskemål om förbättringar av narkosläkarnas specialistutbildning innebär därför en stor utmaning för anestesiologer med utbildningsansvar.

I denna avhandling presenteras två fenomenografiska studier om hur förståelse av arbete varierar bland narkosläkare. Studie I visar att specialistkompetenta narkosläkare uppfattar sitt arbete på olika sätt; dessa uppfattningar representerar olika aspekter av arbetet. Vissa läkare uppfattar tre eller fyra aspekter av arbetet, medan andra har en mera begränsad förståelse. ST-läkare uttryckte i studie II liknande uppfattningar av arbetet som specialisterna, men deras beskrivningar var mindre tydliga. I avhandlingen visas hur fenomenografisk pedagogisk teori kan tillämpas på narkosläkarnas specialistutbildning. Det är viktigt att blivande narkosläkare utvecklar praktisk kompetens inom arbetets alla aspekter, vilket underlättas om de handleds av läkare med bred förståelse av arbetet.

Avhandlingens andra del handlar om att skapa en bra pedagogisk miljö. Den baseras på två kvalitativa studier om svårigheter som narkosläkarna upplever i sitt arbete. Studie III visar att mycket stora krav ställs på ST-läkare i anestesiologi, framför allt under jourtid. Studie IV är en tematisk analys av specialisternas svårigheter i arbetet. Dessutom beskrivs en liten grupp av narkosläkare, som inte alls upplever svårigheter i arbetet; dessa ger i avhandlingen råd till unga ST-läkare om hur man som narkosläkare ska hantera svåra situationer för att kunna leva väl med sitt arbete.

XIII. References

1.	*Dall'Alba G, Sandberg J*. Educating for competence in professional practice. Instructional Science 1996; 24: 411-37
2.	*Pope C*. Qualitative Research: Reaching the parts other methods cannot reach: an introduction to qualitative methods in health and health services research. BMJ 1995; 311: 42-5
3.	*Nuland S*. Surgery Without Pain: The Origins of General Anesthesia. In: Doctors. New York: Alfred A Knopf inc., 1988
4.	*Gordh TS*. How anaesthesiology came to Sweden. Acta Anaesth Scand 1998; 42 (suppl): 34-8
5.	*Van Aken H*. Who should provide anaesthesia? Eur J Anaesthesiol 2000; 17: 535-6
6.	*Kane M, Smith A*. An American tale - professional conflicts in anaesthesea in the United States: implications for the United Kingdom. Anaesthesia 2004; 59: 793-802
7.	SFAI-tidningen (Newsletter of The Swedish Association of Anaesthetists) 2003:1; 2004:10:
8.	*Wiklund L*. Utbildningsfrågor. In: Halldin M LS, editor. Anestesi. Stockholm, Sweden: Liber AB, 2000
9.	*SvenskaLäkaresällskapet, Sverigesläkarförbund*. Utbildningsboken
10.	*Platon, Lindskog C, Thesleff H*. Staten. Sverige: Bokförlaget Nya Doxa; 1993
11.	*Pellegrino E, Thomasma C*. A Philosphical Basis of Medical Practice. New York, Oxford: Oxford University Press; 1981
12.	*Schön D*. Educating the reflective practitioner: How professionals think in action. San Francisco: Jossey Bass; 1987
13.	*Schön D*. From Technical Rationality to Reflection in Action. In: Schön D, editor. The Reflective Practitioner. New York: Basic Books inc, 1982; 39-41
14.	*Barnett R*. 'Competence' and 'Outcomes'. In: Barnett R, editor. The Limits of Competence. Buckingham: SRHE and Open University Press, 1994; 69-82
15.	*Hofmann B*. Medicine as *Techne* - A Perspective from Antiquity. Journal of Medicine and Philosophy 2003; 28: 403-25
16.	*Epstein R, Hundert E*. Defining and Assessing Professional Competence. JAMA 2002; 287: 226-35
17.	*Foucault M*. The Birth of the Clinic. London, UK: Routledge; 2003
18.	*Benner P*. From Novice to Expert. Excellence and Power in Clinical Nursing Practice. Menlo Park, California: Addison-Wesley Publishing Company; 1984

19.   *Ramritu P, Barnard A*. New nurse graduates' understanding of competence. Int Nurs Rev 2001; 48: 47-57

20.   *Bereiter C, Scardamalia M*. The Need to Understand Expertise. In: Bereiter C, Scardamalia M, eds. Surpassing Ourselves: an inquiry into the nature and implications of expertise. Chicago and La Salle, Illinois: Open Court Publishing Company, 1993; 1-21

21.   *Hacker W*. Expertkönnen. Erkennen und vermitteln. (Expert knowledge, recognizing it and bringing it about). Göttingen, Germany: Verlag für Angewandte Psychologie; 1992

22.   *Talbot M*. Monkey see, monkey do: a critique of the competency model i graduate medical education. Med Educ 2004; 38: 587-92

23.   *Hager P, Gonczi A*. What is competence. Med Teach 1996; 18: 15 - 8

24.   *Fletcher G, McGeorge P, Flin R, Glavin R, Maran N*. The role of non-technical skills in anaesthesia: a review of current literature. Br J Anaesth 2002; 88: 418-29

25.   *Greaves JD*. The non-technical skills of anaesthetists. In: Greaves JD, Dodds C, Kumar C, Mets B, eds. Clinical teaching, a guide to teaching practical anaesthesia. Lisse, The Netherlands: Swets & Zeitlinger Publishers, 2003

26.   *Sandberg J*. Understanding the basis for competence development. In: Velde C, editor. International Perspectives on Competence in the Workplace. Dordrecht: Kluwer Academic Publishers, 2001; 9-24

27.   *Marton F, Booth S*. The path of learning. In: Marton F, Booth S, eds. Learning and Awareness. Mahwah, New Yersey, USA: Lawrence Erlbaum Ass, 1997; 139-42

28.   *Holmström I, Rosenqvist U*. A change of the physicians' understanding of the encounter parallels competence development. Patient Educ Couns 2001; 42: 271-8

29.   *Sandberg J*. Understanding human competence at work. An interpretative approach. Acad Manage J 2000; 43: 9-17

30.   *Klemola UM, Norros L*. Analysis of the clinical behaviour of anaesthetists: recognition of uncertainty as a basis for practice. Med Educ 1997; 31: 449-56

31.   *Klemola UM, Norros L*. Practice-based criteria for assessing anaesthetists' habits of action: outline for a reflective turn in practice. Med Educ 2001; 35: 455-64

32.   *Norros L, Klemola U*. Methodological considerations in analysing anaesthetists' habits of action in clinical situations. Ergonomics 1999; 42: 1521-30

33.   *Rosenqvist U, Theman J, Assal J*. NEW DEVELOPMENTS IN DIABETES EDUCATION, a call for a new task for the patient. From classical to holistic approach. Geneva, Switzerland: Diabetes Education Study Group of The European Association for the Study of Diabetes, EASD; 1995 Marh 1995

34.   *Polanyi M*. The Tacit Dimension. Gloucester, Mass: Peter Smith; 1983

35.   *Siker E*. Assessment of clinical competence. Curr Opin Anaesthesiol 1999; 12: 677-84

36. *Greaves JD, Grant J.* Watching anaesthetists work: using the professional judgment of consultants to assess the developing clinical competence of trainees. Br J Anaesth 2000; 84: 525-2

37. *Sydney M, Dauphinee W, Blackmore D, Rothman A, Reznik R, DesMarchais J.* A Sequenced OSCE for Licensure: Administrative Issues, Results and Myths. Adv Health Sci Educ Theory Pract 2003; 8: 223-36

38. *Hodges B, Regher G, McNaughton N, Tiberius R, Hanson M.* OSCE checklists do not capture increasing levels of expertise. Acad Med 1999; 74: 1129-34

39. *Gaba D, Howard K, Brendan F, Smith B, Fish K, Botney R.* Assessment of clinical performance during simulated crises using both technical and behavioral ratings. Anesthesiology 1998; 89: 8-18

40. *Forrest F, Taylor M, Postlewaite K, Aspinall R.* Use of a high-fidelity simulator to develop testing of the technical performance of novice anaesthetists. Br J Anaesth 2002; 88: 338-44

41. *Bowden J, Marton F.* Finding out what has been learned. In: Bowden J, Marton F, eds. The university of learning. Beyond quality and competence. New York: RoutledgeFalmer, 1998; 160-85

42. *Barnard A, McCosker H, Gerber R.* Phenomenography: a qualitative research approach for exploring understanding in health care. Qual Health Res 1999; 9: 212-26

43. *Dall'Alba G.* Medical practice as characterised by beginning medical students. Adv Health Sci Educ Theory Pract 1998; 3: 101-18

44. *Holmström I, Jonsson A-C, Rosenqvist U.* Understanding the Job in a New Way - A Basis for Development of Competence in Diabetes Care. Upsala J Med Sci 2000; 105: 161-9

45. *Marton F.* Phenomenography - Describing Conceptions of the World Around Us. Instructional Science 1981; 10: 177-200

46. *Marton F, Booth S.* The Idea of Phenomenography. In: Marton F, Booth S, eds. Learning and Awareness. Mahwah, New Yearsey, USA: Lawrence Erlbaum Ass., 1997; 110-36

47. *Åkerlind G.* Principles and Practice in phenomenographic research. In: Proceedings of the international symposium on Current Issues in Phenomenography; 2002; Canberra, Australia; 2002

48. *Strömdahl H.* On mole and amount of substance: a study of the dynamics of concept formation and concept attainment. Göteborg, Sweden: University of Göteborg; 1996

49. *Barr R, Tagg J.* From teaching to learning: a new paradigm for undergraduate education. Change 1995: 3-14

50. *Husserl E.* The Idea of Phenomenology. Dordrecht, The Netherlands: Kluwer Academic Publisher; 1999

51. *Husserl E.* Cartesianska meditationer: En inledning till fenomenologin. Göteborg, Sweden: Bokförlaget Daidalos AB; 1992

52. *Hick C.* The art of perception: From the live world to the medical gaze and back again. Med Health Care Philos 1999; 2: 129-40

53. *Paley J.* Husserl, phenomenology and nursing. J Adv Nurs 1997; 26: 187-93

54. *Zahavi D*. Intersubjectivity. In: Zahavi D, editor. Husserl's Phenomenology. Stanford, California, USA: Stanford University Press, 2003; 109-25

55. *Strandmark M, Hedelin B*. Phenomenological methods reveal an inside perspective on health and ill health. In: Hallberg L-M, editor. Qualitative Methods in Public Health Research. Lund, Sweden: Studentlitteratur, 2002; 71-103

56. *Karlsson G*. Psychological Qualitative Research from a Phenomenological Perspective. Stockholm, Sweden: Almqvist & Wixell; 1995

57. *Marton F*. Cognosco ergo sum - Reflections on reflection. In: Dall'Alba G, Hasselgren B, eds. Reflections on Phenomenography. Göteborg: Acta universitatis Gothoburgensis, 1996; 163-87

58. *Le Vasseur J*. The problem of bracketing in Phenomenology. Qual Health Res 2003; 13: 408-20

59. European Board of Anaesthesiology: Training Guidelines in Anaesthesia, Reanimation and Intensive Care. Eur J Anaesthesiol 2001; 18: 563-71

60. *Kenny N, Mann K, MacLeod H*. Role Modeling in Physicians' Professional Formation: Reconsidering an Essential but Untapped Educational Strategy. Acad Med 2003; 12: 1203-10

61. Canadian Medical Education Directions for Specialists 2000 Project, Skills for the New Millennium: Report of the Societal Needs Working Group CanMEDS 2000 Project , http://rcpsc.medical.org/english/publications; 1996

62. Dansk Selskab for Anestesiologi og Intensiv Medicin, Uddannelsebog: Introduktionsuddannelsen i Anaestesiologi http://www.dasaim.dk/Uddannelse.htm; 2001

63. *Martinez M, Sauleda N, Güenter L*. Metaphors as blueprints of thinking about teaching and learning. Teaching and Teacher Education 2001; 17: 965-77

64. *Benner P*. The Dreyfus Model of Skill Acquisition Applied to Nursing. In: Benner P, editor. From Novice to Expert. Excellence and Power in Clinical Nursing Practice. Menlo Park, California: Addison-Wesley Publishing Company, 1984; 13-38

65. *Marton F, Booth S*. Qualitative Differences in Learning. In: Marton F, Booth S, eds. Learning and Awareness. Mahwah, New Yersey, USA: Lawrence Erlbaum Ass, 1997; 14-32

66. *Holmström I*. Gaining Professional Competence for Patient Encounters by Means of a New Understanding: Uppsala university; 2002

67. *Holmström I, Larsson J, Lindberg E, Rosenqvist U*. Improving the Diabetes Patient Encounter by Reflective Tutoring for Staff. Patient Education and Counseling 2004; 53: 325-32

68. *Marton F, Pang Ming F*. Two faces of variation. In: 8th European Conference for Learning and Instruction www.ped.gu.se/biorn/phgraph/civil/graphica/pwy.pdf; 1999; Göteborg; 1999

69. *Pong Wing Y*. The Dynamics of Awareness. In: 8th European Conference for Learning and Instruction

www.ped.gu.se/biorn/phgraph/civil/graphica/pwy.pdf; 1999; Göteborg; 1999

70. *Dewey J*. How we think. Mineola, N.Y: Dover Publications Inc; 1997

71. *Paice E, Rutter H, Wetherell M, Winder B, McManus I*. Stressful incidents, stress and coping strategies in the pre-registration house officer year. Med Educ 2002; 36: 56-65

72. *Bligh J*. The first year of doctoring: still a survival exercise. Med Educ 2002; 36: 2-3

73. UGFU, Utbildningshandbok för grundläggande flygutbildning, Försvars-makten, Krigsflygskolan

74. *Gaba D*. Basic Principles of Crisis Management in Anesthesiology. In: Gaba D, editor. Crisis Management in Anesthesiology. Philadelphia, USA: Churhill Livingstone Inc., 1994

75. *Nyssen A, Hansez I, Baele P, Lamy M, De Keyser V*. Occupational stress and burnout in anaesthesia. Br J Anaesth 2003; 90: 333-7

76. *Jackson S*. The role of stress in anaesthetists' health and well-being. Acta Anaesth Scand 1999; 43: 583-602

77. *Matalon A, Granek-Catarivas M, Rabin S*. The pleasures of doctoring through reflections in Balint groups. Proceedings of The Thirteenth Interna-tional Balint Congress. In: Salinsky J, Otten H, editors. The Doctor, the Pa-tient and their well-being - world wide; 2003; Berlin: The International Balint Federation; 2003. p. 58-62

78. *Smith A, Goodwin M, Mort M, Pope C*. Expertise in practice: an ethno-graphic study exploring acquisition and use of knowledge in anaesthesia. Br J Anaesth 2003; 91: 319-28

79. *Marckman G*. Teaching science vs. the apprentice model - do we really have the choice? Med Health Care Philos 2001; 4: 85-9

80. *Porter R*. Antiquity. In: Porter R, editor. The Greatest Benefit to Mankind. London: Fontana Press, 1999; 44-82

81. *Stone S, Ellers B, Holmes D, Orgren R, Qualters D, Thompson J*. Identify-ing oneself as a teacher: the perceptions of preceptors. Med Educ 2002; 36: 180-5

82. *Ricoeur P*. Det praktiska förnuftet. In: Östling B, editor. Från text till hand-ling. Stockholm, Sweden: Brutus Östlings Bokförlag Symposion AB, 1988

83. *Giorgi A*. An Example of Harmony Between Descriptive Reports and Be-havior. Journal of Phenomenological Psychology 1989; 20: 60-88

84. *Säljö R*. Minding action: Conceiving of the world versus participating in cultural practices. Nordisk pedagogik 1994; 14: 71-80

85. *Carnie J*. Patient feedback on the anaesthetist's performance during the preoperative visit. Anaesthesia 2002; 57: 697-701

86. *Larsson J, Holmström I, Lindberg E, Rosenqvist U*. Anaesthetists under-stand their work in different ways (Letter to the editor, reply). Br J Anaesth 2004; 93: 303-4

87. *Sjöström B, Dahlgren L*. Applying phenomenography in nursing research. J Adv Nurs 2002; 40: 339-45

88.   *Bowden J, Marton F*. What should be learned: competence and competencies? In: Bowden J, Marton F, eds. The university of learning. Beyond quality and competence. New York: RoutledgeFalmer, 1998; 91-129

89.   *Hamberg K, Johansson E, Lindgren G, Westman G*. Scientific Rigour in Qalitative Research - Examples From a Study of Women's Health in Family Practice. Fam Pract 1994; 11: 176-81

90.   *Lincoln Y, Guba E*. Naturalistic Inquiry. Newbury Pard: Sage; 1985

91.   *Schwandt T*. Farewell to criteriology. Qualitative Inquiry 1996; 2: 58-72

92.   *Morse J, Barret M, Mayan M, Olson K, Spiers J*. Verification Strategies for Establishing Reliability and Validity in Qualitative Research. International Journal of Qualitative Methods 2002; 1:

93.   *Theman J*. Uppfattningar av politisk makt (Conceptions of political power). Gothenburg, Sweden: University of Gothenburg; 1983

94.   *Schön D*. The Reflective Practitioner. New York: Basic Books inc; 1982

95.   *Greaves JD, Dodds C, Kumar C, Mets B*. Clinical teaching, a guide to teaching practical anaesthesia. Lisse, The Netherlands: Swets & Zeitlinger Publishers; 2003

96.   *Lindgren A*. Pippi Långstrump i Söderhavet (Pippi in the South Seas). Stockholm: Rabén och Sjögren; 1948

Acta Universitatis Upsaliensis

Comprehensive Summaries of Uppsala Dissertations
from the Faculty of Medicine

Editor: The Dean of the Faculty of Medicine