The guiding function of the object of work

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Abstract: The paper explores how work activity gets its orientation. With the help of Ilyenkov’s conception of the dialectical unity of activity/object and Leontiev’s conception of activity as layered, I make an analysis of patient cases presented in a clinical heart conference. The aim is to find out how the motivating character of the object of work influences the aggregates of work actions. The empirical finding is that – and how - the transformations of the object occur in phases, which are determined by the practical encounter with the designed and redesigned objects. In the discussion of the findings three themes are presented. First, what constitutes the object of coronary clinical work, and how to describe and analyze it. Second, as one of the social actors which contribute to the configurations of the object, the voices of the patients which are heard in the clinical work are taken into account as one determination of the object of work.. Finally the paper discusses the instructive character of the transformation of the object of work.

Introduction

This paper is one in a series of papers exploring how work activity gets its orientation (Sutter 1999, 2000, 2001, 2002). The theoretical ground of the paper is based on Ilyenkov’s (1977) analysis of activity and the object of the activity, and on the conception of activity/object as layered, as suggested by Leontiev (1979). From this theoretical perspective, I make an analysis of an activity system of coronary diagnostic work. Taking for granted – based on an activity-theoretical approach – that the object of an activity has a guiding function of the activity, the aim of the study is to find out in what ways guidance is achieved.

The Russian philosopher Evald Ilyenkov has developed the concept of activity by elaborating on how artifacts, man-made objects, relate to living human activity. He conceptualizes his ideas in the concept of “ideal object” or “the ideal” (Ilyenkov 1977). In my understanding, Ilyenkov’s philosophy is a way to stand up for materialism (but not vulgar or silly materialism, as he points out), which encompasses the active side of human life, including consciousness, intention and motivation. I will try summarize the central issues in Ilyenkov’s position in two claims:

- There is no “pure activity”, no activity without “traces of palpable corporeality.”
- There is an ongoing dialectical transformation between activity and object.

Very briefly I will argue for the “two claims” with reference to what Ilyenkov has written in a chapter from 1977.

Concerning the first claim, that activity is always object-mediated. Ilyenkov on several occasions points out that “ideality” cannot be restricted to something mental or individual. “Social consciousness is not simply the many times repeated individual consciousness” (p. 77). He refers to Hegel’s understanding of what is meant by “social consciousness” and
claims that the “social consciousness as an ‘entity’ is certainly not built up, as of bricks, from the ‘sameness’ to be found in each of its ‘parts’ (individual selves, individual consciousness)” (p. 80). For Hegel and Ilyenkov “social man” is something else: “It is these forms of the organization of social (collectively realized) human life activity that exist, before, outside and completely independent of the individual mentality, in one way or another established in language, in ritually legitimized customs and rights and, further, as ‘the organization of the state’ with all its material attributes and organs (…)” (ibid., p. 81). “Ideality,” he sums up, “is nothing else but the form of social human activity represented in the thing” (p. 86).

Concerning the second claim, that there is an ongoing transformation between activity and object, Ilyenkov states that “[t]he ‘ideal’ plane of reality comprises only that which is created by labour both in man himself and in the part of nature in which he lives and acts” (p. 96). Human activity is social, purposeful, and transforming. The ideal form of labour is realised in the substance of nature. Sometimes Ilyenkov says that labor is embodied in the substance of nature, or is alienated in it. This means that man’s labor presents itself to “man the creator as the form of a thing or a relationship between things in which man, his labour, has placed them” (p. 97). By rephrasing, he states the same thing in the following words: “‘Ideality’ (…) exists only through the unceasing process of the transformation of the form of activity – into the form of a thing and back – the form of a thing into the form of activity” (…) (p. 98).

Ilyenkov has a wording that I like very much. It is as follows:

“And only in the reciprocating movement of the two opposing ‘metamorphoses’ – forms of activity and forms of things in their dialectically contradictory mutual transformations – DOES THE IDEAL EXIST.” (p. 99. Capital letters in original)

The meaning of this sentence can be discussed in length. I will not go into such a discussion, however. Instead I will accentuate what I will take as central for the analysis of this study: there are transformations between activity and object. There is no activity without an object, and there is no object without activity. Activity and object are mutually determined. They constitute a dialectical entity.

I think this dialectics can be described by means of a method of notation that Vygotsky used in an article about play (Vygotsky 1966). The preschool child, says Vygotsky, has not yet developed its thinking activity so that it goes beyond perceptual reality. It cannot understand that five ants are more than four elephants. However, in the activity of role-playing, the child takes a big leap in development. One can see a shift from a notion bounded by the perceptual field to a conceptualization that goes beyond the empirical-given. This achievement is made with the help of mediating material or bodily means (pivots). What is gained is a change of focus, from the perceptual features of the object to the emergence of thinking. The transformation that is an outcome of role-playing is by Vygotsky accounted for by means of a formula:

\[
\text{object} \rightarrow \text{meaning} \rightarrow \text{object}
\]

If I use Vygotsky’s system of notation, Ilyenkov’s idea can be put in a corresponding formula:

\[
\text{meaning} \rightarrow \text{object} \rightarrow \text{meaning}
\]

\footnote{Or the perceptual features of actions, as when, for example, the child moves its hand from table to mouth in order to illustrate the act of eating. In that case the formula is: from action/meaning to meaning/action.}
The formula is an attempt to show the contradictory unity of activity and object as well as the transformation between them. What the formula expresses is that, occasionally and from a certain perspective and by means of an object-related (Gegenständlich) activity, an object is created, an object that “leaks” its “ideality”, its trace of human activity in materiality. In the formula, the object that is transformed by the activity is accounted for by the second and third ratio. Correspondingly, the activity that produces an object is described through the first and second ratio.

Material, embodied activity shapes the ideal. In other words, the “ideal object” is the trace of human activity in materiality, artifacts are activity products. Without activity, the object would not be an artifact, but pure nature. Thus, according to Ilyenkov, there is “ideality” in all things made by humans. I believe such a position may easily be accepted. However, I think his idea that all “ideal objects” have a material aspect is harder to digest. This being the case for a table or a computer program, will for many people probably be recognized as an acceptable philosophical position. That it also would be a valid statement for mathematical concepts, procedures, and conceptions of health, disease and illness, I guess, many people would find unacceptable. Thus, according to Ilyenkov, all “ideal objects” have a material aspect. Ilyenkov persistently refutes those alternatives. For example, on several occasions he repeats that one should not conceive of “social consciousness” as the many times repeated individual consciousness. It is more than the sum of individual minds. With this perspective, is there not a risk that “subjectivity” might be lost? Do not the imaginations, goals and intentions of the individuals play any role? Of course they do, is Ilyenkov’s answer, but even if we take for granted that other people have a consciousness and intentions, we come to the conclusion through their actions and talk and influence on the material world. What we want, strive for and intend are “made instructably observable” in the interaction with other people (to use the wonderful phrase from Garfinkel, 1996). How else could we know? How can something be “made instructably observable” if it is without “traces of palpable corporeality” (Ilyenkov, 1977, p. 87)?

In our time of “postmodernism” or “cultural modernization” (Ziehe 1989), when “make-ability” is a highly praised quality, it is important to understand the limits of make-ability (or constructionism). There is an “inertness” in human affairs depending on the role of artifacts. There is a “given” to count with in any action. This means that artifacts are to be taken seriously. Actor Network Theory (ANT) is a perspective that takes the role of artifacts in human activity seriously. As a reaction to the persistent tendency to ignore or underestimate the importance of artifacts, ANT has an essential message, although, in my opinion, it goes too far when it with the concept of “actants” places artifacts on a par with humans. From the point of view of activity theory, Ilyenkov and Wartofsky (1979) have made attempts to deal with the problem. Here I make use of Ilyenkov’s idea of a dialectical relationship between forms of activity and forms of ideal objects (artifacts), as a point of departure to describe how teams of physicians accomplish their work of coronary diagnostics.
“is to be understood as a project under construction, moving from potential ‘raw material’ to a meaningful shape and to a result and an outcome. In this sense, the object determines the horizon of possible goals and actions. But it is truly a horizon: as soon as an intermediate goal is reached, the object escapes and must be reconstructed by means of new intermediate goals and actions.”

A consequence of the unfinished character of the object of activity is that planned or scripted actions are not enough. In advance you cannot comprehensively know what to do. There will always be “corrective” actions to accomplish the activity. Leontiev describes some aspects of this multi-level characteristic of human activity as the “structure of human activity” (Leontiev 1978, 1979). He has developed his now famous idea that there is a level of activity related to motive, and levels of actions and operations related to goals and conditions. In that way an activity is layered. In his own words:

“In connection with selecting the concept of action as the most important ‘component’ of human activity, we must keep in mind that any kind of well-developed activity presupposes the attainment of a series of concrete goals, some of which are rigidly ordered. In other words, an activity is usually carried out by some aggregate of actions subordinated to partial goals, which can be distinguished from the overall goal.” (1979, p. 61)

An activity is also layered in that it encompasses activity/object, present and past in the same moment. In addition, it encompasses intentions about the future. Thus, activity is a weaving together of objects and of past, present and future. The purpose of the paper is to describe in detail the “interweavingness” of activity and objects.

That the object is “a project under construction” (Engeström) does not mean that the “ideality” of objects is a property of mind. Rather, as Ilyenkov has stressed, “mind” as well as “ideality” is an outcome of human activity, palpable corporeal activity.

Such an ontology and perspective will have methodological consequences. Charles Goodwin is one of them who – albeit partly from a different theoretical perspective – has formulated consequences for empirical studies, which I have found enlightening. He says that an investigation must take into account how the activities

“are organized by juxtaposing quite disparate phenomena, including artefacts, inscriptions, language, displays made by the body, underlying standards, and so on as to make visible for participants the unfolding structure of relevant events, such that they can accomplish in concert with each other the consequential activities that make up the lifeworld of their community.” (Goodwin 2000, p. 1)

Methodological considerations

In activity theory, the unit of analysis is often said to be an activity system (e.g., Engeström 1987). During several years I have studied coronary diagnostic work which can be described as an activity system. This specific activity system was characterized by being distributed between two sub-teams and using special videoconference facilities as a central mediating artifact. It was run between 1993 and the end of 1996, and ceased to exist when it was transformed into two independent (but collaborating) activity systems. The outcome of the transformation was the founding of the Thorax Clinic at the Blekinge hospital in Karlskrona as a new actor on the medical scene in Southern Sweden, in addition to the already well-established University Clinic in Lund.

Among the 17 heart conferences I have videotaped and studied from March 1995 to August 1996, I have selected one (from June 1996) as for the analysis of the paper. I regard the heart conference as a microcosm of the activity system of coronary diagnostics. A heart conference is a formal meeting place for collegial decisions, limited in time and involving staff from all
relevant professional disciplines. By studying the heart conference I can grasp some essential parts of what constitutes the institutional order of coronary diagnostic work. The institutional order is given – by way of tradition, habits, procedures, work descriptions, coding schemes, and other artifacts. At the same time, the institutional order is accomplished in and as part of everyday work. The institutional order both is and becomes, it consists of something given and something projected. In my presentation I will utilize the given/produced institutional order of the heart conference as a microcosm, the heart conference as a gathering and concentration of the activity that most often is distributed over time, places, and people. On the occasions of the heart conference, the activity becomes focused in one place. Therefore, the heart conference gives an excellent opportunity to study how coronary diagnostic work is done.

The presentation of the case will proceed in four steps. First, I will give a comprehensive overview of patients dealt with in the heart conference. Second, I will select one patient (Patient 4) and present its case by means of a comprehensive video log with a commentary. I could, in principle, have picked out any of the patients that were recommended treatment by the heart conference participants in order to make a detailed study of the object of work. Third, I will once more give a comprehensive display of all the patients in the heart conference, this time in the form of how their voices are heard in the conference. Fourth, I will present a detailed episode from another patient (Patient 3). The reason why I select this episode is that it so well underlines an aspect of work activity, namely being comprised also by innovative actions. Most of the actions are only “minor novel” and do not get an impact so that they count as real innovations.

The rough classification of the patients as it is made through the diagnostic work in the heart conference is shown in Figure 1.

<table>
<thead>
<tr>
<th>Patient</th>
<th>A case for the heart conference?</th>
<th>Recommended treatment</th>
<th>Specification of limits for queuing time to treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
<td>Surgery</td>
<td>3 months</td>
</tr>
<tr>
<td>2</td>
<td>Yes</td>
<td>PTCA</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Yes</td>
<td>PTCA</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Yes</td>
<td>Surgery</td>
<td>1 month</td>
</tr>
<tr>
<td>5</td>
<td>Yes</td>
<td>Surgery/PTCA??</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Yes</td>
<td>Surgery</td>
<td>3 months</td>
</tr>
<tr>
<td>8</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Yes</td>
<td>Surgery</td>
<td>3 months</td>
</tr>
<tr>
<td>10</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Yes</td>
<td>PTCA</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Yes</td>
<td>Surgery</td>
<td>3 months</td>
</tr>
<tr>
<td>13</td>
<td>Yes</td>
<td>Surgery</td>
<td>3 months</td>
</tr>
<tr>
<td>14</td>
<td>Yes</td>
<td>Surgery</td>
<td>3 months</td>
</tr>
<tr>
<td>15</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Yes</td>
<td>Surgery</td>
<td>3 months</td>
</tr>
<tr>
<td>17</td>
<td>Yes</td>
<td>Surgery</td>
<td>1-2 weeks</td>
</tr>
</tbody>
</table>

*Figure 1.* Categorization of patients in the heart conference.
As a preparation for the heart conference, 17 patients were referred to an angiocardiographic investigation (“angio” for short), where the coronary artery was x-rayed. Later the patients were put on a list for the heart conference in question. As part of the heart conference, the patients were classified into several categories, 4 or 6 depending how one counts. If all patients that are recommended surgery are lumped into one group, there are four categories, but if a distinction is made based also upon how soon the surgical operation is planned to take place, there are 6 categories. The physicians themselves explicitly state the period within which surgery is recommended, and they categorize the surgery patients into three sub-categories. Thus, the members of the activity system themselves use 6 categories.

Patients 6, 8, and 15 are discussed very shortly at the conference. “We’ll skip her,” said the presenting cardiologist about Patient 6, “because she has no significant stenoses.” With similar phrasings, the other two just mentioned patients were also dealt with in the meeting. The reason stated is that all three patients had normal coronary arteries. In the greeting ceremony of the heart conference, the surgeon got a hint about these three patients from the cardiologist. (Surgeon: “Good morning. It is a thick collection you have to offer today.” Cardiologist: “Three will disappear, I think.”). The surgeon accepted the short explanations from the team in Karlskrona regarding the three patients, and by that the decisions were a fact. For the fourth patient in this category, Patient 10, like all the other 14 patients, a full presentation of the patient history was given by the cardiologist, followed by an angio-film presentation by the radiologist and a discussion. The decision for the Patient 10 case was to return it to the referring hospital, because there was not enough evidence to motivate PTCA treatment or surgery.

Patient 5 constitutes a single case category. The case was complicated and a conclusive decision could not be formed at the heart conference. Therefore it was decided that the patient should be sent to Lund and get some kind of treatment, but more exactly which treatment had to be based on more careful consideration. The remaining four categories of patients are the patients the team assesses to be in need of treatment, either in the form of balloon dilatation or surgical operation.

The category “surgery within 3 months” comprises 7 patients. Judging from a comment by the surgeon, There seem to be unusually many patients in this category in this heart conference: “There are many three-month cases today.” He made the comment directly after Patient 14 had got her 3-month surgery decision. As can be seen from Figure 1, still another 3-month decision will follow. A 3-month decision means that the patient is not in acute need of a surgical operation. The risk indication says this is not an emergency case, but surgery is recommended for the wellbeing of the patient. Research shows (Socialstyrelsen 2001) that surgery for these patients does not improve their length of life, but improves their quality of life. In light of the existing long patient-queues for surgery, this category is somewhat of a dilemma. By ameliorating life for some of the patients, whose lives are not at stake, resources become scarcer for patients with life-threatened conditions.

The first step in my method was to describe an aspect of the fabric of the institutional order of classifying patients (Bowker and Star, 1999). The next step in my method is to distinguish *layers of the activity/object of the physicians’ work* at the heart conference. By this I refer to patterns like aggregate of actions, overall goal and partial goals (to speak with Leontiev), and

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2 PTCA (percutaneous transluminal coronary angioplasty) is an x-ray based method for surgical repair of a coronary blood vessel by means of balloon dilatation.
tools and objects (to speak with Engeström 1990). Proceeding in this way, I can see that there are patterns or layers in the heart conference forming a kind of natural order of distributed work. First, there is a move of bringing evidence concerning the patient to the “center”, that is, the angio lab and the heart conference. This move is about institutional remembering of what has earlier been distributedly achieved in the health care system. It means updating the case, grasping "the state of the art" for the patient - in figures and descriptive vignettes. Second, there is confirmation and assessment of the tests that are made especially for the heart conference. This includes x-raying of the coronary artery as well as measurements of the working capacity of the heart (ventricle and cardiac valve) and bedside talk with the patient. Third, there is an overall assessment of the heart as a whole. Based on noticing many pieces of information, pieces that are not always coherent and sometimes apparently contradictory, a picture is formed weighting in reliability of facts and relevance for treatment. Fourth, a decision is made, consisting of a strong recommendation to the colleagues in Lund concerning the future treatment of the patient.

There is an institutional order in dealing in with the patients in the heart conference. The order consists of four phases: Updating the case, Inspection of parts, Overall assessment, and Decision of action to take. The phases are sequential. Sequentiality emerges from the fact that the career as a patient unfolds in time, and there are indications of how, but it also originates from the fact that the physicians have to face patient-sequences and facts one at a time. My presentation of the patient case (Patient 4) will be structured according to these phases.

I have chosen a patient case, which I present comprehensively. The patient I have selected, Patient 4, comes from one of the four “action-demanded” categories the physicians have used in the heart conference in question (Figure 1). Patient 4 got a surgery decision with the specification of “one month.”

Let me sum up the approach of my study. I want to give a picture of a whole heart conference, and I do this by outlining how the 17 patients are classified and also by presenting the voice of the patients as they are heard in the conference. I also want to present detailed descriptions of the patient cases. I do this by giving an account of one full patent case complemented with details from an episode from another patient case. The object of my study is how the object of the work activity is manifested in how the work is done, or, in other words, how the guidance of the object of work is accomplished. Thus, I aim at an activity-theoretical study (that is both holistic and detailed) inspired by “Ethnomethodology’s program” which means to “make instructably observable” (Garfinkel 1996) and to give an account of “the interactional what” (Button 2000). My course of action to explain these dense theoretical expressions is the same as I apply in the case of Ilyenkov’s, that is, to outline how the expressions are important in my analysis, and then let the fuller explanation of them unfold along with the description of the work practice.

In the next step of the presentation of this paper, I will display the phases of activity/object as they are particularized in a patient case. My attempt is, through the patient case, to describe in detail how the mutual transformations of activity/object occur.

The Patient 4 case

Phase I. Updating the case
The cardiologist is updating the patient cases as part of his presentation of them. He summarizes the patient history and brings to the meeting results from taking of specimens, anamnesis, and assessments from his own encounter with the patient. I will present the Patient 4 case as an example.

What the diagnostic team has to tackle in the first phase of the patient case are the patient’s significant problems according to earlier tests, and the stated reason why she got a referral for an angio investigation.

The cardiologist, who is presenting the patient case, builds his presentation mainly upon the patient journal. The patient journal is at hand for all the participants during the conference, and the cardiologist uses it as his manuscript during the presentation. This is how the cardiologist who is presenting the case in the conference always works, and sometimes he also adds commentaries from his own memory of his meeting with the patient at the clinic (probably backed up by notes). How this was done in the Patent 4 case is presented in Figure 2.

Evidently the reason for sending Patient 4 to Karlskrona is not explicitly stated in the patient journal. (Line 1) The presenting cardiologist corrects the omission by pointing out a specific page in the patient journal, “here, page 24b,” where the diagnosis of the referral should have been stated. I can only speculate as to how the cardiologist knows the reason. Probably he has addressed the complete journal of Patient 4, which is placed in a pile together with the other patient journals that are placed in a shopping trolley within reach of the cardiologist.

<table>
<thead>
<tr>
<th>Actor</th>
<th>Commentary</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Cardiologist</td>
<td>There is no stated diagnosis here, but there should have been a notation, “aorta stenosis” here, page 24B</td>
</tr>
<tr>
<td>2 Surgeon</td>
<td>Mm <em>(He makes a note in the patient journal)</em></td>
</tr>
<tr>
<td>3 Cardiologist</td>
<td>This is an 82 year old vigorous widow, who earlier has smoked a little, but that is long ago.</td>
</tr>
<tr>
<td>4</td>
<td>No problem with varices, asthma pains however.</td>
</tr>
<tr>
<td>5 Surgeon</td>
<td>Mm</td>
</tr>
<tr>
<td>6 Cardiologist</td>
<td>She had surgery for (inaudible) cancer autumn – 92. Post-surgery tests are said to be okay. She also has had (inaudible) treatment.</td>
</tr>
<tr>
<td>7</td>
<td>A known murmur since at least 20 years</td>
</tr>
<tr>
<td>8</td>
<td>In connection with an infection she got accentuated asthma pains, that is pains correlated to breathing. And in connection to that an echo test was made and then a dense aorta stenosis and left ventricle hypotrophy was found. Hypotrophy = abnormal growth. Echo = echography, diagnostic examination using ultrasound.</td>
</tr>
<tr>
<td>9</td>
<td>And she has, according to the doctor who has referred her, pains with pressure on the chest.</td>
</tr>
<tr>
<td>10</td>
<td>But the patient does not believe she does. She is digging in the garden without real pains. But she has fainted on several occasions. She experiences that it can come at any moment.</td>
</tr>
<tr>
<td>11</td>
<td>I think this patient really ignores the symptoms.</td>
</tr>
<tr>
<td>12 Surgeon</td>
<td>Mm <em>(He turns over the pages and makes a note)</em></td>
</tr>
<tr>
<td>13 Cardiologist</td>
<td>I think this is important to stress because …</td>
</tr>
<tr>
<td>14</td>
<td>Besides that she is alert. She has several medicines, not the least … mainly asthma based. Surgeon turns over the pages</td>
</tr>
<tr>
<td>15 Surgeon</td>
<td>Mm</td>
</tr>
<tr>
<td>16 Cardiologist</td>
<td>In connection to undressing and dressing she displayed some dyspnea, so she is more bothered than she is willing to admit. Dyspnea = difficult or labored respiration</td>
</tr>
<tr>
<td>17 Surgeon</td>
<td>Mm <em>(He makes notes or markings and turns over the page)</em></td>
</tr>
</tbody>
</table>
The heart displays the murmur (Ψ) that can be expected for an aorta stenosis. (Φ) Echo from (name of the neighboring county town) in April shows measure of 42 mm of the left ventricle, with concentric left ventricle hypertrophy and growing thickness of the walls. And a gradient between 90 and 100 Hg. (Φ) Also a little leakage of mitralis.

ψ = surgeon turns over the page
Φ = surgeon makes a note

Mitralis = mitral valve

We have not tested pressure, because we were not able to penetrate the ventricle, it was too tight.

Pressure = a measure of the ability of the heart to pump blood

Well

Surgeon turns over the pages

One might perceive of the presentation of the patient case as a monologue conducted by the cardiologist. This is not the case. The presentation is an updating for the whole team, and all team members are engaged in the updating – in different ways. The updating comprises material work and a dialogue. Although Figure 2 does not manage to do full justice to what is going on in the conference, it gives a picture of the dialogue. Notice that the surgeon responds to the presentation of the cardiologist and he attentively follows the presentation of the case – by reading and turning pages in the patient journal (lines 12, 14, 18, and 20), listening to the cardiologist’s oral presentation, making notes (lines 2, 12, 18) and going into dialogue (minimalistically, I admit) by means of his mm-responses (lines 2, 5, 12, 15, 17, and 19) and also his concluding “well” (line 21).

In the heart conference I present here, the whole team consists of three physicians, which is a minimum – a radiologist and a cardiologist in Karlskrona, and a surgeon in Lund. Actions of the later two are possible to infer from Figure 2, but what does the radiologist do? He is also taking part with his specialty in the division of labor.

**Figure 2.** Patient 4 - updating the case.

In the heart conference I present here, the whole team consists of three physicians, which is a minimum – a radiologist and a cardiologist in Karlskrona, and a surgeon in Lund. Actions of the later two are possible to infer from Figure 2, but what does the radiologist do? He is also taking part with his specialty in the division of labor.

**Figure 3.** The participants in the heart conference
When the cardiologist starts to present Patient 4, the radiologist directly turns the pages of the patient journal to a certain page. This page shows the result of the angio investigation in graphics, numbers and statistical figures, and texts. During the updating phase of the patient case, he has this page spread in his lap, and now and then he looks at it. He is following the presentation of the case, and, most certainly, he is preparing the next phase, where he will have a very active role.

A dilemma or contradiction is evident in this first part, where the case is updated. The clinical measurements that caused the referral to the hospital strongly indicate that the patient is suffering from a clogged aorta, which is a serious problem. On the other hand, however, the patient is vigorous, and she denies she has any serious problems. Life threatening problem according to objective tests versus subjective reports of well-being – how do the physicians cope with this contradictory evidence? Referring to more evidence is what the cardiologist does. He finds new indications of the seriousness of the problem in the life-world of the patient. Sometimes she faints away (line 10) and she displayed difficulty with her respiration when she undressed and dressed for the consultation meeting with the doctor (line 16). The cardiologist’s suggestion is that the woman psychologically denies her problem. This is what the cardiologist points out in his presentation (lines 11 and 13).

This first phase of the presentation of the patient case I have called “updating of the case.” It is not just a mental updating. Indeed, it regards all-round work activity. It means, among other things, updating of the patient journal (writing in the referral diagnoses, “aorta stenosis”, in its proper place, “page 24b”). It means following routines important for the encirclement of coronary illness, it means applying coding schemes, embodied in paper forms, in organizational procedures, and in behavioral habits (for example, “has smoked a little”, line 3; “no problem with varices”, line 4; “we have not tested pressure, because we were not able to penetrate the ventricle,” line 20).

Updating, of course, means much more. And then I am only talking about the updating work going on in the 70 minutes long heart conference, not the preparations or infrastructural work that has been accomplished before the conference, in several places, also with other people involved.

In sum, we have seen “updating work” accomplished by the diagnostic team, comprising a cardiologist and a radiologist in Karlskrona having a videoconference meeting with a surgeon in Lund. The updating or re-presentation of the patient case is “just” to pick out what is relevant from the diagnostic work done beforehand, and add some more information. With the approach of this study, to describe in some detail “the interactional what” of coronary diagnostics, this “just” picking out and adding a little information should not be misunderstood. This “just” is hard work. And it is only the beginning of the patient case.

**Phase 2: Inspection of parts**

In the special meeting called “heart conference,” collegially organized for a comprehensive diagnosis of the heart by means of the major professionals involved, the angiocardiographic film (the “angio”) has a central place. Angiocardiography means a “roentgenographic visualization of the heart and its blood vessels after injection of a radiopaque substance”

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5 At this heart conference, we researchers (Bo Helgeson and myself) had two video cameras in action. One was focusing the radiologist and his handling of the special device that made it possible to show the angio video within the framework of the regular distance-mediating heart conference.
(Marriam-Webster’s Medical Dictionary). By means of this powerful method, the team can make a detailed inspection of the coronaries and the heart. This inspection is what the second layer is about. Before we go into the activity/object transformations in this second phase/layer, first some words about the production of the angio film.

| 23 | Radiologist | She has a lot of calcification |
| 24 | Surgeon      | Well                         |
| 25 | Radiologist | Light insufficiency, stiff and calcified mitralis, and also much calcification in (inaudible) |
| 26 | Surgeon      | That ventricle is not well, right? |
| 27 | Cardiologist | From sitting markedly leaning forward and attentively looking at the display of the angio video, he now leans back, and turns over the pages in the patient journal. After some seconds he says: It is said, in April at least, that it was not that... |
| 28 | Radiologist | Normal right as you can see there Right = right ventricle |
| 29 | Surgeon      | Yes                          |
| 30 | Radiologist | And the aorta we have not (inaudible)... |
| 31 | Radiologist | She has two LAD stenoses around 50%, especially the distal one Surgeon makes a note in the patient journal |
| 32 | Surgeon      | Normal circumflex, normal main stem |
| 33 | Surgeon      | It is this area (he is showing with the pointer on the screen) that (inaudible) diagonal |
| 34 | Surgeon      | The diagonal will pass?      |
| 35 | Radiologist | Well, the diagonal will pass, yes |
| 36 | Surgeon      | Min (makes a note) The right = right coronary |
| 37 | Radiologist | And if you want we can show the right in high speed to show that it too is normal |
| 38 | Cardiologist | In case they said from echo that there were normal contractions of the ventricle, in April |
| 39 | Surgeon      | Well (makes a note or underlining) |

**Figure 4.** The Patient 4 case – searching for significantly diseased parts of the heart.

There is a standard shooting of the angio film, which has been described in the following manner by members of the team: “The examinations usually consisted of left ventricular angiography (frontal and lateral simultaneously), four to six runs of the left coronary artery, depending on anatomy, and four runs of the right coronary artery.” (Kehler et al., 1996, p. 161). Because the film is composed as it is, in a standard order, it follows that the heart and the coronaries are examined in the same order in the heart conference (unless the team wants to jump between the sequences of the film). The order of the angio investigation and, thus, the order of the radiologists’ presentation of the angio film, can be read in Figure 4.

The presentation of the angio film starts with inspection of the ventricles, first the left ventricle (lines 23-27) and then the right ventricle (lines 28-29). Then the aorta, which has not been examined in the angio lab (line 30). In the next step the left artery is gone through: LAD (lines 31 and 33), Circumflex (line 32), main stem (line 32), diagonal(s) (lines 34-36), and finally the right artery (line 37). Notice that the order of the parts of the heart and the coronary artery, which are to be inspected in the heart conference, is more or less given by the order laid down through the work in the angio lab. In that respect, the angio-film strongly determines the work practice of the meeting.
The dialogical pattern that was observable in phase 1 can be observed also in phase 2. In the latter, the radiologist and the surgeon are most visible through the log records, but the cardiologist is also active all the time, which is suggested through his emergence in the log (lines 27 and 38).

Although the angio film can be regarded as the central artifact during this phase of the heart conference, other artifacts are important too. The division of labor between the participants is striking. The radiologist is the operator of the angio film, he loads the video-cassette, runs the film, manages the maneuvering-device that regulates the arrow-pointer for the monitor, and orally he comments upon the film. In his lap he has the patient journal, with the particular page earmarked for the angio graphics turned over as front page, and upon it he has placed one of the operating devices he uses (Figure 3). His specialized work activity has been noticeable also earlier in the conference. I did not mention it in Figure 2, but I will here. When the cardiologist and surgeon are talking (lines 1-6 in Figure 2), the radiologist minds his own business: he writes down the decision taken for Patent 3 on the front page of his issue of the patient journals, he turns over the pages until he finds the page with angio graphics of Patient 4, puts the journal with the angio-graphic page upward in his lap, takes out the video cassette for Patent 3 and puts in the cassette for Patent 4.

As part of taking part in the interaction by talking, the surgeon consults the patient journal, at times turning over the pages, or making a note.

The cardiologist looks at the film, at any moment with at least one eye on the patient journal, as if he wishes to assure himself that there is a correspondence between the pre-angiolab diagnoses and the partial diagnoses that are suggested through the angio film. He also browses through the patient journal to get an answer to the question of how the left ventricle has been diagnosed before the patient was sent to the angio investigation (lines 27 and 38).

The surgeon continues with his “defensive” role in the dialogue. In the Part 2 sequence, he adds four more “mm” or “well,” but he also takes more apparently active actions by asking how to interpret what is shown (line 26: “That ventricle is not well, right?” and line 34: “The diagonal will pass?”). That much about the form of interaction. What about the content?

I will pick out two topics that seem to be important, in the sense that it is not self-evident how to understand their conditions. The first is about the (left) ventricle, and the second is about stenoses on the LAD-vessel. The ventricle is the first topic and it is commented on. It is calcified, but how it should be assessed is an open issue. “Light insufficiency” is a judgement from the radiologist, but the surgeon is hinting at a more serious assessment (“That ventricle is not well, right?”). The cardiologist comments on the condition of the ventricle, and he bases his argument on indications available before the heart conference (lines 27 and 38) – electrocardiography (“echo”) has shown that the ventricle is OK. The fact that he brings it up twice indicates that he finds this information important and wants it paid attention to. The second topic that, according to the visible interaction, needs to be given a second thought is the stenosed LAD. This is central because LAD is usually one of the three most important vessels of the coronary-artery. At LAD there are two reported stenoses, which are said to be “around 50%.” This is a measure saying that the blockage is so substantial that there is a coronary-artery disease to take into account. The physicians are also concerned about the “diagonal,” a vessel that branches off from the LAD. Might it be affected by the LAD stenoses? It is a question they pose and answer: no, it passes.
Phase 3: Overall assessment
Phase 1 and phase 2 contributed with indications of the condition of the patient’s heart and coronary arteries. A large amount of clues have so far been provided. In phase 3 the task is to distill the significant features out of the range of pieces of information.

When the team has updated and commented on the Patient 4 diagnoses (phase 1) and inspected the angio film, one might expect that the physicians, as they normally do, explicitly state what is the significant problem that is to be taken care of. This does not appear in this case. The team immediately starts to discuss what action to take. The explanation is that the overall assessment is interleaved with the other actions. Given the professional conception of heart disease and given what is shown, it is evident for the members that the aorta is sick and so is LAD, and both of them have to be cared for. The left ventricle, despite calcification and stiffness, is not judged as significantly sick, and consequently there is no need to take measures. Without summing it up explicitly, the team has decided that the aorta and the LAD have to be treated. Based on this, the team continues their work by discussing what action to take in the next step.

Phase 4: Deciding what action to take
Four topics are covered in the third phase: 1) The aorta was diagnosed by means of echo before the investigation in the Angio Lab, and it did not get any further investigation by means of angiography. Nothing brought up in the heart conference suggests that the echo test is not valid, and therefore it is taken for valid. This is implied without saying. 2) The surgeon and the radiologist speculate about the coming bypass operation (lines 40-46). This is very unusual, I have not seen it in any other of the heart conferences I have videotaped, and the physicians soon drop the theme, saying that it is not their problem. So this is a dead end. 3) The patient’s conjectured sublimation is taken into account. The cardiologist’s calling attention to that (in the first phase, lines 10, 11, 13) bear fruit. 4) A rather high priority is set for the treatment, “one month.” although they expect it might be difficult to realize during the summer because of vacations and shortage of staffing. (According to my observations, they usually use the scale: one week, 1-2 weeks, one month, three months.)

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>Surgeon</td>
<td>Thus ... on the diagonal you have to do something surgical between there, right? So that ... the diagonal with LAD <em>(he makes a note)</em></td>
</tr>
<tr>
<td>41</td>
<td>Radiologist</td>
<td>If you put mammary – LAD distally it will settle Mammary = Internal mammary artery</td>
</tr>
<tr>
<td>42</td>
<td>Surgeon</td>
<td>Was it after you put it, was it?</td>
</tr>
<tr>
<td>43</td>
<td>Radiologist</td>
<td>No, it was between the diagonals, so it will settle <em>Surgeon makes a note</em></td>
</tr>
<tr>
<td>44</td>
<td></td>
<td>And that makes it easier</td>
</tr>
<tr>
<td>45</td>
<td>Surgeon</td>
<td>Okay. I don’t think it will be mammary to LAD, I don’t think so. <em>(He makes a note)</em> But this is not my headache.</td>
</tr>
<tr>
<td>46</td>
<td>Radiologist</td>
<td>And mine even less</td>
</tr>
<tr>
<td>47</td>
<td>Surgeon</td>
<td>Then we have to take her a little earlier, if on top of that sublimation is involved</td>
</tr>
</tbody>
</table>
The voice of the patient
In general, the patient who has qualified to be a patient in the heart conference is not in a very strong position to make her voice heard there. One reason is of course that he or she as a person-patient is not present, but is represented by proxies, first of all the cardiologist, who in particular has that role in the division of labor within the clinical team. True, the person-patient regularly is asked about her opinion as part of the clinical process, and that is normally accounted for in the heart conference. But in her position she is at a disadvantage – what can she say when she does not feel well, and the doctors have tests objectively showing this and that? It is easy to imagine that the person-patient in such a situation has difficulties in speaking with an independent voice. However, this is speculation. Let us see what it looked like in the heart conference I am discussing in this paper. (Thus, here I am not only discussing the Patient 4 case, but all the patients in the heart conference.)

As can be seen from Figure 6, most of the patients at the heart conference indirectly had a say on their own heart-disease problem.

In the clinical praxis of diagnosing a patient, assessments from the life-worlds of the patient are used together with objective tests from science and professional activity. Life-world signs can be reported, as for Patient 12, “Does not even manage to walk on slopes and stairs,” or “May have pains when she lifts her grandchild and when she walks” (Patient 2), or “When effort a substantial feeling of pressure on the chest” (Patient 1). In all cases, you can hear the patient’s “voice” from her life-world. The voice of the patient is always mediated by the cardiologist, and always rather weakly. But it is there. Exceptions are the patients that were not presented at the conference, just mentioned and “acquitted” – no significant problem of the coronaries (patient 6, 8, and 15). One other patient (Patient 5) had no say on her problem. I can only guess why Patient 5 did not have a life-world related indication of her health status. She had got a referral on suspicion of a severe problem (ascending aorta stenosis), a clear risk-indication, and therefore, I imagine, it was judged not necessary to report life-world indications of minor importance. However, my point is not to speculate, but to state what happens in the heart conference. What happens is that, as a rule, the voice of the patient comes up in the heart conference, admittedly indirectly and faintly, and mediated by clinical proxies and documentation. It is asked for and it is heard, through evidence from life-world behavior or oral declaration of the patient.

So far, I have talked about what I call “patient’s voice on her problem” (left column of Figure 6). There is also a column for “patient’s voice on treatment,” and with reference to that the picture is quite different. In the heart conference, only two of the patients had a say on their own treatment. Patient 3 wanted a new balloon dilatation, because he had appreciated the treatment he had got the year before, and Patient 16 was reported “not uninterested in surgery.” In addition to that there is an additional voice popping up.
<table>
<thead>
<tr>
<th>Case No</th>
<th>[as echoed by medical staff]</th>
<th>[as echoed by medical staff]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&quot;When effort a substantial feeling of pressure on the chest.&quot;</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>&quot;May have pains when she lifts her grandchild and when she walks.&quot;</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>&quot;He got much better from it [PTCA 1995] but now it has grown worse. He has been at the hospital during the end of May and the beginning of June.&quot;</td>
<td>Radiologist: &quot;the patient ought to have the last word.&quot; Cardiologist: &quot;actually I have discussed this already with the patient and he is thus (1.0) he would (1.0) be happy for PTCA yes, he thinks it was a very good way to (...) the stenoses fit well for that so I think that it ... he was satisfied with the last treatment, he wants to try it again&quot;</td>
</tr>
<tr>
<td>4</td>
<td>&quot;Referred because of pains and pressure in the chest. But the patient does not believe she does. She is digging in the garden without pains.&quot;</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>&quot;He feels pressure in the chest with radiation to arm and neck when he is stressed and when the weather is cold.&quot;</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>&quot;He really is in big trouble.&quot;</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>&quot;Manages to walk on flat ground, but not on stairs and slopes.&quot;</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>&quot;Pressing work, 60 to 80 hours a week.&quot;</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>&quot;Does not even manage to walk up slopes and stairs.&quot;</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>&quot;Has been able to do forestry work, but now he is only able to walk a few hundred meters before he feels pain. Earlier she was able to walk several kilometers, but now she cannot go down to the cellar without getting chest pains.</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Light breathlessness caused by hard physical effort, but no pains when in rest.</td>
<td>K: What does he think? Is he keen on ... C: Yes, I really asked him myself, directly after, and he was not uninterested in surgery</td>
</tr>
<tr>
<td>16</td>
<td>Daily he has had pressure in the chest, but less than before</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 6.** The voices of the patients.

**Episode #1** (from the Patent 3 case)

The following episode is picked out because it illustrates a certain aspect of “the guiding function of the object of work,” namely its innovative side. In the episode the physicians make a decision that is “new.” Even if all human actions can be said to be new in that they are responsive to the uniqueness of the situation, the “novelty” only seldom has bearing for the overall activity, and in that respect earns the label “innovation.” However, in Episode #1 it does.

First a short background to what is going on in the sequence shown in Episode #1. The situation is this. A patient case is being discussed in a heart conference. Present at the conference are a radiologist and a cardiologist in Karlskrona and a surgeon in Lund. The cardiologist has already presented the background of the patient history and also reported actual test results that may be of importance, and now, when we are invited by means of the
example to watch what is going on, the radiologist is in the middle of presenting the patient case as it appears on the angio film. The physicians have already examined the former part of the angio film and have found that two coronary vessels are significantly sick. Now they are discussing a new vessel, called the Marginal.

27 (R) and this is also (0.5) sick
28 but it’s ‘little
29 he has written “over fifty”
30 it yeah it may depend on what to compare with
31 (S) they are large-sized the vessels
32 (R) they are large-sized the vessels
33 thus you have
34 (S) [at the catheter it doesn’t look stenotic
35 (R) exactly because you have about one decimal one decimal seven
36 at the catheter
37 so the width is rather good
38 (S) hmm
39 (R) so it (0.5) perhaps one ought to PTCA this one too
40 and then here at the end then comes
41 (S) but that will be many to do
42 you have to do LAD, the diagonal, the marginal and
43 (R) [no yes those 3
44 (S) yeah
45 [(1.0) shall we do that then?

The physicians know that if the blockage of the vessel gets a measure of 50% or more, experience has shown that this is serious and therefore the vessel should be classified as significantly sick. Thus, it is a rough categorization. If the measure is under 50%, the physicians are recommended to acquit, and if it is 50% and more, they are expected to assess it as significantly sick. Thus, the physicians use a systematic procedure “to transform the world into categories and events that are relevant to the work of the profession” (Goodwin 1994, p. 608). In other words, they are using a “coding scheme” which I here will call Fifty Percent.

On this occasion the coding scheme 50% is on the merge to being put aside. The reason seems to be that the measure (a measure got with help of a computer program) does contradict what is estimated by eye, and also because the vessel is thicker than usual so that even if the blockage is regarded as significant, it nevertheless has so much space left that it is expected to provide a sufficient amount of blood. However, instead of letting the vessel pass as not significantly diseased, the radiologist suggests that also this vessel should get a PTCA. The surgeon first makes an objection (“but that will be many to do”) and starts to count up the vessels that will get invasive treatment. After having numbered three vessels he prepares to mention a forth (“and”) but he is interrupted by the radiologist (“no yes those 3”) and then they decide to PTCA the three vessels. This decision do not have a routine character, rather it is an innovative move. Some years earlier it would have been almost impossible.4

4 Statistical figures show that in Sweden the proportion of PTCA has grown from 7% of the total number of invasive treatments of the coronaries in 1985 to more than 50% fifteen years later (National Guidelines 2001). And the local statistics from the Thorax Clinic at Karlskrona hospital is in accordance with the national picture.
Discussion

In this concluding section of the paper, I will discuss themes: 1) what constitutes the object of coronary clinical work, and how to describe and analyze it, 2) the multiple social determination or the multivoicedness of the object of work, and 3) the instructive character of the transformation (design and redesign) of the object of work.

What is the object of coronary diagnostics work?
The cultural-historical activity approach of my study implies that an activity is regarded as object-oriented. This means that there is an activity/object dialectic to take into consideration. As a consequence, the question “What is the object of coronary diagnostic work activity?” is equivalent with the question “What kind of activity is coronary diagnostics?” The questions differ in what they focus on, the “product” or the “process”, the object or the activity. Whichever the question, an answer has to give an account of the activity and the object, which are intertwined and cannot be separated, except for analytical purposes. I will deal with these questions by discussing the concept of object of work, starting from Ilyenkov’s concept of the ideal object and using it as a guiding idea for an empirically grounded analysis of coronary diagnostic work as it appears in a heart conference. The ambition is to grasp – in the words of Ilyenkov 1977, p. 99 - “the reciprocating movement of the two opposing ‘metamorphoses’ – forms of activity and forms of things in their dialectically contradictory mutual transformations”.

The activity/object is a complex and layered phenomenon. In my analysis of the heart conference, I have found it appropriate to discern four phases, which are related to the unfolding of the sequentiality of the activity. The first phase is “Updating the status of the patient.” This phase consists of (a) the assessment of earlier measurements and (b) the life-world assessments made specifically for the heart conference. At the same time as it is an assessment, this part of the activity is also “bringing together and bringing to life” that which, so far, has been taken place locally, and, lately, been inert. Now it is “updated” in a situation.

The second phase consists of “inspection of parts,” based upon fresh and advanced measurements that are producing data at the edge of what is possible in the medical culture of today (coronary artery angiography). The third phase, “Overall assessment of the patient problem,” faces the problem of grasping the whole picture. There is a lot of data related to the condition of the patient available to the physicians at the heart conference, data fabricated at different times, with different methods, and by different professionals. Some of the data may point in the same direction, some may be seen as contradictory or do not fit together in an obvious way. The problem for the team of physicians at the heart conference is to come to an agreement on the main diagnosis of the patient as it is related to their domain, the heart. The fourth phase is the “Decision of action to take.” The main diagnosis of the patient is

From 1997, the first year the treatment was performed in Karskrona and not as earlier at the University clinic in Lund, with 35% PTCA to about 50% from 1999.)

I think this is similar to what ethnomethodologists term the "interactional what" (e.g., Button, 2000), provided that the object aspect of the interaction is accounted for. However, a comparison between the conception of activity theory and the conception of ethnomethodology is beyond the scope of this paper.

This “updating” should in no ways be regarded as automatic. The inert artifacts of measurement notations are used in the diagnostic activity. The notations are turned into tools in the diagnostic activity.
determined by treatment procedures that are available\textsuperscript{7} - surgical operation, balloon dilatation, and conservative treatment (“wait and see,” and possibly changing of medication).

The object of work and its transformations in coronary diagnostic work as it appears in my analysis of the Patient 4 case is depicted in Figure 7.

<table>
<thead>
<tr>
<th>First phase: Updating the case</th>
<th>Second phase: Inspection of parts</th>
<th>Third phase: Overall assessment</th>
<th>Fourth phase: Decision of action to take</th>
</tr>
</thead>
<tbody>
<tr>
<td>Object as incoming “raw material”;</td>
<td>Outcome of the updating activity</td>
<td>Object as it appears “unsorted” in the heart conference</td>
<td>Outcome of the inspection activity</td>
</tr>
<tr>
<td>- asthma pains</td>
<td>1. certainly aorta stenosis 2. left ventricle hypertrophy</td>
<td>- calcification - stiff and calcified mitralis - ventricle not well? - normal contractions of the ventricle according to echo test</td>
<td>1. Two stenoses at LAD, especially the distal one 2. Ventricle will pass!</td>
</tr>
<tr>
<td>- pains correlated to breathing</td>
<td>- echo test indicating aorta stenosis and left ventricle hypertrophy</td>
<td>- pains with pressure on the chest</td>
<td>1. Surgery on aorta and bypass of LAD - Within one month</td>
</tr>
<tr>
<td>- patient seems to ignore her problems</td>
<td>- some dyspnea - little leakage of mitralis</td>
<td></td>
<td></td>
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</tbody>
</table>

Figure 7. The transformations the object of work - the Patient 4 case.

According to the analysis shown in Figure 7, the object of coronary diagnostic work is transformed in four phases. The first transformation takes place on basis of “raw material,” which is “produced” as a preparation to the heart conference, and which is possibly informative of the condition of the patient. The clinical activity of the team in the first phase of the patient case transforms the inert “raw material” into a live “actual updating” of the case. In that way the heart conference as a center gets to know what so far has been spread out in the local health care system.

The second transformation is the adding on of more recent and (probably) more central information by means of the angio film. The core of the activity here is to go through parts of the heart and the coronary arteries and assess the conditions of those parts.

The third transformation is, on the basis of available pieces of information, to “get the whole picture,” that is, to lay down what is the problem of the patient. This third phase of overall assessment, as it is displayed in Figure 7, illustrates the shortcoming of analyzing the activity only in sequential phases. The column of the third phase shows that there is nothing to be seen! It is as if the team had skipped this third phase, and jumped directly into phase 4. The only reasonable explanation of this seems to be that the team already has made the overall assessment, in parallel to the inspection-of-parts work done in phase 2. This indicates that activities occur not only sequentially, but that they are layered and unfold on several planes simultaneously. The fourth phase is the transformation of the diagnosis into a strong recommendation about treatment. Here, the consequences of the diagnosis, in the light of available treatment procedures, are spelled out.

\textsuperscript{7} Or, can be made available, because there is room for innovations as the Patient 3 case (Episode #1) has shown.
The multiple social determination or the multivoicedness of the object of work

A characteristic feature of activity systems is their multivoicedness. In the case of diagnosis and treatment of coronary-artery disease, there are many interests involved, although most of them are without immediate presence in the heart conference. There are the interests of the Karlskrona team of cardiologists and radiologists, the interests of the team of surgeons and radiologists in Lund, and of the person-patient. A further interest is represented by the Swedish National Board for Health and Welfare, which issues guidelines for the clinical activity and also asks for input for the statistical figures the National Board makes up in order to get an overall grasp of the coronary-artery activity on a national scale. Still other interests are those of the cardiologists at the local hospital who have referred the patients to Karlskrona, and the interest of the people closely related to the patients. All these interests can be expected to be present in the heart conference, although most of them indirectly.

The empirical data indicates that the physicians had to take into account a lot of things, among others some general goals or objectives, which are stated in this way in the National Guidelines 2001 from the Swedish National Board of Health and Welfare: “The objective of the treatment is to save life, alleviate symptoms, prolong life, reduce damage, avoid complications, and prevent new illness.” (Socialstyrelsen 2001, version for managers, p. 18)

To this come the many circumstances from the particular case, for example:

- The relative or absolute measure of the blockage (computer supported assessment or assessment by eye?)
- The patient has earlier already had a PTCA and would prefer another one instead of bypass surgery.
- In the light of the fact that three vessels are assessed significantly sick, what decision to take, PTCA or surgery?
- A responsible handling of the rivalry and differences in professional perspectives that exist between surgeons (Lund) on one side and cardiologists and radiologists in Karlskrona on the other. (Studies have shown, and they are summarized in National Guidelines from “Socialstyrelsen,” 2001, p. 175, that surgery has better sustainability in the long run, and also better relief of symptoms. However, during and immediately after the invasive treatment, PTCA is much more lenient to the patient).
- Thus, what we can see here are many actions that obviously are guided by “what it all is about”, or in the vocabulary of activity-theory, the motive of the object of work, in addition to the many concrete circumstances that exist.

Keeping to the methodological principle to only bring into the analysis what the participants themselves are bringing in by means of their talk or actions, I will in this paper focus on the interests of the patient-person and of the physicians as a group. The interest of the patient-person is of special importance. It is for him/her the diagnosis and the treatment are made. Nevertheless, not even the patient is directly present in the heart conference, s/he is only represented by patient-case documents and proxies in the form of the physicians, particularly the cardiologists.

Let us imagine a vision of the future, where the voice of the patient is louder and more influential. A distinction launched by the German philosopher Jürgen Habermas (1981) may be useful here: life-world versus system-world. The former comprises a spontaneously organized activity. The second is a world of activity systems, systematized mainly by power,

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8 For a discussion about contradictions between the physicians, see Sutter (2001).
money or science. There is a dialectic movement between the two worlds, which mutually educate each other. However, there are two threats against the mutual educative process of the two worlds. One is that the system-world isolates itself too much from the life-world. When this tendency goes far enough, the system world will atrophy. The other threat is that the life-world is “colonized” by the system world. If this happens, the viability of the life-world declines. An actual example could be when the “the emergency treatment model,” which has been so successful within one sector of the health care system, also is applied for illnesses and aging or used in phases of the “health-care-chain” where it is not appropriate. Then the outcome is often contra-productive (as shown e.g. by Gustafsson, 1987), because illness and ailing to a large extent are preferably handled by general practitioners with access to the patient’s life-world context, or perhaps by laymen within the life-world and sometimes in collaboration with professionals.

Still, while the future is not yet here, the different interests are mediated by the physicians. They have to cope with the interests indirectly as part of their work. There are no individual upholders of the interests present in the heart conference, but the interests are there as patient cases, “rules” and “professional standards.” The physicians embody the many interests and conflicts in their work practice. The many interests are not negotiated in the open, but are taken care of in an indirect way. This is the way the object of coronary clinical work is formed. Thus, the clinical team members have to be craftsmen “in the small,” but also to be delegates for diverse and public interests. This determines how “object and motive give [their] actions coherence and continuity” (Engeström 2000, p 964), or, in other words, how the object and motive give guidance to their work actions. The multivoiced character of the object and motive also explains the urge to develop the activity, to find out innovative ways to better accomplish the work, as a way to manage the internal contradictions in the object.

**The guiding function of the transformed objects**

The driving force of an activity is, according to Leontiev, its motive. I think it is important to realize that a motive of the object is always a motive “given the circumstances.” Without circumstances (“Gegenständlichkeit”) there is no motive, only daydreaming. As a consequence, the motive changes with the rebuilding of the circumstances, with the design and redesign of the used artifacts.

Artifacts being designed means that they become imbued with intentionality: The simple reason is that they are designed to be instructive. To me this point of view seems to be a possible opening to understanding of the influence of past activities inherited in plans, scripts and other kinds of artifacts. Furthermore, artifacts are instructive, but only potentially instructive. The potentiality has to be realized in the use of the artifacts as part of an activity. In the vocabulary of Ilyenkov (1977), one can say there is a dual transformative dialectic between activity and objects, a dialectic that can be illustrated in the following manner:

Artifacts are ideal objects, and the ideality of the object comes from activity. Another way to put it is to say that artifacts as such are inert, but they are born out of activity and they are re-lived when being used in activity.

I will sum up by giving space to the voice of Sartre: From an artifact-perspective, the situation, the practical field that a person encounter, is a “hodological space” where ways and routes are mapped. This practical field corresponds to what Sartre (1939/1971, p. 62) calls “the pragmatic intuition of the determinism of the world.” The “given” aspect of the produced world of artifacts offers invitations, recommendations, directions, and suggestions: “Do this!”
or “Do something! These are the alternatives!” In Sartre´s words: “The means themselves appear to us as potentialities that lay claim to existence.” (ibid.) However, for Sartre, this given-aspect of the practico-field is only one aspect, which is the point of departure for the human project, the transcendence of the given circumstance. The distinction Sartre makes between the hodological space of the given and the transcending project corresponds to my distinction between artifacts as only potentially instructive and artifacts which are instructive when used as part of an activity. The point is that artifacts have structural properties, which make them potentially instructive, but the potentialities are realized only when incorporated in human activity. In that way, it makes sense to say that artifacts are instructive.

How do aggregates of work actions gain guidance from the object of the activity?
In this paper, I have explored the mutual transformations of activity/object from a special perspective, namely from the perspective of how the object gives guidance to the activity or motivates the activity. I have come to the conclusion that artifacts of different kinds – for example, linguistic, graphic, practical-material, and organizational artifacts – play an instructive role in the activity of work. And the reason for artifacts being instructive is that they are made instructive. Things are designed or redesigned as part of work, and the (re)designing aims at pushing the work a little further, handing over to others (or oneself) in a later step. Things are, to use Ilyenkov’s words, “created by human beings for human beings” (quoted after Bakhurst 1991, p. 199). When we encounter a thing, an artifact, we are able to “read” it – at least in part – and go back and trace what activity has been going on here. We are also able – I quote Bakhurst (1991, p. 197) – “to reproduce the forms of activity that endow the world with ideality, to mould one’s movements to the dictates of the norms that constitute humanity’s spiritual culture.” It is from activity things get their instructive power.

In other words, to become a human means learning to cope with a world already endowed with meaning, and in this world things are not mute, they speak and one has to learn what they say at the same time as one learns the speaking and doing of the other inhabitants of the world.

From the perspective of activity theory, it is obvious that the object of work has a guiding function for the work practice. The object of an activity is the “true motive” of the activity, as Leontiev says, or in other words, “It is exactly the object of an activity that gives it a determined direction” (1978, p. 62). If this is so, then the guiding function of the object is part of the “language game” of that perspective. Therefore, I have argued, the interesting thing is to go further and ask, in what ways?

By describing the diagnostic activity of the physicians as it occurred in four phases (summed up in Figure 7), I have given an account of how the physicians through their work in a specific phase are transforming the “given object” they have at their disposal into a new (given) object. This transformation is made with the intention to “push” the work a little further, to get a new object to work with, a new artifact that has been “loaded” with instruction for how to continue the activity.

Using the formula that was inspired by Ilyenkov and which I introduced in the beginning of the paper, and applying it on the empirical outcomes, gives a result that is presented in Figure 8.

<table>
<thead>
<tr>
<th>Activity/object</th>
<th>Object/activity</th>
<th>Activity/object</th>
</tr>
</thead>
<tbody>
<tr>
<td>Making artifacts instructive through design activity</td>
<td>Artifacts as potentially instructive</td>
<td>Artifacts as instructive in use, by being used in an activity</td>
</tr>
</tbody>
</table>
In Phase 1
Diagnosis 1: 
- certainly aorta stenosis 
- left ventricle hypothrophy 
Patient journal used as a tool

In Phase 2
Diagnosis 2: 
- two stenoses on LAD 
- ventricle passes 
Diagnosis 1 used as a tool

In Phase 3
Diagnosis 3: 
[aorta sick]  
[LAD sick] 
Diagnosis 2 used as a tool

In Phase 4
Recommendation for treatment: 
- surgery on aorta and bypass on LAD  
- within one month 
Diagnosis 3 used as a tool

**Figure 8.** Two opposing metamorphoses of production and use of artifacts.

As an outcome of the physicians’ activity in each of the four phases that comprises the handling of a patient case in the heart conference, the object appears something given. This “givenness” when being used in an activity, functions as a tool for accomplishing of a new (next-phase) activity.⁹

Let me remind the reader of what Ilyenkov said Hegel said: “It is these forms of the organisation of social (collectively realised) human life activity that exists, before, outside and completely independent of the individual mentality, in one way or another established in language, in ritually legitimised customs and rights and, further, as ‘the organisation of the state’ with all its material attributes and organs (…)” (p. 81) Expressed in these terms, what I attempt to do in the paper is to give a description of some of the “material attributes and organs” of clinical coronary work.

As I see it, the physicians are mutually instructing each other what vessels to look at, how to judge their conditions, what measures to take into account, how to balance the details, how to get to “the whole picture” of the patient’s heart-disease, how to weight in the wish of the patient, and so on. In my opinion, what is going on is collaboration guided by the object of work, and not just on the level of smaller details and more well-defined tasks, but takes the form of interaction oriented at what has to be achieved, which is framed only vaguely, and in consideration of available particulars. The physicians make decisions paying attention to the given circumstances and the possible risks and solutions. In short, they are co-coaching each other while keeping in mind and in hand the “moving target” – as Engeström, 2001, p.132 glosses the object of work. In my understanding, that is the way the guidance of the object of work is accomplished.

The answer that my investigation has given is that the guiding function of the object of work comes through in (at least) two intertwined ways. There is a guidance from the object/activity, the “given” (the tradition, the infrastructure, the “raw material”), which determines and regulates what ought to be done. There is also guidance from the activity/object that is opening up for the imagined future and intended outcomes. The “processing of the raw material,” the possibilities, the openness that always characterize activity and actions are regulated through “negotiations” of what ought to be done, and of what might be fitting and

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⁹ Engeström (1990) has made a similar analysis of the work of a General Practitioner, an analysis that I have discussed in (Sutter 2000).
appropriate. There are many voices heard, many actors and interests involved. The “negotiations” are dialogical and conflicting and embodied in the work of the clinicians.

References


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