Unproductive Participation and Protection Against Germs: Technical-Ritualistic Practices in Heart Surgery

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Abstract

There is a debate in the social sciences about the character of the effectiveness of techniques and performances in the surgical field. The literature is divided into different postures, which highlight the ritualistic aspects of techniques and procedures (Katz, 1981; Rawlings, 1989; Hirschauer, 1991) or emphasize their pragmatic efficacy and the purely antiseptic character of sterilization procedures (Collins, 1994). During ethnographic research conducted in the field of cardiac technology production, I observed that these spheres are, in fact, intertwined. Additionally, I believe that it is necessary to consider that the formation of the surgical field (a procedure that will be explored in the following article), as well as the employment of other hygienic procedures are not simply rituals to keep microorganisms away, but are also part of the conditioning of the "surgeon's body". Surgeries are risky procedures that require the development of techniques in order to avoid contamination with both microscopic agents and unproductive involvement. The threat of unwanted involvement implies the development of skills that allow for "good participation". In my ethnographic research, in contrast to the surgeries performed on humans in the operating rooms, the procedures performed on animals show that the process of "depersonalization" (that is, the subject's erasure through the construction of the surgical field) in experimental surgery has the effect of naturalizing non-human animals, instituting them as substitutes for humans. This requires a delicate game of approximation and distancing on the part of the surgeon and the medical team. In general, my aim here is to describe and analyze the technical-ritualistic aspects that are part of cardiac interventions and which underlie the establishment of the surgical field, seeking to dilute the dichotomy established in the social sciences between a technical-functional pole and a ritual-symbolic one.
Keywords: technique and ritual; body; surgical field; depersonalization.

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Proteção contra germes e participação improdutiva: técnicas prático-ritualísticas em cirurgias cardíacas

Resumo

Há nas ciências sociais um debate sobre as técnicas e atuações no campo cirúrgico, a respeito do caráter de sua eficácia. A literatura é dividida em diferentes posturas que, em contraste, destacam o aspecto ritualístico das técnicas e procedimentos (Katz, 1981; Rawlings, 1989; Hirschauer, 1991) ou a ênfase na eficácia pragmática, no caráter puramente antisséptico dos procedimentos de esterilização (Collins, 1994). Na pesquisa etnográfica realizada no âmbito da produção de tecnologias cardíacas observei que essas esferas estão entrelaçadas. Além disso, é necessário considerar que a formação do campo, procedimento que será explorado aqui, bem como os demais procedimentos de higiene não são apenas rituais para manter afastados os micro-organismos, mas também fazem parte do condicionamento do "corpo do cirurgião". Cirurgias são procedimentos arriscados, que demandam o desenvolvimento de técnicas para evitar a contaminação por agentes microscópicos, mas também de envolvimento improdutivo. A ameaça de envolvimento indesejado, demasiado, fora de medida, prenuncia o desenvolvimento de habilidades que permitem instituir uma "boa participação". A etnografia também permitiu iluminar, que em contraste com as cirurgias performadas em humanos nos centros cirúrgicos, os procedimentos em animais realizados no âmbito dos testes in vivo evidenciam que o processo de "despersonalização", ou seja, o apagamento do sujeito por meio do campo cirúrgico, na cirurgia experimental tem o efeito de naturalizar os animais não-humanos, instituindo-os como substitutos dos humanos, o que demanda um jogo de aproximação e manutenção da diferença. Em linhas gerais, o intuito é descrever e analisar os aspectos técnicos-ritualísticos que compõem as intervenções cardiológicas e fundamentam a instituição do campo cirúrgico, buscando diluir a dicotomia instituída nas ciências sociais entre um polo técnico-funcional e outro ritual-simbólico.

Palavras-chave: técnica e ritual; corpo; campo cirúrgico; despersonalização.

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Introduction

The present article is rooted in ethnographic research regarding the production of medical technologies known as "artificial hearts".[1] Although my research was not conducted in one single institution, but rather among a network of researchers and cardiac devices, the data presented below was primarily collected in a Brazilian hospital, located in the city of São Paulo that specializes in cardiology. This hospital contains a bioengineering laboratory in which artificial hearts and other medical artefacts are designed. "Artificial heart" is something of an "umbrella category" that refers to a series of technologies, among them *ventricular assist devices* (VADs), total artificial hearts, and temporary circulatory support mechanisms utilized during surgeries, among many other devices.

The possibility of directly studying the processes related to experimental surgery performed on non-human animals and the surgeries conducted with human patients took me by surprise during my research. This question first raised its head when, after accompanying laboratory activities (*in vitro* tests, also known as "bench tests"), I was invited by some of my interlocutors to observe the *in vivo* tests of the VAD that I had watched being developed in the lab. After observing the VAD being implanted in pigs, I was invited to accompany the re-evaluation of another device that had been developed at the same institution: a temporary pump. This would take me into an operating theater where this equipment would be evaluated in humans, the third stage of research in the production of artificial hearts, which only takes place after *in vitro* and *in vivo* testing. [2]

In the material presented below, I aim to describe and analyze technical-ritualistic aspects that are part of the cardiac interventions I witnessed and that I believe underlie the "surgical field".[3] Here, I seek to destabilize the dichotomy established in the social sciences between that which is understood to be technical-functional and what is considered to be ritual-symbolic. To this end, the present article will be divided into three parts. The first section will cover the training, education, and conditioning of surgeons, and it will include a reflection on "technique". Utilizing reports on the training and education of researchers produced by American anthropologist Rachel Prentice (2007, 2013) in her ethnographic research into anatomical and surgical education, I endeavor to show that the supposed opposition between ritual and technical practices,

1 This research was part of my doctorate undertaken at Programa de Pós-graduação em Antropologia Social da Universidade de São Paulo (USP), under the mentorship of Professors Heloísa Buarque de Almeida and Stelio Alessandro Marras. This reserach received financing from the Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP – processo nº 2013/02389-2). Due to a post-doctoral scholarship, also from FAPESP (processo n° 2018/22183-3), I have been able to produce and translate the present article.

2 I ethnographically observed three surgical procedures performed on humans and six conducted on pigs. I also interviewed one of the surgeons who conducted some of these procedures. The interviews ended in the operating room, where I could follow the surgeon's work. All of these experiences underpin the analysis presented below.

3 "Surgical field" is a category that will be referred to and explained throughout the present article. I opt to not use quotation marks or highlighting for the term, from this moment on, in order to not visually pollute the text, as this term will repeatedly show up throughout the article. The same goes for the term "technique". It is worth noting that emic or analytical terms that are originally presented in quotation marks may no longer be so indicated throughout the text, once they are properly explored and/or ethnographically deconstructed.

(the latter being those practices undertaken exclusively due to their practical/material effectiveness), presented during the education of surgeons and throughout the development of their surgical skillset, does not adequately describe practical relationships as they are really lived in the surgical field.

Part two of the article draws on my own ethnography in order to describe the formation of the surgical field itself, investigating its potential as a technical-ritualistic practice that prevents the invasion of potentially dangerous agents and microorganisms while it simultaneously impedes unproductive involvement between the subjects, actants, tools, medical team, and "patient" (the body/person/subject/object/substance that is presupposed and at the same time abstracted in the surgical field). The threat of unwanted, excessive involvement, demands the development of skills that enable the surgeon's correct and adequate participation in the surgical process. I have borrowed the term "unproductive involvement" from the work of Brazilian anthropologist Stelio Marras (2019), who has reviewed the classic notion of exchange and its (re)connection to participation in order to fuse contract and contact. Marras does this by following a lineage of theoretical texts and formulations including (but not limited to) the works of Marcel Mauss, Claude Lévi-Strauss, and Lévy-Bruhl. Marras suggests that the pragmatic existence of things and people is created through participation, which (like exchange) must include nonhumans (who are judged as natural). Thought of as reciprocal links and as relations of continuity, participation illuminates the "participationist" character of the presuppositions underpinning the surgical field in such a way that agents, actants, subjects, tools, and objects can be characterized as "participation networks" that create themselves and set themselves in motion. Looking at "involvement" in terms of participation allows us to reshape it, understanding it as co-involvement, while simultaneously noting the not quite voluntary or intentional participation of the "involved". Given the comparison between modes of participation and the supposed radical difference between Us and Them, one might suppose that the relations and entities on display in the operating room could be characterized as non-participatory, if we were to frame them within the order of a naturalistic cosmology. However, the relationships established in the surgical field – as well as the actions, techniques and skills developed there – are indeed extremely participatory. Because of this, the mechanisms of purification of the effects of participation do not seem to account for the ontological separations between things, people, humans, and nonhuman others (LATOUR, 1991). What happens in the operating room is therefore the participation of – and association between – beings of the most heterogeneous sorts (Marras, 2018). The forces that emerge from these relationships are thus found neither in human nor in things, but in the very interaction between them (MARRAS, 2018; BAILÃO et al, 2018).

The hypothesis of depersonalization, seen as an effect of the institutionalization of the surgical field itself, will also be discussed here, but is mostly taken up in the article's third section, in dialogue with the social sciences literature regarding the subject (Katz, 1981; Rawlings, 1989; Hirschauer, 1991; Fox, 1994; Collins, 1994; Goodwin, 2008; Tantchou, 2014). These authors represent two strands of understanding regarding depersonalization. The first that argues for its ritual-symbolic character while the second ascribes a technical effectiveness to the phenomenon. This is not about relativizing the existence of microbes, as Josiane Carine Tantchou (2014) seems to do, when she addresses trivialized space while observing non-compliance with certain hygienic procedures that blurs the boundaries between operating room and the surrounding world. Rather, it recognizes that the formation of the surgical field and its hygienic procedures are not merely strategies to keep unwanted microorganisms at bay: they are also part of a surgical conditioning. This must lead us to reconsider the very notion of the effectiveness of the ritualized practices themselves.

Surgical skills as conditioning: what does it mean to say that surgeons are technicians?

A technician. A kind of robot. Someone who develops the techniques for which he has been trained and which are improved throughout his life. Someone who only knows how to do things according to said techniques. This is how surgeon Achilles defined himself, much to my surprise and that of some of my bioengineering interlocutors, who – like me – seemed uninformed about surgery in the field of biomedicine.[4] Achilles' definition seems to mirror common sense regarding surgeons, who are viewed as "cold" professionals, little involved with and indifferent to their patients.

This is a necessary distancing, however, built according to certain conditions that Achilles revealed, when I ask him what he usually knows about a patient before operating:

> **Achilles** - Here the patients are discussed in a clinical meeting including everyone engaged in the case, and minutes are taken down. This patient is often operated on only 6 months later. So I have to look at the minutes, which are all on paper, to remember which patient it is. So before surgery I look at the minutes.
>
> **Marisol** - Do you know the full history of the disease?
>
> **Achilles** - Yes, all the exams are there. There is a very well developed discussion of its course. So I look at that and come in to work.
>
> **Marisol** - So you know the whole medical history [of the patient]? Is that what you know about the patient? You do not know their name or personal data?
>
> **Achilles** - I usually joke that I'm a technician. I do not talk to the patient. I just go in there and solve the problem. And it's one after another. Ideally, there should be more interactivity. But I think it's good, because this way doesn't create interpersonal relationships. The clinician has a relationship. I cannot have pity. If I have pity, I don't operate.
>
> **Marisol** - Is it a defense strategy?
>
> **Achilles** - Yes. Because sometimes I have to do something very risky and if I start thinking about the child's mother, the child, I don't do it. So I do what has to be done without blinking. If I have to cut something and that has some risk, I'll cut it. And then I'll fix it.

Regarding his distancing from patients, Achilles reveals that personal information and interpersonal relationships, besides being useless, might compromise a surgeon's "courage". He thinks the ideal would be for more "interactivity" to occur between patient and surgeon, but over the years he has come to keep less and less track of his patients in the intensive care unit (ICU), although he understands that having *feed back* from patients is critical in order to improve surgical outcomes. Interactions with the patient after the procedure, however, refers to the case and exams, in which Achilles can view and evaluate the "outcome" of the surgery.

At the beginning of his career, Achilles would talk to family members after surgery. There were situations, however, when he "wasn't in the mood." The difficulty surgeons encounter in giving some feedback to the family (especially when news about the patient is negative) involves the responsibility not only of the surgeons themselves, but also that attributed to the family. Even if the patient was very ill before surgery, dying on the operating table implies a burden: a responsibility for a decision that may have culminated in the ending of that life. At the moment of his career when I interviewed him, if Achilles did not talk to the family himself, he would delegate this task to his assistant. Dodging interaction with the family reveals that this kind of

4 Achilles defined himself as a technician at the time when I had interviewed him, but he repeated this definition in a public debate involving bioengineering researchers. In that second situation, I noticed that some of my bioengineer colleagues were also surprised by his words. It might seem more likely for bioengineering researchers to recognize themselves as a "technician" - at least a certain type of technician - given that patients (the potential users of the technologies the engineers develop) are largely abstractions to the engineers, usually represented by numbers, data, graphs, and so on.

participation/relationship demands an emotional burden on the surgeon. Saving yourself from this friction is the act of someone who understands, through long experience, the proper level of such interactions necessary to both reassure/inform the family and protect the surgeon from emotional stress. By delegating this task to his assistant, Achilles demonstrates that he feels the task of informing the family is a critical part of learning, conditioning, and educating a surgeon, by teaching him or her to measure the proper level of participation.

Achilles' comments regarding the effectiveness of his surgical skills demonstrates that distancing is also something that is cultivated through a conditioning process: the more technically he acts, the better a surgeon will be and his patients will have more favorable outcomes. We need to qualify your understanding of what it means to be a surgical technician here. My suggestion is that the technical character of his work refers to an intertwining of embodied technical-ritual skills and dispositions via a long apprenticeship involving education through conditioning, which is part of a series of relationships established between different entities in an environment in which there is active engagement between human and nonhuman actors.

According to Rachel Prentice (2013), surgery is a medical specialty that has historically been related to manual labor and artisanal skills, given the "physical techniques" employed by surgeons and other members of medical teams. The definition of the word "surgeon" emphasizes the connection of practice to a craft by combining the Greek terms *cheir* (hand) and *ergon* (work). The term captures the deep connection of surgery to physical activity, although the emphasis on hands may have the effect of ignoring the rest of the surgeon's (extended) body and its participation in the operating room. The hands should be understood as only one part of a larger scheme, in conjunction with other actions and skills that include (embodied) decision-making capacity. The "body" itself, for example, might be seen as an integrated unit, with a limiting, organizing boundary provided by its skin. Its limits, however, must be extrapolated to take in the "surgeon's aggregate body" (Hirschauer, 1991). Hirschauer highlights the coordination of the various hands and eyes present in the surgical field and, in particular, in the operating room, where they are guided by gestures and words. These belong to different people who, nevertheless, make up the "body of the surgeon". By investigating the process of the (trans)shaping the surgeon's body into an instrument – that is, by demonstrating how the surgeon's body and skills are extended to instruments and to the hands of assistant surgeons and nurses, Hirschauer allow us to move forward in our understanding of technique and its relationship to the body.

Hirschauer suggests that we consider the body as extended through instruments and added to other bodies, objects, and actants. This view of things is close to French archaeologist and paleoanthropologist André Leroi-Gourhan's idea of "externalization", which refers to the transfer of technique to instruments and the technical externalization of the body through objects and tools. In suggesting that the "hand is to the tool as language is to the face; these are two poles of the same device" (Leroi-Gourhan, 1985, p. 27), one must remember the driving argument of Leroi-Gourhan's work, which concerns the way in which technique and language have evolved in parallel, co-producing one another. For Leroi-Gourhan, the hand frees the word in an evolutionary sense, evidencing a coupling between technique and language as constitutive of the human being itself. The utensils, tools, and objects humans produced can be thought of as "bodily secretions". Everything happens as if the act of using hands has allowed humans to imagine instruments, which Leroi-Gourhan names "artificial organs". In his proposition, the social body prolongs the anatomical body (1985, p.27). We can question whether this division is productive, to what extent it is sustained, and whether it is possible to speak of the anatomical body, because – as Ingold (2000) suggests – the idea of the "anatomically modern" human is an analytical fiction. However, following Leroi-Gourhan, we believe that instruments should not be considered as prostheses: instead they are constitutive. They emerge together with bodies, informing ways of being and relating to the world.

Surgical skills are – and have always been – dependent on a tool use, so such discussions contribute to the understanding of the relationships established in the surgical field between surgeons and the instruments they employ.

Since the early twentieth century, according to Prentice, surgery has been described as one of the most technological specialties of medicine. Deeply associated with the use of tools and devices, modern surgery is dependent on innovations for its maintenance and improvement. It is a roiling, constantly evolving field, whose purpose is to find answers to the challenges posed by and facilitate the execution of medical procedures, as well as extend the life expectancy of patients and improve the conditions of their recovery. This, in turn, leads to a search for "less invasive" procedures.

According to Achilles, the constant emergence of new technologies and surgical techniques implies increasingly greater surgical specialization. At the age of 63, Achilles was a super-specialist, since the pediatric cardiac surgery that is his *forte* is considered a subspecialty of cardiac surgery. He revealed that only after he achieved this degree of specialization that he really began to master his specialty – a statement that was followed by a firm comment that not everyone can dominate their specialty all the time. In any case, Achilles believes that, at the present stage of his career, he has a "baggage" that allows him to "operate with tranquility".

Achilles' need to conduct or observe surgeries and daily practice his learned techniques is related to the imperative of his embodiment of surgical skills, as Prentice emphasizes (2013). By making the embodiment of medical techniques a central part of her analysis, Prentice shows how practices in specific sociotechnical environments accumulate in order to remake medical residents' bodies, allowing the emergence of unique dispositions with regards to acting, relating, believing, and feeling.

The complexity of surgical procedures and activities requires long involvement and highly specialized training, as Achilles' words and Prentice's ethnographic analysis show. Risks require courage. After all, surgical procedures require cutting, breaking, or mutilating parts of the body and its organs. Outside the surgical context, this would be understood as unacceptable "aggression". Courage, however, must be seen as a disposition, a skill that is also embodied throughout extensive training. As Prentice suggests (2013), surgical education is not only about learning manual skills and specific surgical actions, such as sewing or tying knots, which she describes as traditional bodily techniques, following the understanding of French sociologist Marcel Mauss.[5] Unlike the formal, programmatic knowledge that residents are expected to absorb, the surgical learning involves the adoption of values, practices, styles, decision making, and techniques that are rarely invoked objective and explicit elements of the residents' medical educational curriculum. Among these skills, one finds the surgeon's association with tools and instruments, the "secretions" that eventually enlarge and distribute the "surgeon's body".

Following Mauss's (2003b) clue that it is a mistake to suppose technique exists only when an instrument is present, British anthropologist Tim Ingold (2000) questions the existence (in both anthropological and common sense) of a perception in popular Western discourse that technical activity is based upon the use of tools. In groping for a definition of "technique", Ingold suggests that tools themselves are nothing; that they carry no property in and of themselves, but are objects that instead *become* tools by promoting an active and intentional engagement between agents and their environment. In this view of things, one should not think of the use of tools as something that happens when two initially separate things are put together: instead, tool use should be understood as the primary condition of involvement between the agent/craftsman, his tools, the raw material at hand, and an environment. Here, technique is thought of mainly in opposition to the understanding of technology as currently defined in the West: something fixed in a polarity between society and nature.

5 In Mauss's (2003b) pioneering analysis, one finds the view that body techniques comprise bio-psycho-social arrangements. Mauss considered the body to be a social apparatus and he sought to legitimize it as an object of social scientific investigation, rejecting the idea that the body was simply biological data. In addition, Mauss did not treat bodily techniques as individual arrangements: he highlighted the importance of imitation in the transmission of those techniques that enjoyed social recognition.

The view of technique as an inventory of instrumental objects results from the fusion of the technician and the mechanic, typically associated with the modern concept of technology. In this fusion, technology consists of the application of operating principles and rules that are independent of users' experience. According to Ingold, however, technique is dependent on intuition. Skill is not the application of knowledge, but an act in the world. Skill is thus a form of practical knowledge (or informed practice) in the sense that it is both a practice and a knowledge related to one's own actions in the world; to one's engagement with the environment.

Bringing us back to Mauss's proposition that bodily techniques are the ways in which individuals make use of their bodies, this implies recognizing the ways in which bodies are shaped in socio-physiological terms – co-produced by their environment, as it were. It thus becomes necessary for us to consider how bodies and environments intertwine in order for skills to be enacted, as Ingold proposes. Technique is thus to be understood as a property of skilled subjects; ability is incorporated and inseparable from a particular subject's experience. Moreover, in Ingold's elaboration, the skill involved in action emanates not only from one's anatomical body, but from one's extended body, and is related to perceptual and motor properties (Sauthuck, 2007).

For our purpose here (that is, for an in-depth understanding of Achilles' formulation of the "technical" character of surgical activity), employing Ingold's understanding of "skill" allows us to escape the *a priori* divisions between knowledge and practice, body and mind, material/manual and cognitive activities. Another concept that allows us to better understand the actions undertaken in the operating room in all their complexity derives from Latour's proposition that "technique" refers to an adjective, a chain of gestures, a *modus operandi*, and also a designation of "the subordinate role of people, skills, or objects that occupy this secondary function of being present, indispensable, but invisible" (1994a, p.43).

In his work, Latour (1994a, 1994b, 2000) describes a symmetry between actants, forcing us to abandon the object/subject dichotomy. The very use of the term "actant" in place of "agent", "actor", or "subject" (terms generally not used to refer to nonhumans) highlights his choice of considering action from a non-anthropocentric point of view. For Latour, mediation is created by composition, so that action cannot be considered as a property of humans, but rather of an association of actants.

Such a distribution of actions and skills puts before us the problem of agency, which, as Ingold (2012) suggests, can be understood as an attempt to revive a world of things already dead or rendered inert by interrupting the flows of substance that give it life.[6] Ingold questions the idea of the "object", proposing instead that we understand it as a "thing" defined as an aggregation of vital threads that trace creative paths, an impromptu gathering of formative processes. In Ingold's understanding, an object is not simply a discrete, finished phenomenon. For him, to understand the life of things according to their capacity for agency is to produce a double reduction: from things to objects and from life to agency.

We need to clarify what it means to say that nonhumans have agency, participate in relationships, or act in the world. To do justice to the way nonhumans compose surgical skills, we must consider that it is only possible to address the agency of a particular nonhuman if we ignore humans and nonhumans in line with said agency (Sayes, 2014).

6 Regarding criticisms of the concept of agency, Sayes points out: "ANT, in fact, attempts to pluralize what it means to speak of agency. As has already been noted, agency is decoupled from the criteria of intentionality, subjectivity, and free will. (…) Thus understood, ANT adopts a complicated but nonetheless minimal conception of agency. It is minimal because it catches every entity that makes or promotes a difference in another entity or in a network. Latour (2005: 71) maintains that one need only ask of an entity '[d]oes it make a difference in the course of some other agent's action or not? Is there some trial that allows someone to detect this difference?' If we can answer yes to these two questions, then we have an actor that is exercising agency – whether this actor is nonhuman or otherwise. It is thus not the case, as Khong (2003: 73) suggests, that the human becomes the 'standard measure' of agency, but that the 'standard measure' of agency becomes dehumanized: the ability to make a difference" (Sayes, 2014, p. 141).

In investigating how to include nonhumans in politics, Stengers (2010) considers that part of the problem concerns our inability to properly define nonhumans[7], which involves a risk of losing the very definition of what is human. She suggests that we should not regard humans as a hollow generality as thinking beings, but instead as speakers. In this view of things, what makes us human is not our properties, but the relationships we are able to create/host with things that we have not created. The idea of a drastic opposition between humans and nonhumans is understood here as an expression of the power unleashed by the (nonhuman) idea that has made us human, which allows us to claim exceptionality by claiming the existence of a drastic cut between "beings who have ideas" and all the rest of the universe. We thus believe we should eschew a radical distancing between humans and nonhumans, not to claim that the two are the same, but to consider Latour's proposal (highlighted by Stengers) that we should treat humans (as well as nonhumans) as experimental scientists treat nonhumans. This implies learning from their typical recalcitrance, understanding that to capture them is an event, a veritable feat. This is not a matter of considering humans and non-humans to be similar or of abandoning distinctions between the two, but of symmetrizing them and thus escaping from our anthropocentric starting point. It is a matter of recognizing that nonhumans are the conditions of possibility for the formation of human societies, the solidity of which is guaranteed by artifacts (Latour, 1991). Or, as Serres suggests, object are what stabilize our relations and what differentiate our society from the arrangements of other species: "(...) our relationships, social bonds, would be as airy as clouds were there only contracts between subjects" (apud Ingold, 2012b).

Such approaches make untenable – or at the very least destabilize – the radical distinction between human and nonhuman, nature and culture, subject and object, material and cognitive, body and mind, objective and subjective, technical and symbolic. In the surgical field, skills as well as responsibilities are shared among diverse entities. Technique refers to the socialization of nonhumans (Latour, 1994a), so that in defining himself as a technician, Achilles is also referring to the intertwining of forces that make up embodied abilities, instituted in the relationship between human and non-human actants. This is a form of conditioning that allows for arrangements between distinct bodies that are not understood as ready-made, discrete, and separate entities, but rather as networks through which new entities and actions emerge.

The execution of cuts, clampings, stiches, the implantation of artifacts, the relationship with (and between) blood, instruments, tweezers, scissors, gauze, threads, various materials, diverse hands, numerous eyes, technological apparatuses and so on imply, from Achilles' point of view that "the awareness, in the surgical field, that there is a patient with a history and with a family" must be placed on stand by. Remembering this fact can interfere with one's performance and the courage needed to do risky things. Therefore, the effectiveness of the skills required to perform surgical procedures relies on the embodiment of "good participation", which is cultivated through aseptic techniques that, according to Achilles, allow the surgeon to be transported to "another world":

> One day, I arrived with my normal glasses on. My wife, who is also a surgeon, was preparing the organ, and when I looked at it through my normal glasses, I was shocked by its size. I said: 'Wow, that's small!' So there is all this conditioning [one needs to have] to enter that world... This work requires making stitches in very small structures. It has to be very accurate; one has to have a whole lot of training and conditioning.

7 Edwin Sayes (2014) points out that the term "nonhuman" corresponds to a dissatisfaction with the use of "object" in the philosophical tradition, as something automatically opposed to "subject" and which is thus treated radically differently. Sayes lists a number of uses and suggests that "nonhuman" is used as an umbrella term to denote diverse entities such as animals, natural phenomena, artifacts, texts, and so on. However, Sayes believes the term must be distinguished from others that are used to designate similar dissatisfactions, such as actor, actant, and monad.

> Training also means being able to get in and out of this world. When it's okay, you hand it over to the co-pilot [previously he had made an analogy between surgery and flying a plane]. Let the assistant finish, close up, but wait around to see if you need to go back in. So there's an entrance and an exit from this world. When you have the confirmation that you are done, you forget that world.

In defining himself, the surgeon, as a technician, Achilles does not refer to the execution of mechanical activities, much less coldness, insensitivity, or indifference towards the patient.[8] His distancing is directly related to his commitment to the patient and the successful conclusion of his task. The technical character of his work refers to the conditioned embodiment of surgical skills, a process that transforms surgeon's (physiological) bodies, giving them extensions and the skills to relate to the numerous tools, technologies, and human and non-human agents that participate in the surgical field.

These skills are difficult to embody, but are extremely necessary, given the instability of the conditions established in surgical procedures, which gives rise to chains of human and non-human associations. Surgical procedures, especially those considered invasive (such as the cardiac interventions studied here, which require organ paralysis and the use of cardiopulmonary bypass – i.e. the temporary replacement of heart functions by a technological apparatus) institute new bodies. Some of these are ephemeral, lasting only as long as surgical procedure itself. Others are more durable, such as when a body is coupled to an artificial heart for longer temporary period (as a transplantation bridge, when the patient is waiting for a transplant), or for permanent use. The procedures that constitute these new entities involve an assembly of humans and nonhumans, whose ontological definitions become unstable as they become practically indistinguishable from each other (Latour, 1994a, 2000).

This is not a technical activity in the sense that it is mechanical. If that were the case the "rituals" of being transport to "another world" would not be necessary. It is technical activity in the sense that it is an embodied skill, deeply intertwined with tools and instruments as well as technological apparatuses – a skill that is acquired through observation, imitation, and practical engagement, which involves the embodiment not only of gestures but of the ability to make decisions and to act with courage. Moreover, as we will see below, this conditioning allows one to measure the distance of participation in the process, allowing one to avoid undesirable, contaminating participation. Skill, therefore, also refers to the institution of good participation: distant enough not to lose courage, but close enough to be committed to the life at stake.

Thus informed by the relevant social scientific conceptions about relations, the distribution of agencies, the formation of bodies, the performance of tools, technologies, materials, and the organization of spaces[9] – and critically considering the limits of such approaches – I suggest that we now think about the formation and development of surgical skills in terms of practical-ritualistic conditioning. It should be emphasized that I do not pretend here to solve all the problems posed in the relations established in operating rooms. I merely intend to create an explanation that dissolves the technical-ritual dichotomy regarding the effects of practices. In the wake of the effort to develop a principle of "causality that places the relationship between humans and matter as an act of production" (Mura, 2011, p. 96), using technique as an approach allows us to reconsider the notion of effectiveness, given that the skills instituted by conditioning refer to a practical-ritualistic engagement with the world.

8 Renzo Taddei suggests that this technical relationship be thought of in terms of the "banality of the technician", in reference to Hannah Arendt's "banality of evil" thesis.

9 For detailed descriptions and analyses of the spatial distribution and organization of the operating room, see Katz (1981, 1999) and Tantchou (2014). For an understanding of spaces as circuits of hygiene, composing the backdrop of the surgical drama see Fox (1997). For an understanding of space in mutual relationship with activities, that is, for a description of surgical interventions as events occurring in spaces, different topologies that are characterized in four ways (region, network, fluid, and fire) that correspond to. intersecting monads - created by the interrelationship between topologies and a monadological dynamic that organizes events, see Moreira (2004).

Techniques are acts (Mauss, 2003b; Sigaut, 2003) and building artifacts and relationships is characterized as a technical activity. Meanwhile, technical activities are skills that do not undergo rationalization, which are not reduced to the use of tools, which do not refer to the mechanical application of rules or articulation of principles, which are incorporated and inseparable from the experience of subjects in the formation of certain things (Ingold, 2000). These skills are shared, constituted, and distributed among different actors (Latour, 1991, 1994b). Understanding this allows us to recognize the deep understanding made possible by the attention given to the techniques and skills emerging in the operating room and their effectiveness in preventing the threat of contamination from materializing.

The surgical field: environment and effective skills to ward off the outbreak of unwanted participation

Scene 1: We enter the surgical center and cross a wide, busy corridor, full of people. There are bodies moving and bodies lying about. Bare and protected feet. Bodies that drag equipment and carry devices, artifacts that carry and drag humans. Surgical instruments, medicines, equipment, machines are all about. In the corridor are several doors, of which I will enter two: a storage and equipment preparation room and an operating room. Completely attired – that is, wearing the proper "costumes" (sterile clothes, cap, mask and foot protector) – I walk through the operating room door. Some professionals (including nurses, the instrumentalist, and the anesthetist) are already at their duties. The patient is already on the table, probably anesthetized or pre-anesthetized. He is a young, thin, small boy. I have difficulty staring at the exposed, naked, and apparently vulnerable body. The assistant surgeon is inserting things into the boy's body. I can recognize some of the actions that I have previously seen in experimental procedures on pigs, so I know that those needles, dressings, bandages, and tubes were mediations: channels through which liquids would flow in and out; through which medicine would enter the bloodstream and internal fluids (mainly blood) would be extracted to perform measurements that allow the patient's condition to be monitored. This is not a mediation between the body's exterior and interior, however. If we take seriously Donna Haraway's (1991) view that our bodies should not be bound by our skin, these accesses can be seen as evidence of our "open" (or not limited) condition. The way we experience the body/world is thus not limited by the boundaries of our skin, although reiterating the skin as a boundary is pragmatic in biomedical discourses/ practices. If conceiving of the body in an environment allows us to dissolve the supposed limit imposed by the skin, the establishment of the surgical field – the process being described here – allows other limits to be transgressed.

The sleeping naked body is covered by green sheets[10], forming the surgical field that creates and isolates the opening through which the body's organs will be accessed. Disappearing from my field of view, the body is hooded, and the field is set up. The naked body becomes transformed into a covered area: open and exposed, but isolated. The boy's head is covered and isolated, making it accessible/visible only to the anesthetist and to me, positioned in the non-sterile area located behind the tissue that separates the head from the surgical field. Now the scenario is composed of green tissues, tweezers, instruments, wires, tubes, serum bottle, medicines, equipment, monitors that measure signals, and a hole that demarcates the region of surgical intervention. The "field" category I employ here refers to both the sterile fabrics that make up the scenario and

10 These are sterile disposable fabrics, which are green or blue not by chance, but because these colors are the opposite of red. Unlike clinical practice, associated with white clothing, green and blue are considered the most comfortable colors for surgeons in operating rooms because red is a constant for them. White became established as a norm in the late nineteenth century, with the emergence of ideas about asepsis and the view that many diseases resulted from poor hygiene in hospitals. According to Stefan Cunha Ujvari and Tarso Adoni, in "The History of the Twentieth Century for the Discoveries of Medicine", green and blue garments began to be used in operating rooms in the early twentieth century as part of the innovations of modern surgery. After a long time of looking at the surgical field, where red predominates, when you raise your head or blur your eyes, green and blue spots may appear in when contrasted with a white background. That is why green and blue are the colors recommended for operating room clothing.

the covered and insulated hole in the body itself. At this point, from the back of the room where I am sitting, behind the tissue, still without a glimpse of the surgical field freshly established, I begin to smell the characteristic scent of flesh burned by an electric scalpel, an artifact that simultaneously cuts and cauterizes. The smell allows me to identify the opening of the hole – perhaps the most dramatic moment of the formation of the surgical field in the case of cardiac surgeries[11]. Next, the bones of the sternum are sawed apart and spread by retractors, an instrument that forces apart the ribs and keeps them open, thus allowing access to the organ. For a lay observer like me, the smells, sounds and performance of the instruments are quite impressive. It has been over an hour since I entered the room and found people already engaged in their tasks and the heart has not yet entered the scene. With the rupture of the pericardium – the membrane that protects the organ – the heart becomes exposed. The field is now ready for the intervention to begin and the primary surgeon enters the scene. It will still take more than half an hour to ready the new body/apparatus arrangement which will permit the extracorporeal circulation of the patient's blood, replacing heart and lung functions during surgery and allowing the organ currently in the boy's body to be paralyzed and manipulated.

Scene 2: In the midst of an interview lasting about 1h20min and which is interrupted by the noise of our surroundings, Achilles invites me to accompany him to the operating room to watch the procedure he would soon perform. He had previously explained to me that he generally scheduled meetings and activities before his daily surgeries, which usually took place around 10 AM. We go through the bioengineering section, chat for a bit, and head to the operating room. On the way he asks if I "know how to get dressed" and began to tell me about the procedure he would perform that morning. "I'll have to make 2 or 3 stitches to close up again." The patient had been operated on four or five days ago, but after the procedure, the "echo" (trans-esophageal echocardiogram) revealed a problem: the hole had opened again. According to Achilles, the procedure had been successful, but the "correction" could have "torn" because the heart beats continuously and may break the stitches' thread.

We head for the different locker rooms and Achilles suggests we meet on the other side[12], in the waiting room next to the operating theaters. A little lost, I am trying to find the sterile clothes in the locker room when a nurse approaches and said that Achilles had asked her to help me. After being dressed, I am led by the nurse to the professional waiting room, where two young men are talking and using their cell phones. The nurse offers me coffee, water and suggests that I wait for the surgeon. While I am having coffee, Achilles appears. We talk for a while and he suggests we go into the operating room. There, he quickly introduces me to the team, but the anesthetist suggests that I come back later to follow the procedure from the time of the surgeon's entry. According to her, the situation was currently a little tense. I caught a glimpse of the patient: a small baby, naked on the stretcher. Achilles and I head back to the waiting room. We talk. Later, I don't remember exactly about what, but I remember that we discussed more philosophical themes in which we were not exactly personally involved. We are nervous. At least I am, and I feel that he is in a different state from when we were talking earlier. After a while (I don't know how many minutes), Achilles invites me into the operating room once again. We enter and he suggests that I stay in the same non-sterile zone occupied by the anesthetist behind the patient's head. Achilles then withdraws again, possibly to scrub his hands and arms. Upon his return, Achilles dons a sterile blue cloak with the help of a nurse.

11 There is a debate in the social sciences about the importance of the first cut. In this regard, Hirschauer (1991), Fox (1994), and Collins (1994) consider that Katz (1981) was mistaken in placing so much emphasis on the importance of the "border crossing" represented by the first incision. Collins recounts his frustrations as an observer, where he several times "missed" the first incision, showing how non-dramatic it often is. In heart surgery, the first incision in the organ occurs much later and much less dramatically (and aggressively) than the first opening of the body, which when sternum's bones are cut with saws and opened with retractors.

12 Changing rooms are passageways to isolated areas of the hospital, accessed only by authorized people. It is not possible to reach the operating room by any means other than through the intermediate environment of the changing rooms. The changing rooms are divided by gender, so it was not possible for Achilles to help me, indicating where I could find the clothes and all the necessary equipment to enter the operating room.

It overlays standard green clothing worn by all the people present: the closer one is to the field, the greater the need for protective equipment (in this case sterilized, as he would be directly engaging in the surgical field). Achilles puts on his surgical glasses. equipped with a magnifying glass that widens his vision. The nurse helps him perform a little ballet in order to don his gloves[13], and Achilles becomes integrated into the surgical field.

The purpose of these ethnographic descriptions (aside from presenting a narrative description of the procedures involved in forming the surgical field and preparing for the procedure) is to contrast two different experiences. In the first, I was able to personally follow the formation of the surgical field while in the second, I followed the surgeon's trajectory inside the hospital, as he prowled around the margins of the formation of the field at a distance. The point here is to use these contrasting experiences to show that when a surgeon encounters an already established surgical field, he is spared visual contact of the patient's body. The patient as subject is erased by the field and, following the opening of the patient, his body materializes as an abstraction. Arriving at the end of the surgical field's preparation, the surgeon avoids witnessing the process of erasure of the patient's body, allowing the abstraction of the surgical field to take place.

The formation of the surgical field removes the body from the scene except for the region to be manipulated, which, in the field, is characterized as an open hole in which the heart and other anatomical structures that accompany it can be found. The field transforms the abstracted part of the body into a kind of bench, covered with sheets, instruments, scissors and thread. Its purpose is to isolate the region being operated upon, protecting it from contaminations that (as I will argue) are of two different orders. The first potential contaminants are bacteria and microscopic agents that may enter into the patient's body through the new, artificially created opening, which needs to be controlled with strategies of asepsis. The second contamination is the unwanted and unproductive involvement of the surgeon responsible for the main intervention, whose participation requires a certain amount of distance.

In an operating room, actants, instruments, and materials are classified as sterile or non-sterile. In order to remain sterile, they must only establish contact or relationships with other sterile actants: otherwise they will be considered to be contaminated. When not sterile they can be classified as: clean, dirty or contaminated – denominations that take on different meanings according to the different stages of the operation (Katz, 1981). The sterility and cleaning fields within the operating room are well mapped out and everyone in the operating room knows their limits.

The formation of the surgical field follows other procedures, such as the practice of scrubbing down that, besides preventing contamination, "takes the surgeon into another world", as Achilles revealed to us. Scrubbing is the procedure of washing one's hands and lower arms for a specified amount time with specific movements. The purpose of scrubbing is to remove as much bacteria as possible from one's fingers, nails, hands, arms, and elbows. It is a procedure intended for surgeons who will effectively act or directly assist in surgery. Katz (1981) provides a rich description of the scrubbing procedure:

13 I characterize donning gloves as a ballet in reference to the detailed description of the complete procedure that must be performed in order to wear the lab coat and gloves without touching the sterile parts. As Katz describes it, "After scrubbing, the surgeon and his assistant(s) enter the operating room by pushing the door with their hips. They hold their lower arms and hands in an upright position, away from the rest of their bodies. They are forbidden to allow their scrubbed hands and arms to come into contact with any object or person. The scrub nurse hands them a sterile towel to dry their hands. They dry each finger separately and throw the towel into a container on the floor. The scrub nurse holds the outside, sterile part of a green gown for the surgeon and his assistant(s) to wear. They insert their hands through the sleeves, without allowing their hands to touch the outside of the gown. At this point, their hands, although scrubbed and clean, are not sterile. But the outside of the gown is sterile. After their arms pass through the sleeves, the scrub nurse holds their sterile gloves in place with the open side facing their hands. The surgeon, followed by his assistant, thrusts one hand at a time into each glove. They accomplish this in one quick movement, in which a hand is brought down from its upward position, thrust forward inside the glove and snapped in place over the sleeve. When only one glove is on, the surgeon is not permitted to adjust it with the other hand. However, when the second glove is on, he can adjust his glove and the sleeve of his gown and any other part of the front of the gown." (Katz, 1981, p. 338)

> Before a person begins scrubbing he checks the clock in order to time the seven-minute procedure. He turns on the water by pushing a button with his hip, and reaches for a package which contains a nail file, a brush and sponge which is saturated with an antiseptic solution. For two minutes he cleans under each of his nails with the nail file. For two-and-a-half minutes, he scrubs his fingers, hands and arms to his elbows, intermittently wetting the sponge and brush with running water. Using elbows, intermittently wetting the sponge and brush with running water. Using a circular motion he scrubs all of the surfaces of his fingers on one hand, his hand, and, finally, his arm to the elbow. After rinsing that arm thoroughly under running water, he repeats the procedure for two-and-a-half minutes on his second hand. After having scrubbed for seven minutes, he discards the sponge, brush, file, and paper, and turns off the tap water by pressing a button on the sink with his hip. (Katz, 1981, p. 338)

Field formation and scrubbing are considered aseptic techniques/skills whose practical-ritualistic character fits the Maussian description (Mauss, 2003c) of technique and ritual as total social fact. Their effects integrate protection against the entry of pathogenic germs and unproductive involvement. They would not be imperative if their efficacy operated only to limit the intrusion of undesirable agents. In other words, such measures are not only aimed at ensuring the survival and full recovery of the subjects being operated on. In the case of experimental surgeries in which non-human animals are euthanized at the end of the procedure, concern with postoperative recovery is not necessary. Maintaining the life of these subjects after surgery is not imperative, so hygienic strategies would not need to be performed if we consider that their effectiveness is limited to containing microbes and pathogens that can cause infections.

However, experimental surgeries aim to validate the technologies under development – i.e., test their functionality, but also train surgeons and medical teams and institute the new surgical techniques required for the participation of a new artifact. They should thus mimic the procedures performed on humans. In this sense, it is necessary to consider the complexity of the effectiveness of the techniques being employed. Thus, to advance against this unwarranted dichotomy, which fixes these techniques in separate poles, it is necessary to (re)qualify the notion of the techniques' effectiveness, disconnecting them from utilitarianism. If to be "effective" is to produce an expected effect (Sigaut, 2003), the mimicry of procedures performed on humans in experimental surgeries is part of the effective conditioning of the surgeons, who, as Achilles suggests, do not know how to otherwise operate.

When I questioned him why aseptic measures were used in experimental surgeries on nonhuman animals that would be killed post-surgery and therefore would not need to recover after the procedure, Achilles argued that an acute infection could interfere with the procedure, preventing its completion. But he had barely finished his explanation when he already countered it, by suggesting that in a procedure in which a device is implanted and kept in a living animal for only a few hours, after which the animal is euthanized, there would be no time for the development of an infection that compromises the progress of the procedure. Achilles then had to confront the fact that "we are very conditioned" and that the institution of the surgical field is part of this conditioning. Therefore, according to Achilles, it was necessary to perform "the whole ritual as if it were a sterile procedure", even when the patient was a non-human animal expected to die shortly afterwards.

Thus, in the experimental procedure, the non-human animals go through the same process of *depersonalization* which humans are subjected to in the operating theater. This shows that the subject covered by the surgical field is presupposed (it is not just a hole, but a person there), but that the status of personhood (Mauss, 2003c) varies: that is, there are subjects that arouse greater identification and to whom the status of humanity is guaranteed. With nonhuman animals, depersonalization is an effect of the mimicry of human procedures required by the conditioning of surgical skills. Everything happens as if depersonalization – that is, the deletion of the subject by the surgical field – in experimental surgery has the effect of naturalizing nonhuman animals, bringing them closer to humans, as they are submitted to the same procedures: field formation, abstracting the subject, and naturalizing the organs highlighted in/by the surgical field.

Achilles not only corroborated this conception of depersonalization of the subject, but he also suggests that a transformation of the surgeon takes place in these procedures.

As one assistant surgeon (whom I accompanied during an experimental procedure) pointed out: "As you may have noticed, I have no visual access to the patient's head. It helps me focus on the procedure, forgetting the person behind the surgical field". Not only does this comment highlight the strategy of depersonalization, but the assistant's choice of words allows us to see that this tool is thought of in relation to humans, even though it is also used on nonhuman animals in experimental surgeries. Animals are not patients. They are research objects/subjects. Even so, they are described as persons although in the end they will subject to euthanasia.

Although they mimic procedures performed on humans, in which the atmosphere is permeated by informal and playful conversation, experimental surgeries on non-human animals contain a sort of exaggerated solemnity, as if the seriousness at stake in experimental surgeries procedures is performative. This does not mean that there is no strain involved in experimental procedures, let alone no commitment to, say, a pig's life. But in contrast to the atmosphere that usually exists in operating rooms where human subjects are on the table, where there is a greater oscillation between moments of tension and relaxation and in which even music can be essential (Marini, 2018), the mood in the experimental operating room is a conditioned formality. There is respect for the life of nonhuman animals, but according to Achilles[14]:

Achilles - If the animal dies, it won't matter as much. Now if the child [patient] dies, it will be very important.

Marisol - It will not matter much to whom if the animal dies?

Achilles - To the animal's family [embarrassed laughter]. Because I won't have to go to the animal's family and say, "Oh, your son died".

From Achilles' argument, we can infer that different levels of responsibility require distinct forms of participation. In this sense, the more valuable the life is from the surgeon's point of view, the greater the need for a distancing strategy. That is, in Achilles' understanding, in experimental (live) animal surgery "there is a medium level responsibility, whereas working with operating models [usually dead animal organs] involves minimal responsibility. Meanwhile in simulation, there is zero involvement". On this scale of involvement, procedures on human procedures involve the highest degree of responsibility and, consequently, surgeon involvement.[15]

At its limits, the surgical field can erase the distinction between human and nonhuman animals. What happens in *in vivo* testing, however, is an approximation/naturalization that establishes relationships of participation and identification, producing companion species (Haraway, 2008, 2011). Such an approximation and the consequent threat of mixing/contamination requires the enactment of protection strategies. In experimental surgeries, these are expressed mainly in terms of a staged formality. This ritualized respect is a protective mechanism against the threat of (non-productive) participation, but it is also a strategy of separation, set against the threat of interspecies mixing.

The institution of the surgical field operates as a strategy of practical-ritualistic protection. The resemblance of the techniques performed in experimental procedures to the practices employed in operating rooms makes it clear that these are not strategies whose effectiveness can be reduced to the prevention of contamination by microorganisms. These processes seem designed to manage the uncontrolled forces produced by identification that potentially lurk in the complex relationships established in the surgical field.

14 It should be noted that Achilles was not referring here to the procedures with pigs cited above (which were not performed by him), but to his own experimental animal research, especially that which he conducted in his formative years.

15 Achilles refers here not only to his experience, but also to residents and students in training with whom he accompanied.

The depersonalization thesis: conditioning, skills, and (re)considering the notion of effectiveness for a review of the technical-ritual dichotomy

The central aspects of the social scientific debate regarding ways of understanding space, relationships, hygiene and sterilization procedures, as well as the establishment of the surgical field, have been merely introduced above. Looking deeper into the disputes around the notion of depersonalization and analyzing the oppositions presented in the literature, however, will reinforce the argument I am developing here regarding technical-ritual entanglement, wherein technique and ritual become conceptually unsustainable as discrete and separate phenomena. I believe that it is better to treat them as practical-ritualistic techniques by unpacking conditioning and understanding the surgeon's development of operating skills and the formation of the surgical field as forms of sensitive engagement with the environment (Ingold, 2000) and as properties of the relationships between instruments, materials, tools, artifacts, human actants and also many non-humans (Latour, 1994a, 1994b, 2000).

The depersonalization thesis was originally proposed by German sociologist Stefan Hirschauer (1991), who produced a detailed narrative on "body making" in surgical procedures. Previous ethnography by American anthropologist Pearl Katz (1981) had primarily investigated the "ritualistic character" of behavior in operating theaters.[16] Katz's work ran contrary to the classical definitions of ritual studies, in which the behaviors performed in surgical procedures in modern hospitals could not be defined as ritual, but rather predominantly as "technical", "rational", or "scientific". In short, Katz suggested that rituals are an integral part of surgical procedures and that most of them symbolize the separation of areas containing microorganisms from areas that should avoid them, separating cleaned (sterile, asepsis) and polluted (non-sterile, contaminated) domains. In their conception, these rituals work to avoid confusion by defining categorical boundaries and establishing limits between states and conditions that need to be very clear and defined.

A decade later, Hirschauer (1991) focused his interest on the composition of the body, suggesting that what was happening in the surgical field was the meeting of two distinct and disciplined bodies: the patient's body-made parts, and the aggregate body of countless professionals who cooperate in order to compose the "body of the surgeon". By investigating the process of bodily (trans)formation – of creation of the surgeon and the team as the instrument and the patient as the object, whose personhood disappears in the formation of the surgical field – Hirschauer's depersonalization thesis gained significant weight and seems to mirror, in a way, part of the symbolic dimension explored by Katz in her ethnographic (re)shaping of the relationship between "ritual" and "practice."

Hirschauer (1991) points out that a consequence of the preparation of the patient's body for surgery is the disappearance of the everyday body, which is covered and isolated. This implies the patient's anonymity and the disappearance of their personhood and with this, bodies are distanced from people. The patient's head disappears behind a curtain/sheet, so that her/his face, perhaps a person's most potent visual marker, becomes invisible.

British sociologist Harry Collins (1994) reduces the purely symbolic-ritualistic character of the depersonalization hypothesis, however, by suggesting we reconsider the interpretation of antiseptic procedures as a way of objectifying the surgeon-patient relationship. Committing himself to the surgeons' experience and point of view, Collins questions what makes us so ready to accept what we see in the operating room as a process

16 Katz was not alone in treating "technical" procedures as "rituals", citing at least two other contemporary works that also considered secular ceremonies as rituals (Firth, 1972; Moore and Myerhoff, 1977 apud, Hirschauer, 1991). What leads her to consider that behaviors in the operating room could be understood as rituals is a proposal to broaden the use of the term. Katz proposes that rituals can be found in any society in situations where categories are not clearly defined and the limits are not known. The role of rituals, in this sense, is precisely to proclaim that something is in one category and not in another. They define passages such as time, seasons, life stages, status changes, and so on. Unlike the rituals described by most anthropologists in sacred contexts that express values and are linked to institutions of daily life, however, operating room rituals demarcate a discontinuity with everyday life and with the values or categories of thinking that lay outside the medical field.

of depersonalization. For this author, we, the readers, share with Hirschauer the experience of being surgical laymen and this is what makes depersonalization an attractive thesis. In this sense, much of the persuasive weight of Hirschauer's argument comes from our sharing not in the social life of surgeons, but in the social life of naive surgery observers. For Collins, explaining surgical field formation, sterilization procedures, and green sheets as depersonalizing says more about analysts – lay observers or uninitiated observers – than it does about surgeons themselves. This is not to say that surgeons do not depersonalize their patients, but only that they do not need antiseptic paraphernalia to do so, in his understanding.

By reducing the debate about the roles of the surgical field and sterilization procedures to a methodological issue, Collins seeks to de-legitimize Hirschauer's thesis regarding surgical field formation as a depersonalization procedure. It should be noted that Collins article is entitled "Dissecting Surgery: Forms of Life Depersonalized", which demonstrates the importance of the depersonalization thesis in his analysis, although he is questioning it. In Collin's reading, these procedures operate as an instrumental ("symbolic") discourse on antiseptic function that does not correspond to the experience of surgeons, for whom the coverings forming the surgical field are related to "technical" issues. Collins argues that it is very difficult to kill all of the germs on the human skin, which requires shaving the patient, then scrubbing down the skin more than once while applying strong antiseptics. This takes a long time and is only feasible for small areas of the body. The covering avoid the necessity of carrying out this procedure over the patient's entire body. According to Collins, there is another "technical" convenience in the surgical field that is established by sterile green sheets: in addition to controlling germs, it forms a workbench and a conveniently absorbent surface. In this sense, the larger the patient's covered surface, the less the surgeon has to worry about not touching impure things during the course of the operation – in other words, the more the patient is covered, the greater the surgeon's freedom of movement. Collins compiles a series of arguments reducing them to antisepsis, separating possible "symbolic", "ritual" or "affective" aspects.

Collins' co-optation of the debate on depersonalization by the greater clash over postmodernism has contributed very little to our understanding of the complexity of the relationships established in the operating room. To reduce these to a methodological dispute is an impossibility because, as Nick Fox (1994) suggests, Collins's argument and claims simply replace one fabrication with another. Moreover, the vocabulary used by Collins suggests the apparent authenticity of the reality mapping analysis methodologies, which, in Fox's understanding, is something that contributes to the myth that sociology is not a fiction but an attempt to transparently report a transparent world, as if reality were something to be revealed.

In her formulations (the purpose of which was to broaden our understanding of the actions and practices performed in the operating room), Katz considers that operating room "rituals" contribute to the efficiency of "technical-scientific" activity, allowing the participants autonomy and permitting them to work under ambiguous circumstances. In this sense, they can be seen as an arrangement between technique and ritual, although still belong to different universes in Katz's analysis.

The main surgical challenge is to keep microorganisms at bay and not make the patient any sicker than she/he already is. This is a critical situation. Therefore, Fox (1994) proposes that movements in *the hygiene circuit* should be understood as a set of rules that must be understood as a pact; an alliance between the various professionals and patients in the operating room, created so that the procedure can occur in relative safety. The rhetorical markers that signal the *hygiene circuit* are valuable precisely because surgery is a risky endeavor.

The "ritualistic" hypothesis regarding these practices is mirrored in Achilles' words. This surgeon obviously understands the hygienic functions of procedures performed in the operating room, which are undoubtedly recognized in the field of biomedicine and modern surgery in general (Rawlings, 1989). However, Achilles intertwines/incorporates symbolic and ritualistic senses with technique in a way that Collins would deny occurs.

Considering such practices as a "total social fact" (Mauss, 2003a) thus implies recognizing their pragmatic-ritualistic character. Understanding technique in terms of a "total social fact" returns it to Leroi-Gourhan's analysis, where there is an intrinsic relationship between humans and technique, which makes Leroi-Gourhan understand the "gesture" as our primary unit of analysis (Sautchuk, 2007).

In addition to preventing contamination, scrubbing down is a technique that "takes the surgeon to another world," as Achilles reveals. "When you start scrubbing, you are already moving to another plane of conditioning. These rituals put you somewhere else." Considering sterility practices as strategies to build "good distance" does not imply that the surgical field is established solely to protect the surgeon from unwanted participation: it provides multiple conveniences. There is a lot at stake in the surgical field. Lives, reputations, relationships, as well as risks of contagion, contamination, involvement, and unproductive interference. To meet these challenges, any protection strategy is welcome.

Final considerations

In conclusion, I would like to turn to a scene described by Donald McRae (2009) in his narrative about the race for the first heart transplant in the 1960s. This refers to the time when one of the teams seeking to undertake a successful heart transplant in humans found a suitable candidate for organ donation. One of the major difficulties in performing heart transplants was precisely the availability of organs, given that the legislation then in force considered the heartbeat to be an indicator of life. This meant that the transplantation of organs was conditional upon complete termination of cardiac activity, which had serious implications for the quality of the organ which was to be transplanted. One of the teams was treating a very serious case: a dying baby patient. In an effort to save him, they decided to announce in all US hospitals that they needed an organ from a baby born with microcephaly, a condition in which the newborn lives for a short time. The inevitable death of this sort of baby would make it easier to prepare it for the organ removal procedure. Some time later, just such a baby arrived at the hospital from another state. He became a donor with the consent of his family. The transplantation teams then prepared two operating rooms for the removal and implantation of the organ. The nurses preparing the donor baby's body covered his head so that he would not have to face his deformation. Throughout the procedure the surgeon uncovered the baby's head, arguing that the team should look at the baby's face as a way of honoring his life. One of the team members, after some time, covered the face up again.

It can be argued that the discomfort regarding the display of the baby's head was associated with its deformity (the baby being microcephalic). The scene shows, however, the interference caused by the explicit face/disfigurement, which the professionals who performed the heart operation could not just "blank out". The contamination and involvement caused by the display of the face is unquestionable, either in the refusal of those who covered it or in the reaffirmation of the one who exhibited it for the purpose of honoring that life.

By comparing this with the two scenes presented above – the formation of the surgical field, and the surgeon's arrival situation with the field already established – it becomes clear that said field protects the principal surgeon from (visual) contact with the patient. Preparing the patient's body is a long procedure, involving a series of interventions that make accessible the organ to be operated on while they simultaneously abstract and depersonalize the body on the table. Given the imperative to "get it out of your head" that there is a person on the table who, in fact, has as family outside that is anxiously waiting for news, (as surgeon Achilles put it) one cannot disregard the convenience of the surgical field's hiding the patient's face and body. It is necessary to recognize the practical-ritual efficacy of the surgical field and its relevance, especially for the principal surgeon, as a strategy that is necessary to produce good participation.

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