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# Rethinking Nuclear Safety Management: Injunction as a Meta-Concept.

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## ABSTRACT

The management of safety is marked by strong procedural features and permanent adjustments of social actors to situations. Focusing on these two noticeable aspects of its operational reality, we propose to go hunting for new food for thought: rethinking safety management in the light of the meta-concept of injunction.

In order to understand the nature of safety injunction, we will analyze it through two approaches: a scientific one and a philosophical one. As a mass communication device triggering heteronomy to its receivers, safety injunction appears as a basis for safety management concepts. So one can note that safety injunction is a meta-concept to talk about safety.

But philosophy and sciences do not insist on the same aspects of this meta-

concept. Philosophy analysis leads us to think that safety injunction is linked to a model and introduce new elements in it through experience while a scientific point of view is more focused on safety injunction output with some cause-effect pathways dealing with struggles for power at organizational and social scales.

However, as scientific safety injunction analysis also implies normativity and subjects' perceptions issues in its scale tension showing the difficulty to master safety injunction. That is why; one can conclude that safety injunction cannot be separated either from practice or experience. This interesting result not only helps to define safety injunction but is also an important parameter to be considered in the design of an appropriate methodology.

In order to deploy and animate risk prevention measures, the nuclear industry mainly uses injunctions for safety which are practically based on the rise of expectations projected on to a unit from outside (Boussard, Demazière & Milburn 2010). The aim of this article is to define injunction as a meta-concept for safety management, that is to say a concept aiming to provide the firm grounds to a language attempting to talk about scientific concepts while discovering their meaning (Lacour 2005).

First, we will define injunction around safety through a scientific and philosophical approach. Then we will analyze its impacts at a social and organizational level and the consequences lead on safety management in high risk organizations. On the one hand this will lead to notice the interest to consider injunction as a meta-concept for safety management, but, on the other hand, this will underline the necessity not to reify injunction that is to say disregarding the role of its experience in the field.

## 1. WHAT IS SAFETY INJUNCTION?

### *1.1. Injunction as a Meta-concept for Safety*

To master safety, high risk industries follow a general trend of “normalization of social interactions and practices, leading to the bureaucratization of everyday life, a phenomenon long envisioned by Max Weber and regularly reassessed and commented by sociologists” (Bieder & Bourrier 2013). The existence of rules and the integration of these observations into a symbolic universe (in a large sense) allow us to state that we are before the presence of a human fact (Granger 1992).

This human fact can be scientifically cut-up and analyzed to draw its meaning, revealing a structure referring to a

“cybernetic” model in which “energetic”<sup>1</sup> organization is regulated at an informational level, in a flow of information through a network. But this scientific approach of the human fact disregards how humans experience toward a safety injunction since it only focuses on its structures.

If safety is an output of an injunction produced by social actors, then injunction would be a meta-concept for safety, thus a concept on which the language of safety relies on to make meaning through experienced actions.

Reducing the safety injunction to a mechanism of cause and effect suppresses the possibility to inquire about what really is at stake: the heteronomous<sup>2</sup> tension that it applies on individuals. For this reason, we will also propose to set up a philosophical scaffold around the organization of this experience with the purpose to understand safety injunction.

### *1.2. Safety injunction in Philosophy*

Neo-classic philosophy, the historical mainstream of contemporary thinking, reduces individual behaviour and collective functioning to the *homo oeconomicus* model, whose vices would lead to the general interest. A classic example is given to us by Adam Smith, who wrote that “it is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from the attention they pay to their own interest. We address ourselves, not to their humanity but to their egoism; and we don’t talk to them about our needs but always about their advantages” (Smith 1776)<sup>3</sup>.

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<sup>1</sup> A one-plan model in which organizations receive an input and transform it into an output like a machine (Granger 1992).

<sup>2</sup> Heteronomy: when one does not follow its own rules by looking after his reasons to act in external things. Heteronomy is opposed to autonomy.

<sup>3</sup> Tough Adam Smith is not a neo-classic but a classic economist, neo-classic theory is based on his “invisible hand” metaphor.

Even if this model is rather closed, loops would exist opening the way to the positivist modernization front started by the Enlightenment (Latour 2012). In this world portrait, injunction would inject in the autonomous and rational individual the necessary elements to perpetuate his or her capacity to make the “right” choices, just as it would inject into society the necessary elements to go on with the course of civilization. Briefly said, injunction would be the meta-concept “opening” and adjusting our understanding of the world along with the knowledge production progress. Injunction as a meta-concept would be hence defined as a heteronomous device at the service of a neo-classic instrumental rationality. Furthermore, the hypothesis of transparency of information inherent to the instrumental rationality ideal is an assumption far away from concrete action, just as the pure and perfect competition principle in economics. As for recruitment, the decision to join a firm is more complex than suggested by classic Supply and Demand Theories. The desirability of a movement is related to a lot of subjective variables. “Whether dissatisfaction with the organization leads to withdrawal depends on whether the participant perceives the “employment contract” as given or as subject to change. Where the contract is viewed as unchangeable, the only options are to “accept” or to “reject”. Where the contract can be changed, participation by no means precludes internal conflicts and bargaining” (March & Simon 1993).

### *1.3 Safety injunction in sciences*

Injunction, as a meta-concept for safety, looks like mass communication triggering heteronomy on its individual receivers. At a large scale, individuals would introject the content of a message. As a result the content of the message would become their own subjective meaning, making of this message the source of their motives to take

any action, instead of looking for those motives in themselves.

At the Oak Ridge National Laboratory in 1947, safety injunction took shape concretely through preventive posters warning the staff of the Manhattan Project of radiation risks.

As the poster suggests, individuals are the particular dispositions of the safety injunction hence their subjectivities are more or less called upon, depending on the practices linked to the injunction. In the case of an order, the compliance of individuals is weaker than it would be through a message diffusing an ISO norm relying on a participatory basis.

In the case of the preventive poster mentioned above and presented below, the staff members are called upon twice. They must learn to be aware of an invisible hazard and develop the proper discipline to work in a radioactive environment at the same time.

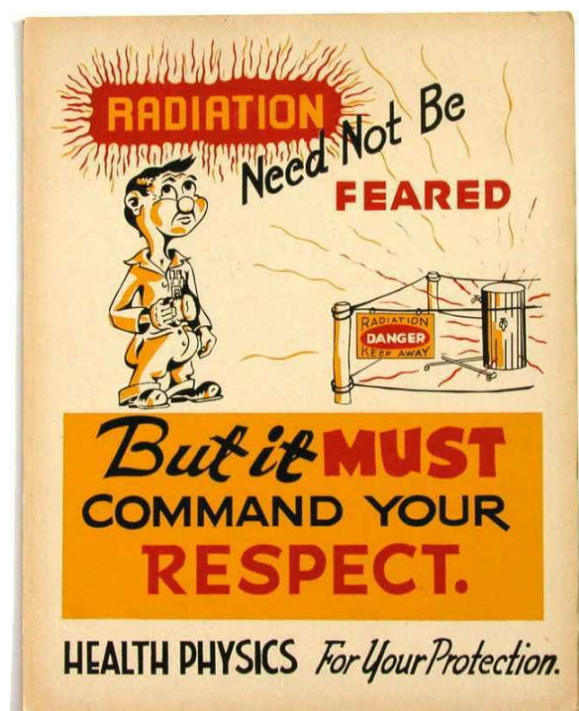


Figure 1. Radiation risk prevention poster in Oak Ridge (U.S.A.).

## 2. HOW DOES THE SCIENTIFIC CONCEPT OF INJUNCTION ON SAFETY WORK?

Scientific analysis of injunction on safety as a meta-concept on the field shows a double mechanism: injunction as a flux and instrumentalized injunction, at social and organizational levels respectively.

### 2.1. *Injunction as a flux*

Injunction on safety comes from the desire to respect our society values such as life, leisure or work. As a consequence, individuals want to stick to moral (to put it in a nutshell: value aggregation) as those values are important to them. When it comes to action, social actors expect a form of ethics (an applicable moral) from each other that suits social values. Not only the social actors find normal or acceptable a practice that matches their ethics but they also expect others to behave according to the same ethics.

Injunction as a flux is a support that transports permeable expectancies that appear for action. Injunction on safety as a support diffuses expectancies through a network crossing society. There is no determined reaction due to injunction diffusion.

Expectancies that feed the flux come from all kind of human and non-human network-actors. They have no determined origin. As Egyptian mosquitoes, hardly definable targets that “forge links and arouse chain reactions” (Callon 2006), injunction as a flux does not structure society but crosses it, transmitting what it brings.

The example of the Oak Ridge Laboratory poster on which an operator pays his respects to a radioactive source in a zone with a “Radiation, Danger, Keep away” sign illustrated with two sentences “Radiation need not to be feared ... but it must command your respect”, directly shows injunction as a flux. Indeed, this message is general and clearly referring to

a soldier’s experience. As a soldier should not be afraid of the enemy as fear is counterproductive, a worker (which has often a military status in this context) should not be afraid of radiation. However, being brave and hardworking does not mean that one should take unconsidered risks while fulfilling his duty. One should not underestimate radiation danger.

### 2.2. *Instrumentalized injunction*

In organizations, applying injunction as a flux implies a contextualization of it in order to reach a goal. For instance, to be authorized to produce for the nuclear industry. The decision-maker selects in the flux the closest expectancies toward the actual action processes.

When organizations seek for some particular elements, injunction is applied as a medium to get it. In other words, injunction is instrumentalized to fulfil objectives. In an analysis based on the actor-network theory, organizations involve their stakeholders by using points and arguments referring to economics or social depending on those actors position toward organizational goals. As one can see “it is clear [...] that stakeholders mobilization thus their concrete implication in the action plan goes through a problematization phase to build a sense to action that can be accepted by all” (El Abboubi & Cornet 2010). This is precisely in this step that organizations can associate stakeholders which can be quite hostile at first glance. In this move, organizations absorb their position in the action plan which was their initial goal. Then, they can submit workers mass to legitimate policies. Instrumentalized injunction has been derived from the flux to serve action for the firm sake.

In the risk prevention campaign of Oak Ridge, the intended effect is the modification of operators’ behaviours facing a risk through a visual support. Operators are encouraged to discipline and to command respect as one can note with

the character attitude. Indeed, he placed his cap on his chest, as soldiers do to show respect toward important people.

### 3. INJUNCTION ON SAFETY AND NORMATIVITY

Uniformisation of perceptions and practices due to injunction on safety and safety apprehension as a social value lead to constraint individuals. How can we understand this normativity?

#### *3.1. Safety in society*

Scientific analysis of injunction on safety as a meta-concept implies at the same time a reduction of normativity to an object and an objective representation of normativity. For centuries the sovereign power had the privilege to “make one die or let one live” (Foucault 1976), but in the Classic Age, the sampling mechanisms needed to defend and maintain the sovereign tend not to be the major form of power exercise anymore. Sampling mechanisms become “a piece among others that has incentive functions, that reinforce, control, supervise, arise and organize the forces they submit: a power made to produce forces, to increase and order them instead of preventing, breaking or destroying them” (Foucault 1976).

This “biopouvoir” as modern power over life supposes universalist human well-being conceptions and the end of some practices judged as unethical by stakeholders such as dose management (high exposure to radiations during short periods of time coupled with high team turn-over to maintain or increase nuclear industry production). At the same time, sensibilisation to rules work is encouraged by decision-makers considering that it is important to protect workers by making them aware of their workplace risks.

Injunction on safety tend to neutralize spoilers that justify its existence rather than to ensure the appropriate behaviour according to its standards. The use of

injunction in safety management tends to stamp out and alleviate life roughness.

But this way to proceed fails to recognise the interpretation and normativity reorganizations in other normativity signification systems. Indeed, no one can really anticipate operators’ reception and feelings towards the poster campaign and its collective effect. But, this recognition defines our relationship with phenomenological experience that is to say how facts appear to me in my own subjectivity. We will now analyze injunction on safety psychological effects.

#### *3.2. Injunction on safety psychological effects*

Injunction on safety is not made to equilibrate the communication relationship between transmitter and receiver. It demonstrates power relationships and a social order in which we are all involved. This struggle for power and influence on the receiver is part of injunction authoritarian character. Not following the path is a potential threat toward the social group cohesion.

So, “statistically, threat becomes a moderator variable instead of a direct predictor: an interaction model” (Feldman 2013). “In brief, this model posits that the underlying basis of authoritarianism is the conflict between the values of autonomy/independence and social conformity. People who are predisposed toward authoritarianism value social conformity over autonomy because they believe that strongly held and rigorously enforced norms and values are needed to maintain social cohesion and order” (Ibid). Radiation threats brought by the “Radiation need not to be feared... but it must command your respect” poster remind the reader of the rule. This imperative is due to the serious aspect of the subject. Beyond danger and risk, operators have to be professionals in their attitude by wearing equipment and being focused. As a consequence, the operator

designed on the poster does not smile but appears as responsible.

This example illustrates that what is invested in our safety apprehension “is less reality than a particular knowledge of what is real [...]. The knowledge contained in the mythical concept<sup>4</sup> is a confuse knowledge, formed by smooth and unlimited associations. This open character of the concept must be stressed; this is absolutely not an abstract and purified essence; it is a non-formed, instable, unclear condensation which unit and coherence particularly depend of its function. In this sense, one can say that the fundamental character of the mythical concept is to be appropriated” (Barthes 1957). The real image of safety is deleted for injunction on safety meta-concept which is a system in a system dealing with sense and interpretation.

Making the operators aware of danger by using emotional mechanisms is an incentive to make them actors of their own safety by protecting themselves. But such a safety management also triggers numerous tensions in organizations as the whole is not the sum of its parts.

#### 4. INJUNCTION ON SAFETY META-CONCEPT IMPACT ON SAFETY MANAGEMENT IN ORGANIZATIONS

##### *4.1. A scale tension between autonomy and heteronomy*

A philosophical approach of injunction on safety shows a tension between subjects' autonomy and injunction heteronomy process. Organizational objectives and values were “initially [...] imposed on the individual by the exercise of authority over him; but to a large extent the values gradually become ‘internalized’ and are incorporated into the psychology and attitudes of the individual participant.” (Simon 2000). So, an operator in a zone exposed to radiations that has incorporated

Oak Ridge poster to his representations can possibly prevent a colleague from staying too long in front of a radioactive source were Becquerels are released in important quantity.

However, when the receiver catches injunction on safety message, he internalizes it and adds it to his representations and practices. The heteronomous mechanism addressed to individuals does not impede individuals from overcoming what is being imposed. Although “events are directed from outside to inside” (Horkheimer 1936), one can also note that the internalized message of injunction changes due to its appropriation by social actors.

As injunction on safety message tends to be diffused at large scale, the number of people with their own and changing representations is multiplied. This individual process becomes a collective fact influencing collective representations guiding the decision-maker. In other words, injunction as a flux and instrumentalized injunction can be combined. As a matter of fact, one can see that safety expertise power is balanced with the necessity for workers mass to integrate safety in their job. While expertise is stuck to support functions, its general knowledge is aspired, modified and adapted to the core functions of the firm, in operators' job descriptions. Furthermore, to be funded, expertise is also led to develop its knowledge depending on operational needs.

##### *4.2. The injunction mastering impossibility*

The slip of injunction on safety message creates some unexpected and unpredictable effects for the decision-maker. Indeed, validating a risk prevention campaign does not mean that the decision-maker masters all operators' reactions (eg. indifference, careful reading or contempt).

When action representation is linear and derived from a decision coming from a reflexion, it is implied that there is

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<sup>4</sup> Or meta-concept in the present article.

intentionality in the process. But, one cannot control all his acts (Reason 1990) or all his communication effects (Adorno 1954).

In the perspective of a Reflexion-Decision-Action model, a decision-maker that cannot obtain the result he wanted would have taken the wrong decision. Combining injunction on safety as a meta-concept and a philosophical approach allows us to imagine that a decision-maker would gather information on factors that could influence his action result, such as federation or separation of social groups or an informal leader's sensitivity.

Decision-maker's goal would be to limit the gap between his result and what was expected. Decision would not be good or bad. What would be at stake would be its normal appearance to the largest number of people who might be concerned by it (Alter 2009).

The risk prevention poster lets the operator act in the most suitable way for him by delegating to him his risk evaluation. While fixing a normative horizon, injunction let the operator determine what to do and what adjustments are necessary in his practice. In the end, the decision-maker has to believe in his influence skills but also in operators' work.

## 5. INJUNCTION AS A META-CONCEPT TO UNDERSTAND SAFETY?

Understanding injunction on safety meta-concept inscription in safety management has led us to consider it with a scientific analysis but also to balance it with a philosophical approach.

Injunction on safety meta-concept, as a concept to provide basis to a language aiming to talk about scientific concepts by finding their signification (Lacour 2005), is quite interesting as we can formulate and give a sense to human facts. The notion of meta-concept gives order to a conceptual system so it is reflexive.

However, capturing injunction on safety with a meta-concept reifies it and conducts

to a paradox: the loss of its reference. Injunction on safety is also an experience-based element, it is a phenomenological manifestation.

Injunction on safety is the meta-concept through which one can understand safety in action and its management. But it is also by its prism that we crystallize expectancies toward our existence.

Concerning methodological issues, one should first analyze empirically injunction on safety by observing actors possibly submitted to injunction in their experience before reshaping the meta-concept.

## CONCLUSION

Injunction on safety allows us a glimpse on operational safety by its apprehension as a meta-concept. But it also makes underlying and structuring safety logics appear under the condition to be kept in experience field too.

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## LIST OF FIGURES

Figure 1. Radiation risk prevention poster in Oak Ridge (U.S.A).