Popper's `Rationality Principle' reconsidered

BY

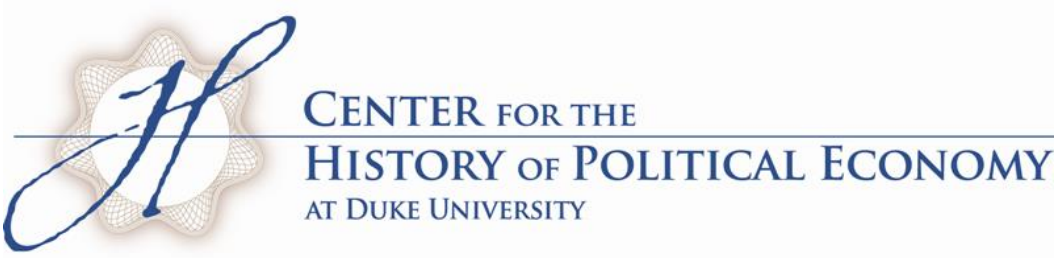
Alfonso Palacio-Vera

AND

Iván H. Ayala

CHOPE Working Paper No. 2016-27

September 2016



Popper´s `Rationality Principle´ reconsidered

By

Alfonso Palacio-Vera[♣]
(Universidad Complutense de Madrid, Spain)
apv@ccee.ucm.es

&

Iván H. Ayala
(Econonuestra, Spain)
ivanhayala@econonuestra.es

September, 2016

Abstract: Popper recognizes that there are, at least, two versions of his `Rationality Principle´ (*RP)* yet he does not explain either *how* they relate to other parts of his works or which version social scientists should adopt. We argue that Popper´s formulation of *RP* can be upgraded by explicitly considering the conjectural nature of all knowledge and the subjective nature of the 'facts' of the social sciences. Next, we examine several areas of Popper´s work as well as some of Hayek´s ideas and conclude that, had Popper reflected on these issues he would probably recommended social scientists to adopt the 'subjectivist' version of *RP*.

Keywords: Hayek, methodology, Oedipus effect, Popper, rationality
JEL Classification: A12, B41

[♣] Address for correspondence: Alfonso Palacio-Vera, Associate Professor of Economics, School of Economics & Business, Campus de Somosaguas, Complutense University of Madrid, Pozuelo de Alarcón (Madrid), 28223, Spain. E-mail: apv@ccee.ucm.es.

Popper´s `Rationality Principle´ reconsidered

> Against positivism, which halts at phenomena— "There are only facts"— I would say: No, facts is precisely what there is not, only interpretations. We cannot establish any fact "in itself": perhaps it is folly to want to do such a thing.
>
> Friedrich Nietzsche, *The Will to Power*

1. Introduction

Popper´s methodological prescription for the social sciences commonly known as `Situational Analysis´ (SA) is viewed by some commentators as a rich contribution to the social sciences that has been underestimated and which deserves to the better known and further developed (Matzner & Jarvie, 1997). Discussions of SA by philosophers of science and social science methodologists alike have focused both on its compatibility with falsification (Hands, 1985, 1991, 1992; Caldwell, 1991; Notturno, 1998; Hedström *et al*., 1998) and its role and status (Latsis, 1983; Nadeau, 1993; Lagueux, 1993, 2006).[1] In particular, the debate has revolved around Popper´s surprising confession (Popper, 1994) that his `rationality principle´ (*RP*), namely, the principle that is at the core of SA and, according to which, in the construction of models in the theoretical social sciences we should assume that `agents always act in a manner appropriate to the situation in which they find themselves´ is *false* but nevertheless a *good enough approximation to the truth* (Popper, 1985).[2] An early evaluation of Popper´s SA is in Latsis (1983, p. 132) who argues that `Popper´s account of the role and status of the rationality principle is obscure and unsatisfactory´. For instance, Latsis (*op. cit*., p. 133) notes that, in different parts of his works, Popper argues that *RP* is `almost empty´, `not *a priori* valid´, `clearly false´, `a good approximation to the truth´, and `the consequence of a methodological postulate´.

Next, Latsis (1983) was the first scholar to distinguish between an `objectivist´ (*RPo*) and a `subjectivist´ version (*RPs*) of the `Rationality Principle´. He associates the former with Pareto (1917, section 150) and Parsons (1937, p. 58), and the latter with Popper.[3] As we show below other scholars have subsequently referred to this distinction in the context of the discussion about the role and status of *RP* which led Popper, when he had the opportunity to respond to his critics in *The Myth of the Framework* (Popper, 1994), to note that in previous presentations of SA he had referred —without apparently realizing it— to two different versions of *RP*: in one version the `problem-situation´ (P-S) the agent faces is reconstructed `as it actually is´ (*RPo*) whereas, in another version, P-S is reconstructed `as the agent sees it´ (*RPs*) (Popper, 1994, p. 183). Building upon Latsis´ distinction between *RPo* and *RPs*, Nadeau (1993) discusses the status of *RP* and concludes that *RPo* is *empirically false* since actors´ behaviour is not always adequate to the `objective´ P-S whereas *RPs* is *irrefutable* and, hence, it can only be a metaphysical statement (*op. cit*., p. 459).[4] Notwithstanding it, he goes on to argue that *RPs* is the correct interpretation of *RP* in that it is the only one that holds `true´ and, hence, *RP* can only be interpreted as an *a priori* principle (*op. cit*.). In this respect, Lagueux (2006, p. 199) insists that, even if we were to accept that *RPs* is the correct interpretation, the former cannot be *a priori* or universally true because it is not true that people *always* act appropriately according to their (subjective) perception of P-S. He thus insists that *RPs* is approximately but not universally true.[5] Be that as it may, he notices that some social scientists understand that *RP* occupies a prominent place in the social sciences insofar as it constitutes a *condition of intelligibility* of any phenomenon that stems from human action. More specifically, the latter can be rendered intelligible, i.e., understood by a external observer, only when it is motivated by reasons, namely, when it represents an appropriate response to the P-S `as seen by the agent´ (*op. cit*., p. 205). Lagueux (*op.*

cit.) concludes that maintaining *RPs* `after acknowledging that it is not universally true is simply to claim, as Popper did, that in spite of the fact that strictly irrational decisions occur, human actions are nonetheless normally understandable´ .

Now, Popper (1994) restricts himself to acknowledging the existence of, at least, two versions of *RP* yet he does not reflect either on *how* each version relates to other parts of his works (other than falsification) or on *which* version social scientists should adopt. Further, and to the best of our knowledge, there has been hardly any discussion in the literature about these two issues. Our purpose in this study is to explore them in some detail. The content of the paper is as follows. In the following section we attempt to summarize the debates surrounding *RP* with a focus on the distinction between *RPo* and *RPs* as presented in Popper (1994). In section 3 we argue that Popper´s definition of *RP* can be upgraded by *explicitly* considering the conjectural nature of all knowledge and the subjective nature of the 'facts' of the social sciences and propose alternative formulations of *RPo* and *RPs* which, according to us, satisfy this goal. Next, in section 4 we argue that, when *RP* is analysed in light of (i) Popper´s version of `evolutionary epistemology´, (ii) Popper´s ideas (inspired by Hayek) about the main aim of the social sciences, (iii) Hayek´s ideas about the `facts´ of the social sciences, and (iv) Popper´s `Oedipus´ effect, the view emerges that, had Popper reflected on these issues he would probably have recommended social scientists to adopt *RPs* in most cases. Lastly, section 5 summarizes and concludes.

2. Popper´s methodological proposal for the social sciences

Popper's methodological proposal for the theoretical social sciences appears in different works under the name of SA and its core principle, *RP*. According to him, the fundamental problem of the social sciences is 'to explain and understand events in terms

of human actions and social situations' (Popper, 1994, p. 166). This is made through the reconstruction of the P-S in which the agent finds himself. In turn, the reconstruction of social situations should take into account all the relevant 'social institutions' which he defines as 'all those things which set limits or create obstacles to our movements and actions' (*op. cit*., p. 167). His essential hypothesis in *The Myth of the Framework* is that there is no fundamental difference between the natural sciences and the social sciences since both of them resort to the construction of models or *typical* P-S to explain and predict events. If anything, he views models as being even more important in the social sciences due to the non-existence of universal laws. In his intellectual autobiography, Popper makes clear that his methodological proposal for the theoretical social sciences can be seen as an 'attempt to generalize the method of economic theory (marginal utility theory) so as to become applicable to the other theoretical social sciences' (Popper, 2002[1976], p. 135).

Early presentations of SA and the principle lying at its core, *RP*, can be found in Popper´s *Open Society* (Popper, (1966[1943], ch. 14, especially, p. 97), in his *Poverty of Historicism*, originally published in three articles in the journal *Economica* in 1944-45 and, then, as a book (Popper, 1957, sections 31-32), in the English translation (Popper, 1985) of a French paper (Popper, 1967), and in *Objective Knowledge* (Popper, 1972, p. 179). However, the very place where he presents it thoroughly is in the chapter titled `Models, Instruments, and Truth: The Status of the Rationality Principle in the Social Sciences´ (Popper, 1994, ch. 8). This chapter was originally written in response to an invitation that Popper received in the early 1960s from the Economics Department at Harvard University and the lecture he delivered there in February 1963. In any case, the full text of the speech he delivered at Harvard University was not made available until

1994 when it was published as the above-mentioned chapter in a collection of essays included in the book titled *The Myth of the Framework* (Popper, 1994)

2.1. The `Rationality Principle´

Popper makes a distinction between 'rationality' as a personal attitude and his *RP*.[6] He insists that his *RP* has nothing to do with the assumption that men usually adopt a rational attitude and defines it as an *a priori* methodological principle which assumes that *our actions are adequate to our problem-situations as we see them* (Popper, 1994, p. 181). Specifically, he remarks that *RP* is *not* true: 'The rationality principle is false. I think there is no way out of this. Consequently, I must deny that it is *a priori* valid' (Popper, 1985, p. 361). Notwithstanding it, he argues that it represents a good enough approximation to the truth. Yet, when asked to clarify whether *RP* is a `methodological principle´ or an `empirical conjecture´, he explains that `[t]his second case is precisely the one that corresponds to my own view of the status of the rationality principle: I regard the principle of adequacy of action (that is the rationality principle) as an integral part of every, or nearly every, testable social theory´ (Popper, 1994, p. 177). As he explains, he views *RP* as the animating part of any model in the social sciences, just as the laws of motion of planets are an integral part of Newton´s gravitational theory. In view of this, Latsis (1983, p. 140) argues that, according to Popper, the role of *RP* is to function as a `plastic interface´ between mental states and behaviour and that this is the reason why it is declared by him to be false but nevertheless close to the truth. More specifically, he argues that *RP* is false if it is interpreted literally because it does not *determine* behaviour in a `cast-iron´ fashion yet it is `close to the truth´ because it captures the tendency of human behaviour to follow the logic dictated by the P-S.[7] Finally, Popper´s advice to scientists is never to abandon *RP* so that, in the wake of a

refutation of their model, they should always revise their reconstruction of the P-S that the actor faces.[8]

Now, in an attempt to make sense of Popper´s view of the status of *RP*, Lagueux (2006, p. 203) explains that though *RP* cannot be *itself* a methodological principle since the former is, as Popper claims, part of any empirical theory in the social sciences and, therefore, it is to be interpreted as an empirical hypothesis, `the *decision* to immunize it [against falsification] can nonetheless be considered as based on a methodological principle´ (*op. cit*.).[9] In a slightly different way, de Bruin (2006, p. 213) maintains that *RP* constitutes a `methodological rule´ which he denotes as the `rule of rationality´ and whose status is equivalent to Popper´s `rule of causality´. According to the former, `one should always try to explain human behaviour in terms of reasons´. Lastly, Notturno (1998, p. 405) rejects the notion that *RP* is an empirical hypothesis and characterizes *RP* as a *methodological principle* according to which `if we want to explain a social event rationally, then we must assume that the people in it acted adequately to the situation, or, at the very least, that they acted adequately to the situation as they saw it´.

2.2. The two versions of the `Rationality Principle´

Latsis (1983) was the first scholar to identify the existence of an `objectivist´ version (*RPo*) and a `subjectivist´ version (*RPs*) of *RP* in Popper´s work. He refers to the former as the `strong´ version of *RP*. Building upon Latsis´ distinction between *RPo* and *RPs*, Nadeau (1993, p. 463) points out that an attentive reading of the 1967 text (Popper, 1985) reveals that although Popper views *RP* as an explanatory principle, he surreptitiously changes his way of formulating it during the course of his argument in the same text, going from an `objectivist´ formulation at the beginning of the text to a `subjectivist´ formulation at the end of it. Hands (1991, p. 118, note 14) points out that

`Popper is really unclear on this´, and Latsis (1983, p. 133) notices that Popper `seems either confused or deliberately elusive´ on this issue. Be that as it may, Hands (*op. cit.*) argues that in his 1985 piece Popper *clearly* adopts *RPs* when he says that rationality is `only as agents see it´ and, therefore, *SA* can be applied to the behaviour of a `madman´. Nevertheless, he adds that Popper (2002[1976], p. 172) denotes *SA* `a purely objective method´ which can be developed independently of subjective mental states and that, elsewhere, he says that *RP* actually consists of the `general law that *sane* persons as a rule act more or less rationally´ (Popper, 1966, p. 265).

Likewise, Koertge (1975, p. 441) recognizes that Popper´s views on *RP* seem to have changed over time; in his earlier writings on *RP* he limited its scope to the actions of `sane´ people whereas in his later writings he stressed that *RP* can also be used to explain the actions of a `madman´. Furthermore, Koertge (*op. cit.*) notes that, as Popper widened the domain of applicability of *RP* to include madmen, he also weakened his claims about the actions which agents could be expected to perform so that where he had previously spoken of `rational´ or `appropriate´ actions, later on he tended to denote them as `adequate´ or `in accordance with the situation´. According to Koertge (*op. cit.*, p. 442), the main reason for this change in terminology was Popper´s increasing stress on the fact that the situation which was central in the explanation was not so much the agent´s objective physical-physiological-psychological situation as her *theory* of her P-S, namely, the situation as the agent saw it. In line with this, she proposes a model for situational explanations which allows for the presence of subjective factors insofar as the use of *RP* does not necessarily imply that the actor´s beliefs are reasonable nor that her method of making decisions is adequate, the only requirement being that the actor appraises her P-S in a *systematic* way.

Now, in a passage of the English translation of his 1967 French paper, Popper (1985, p. 363) proposes his famous example of the `flustered driver´ who, by trying to park stubbornly his car in evidently too small a space, does not act in a way that is appropriate to the P-S *in which he finds himself* and subsequently notes that `we employ the rationality principle to the limit of what is possible whenever we try to understand the action of a madman´ (Popper, 1994, p. 179).[10] It is in the section where he notes that some cases of neurosis have been explained by Freud and other psychologists with the help of their own version of *RP* that he switches to a *subjectivist* version of it.[11] Then, in a note in the same paper, he acknowledges that he refers successively to two different versions of his *RP* and he even identifies a third version according to which P-S is said to be `as the agent could (within the objective situation) have seen it´ (*op. cit*., p. 183).[12] In any case, Popper does not pronounce himself as to which of these two versions of *RP* social scientists should adopt. In the aftermath of it, Lagueux (2006, p. 201) concludes that, according to Popper, `what the agent sees may or may not be considered as part of the objective situation that the model describes´. In particular, and according to him, *RPo* presupposes that agents do possess `true´ knowledge whereas *RPs* presupposes that agents´ knowledge is *partially* wrong. In other words, according to Lagueux (*op. cit*.), both *RPo* and *RPs* presuppose that agents act in a way that is appropriate to the state of *their* knowledge.

3. Upgrading the `Rationality Principle´

We have mentioned above that several commentators as well as Popper identify two different versions of *RP*: an `objectivist´ version (*RPo*) and a `subjectivist´ version (*RPs*). According to *RPo*, the theoretician reconstructs the P-S *as it actually is* whereas, according to *RPs*, the theoretician reconstructs the P-S *as it is actually seen by the agent*

(Popper, 1994, p. 183). Popper (1972, p. 179) admits that, in both versions, the P-S is *conjectured* although, as we show below, this is not explicit in any of them. Now, does it really matter whether the conjectural character of the P-S hypothesized by the social scientist is made explicit? We believe it does. First, a considerable proportion of social scientists do not possess a background in the methodology and philosophy of the social sciences. As a result of it, many of them tend to ignore by default the fact that there may be significant differences between their view of the P-S and both agents´ view of it and other scientists´ view of it. According to us, making explicit the conjectural and, hence, provisional nature of all knowledge in the formulation of *RP* may help making social scientists more aware of the limitations of their knowledge. Second, in the case of the social sciences, and in addition to the conjectural nature of all knowledge, there is the added difficulty that stems from the subjective nature of its 'facts'. As Hayek (1943) puts is, the 'facts' of the social sciences are all *interpretations*. This, as we know, opens up the possibility that social scientists adopt the point of view of actors to understand the P-S (which is a possibility that is not available to natural and physical scientists) but, crucially, it confers the 'facts' that social scientists study a degree of subjectivity that is unmatched by the 'facts' of the natural and physical sciences. This being the case, we think it is desirable that the formulation of *RP* explicitly captures both the conjectural nature of all knowledge and the fact that the theories that social scientists propound do not, in most cases, refer to 'facts' that can be independently verified by an observer but typically constitute their (subjective) interpretation of a phenomenon.

This being the case, we think that an upgraded formulation of *RP*, namely, one that is *explicitly* consistent with both Popper´s insistence that all knowledge (including the theoretician´s knowledge) is conjectural and the subjective nature of the 'facts' of the social sciences can be provided. In particular, if both the theoretician´s view of the

P-S and her view of agents´ view of the P-S are conjectural, how can she reconstruct the P-S as `it actually is´ or `as agents actually´ see it? To be sure, Popper makes it clear that we can never acquire `true´ knowledge about either the `objective´ P-S (in *RPo*) or about agents´ subjective view of the P-S (in *RPs*) yet, and this is our point here, his formulation of *RP* does *not* explicitly recognize it. That is, although he recognizes that both the theoretician´s and the actor´s view of the P-S are *conjectured* his formulation of *RPo* and *RPs* does not explicitly capture it. Were it not for Popper´s unquestionable fallibilist credentials (after all he is the founder of fallibilism), one could interpret that he implies that scientists can know the `true´ P-S that actors face when he suggests the existence of a third or intermediate version of *RP* according to which the theoretician reconstructs the P-S `*as the agent could* (within the objective situation) *have seen it*, and perhaps ought to have seen it´ (Popper, 1994, p. 183). In other words, the third version identified by Popper seems to imply that the theoretician `knows´ that agents´ view of the P-S is partially wrong. But, how can she know this for certain if all knowledge is conjectural? This problem is compounded by the fact that, as Popper notes, a situational model is an *oversimplification* of the real world and, hence, it is `false´ in the sense that it does not reproduce *all* aspects of the `objective´ P-S that actors face and that, as a result of it, all the theoretician can do is to construct a model that is a `good enough´ approximation to the P-S that the actor faces whatever the latter is held to be.

Next, we think that an upgraded formulation of *RP*, namely, one that *explicitly* captures the notion that all knowledge (including the theoretician´s) is conjectural and that the `facts´ of the social sciences are subjective is as follows. According to us, and for the reasons we expounded above, the difference between *RPo* and *RPs* is not that, in the former, the theoretician reconstructs the P-S *as it actually is* whereas, in the latter, she reconstructs it *as agents actually see it*. Rather, if the theoretician adopts *RPo* then

she reconstructs the P-S *as she believes it is* whereas, if she adopts *RPs*, she reconstructs it *as she believes that agents believe that the P-S actually is*.[13] Thus, in the case of *RPo*, there is no insinuation that the theoretician possesses `true´ knowledge in the sense of `knowing how the P-S that actors face actually is´. Rather, the presumption in this case is that the theoretician´s view of the P-S coincides, at least on average, with that held by agents regardless of its `correctness´. In other words, we want to argue that *the adoption of this reformulated version of RPo implies that the theoretician implicitly assumes (perhaps unconsciously) that agents´ view of the P-S approximately coincides with hers whatever the latter happens to be*. By contrast, if the theoretician adopts our version of *RPs*, she seeks to `put herself in the shoes of the actors´ in order to understand *how* the latter see the P-S. That is, according to us, if the theoretician adopts *RPs*, she implicitly assumes that she can `explain´ both (i) *how* actors see their P-S, and (ii) why their view of the P-S is partially wrong.

Now, it follows from this that the essential difference between *RPo* and *RPs* in our formulation of *RP* is that, in the former, the theoretician implicitly (i) *believes* that her view of the P-S is correct, and (ii) assumes that, on average, the actors´ view of the P-S coincides with hers whereas, in the latter, the theoretician implicitly *believes* that actors´ view of their P-S is partially wrong yet she chooses to adopt their viewpoint to explain *why* they behave as they do. Crucially, that the adoption of *RPo* presupposes that the theoretician implicitly assumes that actors´ view of the P-S roughly *coincides* with hers is a *logical necessity*. If the theoretician´s view of the P-S differs substantially from the actors´ it follows that the behaviour deemed appropriate by the latter will differ from the behaviour deemed appropriate by the former. If this were so, one could not expect the situational model to yield accurate predictions since actors´ actual behaviour would significantly differ from their predicted (by the theoretician) behaviour. In short,

if our version of *RPo* is adopted and we are to expect that a certain situational model yields accurate predictions we will need to assume that, `on average´, actors´ view of the P-S coincides with the theoretician´s. But, if so, this implies that the latter somehow `imposes´ on the actors her view of *their* P-S even if she does so unconsciously.[14]

An implication of our version of *RP* is that another difference between *RPo* and *RPs* is not the alleged `objectivity´ of *RPo* and `subjectivity´ of *RPs.* Rather, and to the extent that both versions explicitly presuppose (i) that all knowledge is conjectural, and (ii) that any situational model can be criticized by an external observer and potentially falsified, it follows that the real difference between them lies in the *degree to which the subjectivity of the theoretician manifests itself;* in *RPo* the subjectivity is of the `first degree´ since it is the theoretician´s view of the P-S that is at stake whereas, in *RPs,* the subjectivity of the theoretician is of the `second degree´ since it is her belief about how the actors´ believe that the P-S is that is at stake. This suggests, for instance, that if the theoretician adopts *RPs,* her position becomes equivalent to the position Keynes (1936, p. 156) ascribes to financial market investors when he likens them to participants in the `Beauty Contests´ that were popular in the British tabloids back in the 1930s. According to Keynes, the former do not select the photos of those ladies who they think are the prettiest ones according to their personal canon of Beauty but, rather, select the photos of those ladies who they believe are more likely to be selected by *other* contest participants as the most beautiful ones.

Finally, according to Latsis (1983, p. 132), the adoption of *RPs widens* the scope of SA but, at the same time, it *weakens* it because, allegedly, any observed behaviour can be said *ex-post* to be adequate to the P-S `as the agent sees it´ since it is not possible to prove that the agent really sees the P-S as the theoretician hypothesizes it. There is no question that the adoption of *RPs* allows the theoretician to cover a wider range of P-S

such as the seemingly `irrational´ behaviour that Popper (1994) ascribes to the `flustered driver´ in his paper yet, and according to us, the adoption of *RPs* does not necessarily weaken SA. As we explained above, the key difference between *RPo* and *RPs* rests on the *degree of subjectivity* that each version of *RP* entails; in the former the subjectivity is of `first degree´ whereas, in the latter, the subjectivity if of `second degree´. Therefore, in our reformulation of *RP*, *RPo* does not necessarily exhibit a `higher´ scientific status, as Latsis (1983) implies. Such `higher´ status would be justified if the theoretician were to possess `superior´ knowledge *vis-à-vis* the actors, that is, if she really could see the P-S `as it actually is´ or if she could be said to possess 'better' information about the P-S than the actors do. However, anybody´s view of the social world is partially wrong or incomplete no matter whether it is the scientist or the actors and, as we will see below, Hayek (1943) denies that the theoretician can acquire knowledge about the surrounding environment that is not possessed by the actor.

4. Which version of the `Rationality Principle´ should social scientists adopt?

We noted above that Nadeau (1993, p. 463) points out that an attentive reading of Popper´s 1967 paper (Popper, 1985) reveals that, during the course of his argument, he subtly changes his way of formulating it going from an `objectivist´ formulation at the beginning of the text to a `subjectivist´ formulation at the end. We also mentioned that commentators such as Latsis (1983, p. 133) and Hands (1991, p. 118, note 14) point out that Popper is `unclear´ or even `deliberately elusive´ on this issue. Be that as it may, the initial description of SA that Popper presents in his *Poverty of Historicism* leaves little doubt that the *RP* he originally had in mind corresponds to *RPo*:

`I refer to the possibility of adopting, in the social sciences, what may be called the method of logical or rational reconstruction, or perhaps the "zero method." By this I mean the method of constructing a model on *the assumption of complete rationality* (and perhaps on the assumption of the possession of complete information) on the part of all individuals concerned, and of estimating the deviation of the actual behavior of people from the model behavior, using the latter as a kind of zero co-ordinate´ (Popper, 1957, p. 141, emphasis added).

The reference to the `assumption of complete rationality´ in the quotation above suggests that, as Popper (2002[1976], p. 135) recognizes, *RP* (and, specifically, *RPo*) consists of the principle on which neoclassical utility theory is based on. Arguably, it is for this reason that several commentators associate *RPo* to the `optimization hypothesis´ that pervades neoclassical economics (Matzner & Jarvie, 1998; Oakley, 1999). However, both in his 1967 text (Popper, 1985) and, more explicitly, in his chapter in *The Myth of the Framework* (Popper, 1994), Popper admits that the theoretician may reconstruct P-S either `as it actually is´ or `as agents see it´ which suggests that, over time, he came to realize that matters were more complex than he had initially thought over. In any case, Popper does not comment on which version of *RP* social scientists should adopt. It is quite likely that this issue was not an intellectual priority for him since, after writing his *Poverty of Historicism*, the social sciences were no longer (if they ever were) his main preoccupation. Since the textual evidence available on this issue is scanty, ambiguous and inconclusive (and the scholarly discussion is almost non-existent), our strategy is to look at other contributions by both Popper and his good friend Hayek (from whom he imported some fundamental ideas) to issue a provisional verdict of what Popper would have concluded had he settled himself to the task of reflecting on it. In the rest of this

section we discuss the coherence of both *RPo* and *RPs vis-à-vis* Popper´s `evolutionary epistemology´ and `Oedipus´ effect and Hayek´s views on the `objective´ and the `facts´ of the social sciences.

4.1. Popper´s evolutionary epistemology and the `rationality of the actors´

Popper´s Darwinian version of `evolutionary epistemology´ essentially consists of three separate elements: (i) a theory of knowledge that rests on the notion that all our knowledge is *conjectural*, (ii) an evolutionary theory of learning according to which the growth of knowledge occurs by virtue of an (imperfect) process based on trial and error-elimination, and (iii) his claim that the adaptation of our knowledge to the surrounding environment is *imperfect* owing to the fact that some errors escape and, hence, are not eliminated.[15] Hereafter, we denote the theory made up of all these elements as `Popper´s evolutionary theory of knowledge and learning´ or PTKL (Popper, 1963, 1972, 1990). This implies that we can find two different notions of `rationality´ in Popper´s works: (i) behaviour that is appropriate to the `logic of the situation´, and (ii) willingness to revise one´s beliefs in the aftermath of one´s mistakes (Popper, 1985, p. 364; 1994, p. 180). As several commentators have explained, the watershed between `rational´ and `irrational´ behaviour in PTKL is the *unwillingness of an individual to correct her wrong beliefs* or the *incorrigibility* of her beliefs (Kerstenetzky, 2009; Lagueux, 2006). Thus, hereafter we make a distinction between (i) the rationality of actors from the perspective of PTKL and (ii) the rationality of actors from the perspective of SA.

Now, we wonder how SA would be affected if the actors in a situational model behaved as if they exhibited a theory of knowledge and learning akin to PTKL. To be sure, a situational model consists of three types of elements: (i) external and observable elements such as the physical and, perhaps, the social constraints that actors are subject

to, (ii) the knowledge that actors possess, and (iii) their goals. Now, if the actors of a situational model behave according to PTKL, the situational model should incorporate all the knowledge that actors possess including their accumulated experience from past mistakes. `Adequate´ behaviour in this context implies, as a minimum, not repeating previous mistakes. However, there is no further guidance for actors stemming from their previous mistakes in case they need to make decisions related to new (and, probably, different) P-S. In short, if actors´ behaviour accords with PTKL the situational model will need to take into consideration actors´ `learning´ but, provided this requirement is fulfilled, the former may be compatible with typical behaviour that is *adequate* to the `logic of the problem-situation´. That said, we think that such compatibility may cease to hold if the theoretician adopts *RPo* for reasons we explain below.

4.1.1. *RPo versus* PTKL

Let us address first the compatibility of *RPo* and PTKL. We argued above that the adoption of our (upgraded) formulation of *RPo* implies *de facto* the `imposition´ of the theoretician´s view of the P-S on the actors. As we explained, this is because even if the theoretician reconstructs the P-S `as she believes it actually is´, it logically follows that she implicitly assumes that, at least `on average´, *actors see the P-S as she does*. Now, to the extent that the theoretician (implicitly) assumes that her view of the P-S is `correct´, it follows that she also assumes that actors´ view of the P-S is `correct´.[16] That is, by adopting *RPo* she assumes that actors *possess as much knowledge as she does*. Crucially, and since *RPo* implies that actors´ behaviour is assumed to be `adequate´ to the P-S as `the theoretician believes it is´, the former also implies that, if the theoretician adopts *RPo*, then she implicitly assumes that *actors only make random or non-recurrent mistakes*. Let us explain this. Since the knowledge the theoretician (implicitly) assumes

she possesses is ‘correct’ but of an oversimplified form, then the only type of mistakes that actors can make if *RPo* is adopted are *random* ones. The occurrence of the latter stems, arguably, from the `oversimplified´ nature of the knowledge the theoretician (and, hence, actors) possess which implies that the latter cannot know each and every detail of the P-S. As a result of it, there may well be *random* discrepancies between expected and realized outcomes owing to the presence of unexpected variations in the surrounding environment. However, and crucially, we believe that all this is anathema to PTKL. The latter implies that actors´ `learning´ through trial and error-elimination is *imperfect* in the sense that some of their mistakes will inevitably escape and that, as a result of it, the adaptation of their knowledge to the surrounding environment is *never* optimal. In turn, this entails that the possibility that the actors in a situational model make non-random or recurrent mistakes cannot be ruled out *ex-ante* since PTKL implies that they are fallible and, hence, error-prone. To conclude, to the extent that *RPo* implies that the theoretician (implicitly) assumes that the actors in a situational model do not make non-random mistakes it follows that such behaviour is at odds with PTKL *since the latter implies that actors´ mistakes may also be non-random*. We need to stress here that we refer to the compatibility of SA and PTKL when viewed from the perspective of the ‘behaviour of the agents in a situational model’ and not from the perspective of the behaviour of the theoretician. In other words, we do not mean that the adoption of *RPo* as a research device by the theoretician is incompatible with PTKL. Rather, all we mean is that if we compare *how* the agents in a situational model would behave if their behaviour actually accorded with PTKL with their hypothesized behaviour if the theoretician adopts *RPo*, then there is a conflict because PTKL implies that agents make non-random or recurrent mistakes whereas *RPo* implies the opposite.

This conclusion may look paradoxical. On the one hand, Popper (2002[1976], p. 135) makes it clear that SA is an attempt to extend the methodology of (neoclassical) marginal utility theory to the rest of the social sciences and some of his commentators explicitly associate *RPo* with neoclassical economic theory (Hutchison, 1997; Oakley, 1999).[17] On the other hand, we have argued above that situational models based on *RPo* (in both Popper´s and our formulation of it) are in conflict with PTKL when viewed (but only when viewed) from the point of view of the hypothesized behaviour of the actors in a situational model. Does Popper take for granted that the behaviour of the actors in situational models based on *RPo* is compatible with the behaviour they would exhibit if they acted according to PTKL? We do not know. It may simply be the case that he did not have the time to ponder in detail the compatibility of such models with PTKL or else (though this is much less likely) that he thought this problem is of little relevance. Be that as it may, we think that an advantage of situational models based on *RPo* over situational models based on *RPs* when looked at from the perspective of the theoretician (and perhaps the principal reason why the former are more widely used than the latter in theoretical social sciences like economics) is that *adoption of the former instead of the latter is more likely to enable the theoretician to generate unambiguous predictions*. In particular, we argued above that if the theoretician adopts *RPo* she implicitly assumes that actors do not make non-random mistakes. Now, if it is assumed that actors do not make non-random mistakes and the theoretician reconstructs the P-S `as she believes it is´, it follows that unambiguous testable predictions can, in theory, be generated.[18] This is because, in such case, the `onus of proof´ of the testable predictions generated rests fully on the theoretician´s supposedly `correct´ (oversimplified) view of the P-S. More specifically, if a prediction turns out to be wrong, then the theoretician cannot blame the insufficient or inadequate knowledge of the actors for the failure. Rather, she can only

blame herself. By contrast, as we explain below, if the theoretician adopts *RPs* instead, she can avert falsification more easily by claiming that her predictions have turned out to be wrong because of actors´ *changing* beliefs.

We conclude that, in spite of being at odds with PTKL when viewed (and only when viewed) from the perspective of the behaviour of actors in a situational model, the widespread use of situational models based on *RPo* in social sciences such as economics and its adoption (to a lesser extent) in other social sciences may probably be attributed to the fact that they exhibit a clear advantage *vis-à-vis* situational models based on *RPs* when viewed from the perspective of the behaviour of the theoretician. In particular, by assuming that actors *never* make non-random or recurrent mistakes, situational models based on *RPo* are more likely (relative to situational models based on *RPs*) to generate unambiguous predictions.

4.1.2. *RPs versus* PTKL

Let us now consider the compatibility of PTKL with *RPs*. As we have argued above, the adoption of our reformulated version of *RPs* implies that the theoretician seeks to reconstruct the P-S `as she believes that actors believe that the P-S is´ despite the fact that she thinks that actors´ view of the P-S is partially wrong. First, we should like to argue that (unlike *RPo*) *RPs* is compatible with PTKL when inspected from the perspective of the hypothesized behaviour of the actors in the situational model insofar as, in situational models based on *RPs*, actors may well make *non-random* or recurrent mistakes due to their (assumed) partially wrong knowledge. We believe such behaviour of the actors in a model accords with the notion embodied in PTKL that the adaptation of our knowledge to the surrounding environment is *never* optimal since some mistakes inevitably escape. Second, we saw above that another implication of PTKL is that actors

`learn´ from their mistakes albeit the possibility that they repeat *some* of their mistakes cannot be ruled out. Consequently, compatibility of situational models based upon *RPs* with PTKL when viewed from the point of view of the hypothesized behaviour of actors in situational models requires that the theoretician assumes that actors´ knowledge (i) is *partially* wrong so that some of their mistakes may be non-random, and (ii) *evolves* by means of `learning´. We believe that models based on *RPs* fulfil these two requirements albeit fulfilment of (i) may require that the theoretician regularly `updates´ her view of actors´ (evolving) beliefs.[19] However, and crucially, the evolution of actors´ (partially wrong) knowledge in situational models based on *RPs* constitutes a source of tension between the latter and falsification. Tension arises here because the *evolution of actors´ beliefs makes it less likely, when compared to situational models based on RPo, that situational models based on RPs can generate unambiguous testable predictions*. To be sure, if the testable predictions generated by a situational model based on *RPs* turn out to be wrong *ex-post* the latter can, in principle, be saved from falsification by blaming, for instance, the changing character of actors´ beliefs. In particular, if the theoretician adopts *RPs* the `onus of proof´ does not rest upon her knowledge of the P-S but, rather, upon her knowledge of the actors´ partially wrong and evolving perception of *their* P-S. In other words, if a prediction turns out to be wrong, the theoretician can always blame to `unexpected´ changes in actors´ beliefs to account for the former.[20] Now, we do not mean here that situational models based on *RPs* cannot generate unambiguous testable predictions. We mean that, under normal circumstances, it is *easier* to avert falsification in situational models based on *RPs* than in those ones based on *RPo* and that this may be one reason why situational models based on *RPo* are more common that situational models based on *RPs* in the social sciences.

4.2. The `objective´ of the social sciences

The next issue we address is the relation of *RP* to Popper´s view of the objective of the social sciences. As Popper duly admits (Popper, 1966[1943]), his thoughts on this issue were inspired by Hayek. According to the latter, social studies deal `not with the relations between things, but with the relations between men and things or the relations between man and man. They are concerned with man´s actions and their aim is to explain the unintended or undesigned results of the actions of many men´ (Hayek, 1942, p. 276). In a similar fashion, Popper explains that both our institutions and traditions are the `indirect, the unintended and often the unwanted by-products´ of conscious and intentional human actions and, consequently, that `only a minority of social institutions are consciously designed, while the vast majority have "grown" as the undesigned results of human actions´ (Popper, *op. cit.*, p. 93). It follows that both Hayek and Popper believe that the main objective of the social sciences is to explain the unintended repercussions of intentional human actions. This being the case, we wish to argue that situational models based on *RPs* exhibit an advantage over situational models based on *RPo* when the aim of the theoretician is to explain the unintended effects of intentional human actions. To illustrate this idea let us distinguish between two different scenarios. In the first scenario, the theoretician assumes that the actors in the situational model do *not* have full knowledge of the unintended consequences of their intentional actions whereas in the second scenario she assumes that actors *do* have such knowledge.

Let us address our first scenario. To the extent that the theoretician assumes that the actors in the situational model do not exhibit full knowledge or understanding of the unintended repercussions of their actions it follows that their view of the P-S is assumed to be either partially wrong or incomplete. This being the case, and in line with our previous discussion above, we cannot rule out that they make non-random mistakes

where the latter may consist of either desirable or undesirable discrepancies between expected and realized outcomes.[21] Importantly, such discrepancies can be caused by the occurrence of unintended consequences that stem from the self-interested actions of the actors. We think this type of scenario can hardly be captured by adopting *RPo* since, as we explained above, the adoption of *RPo* implies that in the resulting situational model actors *never* make non-random mistakes in the sense that their self-interested actions do not bring about any unpredicted discrepancies between expected and realized outcomes. In other words, although the possible making of random mistakes by actors implies that their intentional actions may have unintended repercussions, *it is nevertheless the case that it is not possible for a scientist to 'explain' the unintended repercussions of actors´ self-interested actions as long as she assumes that the actors in her situational model only make random and, hence, unpredictable mistakes*. Rather, if she is to provide an `explanation´ of the unintended repercussions of actors´ actions in this type of scenario at least some of actors´ mistakes need to be non-random or recurrent in the sense of being based on either partially wrong or incomplete views of the P-S. Thus, we believe that situational models based on *RPs* constitute a more fruitful avenue for `explaining´ the unintended repercussions of self-interested actions. Unlike situational models based on *RPo*, the former implicitly presuppose that actors´ view of the P-S is either partially wrong or incomplete so that the occurrence of (desirable or undesirable) discrepancies between expected and realized outcomes in the wake of self-interested actions by an individual and, hence, the occurrence of unintended social repercussions can be more easily explained by the theoretician.

Our second scenario is characterized by the fact that the social scientist assumes that actors do have *full* knowledge or understanding of the unintended consequences of their actions. A typical example of this scenario is the one known in the literature as the

`Tragedy of the Commons´ in which the self-interested actions of a certain number of individuals eventually cause the full destruction of a (valuable) common good even though they are fully aware of the unintended consequence of their actions.[22] One would think *a priori* that a P-S where the actions of actors who exhibit such full understanding of the unintended (and unwanted) consequences of them (e.g., destruction of a common good) can be adequately reconstructed by adopting *RPo* insofar as actors `know´ that their actions will inevitably bring about such unintended outcome yet they opt to carry it out anyway. However, we intend to show below that this scenario is better described by adopting *RPs.* Let us consider a 'non-cooperative' game played by a very large number of actors where *each* actor can adopt only one of the following two courses of action:

(i) Course of action (I) is apparently beneficial for an individual actor taken in isolation given the system of (strictly) economic incentives she faces yet is detrimental from the social or collective perspective *if* most actors decide to follow it since it implies the destruction of the common good and, hence, it may be detrimental in the long run even from the individual point of view as a result of it.

(ii) Course of action (II) is initially detrimental for an individual actor from a strictly economic perspective regardless of the course of action followed by the other actors yet, *if* most actors adopt it, it is beneficial from the social perspective in the sense that it does not eventually lead to the destruction of the common good and, hence, it may well be beneficial in the long run even from an individual perspective insofar as it guarantees the preservation of the common good.

In order to make our point about the desirability of adopting *RPs* in this type of scenario, we initially assume that all actors exhibit 'full understanding' of the P-S they face in the sense that each and every actor *knows* that:

(i) If most actors adopt course of action (I) rather than (II) the final outcome is detrimental for all actors since the common good is destroyed even though they may initially (i.e., before the destruction of the common good) obtain an economic gain.

(ii) If most actors adopt instead course of action (II) the common good will not be destroyed and, hence, an individual actor will now (and paradoxically) have an incentive to adopt course of action (I) since, even if she does so, this will not lead to the destruction of the common good.

In other words, each individual actor knows that whether or not her adoption of course of action (I) is beneficial at the individual level by the time the game is over and when due account is taken of the final fate of the common good will depend upon the course of action adopted by the *majority* of the actors.

Next, if the social scientist adopts *RPo* she implicitly assumes that all actors exhibit 'full understanding' of the P-S they face which, in this example, implies that each actor knows for certain the course of action that *all* actors will adopt and each of them knows, in turn, that each and every actor knows it. In this setting, the adoption of *RPo* by the social scientist leads to the contradictory result that, *if* most actors incur a future (both economic and non-economic) significant loss as a result of the eventual destruction of the common good, some of them may decide to follow course of action

(II) instead of (I) so that the destruction of the common good may or may not materialize.[23] In other words, if we assume that all actors exhibit full understanding of their P-S then, and paradoxically, the final outcome is *uncertain*. The latter will depend upon the value of the economic benefit that the `average´ actor obtains from adopting course of action (I) relative to the (economic and non-economic) loss that she incurs if the common good is destroyed. The larger the former is relative to the latter, the more likely it is that most actors will adopt course of action (I) and that the common good will be destroyed and vice-versa. Therefore, and crucially, the eventual destruction of the common good can only be predicted with a high degree of confidence if we assume that the economic loss that the `average´ actor incurs if the common good is destroyed is negligible or, else, very small relative to the economic benefit that the actor obtains from the use of the common good. Be that as it may, the social scientist *cannot* predict the final outcome (i.e., whether the common good will be destroyed) unless she knows:

1. The value of the economic benefit the `average´ actor obtains from the adoption of course of action (I) relative to the (economic and non-economic) loss that she incurs if the common good is destroyed and, crucially,

2. The beliefs of the `average´ actor as to the likely course of action adopted by the majority of actors.

Both elements are clearly *subjective* and, hence, the scientist cannot predict *ex-ante* the final outcome of this game if she adopts *RPo unless* we assume that the loss the `average´ actor incurs in case the common good is destroyed is either negligible or very small relative to the individual benefit they obtain from the use of the common good.

However, as we explain below, if the scientist adopts *RPs* rather than *RPo* and assumes in turn that actors possess *incomplete* knowledge or understanding of their P-S in the sense that they are uncertain as to the course of action that the majority of actors will follow, *she can predict that most actors will adopt course of action (I) without having to assume that the loss caused to actors by the destruction of the common good is either negligible or very small relative to the initial individual benefit they obtain from its use*. In other words, we show below that the adoption of *RPs* rather than *RPo* by the social scientist enables her to *increase* her explanatory power, that is to say, to widen the range of social situations under which she can predict that the common good will eventually be destroyed even when actors are fully aware of this unintended possibility.

Now, let us assume that the scientist adopts our reformulated version of *RPs* and, hence, that she assumes that most actors exhibit *incomplete* knowledge or understanding of P-S and, in addition to it, adopts the viewpoint of actors. More specifically, it is still the case that actors *believe* that:

(i) If most actors adopt course of action (I) the common good will be destroyed and they will thus incur a social loss yet and, crucially,

(ii) They are *uncertain* as to whether the other actors are aware of the former and, consequently, they are uncertain as to the relative proportion of actors who will actually follow course of action (I).

We believe this is a more realistic description of how actors *see* the P-S in the real world. Presumably, each actor attaches subjective probabilities to each course of action (that is, to the expected *relative* proportion of actors who will predictably adopt

course of action (I)) but the probabilities will differ across actors. The incomplete nature of the knowledge possessed by them stems from the *uncertainty* about what course of action most actors will adopt. In any case, we believe it is precisely such uncertainty that makes it likely that most actors will finally adopt course of action (I) because they *believe* that, since it is uncertain what the majority of actors will do, it is also uncertain whether the common good will be destroyed and, therefore, there is a higher likelihood that they will end up adopting course of action (I). Let´s put it this way, these examples show that *the more knowledge the theoretician assumes that actors possess about other actors´ future behaviour the less predictable their behaviour becomes*. In particular, it is only when most actors in a situational model are uncertain (because their knowledge is incomplete) about the particular course of action that most actors will follow that the likelihood that most of them finally adopt course of action (I) is high and, hence, that a clear prediction can be generated without having to assume (as it was the case above when *RPo* was adopted) that the individual loss that actors incur if the common good is destroyed is very small relative to the individual benefit they obtain from their use of the common good. In other words, the more uncertain each actor is as to how likely it is that other actors will follow course of action (I), the less likely it is they will conclude that the outcome will be detrimental to them (because it is less likely that it will lead to the destruction of the common good) and, paradoxically, the more likely it is they will end up adopting course of action (I).

Lastly, if most actors eventually adopt course of action (I) and the common good is destroyed it will turn out that actors´ knowledge of P-S was not only `incomplete´ but also partially wrong, at least *ex-post*. Further, as the degree of uncertainty of individual actors as to the course of action to be adopted by the rest of the actors *decreases* (or as the degree of incompleteness of their knowledge decreases) so that we converge to the

scenario we have associated to *RPo* above, the *less* predictable that individual behaviour becomes for the reasons we expounded above. In short, it is incomplete and/or uncertain knowledge on the part of the actors captured by the theoretician as she adopts the point of view of actors that, in this example, allows her to generate clear predictions about the well-understood unintended (and undesirable) consequences of actors´ self-interested actions. However, and crucially, incomplete and/or uncertain knowledge is incompatible with our reformulated version of *RPo*. To conclude, if the objective of the theoretical social sciences is, as Popper makes it clear, to `explain´ the unintended consequences of intentional human actions, we think there is an advantage to the social scientist if she adopts *RPs* rather than *RPo*.

4.3. The `facts´ of the social sciences

Let us now address the relation between SA and the nature of `facts´ in the social sciences. According to Hayek (1943), and unlike the facts of the natural sciences — which are largely independent of the theoretician´s point of view — the `facts´ of the social sciences are all *interpretations*. That is, according to Hayek, the concepts we use in the social sciences are not just abstractions like the ones we use in the physical and natural sciences but they usually abstract from all the physical features of the objects they refer to. Hayek (1943, p. 3) denotes such concepts as `teleological´ because they can only be defined by postulating relations between three different terms: (i) a purpose, (ii) somebody who holds it, and (iii) an `object´ that the person in question sees as a suitable means to achieve that purpose. As he explains:

`We could say that all these objects are defined not in terms of their "real" properties but in terms of *opinions* people hold about them. In short, in the social

sciences *the things are what people think they are*. Money is money, a word is a word, a cosmetic is a cosmetic, if and because somebody thinks they are. That this is not more obvious is due to the historical accident that in the world in which we live the knowledge of most people is approximately similar to our own…´ (*op. cit*., emphasis added).

Further, Hayek (*op. cit*.) argues that in the typical P-S analysed in the theoretical social sciences actors´ *interpretation* of it becomes an `integral´ part of the former thus affecting subsequent developments. In particular, to the extent that actors understand P-S *via* the internal models they create for that purpose, their understanding of the former will affect their decisions and, by this route, it may *affect the P-S itself*. For instance, let us consider the case of `bank panics´ to illustrate this. The occurrence of a `bank panic´ is, arguably, not necessarily related to the *actual* liquidity situation of a bank. Rather, its occurrence is more likely to depend on its *depositors´ beliefs* about the capacity of the bank to cash their deposits on demand. To be sure, if depositors have doubts about the ability of the bank in question to comply with its obligations if they attempt to withdraw money from their bank accounts (and *regardless* of the `true´ liquidity situation of the bank), a `bank panic´ will likely ensue and, unless the Central Bank short-circuits the latter by providing the bank with all the necessary liquidity, the bank will *actually* go illiquid. This is not to deny that bank depositors will normally consider the `objective´ indicators related to the liquidity of the bank in question when they evaluate (if they can do so) the likelihood of the latter going illiquid. Rather, we want to argue here that what matters for depositors´ decisions is not so much the `objective´ information about the liquidity situation of the bank as actors´ subjective view of it.[24] However, and crucially, if the latter does significantly affect the former, the *actual* P-S will not be independent

of depositors´ beliefs and, consequently, it will not be sensible to assume that there is an `objective´ P-S that can be `known´ by the theoretician but *not* by the actors themselves. We believe this idea is captured in the following comment by Hayek:

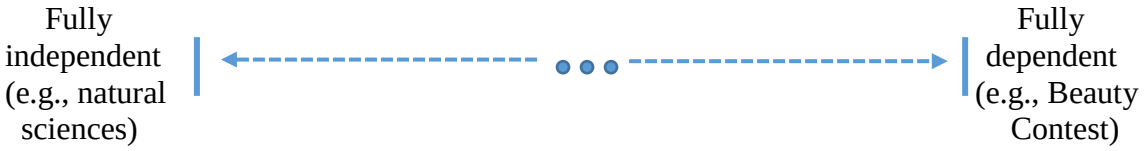
`Perhaps the relevant distinction comes out most clearly in the general and obvious statement that no *superior* knowledge the observer may possess about the object, but which is not possessed by the acting person, can help us in understanding the action in question´ (*op. cit*., emphasis added).

That is, according to us, Hayek suggests that, to the extent that the P-S depends on actors´ interpretation of it, it follows that the scientist does not stand in a privileged position to observe the `objective´ P-S. The implication is that a more fruitful strategy for the scientist is to reconstruct P-S *as agents believe it is*. That is to say, if there is not an `objective´ P-S that is (fully) independent of actors´ views, the scientist may have a better chance of understanding social phenomena if she seeks to adopt actors´ viewpoint. This is not to deny, however, that there may be some circumstances when the scientist may prefer, for the sake of simplicity, to adopt *RPo* instead of *RPs*. In particular, there may be circumstances when, according to her, the P-S is sufficiently independent from actors´ beliefs as to warrant the adoption of *RPo*.

Now, this suggests that *RPo* represents a *limit* or *extreme* scenario within *SA*. In particular, we believe that *RPo* represents a limit case of SA that is characterized by the *assumption that the P-S is substantially independent from actors´ beliefs* and that, as a result of it, the theoretician can acquire knowledge of the P-S that is, as a minimum, equivalent to the actors´. Be that as it may, Hayek´s view of the nature of the `facts´ of the social sciences suggests there are some elements of the P-S such as the knowledge that actors possess and the social constraints their behaviour is subject to which depend,

at least partly, on actors´ beliefs so that the social scientist cannot claim to possess a superior knowledge of the P-S. In other words, although the adoption of *RPo* could *a priori* be justified in case the theoretician could acquire knowledge of the P-S that is not attainable by the actors, Hayek´s view is that this is not possible since, according to him, the P-S (i) consists partly of actors´ beliefs, and (ii) is affected by the latter.

Figure 1. Spectrum of scenarios according to the `degree of independence´ of the P-S from actors´ beliefs



This suggests that, as we illustrate in Figure 1 above, *SA* exhibits a spectrum of possible scenarios depending on the *degree of independence* of the P-S from the actors´ beliefs. At one end of it, there are those scenarios characterized by the *full* coincidence of the P-S with actors´ beliefs or, in other words, by the absence of any elements in the P-S whose properties could be said *ex-ante* to be *fully* independent from actors´ beliefs. An example of this type of scenario is the `Beauty Contest´ metaphor alluded to above in which there are no objective `facts´ because actors´ opinions about the beauty of each of the ladies portrayed in the photos are *subjective*.[25] At the other end of the spectrum there is the typical scenario in the natural sciences where most `facts´ can be said to be (almost) *fully* independent from the observers´ viewpoint.[26] Between these two extreme scenarios there is a wide spectrum of possible P-S characterized by a range of varying `degrees of independence´ of the P-S from actors´ beliefs so that, the lower the former is, the closer the scenario is to the *limit* case we have associated with the `Beauty Contest´ example. In general, the closer the P-S is to the right-hand end of the spectrum in Figure

1, the more desirable it will be to adopt *RPs*. However, if the P-S is sufficiently close to the left-hand end of the spectrum, it may be legitimate to adopt *RPo* for convenience. In other words, even if we recognize, as Hayek (1943) does, that the `facts´ of the social sciences are `interpretations´ there may well be situations where the P-S is *sufficiently* `independent´ from actors´ beliefs as to warrant the adoption of *RPo*. This implies, in turn, that the decision to adopt either *RPo* or *RPs* is ultimately a matter of judgement in that it is the theoretician who has to decide in advance whether the P-S is sufficiently independent from actors´ beliefs. In any case, and according to us, Hayek´s argument above suggests that the `onus of proof´ rests on those theoreticians who adopt *RPo* to show that the P-S that actors face is sufficiently independent from their beliefs as to warrant the adoption of the former.

4.4. The `Oedipus´ effect

Next, the phenomenon typically denoted as a `self-fulfilling prophecy´ (Merton, 1948) corresponds to the scenario where actors´ beliefs allegedly cause a change in their P-S such that the latter eventually converges to the former. In the conceptual framework portrayed in Figure 1 above, this will occur, for instance, when the P-S is located at the right-hand end of the spectrum, namely, the scenario that we have associated with *full* dependence of the actual P-S on actors´ beliefs. However, we wish to argue that a `self-fulfilling prophecy´ is a particular case of Popper´s `Oedipus´ effect (OE). Popper posits the latter in his *Poverty of Historicism* (Popper, 1957, p. 89) as a feedback mechanism whereby the beliefs or expectations of an actor alter the surrounding environment. Its sign is *a priori* ambiguous. If negative, then the actor´s beliefs will cause a change in the surrounding environment that narrows the gap between *ex-ante* beliefs and *ex-post* realizations. If positive, then the actor´s beliefs will cause a change in the surrounding

environment that widens the gap between *ex-ante* expectations and *ex-post* realizations. Arguably, if OE is negative and strong enough so as to bring about full convergence of *ex-ante* expectations and *ex-post* realizations we will thus obtain the scenario commonly known as a `self-fulfilling prophecy´. Now, what is the relevance of the concept of `self-fulfilling prophecies´ and OE for the decision to adopt either *RPo* or *RPs*? According to us, the extensive use that some social scientists make of the concept of `self-fulfilling prophecy´ to explain a wide range of economic and social phenomena added to the fact that the former can be interpreted as a *particular* case of OE suggests to us that the latter can potentially account for an even wider range of social phenomena. But, if so, this lends further support to our claim that, when reconstructing the P-S the `onus of proof´ rests on those social scientists who seek to reconstruct it `as they believe it actually is´ rather on those ones who seek to reconstruct it `as they believe that actors believe it is´. In other words, to the extent that a potentially wide range of social phenomena can *a priori* be reconstructed as particular manifestations of the existence of a negative and strong enough OE whereby changes in actors´ beliefs bring about a convergence of their P-S with the former, we think that this is a further reason in favour of the adoption of *RPs* by social scientists.

Lastly, it is not our purpose here to evaluate the relation between Hayek´s ideas on the `facts´ of the social sciences and Popper´s OE. However, given the friendship and intellectual promiscuity between Hayek and Popper, it is quite likely that Popper was familiar and even supportive of the former.[27] Be that as it may, what is relevant for our previous discussion is that, according to us, both Hayek´s reflections on the `facts´ of the social sciences and Popper´s OE suggest that, when seeking to reconstruct the P-S, and unless the former can be shown to be sufficiently independent from actors´ beliefs, the theoretician can attain a deeper understanding of a social phenomenon if she seeks

to adopt actors´ viewpoint. Let us explain this. On the one hand, Hayek (1943) makes it clear that the scientist does not stand in a privileged position *vis-à-vis* the actors with regard to knowledge of the P-S. On the other hand, Popper´s notion of OE implies that, at least when it is negative (which is, arguably, the common case) and strong enough, there is an advantage in terms of potential explanatory power to reconstructing the P-S `as agents believe it is´ insofar as the former is likely to be significantly affected, if not determined, by actors´ beliefs. Again, in the example of the bank we presented above, if the social scientist tries to understand why a bank has gone illiquid or to predict under what type of circumstances a bank (in the absence of Central Bank intervention) might go illiquid in the future, and for the reasons we have expounded above, it appears to be a more fruitful strategy to analyse the financial situation of the bank in question `as the scientist believes that depositors see it´ than as the former believes that `an independent financial analyst would see it´.

5. Summary and conclusions

In spite of its simplicity Popper´s methodological prescription for the theoretical social sciences known as `Situational Analysis´ (SA) remains both underdeveloped and underutilised in the social sciences. Most controversies surrounding SA have revolved around the principle lying at its core, the `Rationality Principle´ (*RP*). Discussions about *RP* by philosophers of science and social science methodologists alike have focused on its compatibility with falsification and on its role and status. Starting with Latsis (1983), the distinction between an `objectivist´ and a `subjectivist´ *RP* has been a constant in the literature. In the wake of it, Popper (1994) admits that there are, at least, two different versions of *RP*. Unfortunately, he did not comment on either *how* these two *versions* relate to other parts of his works (other than falsification) or *which* particular version

social scientists should adopt. The absence of explicit pronouncements on these issues by Popper may, arguably, have contributed to the underutilisation of SA. Further, and to the best of our knowledge, there has been hardly any debate among his commentators about these issues. Be that as it may, we think that a discussion of which version of *RP* social scientists should use is of utmost importance.

In section 3 we argued that Popper´s late presentations of the `objectivist´ (*RPo*) and `subjectivist´ (*RPs*) version of *RP* do not *explicitly* capture the conjectural nature of knowledge (the cornerstone of Popper´s epistemology) and the subjective nature of the 'facts´ of the social sciences. Although Popper admits that the theoretician´s view of the problem-situation (P-S) and her view of actors´ view of it are 'conjectural', we believe that his *RP* does not explicitly recognize it. We also claimed that his formulation of *RP* does not explicitly capture either the fact that, as Hayek puts it, the 'facts' of the social sciences are all *interpretations* and, hence, they exhibit a degree of subjectivity that is unmatched by the 'facts' of the physical and natural sciences. Now, in view of the fact that a good many social scientists lack any training in the methodology and philosophy of the social sciences, we argued that the provision of a formulation of *RPo* and *RPs* that explicitly captures these two key features may help the former produce better social science. Consequently, we propounded an upgraded formulation of both *RPo* and *RPs* which, according to us, captures these two features.

In section 4 we presented several arguments whereby we think that had Popper reflected upon the compatibility of *RPo* and *RPs* with the rest of his works, and for the sake of internal consistency, he would have recommended social scientists to adopt, in most cases, *RPs* rather than *RPo*. In particular, we discussed the following sets of ideas: (i) Popper´s *evolutionary* theory of knowledge and learning (PTKL), (ii) the notion (apparently inspired by his good friend Hayek) that the main objective of the theoretical

social sciences is to explain the *unintended* repercussions of intentional human actions, (iii) Hayek´s argument that the 'facts' of the social sciences are *interpretations*, (iv) and the `Oedipus´ effect. We believe that the arguments presented above lend support to commentators such as Koertge (1975), Hands (1991), and Nadeau (1993) who suggest that *RPs* is the correct interpretation of *RP*. Furthermore, we also argued that (i) *RPo* is in conflict with PTKL when viewed (but only when viewed) from the perspective of the hypothesized behaviour of actors in a situational model insofar as models based on *RPo* imply that actors *never* make non-random or recurrent mistakes whereas PTKL implies that the occurrence of such mistakes is a possibility, (ii) that its widespread use in social sciences like economics may probably be ascribed to the capacity of situational models based on it to generate unambiguous predictions, and (iii) that although situational models based on *RPs* are compatible with PTKL when viewed from the perspective of the behaviour of actors in situational models, they nonetheless exhibit a certain tension with falsification due to their more *limited* capacity (relative to models based on *RPo*) to generate unambiguous testable predictions. We then argued that *RPo* represents a `limit´ case within a potentially wide spectrum of P-S characterized by *full* independence of the P-S from actors´ beliefs. Notwithstanding it, we also argued that its adoption may be justified in those cases where the P-S is not significantly affected by actors´ beliefs and in those other cases where (i) the main purpose of the social scientist is to explain the unintended but nevertheless well-understood repercussions of actors´ intentional actions, and (ii) actors´ welfare is not significantly affected by the latter.

Last, and in spite of Popper´s unknown position on these issues, we believe that the arguments presented above point, as a minimum, to the desirability of carrying out an analysis of the implications for the theoretical social sciences of adopting each of the two versions of *RP* discussed above and highlight that, to the extent that Popper did not

integrate all his contributions to the philosophy of the social sciences within a single unified conceptual framework, a pending task for philosophers and methodologists is to accomplish such integration. We believe this study represents a modest attempt to make progress in both directions albeit this belief is, of course, conjectural.

References

Caldwell, B. J. (1991) Clarifying Popper, *Journal of Economic Literature*, 29(1), pp. 1-33.

Caldwell, B. (2006) Popper & Hayek. Who Influenced Whom? in Ian Jarvie, David Miller & Karl Milford (eds.), *Karl Popper: A Centenary Assessment: Life and times, and Values in a World of Facts: Volume I,* pp. 111-124, Aldershot: Ashgate.

de Bruin, B. (2006) Popper's Conception of the Rationality Principle in the Social Sciences, in Ian Jarvie, David Miller & Karl Milford (eds.), *Karl Popper: A Centenary Assessment: Selected Papers from Karl Popper 2002: Volume III: Science*, pp. 209-217, Aldershot: Ashgate.

Hands, D. W. (1985) Karl Popper & Economic Methodology: A New Look, *Economics & Philosophy*, 1(1), pp. 83-99.

Hands, D. W. (1991) Popper, the rationality principle and economic explanation, in G. K. Shaw (ed.) *Economics, Culture and Education: Essays in Honour of Mark Blaug*, Cheltenham: Edward Elgar, pp. 108-119.

Hands, D. W. (1992) Falsification, Situational Analysis and Scientific Research Programs: The Popperian Tradition in Economic Methodology, in de Marchi, N. (ed.) *Post-Popperian Methodology of Economics: Recovering Practice*, pp. 19-54, Boston: Kluwer Academic Publishers.

Hardin, G (1968) The Tragedy of the Commons, *Science*, 162 (3859), pp. 1243–1248.

Hayek, F. A. (1943) The Facts of the Social Sciences, *Ethics*, 54(1), pp. 1-13.

Hedström, P., Swedberg, R. & Udéhn, L. (1998) Popper´s Situational Analysis and Contemporary Sociology, *Philosophy of the Social Sciences*, 28(3), pp. 339-364.

Hoover, K. D. (2016) Situational Analysis, Working Paper 2016-17, *Center for the History of Political Economy*, Duke University.

Hutchison, T. W. (1997) On the relation between philosophy and economics. Part II: To what kind of philosophical problems should economists address themselves? *Journal of Economic Methodology*, 4(1), pp. 127-151.

Iwai, K. (2009) The Second End of Laissez Faire ― Bootstrapping Nature of Money and Inherent Nature of Capitalism, *CIRJE-F-646 Discussion Paper*, August, University of Tokyo.

Kerstenetzky, C. L. (2009) Plural situational logic: the rationa(lisabi)lity principle, *Cambridge Journal of Economics*, 33(2), pp. 193-209.

Keynes, J. M. (1936) *The General Theory of Employment, Interest and Money*. Cambridge: Macmillan.

Koertge, N. (1975) Popper's Metaphysical Research Program for the Human Sciences, *Inquiry*, 18(4), pp. 437-62.

Koertge, N. (1979) The Methodological Status of Popper´s Rationality Principle, *Theory and Decision*, 10(1/4), January, pp. 83-95.

Lagueux, M. (1993) Popper and the Rationality Principle, *Philosophy of the Social Sciences*, 23(4), pp. 468-480.

Lagueux, M. (2006) Popper and the Rationality Principle, in Jarvie, I., Minford, K. & Miller, D. (eds.) *Karl Popper: A Centenary Assessment*, Vol. III (Science), pp. 197-217, Aldershot: Ashgate.

Lagueux, M. (2010) *Rationality and Explanation in Economics*, Routledge.

Latsis, S. J. (1983) The Role and Status of the Rationality Principle in the Social Sciences, in Cohen, R. S. & Wartoksky, M. W. (eds.) *Epistemology, Methodology, and the Social Sciences*, pp. 123-152, London: Reidel Publishing Company.

Matzner, E. & Bhaduri, A. (1998) The Socioeconomic Context: An alternative approach to Popper´s Situational Analysis, *Philosophy of the Social Sciences*, 28(4), pp. 484-97.

Matzner, E. & Jarvie, I. C. (1998) Introduction to the Special Issues on Situational Analysis, *Philosophy of the Social Sciences*, 28(3), pp. 333-338.

Merton, R. K. (1948) The self-fulfilling prophecy, *Antioch Review*, 8(2), pp. 193-210.

Nadeau, R. (1993) Confuting Popper on the Rationality Principle, *Philosophy of the Social Sciences*, 23(4), pp. 446-467.

Notturno, M. A. (1998) Truth, Rationality, and the Situation, *Philosophy of the Social Sciences*, 28(3), pp. 400-421.

Oakley, A. (2002) Popper´s Ontology of Situated Human Action, *Philosophy of the Social Sciences*, 32(4), pp. 455-486.

Pareto, V. (1917) *Traitè de sociologie generale*, Payot: Lausanne and Paris.

Parsons, T. (1937) *The Structure of Social Action*, McGraw Hill: New York.

Popper, K. R. (1966[1943]) *The Open Society & its Enemies*, Vol. II, London: Routledge & Kegan.

Popper, K. R. (1957) *The Poverty of Historicism*, London: Routledge & Kegan Paul.

Popper, K. R. (1963) *Conjectures & Refutations: The Growth of Scientific Knowledge*, London: Routledge and Kegan Paul.

Popper, K. R. (1966) *Of Clouds & Clocks: An Approach to the Problem of Rationality of and the Freedom of Man*, St. Louis: Washington University Press.

Popper, K. R. (1967) La rationalité et le statut du principe de rationalité, in E. M. Classen (ed.), *Les Fondements Philosophiques des Systèmes Economiques*, pp. 142-50, Paris: Payot.

Popper, K. R. (1972) *Objective Knowledge: An Evolutionary Approach*, Oxford: Clarendon Press.

Popper, K. R. (2002[1976]) *Unended Quest*, Routledge: New York.

Popper, K. R. (1985) The Rationality Principle, in D. Miller (ed.) *Popper Selections*, pp. 357-365, Princeton: Princeton University Press.

Popper, K. R. (1990) *A World of Propensities*, Bristol (UK): Thoemmes.

Popper, K. R. (1994) *The Myth of the Framework: In defense of science and rationality*, London: Routledge.

[1] Evaluations of Popper´s SA can be found in Koertge (1975, 1979), Latsis (1983), Hands, (1985, 1991, 1992), Caldwell (1991), Nadeau (1993), Lagueux (1993, 2006, 2010), Hutchison (1997), Notturno (1998), Oakley (2002), de Bruin (2006), Kerstenetzky (2009), Hoover (2016) and in the papers included in the two issues devoted to SA in the Symposium published in 1998 at journal *Philosophy of the Social Sciences*.

[2] Lagueux (2006, p. 202) proposes that, since refinements in model-construction in the social sciences imply that models exhibit more detailed descriptions of the situation, *RP* may alternatively be enunciated as implying that `the agent will agree with what is clearly presented by the model itself as the appropriate thing to do´.

[3] However, he notes that such `subjective´ notion of rationality as presented by Popper resembles Pareto´s notion of `subjectively rational actions´ (Latsis, 1983, p. 131). He recognizes that Popper is unclear on this since he hints at a stronger version of rationality in other parts of his 1967 paper that resembles the definition of rationality by Pareto and Parsons. He concludes that the `subjective´ version of rationality is *weaker* albeit *wider* in scope than the `objective´ version.

[4] Hands (1991, p. 112) subscribes this assessment.

[5] For instance, we might say that actors do not always possess the necessary `willpower´ or motivation to pursue the course of action they deem more appropriate. Another possibility is that actors´ behaviour is driven by anger, fury or exasperation. A discussion of this problem is in Lagueux (2010, pp. 104-5) who concludes that whether the behaviour of an actor is said to be `rational´ or `irrational´ by an independent observer, that is, whether it can be said to be appropriate to the P-S as seen by the actor is a matter of *interpretation*.

[6] As we mention below, there are two notions of `rationality´ in Popper´s works. One notion is associated to his evolutionary theory of knowledge and learning whereas another one is associated to his SA.

[7] In his analysis of the role and status of *RP* Latsis (1983) focuses on Popper´s analysis of the `mind-body problem´, that is, the analysis of the manner in which mental states affect behaviour as discussed in his paper `Of Clouds and Clocks´ (Popper, 1966). According to Latsis (1983, p. 139), *RP* represents Popper´s compromise solution to this problem whereby it is suggested that `our mental states control some of our behaviour and that this control is "of a plastic kind".´

[8] This touches upon the issue of the incompatibility of Popper´s *RP* and his falsificationist methodology. For instance, Caldwell (1991, p. 13) argues that 'Popper´s rationality principle represents an immunizing stratagem that is elevated to the status of an inviolable methodological principle'. By contrast, Koertge (1979, p. 93) interprets *RP* as the Lakatosian hard-core of Popper´s research program in the realm of the social sciences whereas the positive heuristic is 'his metaphysical theory of man as an evolving rational problem-solving animal'.

[9] However, Lagueux (*op. cit.*) recognizes that, in Popper´s mind, *RP* is not protected against falsification by the *decision* to maintain it since, according to him, *RP* is already falsified. Rather, this decision implies that it is the other elements of the situational model that are falsifiable.

[10] However, as Lagueux (2010, p. 104) remarks, we can never be sure that the flustered driver´s action is really `irrational´ since we can *never* be certain that she sees her P-S in a way that renders her behaviour appropriate to it. According to him, *RP* does not provide us with a clear watershed between `rational´ and `irrational´ behaviour.

[11] Indeed, Lagueux (2010, p. 104) refers to *RPs* as the `Freudian´ version of *RP*.

[12] Prior to this clarification, Popper had already recognized the existence of two different versions of *RP:*

`There are many cases in which we can reconstruct, *objectively* (even though conjecturally), (a) the *situation as it was* and (b) a very different *situation as it appeared to the agent*, or as it was *understood*, *or interpreted* by the agent. It is interesting that this can be done even in the history of science´ (Popper, 1972, p. 179, note 27).

Then, in *The Myth of the Framework*, Popper writes:

`It seems to me now that there are at least three senses of `rationality´ (and, accordingly, of the `rationality principle´), all objective, yet differing with regard to the objectivity of the situation in which the agent is acting: (1) *The situation as it actually was* — the objective situation which the historian tries to reconstruct. Part of this objective situation is (2) *The situation as the agent actually saw it*. But I suggest that there is a third sense intermediate between (1) and (2): (3) *The situation as the agent could* (within the objective situation) *have seen it*, and perhaps ought to have seen it´ (Popper, 1994, p. 183).

[13] For instance, Matzner & Bhaduri (1998, p. 487) write that `most of standard economic theory implicitly assumes *given* culture and *given* institutions. Those are usually identical with the researchers´ own personal knowledge, experience, and even prejudice´.

[14] When we say that the theoretician `imposes´ her view of the P-S on actors we mean that she implicitly assumes that actors´ subjective view of the P-S roughly coincides with hers.

[15] In particular, Popper writes that 'some of the errors that have entered the inheritable constitution of an organism are eliminated by eliminating their bearer; that is, the individual organism. But some errors escape, and this is one reason why we are all fallible: our adaptation to the environment is never optimal, and it is always imperfect' (Popper, 1990, p. 47).

[16] When we say that the theoretician implicitly assumes that actors´ knowledge is `correct´ if *RPo* is adopted we mean that such knowledge is assumed to be `complete´ even though such knowledge is of an oversimplified form. In turn, by `complete´ knowledge we mean that all the *relevant* aspects of the P-S are duly considered in the situational model.

[17] For instance, though Hutchison (1997) does not explicitly distinguish between *RPo* and *RPs*, he refers to a `fortified´ version of *RP* that is pervasive in mainstream economics and which includes the `full-knowledge´ assumption without which, he insists, *RP* is `almost empty´. By this, we interpret that he means that models which do not make use of the `full-knowledge´ assumption exhibit little capacity to generate testable predictions. In any case, he concludes that in its 'fortified' version, *RP* `seems a good or fair approximation in quite a range of cases, but no approximation at all in another important range of cases´ (*op. cit.*, p. 139).

[18] However, even in neoclassical microeconomics, probably the most formalized field in the theoretical social sciences, the generation of unambiguous testable predictions is not guaranteed. As an example, Heiner (1983, p. 561) notes that standard neoclassical optimization models are unable to imply the `Law of Demand´ (i.e., that a rise in the relative price of a commodity will lead to a fall in its demand) which is, arguably, the simplest empirical regularity in economics. He adds that we can use neoclassical consumer theory to argue that it is *unlikely* that a negative `income´ effect will outweigh the `substitution´ effect yet we cannot be sure that this will certainly be the case.

[19] Although we do not intend to dwell on this issue, this suggests that situational models based on *RPs* are likely to be valid only for a specific institutional and/or historical context.

[20] In situational models based upon *RPo* such `immunizing´ strategy is not available owing to the fact that the theoretician implicitly assumes that the actors´ view of the P-S roughly coincides with her´s. In other words, there can be no change in the actors´ beliefs that is not fully *anticipated* by the theoretician.

[21] To be sure, such discrepancies or `mistakes´ may have either desirable unintended repercussions like in the case of Adam Smith´s `invisible hand´ theorem or undesirable ones like in the Keynesian `paradox of saving´ whereby attempts by individual agents to increase their saving rate by cutting down consumption spending ends up leading to a decrease in aggregate income and, hence, to an eventual fall in the saving rate of many agents.

[22] The concept originates in an essay written in 1833 by William Forster Lloyd, who used a hypothetical example of the effects of unregulated grazing on common land (colloquially called "the commons") in Great Britain. The concept became widely known over a century later in the wake of an article written by the ecologist Garrett Hardin (1968).

[23] By a non-economic loss we mean any source of welfare loss that an individual actor may incur such as, for instance, guilt feelings stemming from the destruction of the common good or concern for the welfare of future generations.

[24] Another example of this idea is the famous story in John Ford's classic Western `The Man Who Shot Liberty Valance´. Ranse Stoddard (James Stewart's character) makes a career as a State Governor and U.S. Senator largely on the basis of his reputation as `the man who shot Liberty Valance´. However, as we all know, it was Tom Doniphon (John Wayne´s character) who really shot him.

[25] This intuition is brilliantly expounded in Iwai (2009, p. 8, emphasis added) who writes:

`In the end, the only reason a particular face is selected as the prettiest is that every competitor [in the Beauty Contest] believes every other competitor believes she is selected as the prettiest, without any support from reality, either objective or subjective. *The prettiest is the prettiest merely because she is selected as the prettiest*. What we see here is the working of the "bootstrapping" logic of Baron Münchausen who claimed he had pulled himself out of a swamp by pulling on his own bootstraps´.

[26] Of course, and in the aftermath of Heisenberg´s `uncertainty principle´, we can never say that a natural or physical phenomenon is *fully* independent of the actors´ viewpoint.

[27] A study where the intense intellectual exchange between Popper and Hayek is dissected is in Caldwell (2006).