

An Eco-Cognitive Model of Ignorance Immunization

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Abstract

In 2005, Woods described the epistemic bubble as an immunized state of human cognition that compromises the awareness of the agent about her beliefs and knowledge. The idea of an immunized knower swung with the proposal advanced by Gabbay and Woods of constructing a practical logic and epistemology, which can actually define itself as agent-centered, goal-oriented, and resource-bound. In order to carry out this project, in this paper we will introduce a symmetrical view on the agent immunization, focused on the agent's missing awareness of her ignorance, also highlighting the importance of considering the actual agent as cogently ignorant, too.

Keywords: Informal Logic; Belief-Revision; Bounded Rationality; Fallibilism; Ignorance; Epistemic Autoimmunity

Introducing Ignorance into the Naturalization of Logic

In 2003 Gabbay and Woods officially proposed a program, condensed in a series of volumes called "A Practical Logic of Cognitive Systems", to the aim of constructing new logical models able to fill the gap between the logical and cognitive representation of human agent and its "real" – eco-cognitive multi-dimensioned – counterpart. The last volume of the series, published in 2013, was aimed at drawing an empirically "sensitive" and "aware" form of logic, able to deal with actual reasoners' cognitive performances (Woods, 2013). At the same time the volume is a collection of the logical and cognitive studies concerning errors in reasoning and their productive character.¹ In this massive production, even if the focus has been on the third-way reasoning humans actually performs, especially the exploitation of errors and downfalls, the agent is always considered an enough acquainted reasoner, a *knower*, in her intents. The principles of her possibilities and boundaries are determined by general abundance theses that substantiate a form of fallibilism:

Proposition 3.2b *The Cognitive Abundance Thesis:* Human beings have knowledge, lots of it.

Proposition 3.2c *The Error Abundance Thesis:* Human beings make errors, lots of them.

Proposition 3.2d *The Enough Already Thesis.* Human beings are right enough about enough of the right things

¹Cf. the other volumes of the series (Gabbay & Woods, 2003, 2005).

enough of the time to survive and prosper (Woods, 2013, pp. 86–88).

In this perspective the presentation of the "right enough human being" is referred to the study of the cognitive endowments of an "actual" agent, mostly focusing on her knowledge and cognitive skills. The "ignorant" part is basically described as an innocent tendency to commit errors (even if lots of them) or treated in the light of fallacious reasoning. We contend, following Proctor, that "ignorance is more than a void" (Proctor, 2005, p. 2), it is an influential part of human cognition, and affects not only our deficiencies but also the ways we adopt to fill them with beliefs and knowledge.² Thus, aiming at furnishing a new contribution to the ambitious project of the naturalization of logic, we will introduce an explanation of the role played by the ignorant part of the "real agent". First of all, by analyzing the state that most indicates the presence of ignorance in the perspective of the agent herself, that is "the state of doubt" and, second, by showing how this state affects the Fallibilist principles (which are the base of the Abundance and the Enough Already Thesis) proposed by Woods.

The Visible Part of Ignorance: Peirce's Irritation of Doubt

Despite the topic of "doubt" undeniably holds a rich past in the history of philosophy, the interest around it in the last century has progressively decreased mainly because of the focus of analytical philosophy on the definitions of knowledge and truth. Many authors became more interested in specifying the visible boundaries that characterize certainty than in directly examining the nucleus of what is beyond it. Attention has been devoted to intertwine doubt with specific arguments such as ambiguity, vagueness, and credibility.

On the contrary, the philosophical background that informs the Naturalization of Logic resorts to Peircean tradition: Peirce directly examined the problem of doubt and tried to grasp its philosophical, epistemological, and cogni-

²Certainly fallacies and heuristics have always been considered the main door to step into the problem of "ignorance", see, for instance the classical (Hamblin, 1970; Walton, 1995; Woods, Irvine, & Walton, 2004) or the analysis of the so-called ignorance-preserving traits of abduction (Cf. (Aliseda, 2005), (Magnani, 2013) and (Gabbay & Woods, 2005))

tive essence. Indeed, in Peirce's pragmatist theory, the specific difference between doubt and belief is practical. He pictured the transition between the state of doubt to belief in terms of *action* and *reaction* of the agent who feels them. The relationship of the mental state of doubt with the active start of questioning and of the state of belief with the relief of the discovery of an answer is fundamental. It allows to clarify the profound connection between the epistemic conditions of the agent and her cognitive *reaction* to them. In accordance to this view, the main incentive that drives the agent to find a solution of the problems that torment her is the cognitive and psychological state related to the doubt itself: in particular, the *known difference between the feelings* that doubt and belief provoke. In a famous article, Peirce described the states of doubt and belief as antithetical (Peirce, 1998b), precisely in consideration of this aspect. Belief is considered the quiet state of affirming a principle (a proposition, an idea) and doubt an irritating condition, which not only deprives the agent of her certainties but, through that loss, compromises her quiet.

Thus, both doubt and belief have positive effects upon us, though very different ones. Belief does not make us act at once, but puts us into such a condition that we shall behave in some certain way, when the occasion arises. Doubt has not the least such active effect, but stimulates us to inquiry until it is destroyed (Peirce, 1998a, p. 114).

What Peirce defines as the *irritation of doubt* is an unwanted state of mind caused by the loss of certainty in the agent knowledge. We can consider this description as the easier way to see the *experience* of a part of ignorance. The individual desperately wants to escape from the condition of doubt (Peirce, 1998a) because, if belief is (at least) the confidence about having a reliable knowledge in order to act, the state of doubt implies the possibility of a blind spot in that knowledge, a missing direction to move toward. Ignorance, in the most visible and concrete form, appears to be just the formulation of specific doubts. In summary, our introduction to the problem of ignorance in the Naturalization of Logic clearly relates to the definition of doubt provided by Peirce, which appears to play the conceptual role of a perfect medium term between ignorance and knowledge. For this reason, we can take advantage of this Peircean definition to insert a complementary proposition into the Fallibilist principles we mentioned above.

Fallibilism: A Belief-Based Paradigm

In order to comprehend how Peirce's epistemology grounds the Naturalization of Logic we should leave for a moment the analysis of doubt and briefly revisit the definition of belief. Peirce describes the state of belief as having just three properties: "first, it is something that we are aware of; second, it appeases the irritation of doubt; and, third, it involves the establishment in our nature of a rule of action, or, say for short

a *habit*" (Peirce, 1998a, 5.397).³ Thanks to this scheme re-join and further deepen the main tenets of Woods' fallibilism indicated in the previous subsection.

The awareness of our belief state (that is, according to both Peirce and Woods, the only state that allows us "to know") obviously is what makes us able to define ourselves "knowers". In this perspective, the tendency to knowledge indicated by Woods in the proposition 3.2b is just a consequence of the awareness of how much we believe we know and how much we are able to learn. The second feature, the capacity of belief to appease "the irritation of doubt" is at the basis of the "Error Abundance" thesis, which composes the second item of Woods' fallibilism. Believing is a *pleasurable* state, a state that calms the agent and gives her the cognitive resources to act. It is this practical advantage that makes it preferable to doubt, no matter if it is *epistemically* more convenient or less. The tendency to commit errors (and so of believing in an incorrect, or "fast and frugal", statement instead of doubting it)⁴ of the actual agent is exactly derived from this unfortunate preference. Finally, the third condition of belief, which "involves the establishment in our nature of a rule of action, or, say for short a *habit*", can be seen as the feature that seals the "Enough Already Thesis". Even intuitively, believing to know something has two main consequences: a) it repels the irritation of doubt, making us sure about our own knowledge (sometimes compromising our ability to individuate errors in it) and, b) since belief gives us the possibility to act in the world upon a certain circumstance, we will be inclined to rely on the same belief as a principle for solving other similar circumstances. The "enough already thesis" does not affirm much more than the prevalence of the occurrence for our belief to be confirmed by a personal (more or less fortunate) experience.

The parallel between Woods' Fallibilist principles and the Peircean definition of belief allows us, first of all, to confirm the knowledge-based perspective of Woods' analysis itself. The actual agent is a *knower*, because she is also a *believer*. The fact she believes she knows implies the possibility of committing errors, but it does not compromise her epistemic status of knower. We contend, extending Woods' characterization of the actual agent, that ignorance is more than a simple tendency to commit errors: taking advantage of the description of belief in Peirce's work we can put down the equivalent three properties for doubt considering it as visible ignorance. Like belief, doubt is a state *we are well aware of*; it is an *unwanted* and *irritating* state for the agent; it requires

³For clarity, we should mention that the neat difference between doubt and belief, in Peircean perspective, is grounded on and limited by the *sensations* and the practical awareness of the agent. It is not in question whether we can have unconscious beliefs or doubts but, according to Peirce, how and why the ones we perceive as affecting our behavior are epistemologically relevant.

⁴Here, thanks to Gigerenzer's formula, (Gigerenzer & Goldstein, 1996), we are in general referring to the cognitive virtues of heuristic reasoning and fallacies, analyzed by informal logic, psychology, and cognitive science in the past forty years, cf., for example, (Gigerenzer, Todd, & the ABC Research Group., 1999; Woods, 2013; Ippoliti, 2015).

an *inferential reasoning* (and the fixation of another belief) in order to end. Two conclusions follow, one more evident than the other.

The most evident outcome is a definition of ignorance that is already formulated in Woods' theory. He defines ignorance as "inferentially productive", as a part of our cognition that we can examine through fallacious but effective inferential processes (Woods, 2013, p. 335). In this perspective we can rethink the principles of knowledge and error abundance adding a "doubt openness condition". The possibility of doubt and of recognizing and admitting ignorance opens the possibility of an improvement of the agent knowledge and so it enforces the tendency to gain new data (Knowledge Abundance). At the same time, as already said, doubt also implies a cognitive irritation that forces the agent to quickly arrive to a resolution of the problem at stake. This urgency can affect the inference, performed in order to solve the problem, making easy for the agent to commit errors (Errors Abundance).

The second and less evident consequence of introducing the doubt as "the visible part of our ignorance" in the fallibilist triad, is instead a sort of "negative" affirmation. Examining the epistemic status of ignorance at the conscious level, so addressing knowledge firstly as belief, and speaking of doubt as something that we do not recognize as belonging to our knowledge, we let the door open to the fact that an actual agent is not "simply" ignorant of what she is aware she doesn't know. Ignorance is not completely equivalent to doubt, it is not just a missing piece of our cognition, something that the agent knows she does not know. Doubt can be *perceived* as the frame of our ignorance, but it is the simple consequence of our fallible cognition. Of course the project toward the Naturalization of Logic has already proposed to extend the field in which knowledge can be investigated, contending the importance of the examination of the errors of reasoning and their "positive" aspects. Something more can be said: since ignorance corresponds to something that goes, at least partially, beyond the cognitive sight of the agent, we should investigate it as the Naturalization of Logic aims at explaining the limit of our knowledge: far beyond the self-perspective of the actual agent.

The "negative" affirmation permits us to have an "Enough Already Thesis", less indulgent with respect to the agent's actual status. As we have already said, the psychological and emotional component of doubt makes its experience repulsive for the agent. So, if even the visible part of ignorance is hard to be managed by the agent, the part of ignorance that falls beyond her control (or her will) must be extremely difficult to reach. The "Enough Already Thesis" displays the capacity of human beings to be right enough about enough of the right things enough of the time to survive and prosper (Woods, 2013, pp. 86–88). Now we should add: "despite" *how much the agent ignores*, how much *she does not want to admit she ignores* and the *repulsion for being in a state of doubt* the agent appears to be not just "able enough" to sur-

vive and prosper, but also to bear the weight of her ignorance without feeling it.

Hence, instead of focusing on the confidence in the "Enough Already Thesis" (that we can condense in "we are able to survive, after all"), all the added *caveats* demand a deeper questioning on the tendency of human beings to avoid a complete awareness of their own ignorance. It is not unreasonable asking how and why this is functional, for instance. The examination of these important issues is already displayed in what Woods called the Epistemic Bubble (Woods, 2005). We can picture the Epistemic Bubble as a form of knowledge-based immunization that inhibits the agent from distinguishing her knowledge and her beliefs. In the next section, we will investigate the "Bubble Thesis": this will allow us to comprehend that the agent bears also a *ignorance-based immunization*, which compromises her ability to frame her own ignorance and distinguish it from what she just doubts about.

The Bubble Thesis and the Double-Sided Autoimmunity System

The idea of the Epistemic Bubble originates from the analysis of both purpose and ending of the state of doubt, albeit it remains focused on the analysis of the state of belief. It is based on the assumption that the state of belief is not just pleasant, but also fallible and uncertain. In its essence, Woods' Bubble Thesis focuses on the relation between the complex of beliefs an agent has and her awareness as regard as either their correctness or unsteadiness. This suggests that the agent's mechanism of belief formation can provide an easy way out to the Peircean irritation of doubt through a systematic *ascription of knowledge* concerning a mere belief, immunizing the agent from being able to spot the difference (so letting the agent think she knows something when she merely believes she does). In order to utterly understand the potentialities of this idea, we have to introduce two dichotomies that Woods indicates as substantial. The first between what we could consider a broad definition of knowledge related to the Peircean state of belief. The second concerning the important distinction between the *first* and *third-person* perspective of the agent.

As already mentioned, belief in Woods' theory corresponds to the Peircean definition: it is the sole state that solves the irritation of doubt and brings peace to the cognitive unsteadiness of the agent; fundamentally, it is a state that calms the agent's mind. Knowledge, instead, is defined as a "*kind of case-making*. *One knows that P only if one has one's disposal a case of requisite strength to make for P*" (Woods, 2005, p. 735). The distinction between belief and knowledge, however, is not evident for the agent who knows and believes. Indeed, the achievement of knowledge always entails a state of belief in the agent, even if the attainment of a belief does not directly imply the gain of knowledge.

The entanglement between knowledge and belief drives our argumentation to the difference between the first and the

third-person perspective. Indeed, for the agent is kind of easy to say if someone else *knows* or *thinks she knows* something. That is to say, from the third-person perspective one can tell the difference between a belief that stands for an actual knowledge attainment and a belief that just brings about some cognitive relief to an irritating state of doubt. The agent can judge if someone else's is either effective knowledge or mere confidence. From the first-person perspective, the difference is instead blurred, due to the fact a belief state entails the occurrence of knowledge. This is an entanglement indeed recognized as the focus for the asymmetry between first and third-person perspective. Whenever the agent knows something, *she is compelled to believe she knows it*. But, since the attainment of knowledge is different from the establishment of a belief, she can believe she knows something even when she does not. This distinction between knowledge and its mere ascription is visible only in a third-person perspective.

Hence, while in the first-person perspective a reliable belief is always claimed as knowledge, in the third-person perspective the proposition can be judged as potentially verified or erroneous. Thus, in the case of the first-person perspective there is not a clear distinction between knowing and believing in something, even if it is pretty clear in the case of the agent's third-person perspective. At the same time, in the case of the first-person perspective the state of belief represents not only the way the agent can experience some relief from the irritation of doubt, but also the unique possibility for the agent of attaining any sort of knowledge. This idea is better expressed in Woods terms in the Proposition 6:

(The Downside of Belief). Belief is both a condition of knowledge and an impediment to its attainment.

In so saying, we can see that the traditional approach to knowledge is defective. It rightly insists on the indispensability of belief for knowledge, but it ignores, or downplays, its impedimental role (Woods, 2005, p. 739).

So, albeit the fact that *there is a solid difference* between the epistemological status of belief and knowledge, the agent cannot be aware of this distinction when she has to deal with her own cognition. Hence, in its essence, the *epistemic bubble* is configured as a *first-person knowledge-ascription*, performed by the knowing agent, to whom the difference between *knowing* something and *thinking she knows* that same thing is unapparent – and the tension that may arise is always solved in favor of the former (Woods, 2005). This mechanism always provides – more or less heavily – an illusion about the truthfulness of the knowledge of the agent's first-person perspective.

Woods describes the epistemic bubble as an *autoimmune* mechanism of the agent. The naiveness of the agent about her own cognition is directed by the same system that at the same time permits her to attain any type of knowledge. Belief, as a cognitive structure, is *in primis* a tool that gives her the possibility of taking action into the world. If the agent

could not be sure about what she thinks she knows, she could not take any decision and she would be constantly in a state of doubt and struggle. The autoimmune mechanism helps her out from the freezing state of doubt but does not provide a *safe* exit from it.

As we can see, the epistemic bubble as an autoimmune mechanism concerns the limits of the attainment of knowledge, its entanglement with the state of belief, and the unapparent distinction between the two in the first-person perspective. As we have said in the case of the original Fallibilist principles mentioned in the previous section, the idea of epistemic bubble is profoundly connected with the definition of belief offered by Peirce. Using a similar connection, in order to shift the focus on the limits of ignorance-recognition, we must reconsider Peirce's doubt in the light of the autoimmune mechanism described above.

Doubt and the Missing-Ascription of Ignorance

Given the fact belief and knowledge are connected in the first-person perspective, but way far from each other in the third-person view, we can formulate the same consideration in the case of doubt and ignorance. The “negative” affirmation in the Fallibilist principles is oriented to highlight the distinction between doubt and ignorance, but this separation is manifest only in a third-person perspective. In the third-person perspective, doubt presents the character of being a state of irritation for the subject, a push for inferential reasoning, and, mainly, a state *she is aware of*: it is a frame of the ignorance of the subject *in those limits*. The proper ignorance of the agent is beyond the frame of her doubts. It is something the agent cannot consider in first-person perspective. At the same time, the only “visible part of ignorance” for the first-person perspective can entirely frame the ignorance of the agent.

This relation is clear when we think about the possibility of describing how we ignore something. The only method that we can apply is to frame our ignorance, speaking about the propositions we doubt to be true, the situations we are not certain about, and the collection of data we are not sure if they are reliable or not. But these data are just what *we consider* part of our ignorance. They cannot be even close to the propositions we are not informed of, the situations out of our sight, and the collection of data we are not aware of. These data are part of our ignorance, but we cannot reach them through our doubts. At the same time, doubt is the only cognitive tool that permits us to grasp pieces of ignorance and let us admit that there is something out of our reach.

So, exactly as in the epistemic bubble, albeit the fact that *there is a solid difference* between the epistemological statuses of doubt and ignorance, the agent cannot be aware of this distinction when she has to deal with her own cognition. Consequently, we can describe the *ignorance-based bubble* as a *missing-ascription of ignorance*, performed by the agent, to whom the difference between *ignoring* something and *doubting* is unapparent.

This structure is also an *autoimmune* mechanism of the agent. Doubt, the only tool that permits the agent to inves-

tigate a part of her ignorance, makes also *impossible* for the agent to distinguish the amount of actual ignorance she possesses from what she is just able to recognize. At the same time, without this autoimmune system we would never leave the state of doubt. The ignorance-based autoimmune mechanism illustrates the *ignorance about one's own ignorance* as the only possible condition for the attainment of any kind of knowledge in more or less uneasy condition. The immunization to ignorance is an indefeasible mechanism of human cognition as well it is the epistemic bubble. They simply define the borders of possibility for first-person perspective agents to modify their own epistemological status.

By considering the cognitive state of doubt, we can extend our analysis also considering Woods' thesis about *truth*. As we will better illustrate, the analysis of the epistemic bubble leads to the affirmation that the truth, for the first-person perspective, is a *fugitive* property. In brief, the difficulty for the agent to distinguish the difference between what she knows and what she believes, impairs her possibility to reach and recognize truth. Using the same association in the case of the analysis of the agent's immunity to her own ignorance we can arrive to a similar consideration regarding her capacity to reach and recognize the entirety of ignorance beyond the frame of her doubts.

The Fugitivity of Truth (and Ignorance)

The autoimmune system of the epistemic bubble makes the attainment of truth a relatively impossible task from the first-person perspective, adding a veil of skepticism to the cognitive analysis. This is clearly stated in Proposition 15, stating the *Fugitivity of Truth*: "Within epistemic bubbles, truth is a fugitive property. That is, one can never attain it without thinking that one has done so; but thinking that one has attained it is not attaining it" (Woods, 2005, p. 745). At this point it is interesting to note we can apply a similar argument when considering ignorance. The missing-ignorance ascription in the first-person perspective makes the idea of ignorance a "fugitive property" because every time the agent tries to define what she ignores, she is reaching just the limits of her doubts. Hence, we can describe the mechanism of epistemic embublement taking advantage of a two-sided definition: a) the impossibility – from the first-person perspective – of a clear distinction between knowledge and belief and b) the certainty of the agent to have a fully achieved knowledge about something even without the actual attainment of it; we can find a similar two-sided definition in the case of the ignorance-based bubble: a) the impossibility – for the first-person perspective – of a clear distinction between doubt and ignorance and b) the certainty of the agent to have fully framed her ignorance through her doubt, even if she cannot do it.

As we have already mentioned, the ignorance that the agent can perceive is just defined through her doubts, and her doubts can picture just a small portion of her ignorance. The disparity between the two parts of her ignorance can be illus-

trated using the Freudian metaphor of the iceberg: the portion apparent to the subject is just a small piece with respect to the whole structure. For this reason the *missing-ascription of ignorance* plays a role analogous to that of the epistemic bubble in the mechanism of creation and revision of beliefs. It assures a cognitive status of certainty about the agent ignorance that permits the agent to be confident in her choices and knowledge. The agent, not being able to see how much she ignores, considers the attainment of answers concerning her doubts a concrete way to remove her ignorance piece by piece.

The role of confidence is part of the autoimmune mechanism as much as the proper ignorance embublement. The embublement allows the agent to consider what is part of her doubts as the *entire amount of her ignorance* and her purpose will be to remove it as much as possible. In this sense, the role of the missing-ascription of ignorance is fully motivational. But the more effective consequence in the agent's cognition is the self-representation that the agent constructs in first-person perspective: indeed, there is a tendency to consider the knowing or ignorant self as a controllable part. The agent is fully aware of both the state of belief and of doubt, which are the only vehicles for her attainment of propositional/sentential knowledge and her partial awareness of ignorance. In the following subsection we will show that these partial recognitions drive the agent to formulate a sort of Homunculus Fallacy, when she tries to depict her epistemological state.

Cognitive Autoimmunity: The Homunculus Fallacy

In the case of the first-person perspective we have illustrated above the epistemic bubble provides two main illusions. The first illusion is strictly related to the epistemic dimension of the bubble: it provides the belief-based ascription of knowledge even when that knowledge is not entirely attained. The second illusion is related to the cognitive and emotional outcome of the bubble: it makes the agent convinced of being aware of the knowledge she possesses, even when she should not.

The same deceptive double effect also emerges from the missing-ascription of ignorance. On the one hand, it provides the agent the conviction that she is ignoring just a specific sort of data, categorizable in the framework of her first-person perspective. On the other hand it gives the agent the illusion of being able to have a clear view of her own ignorance. In both cases the agent is naively assured about her cognition. She thinks herself able to see her knowledge and her ignorance as they were, respectively, sets of attained or missing propositions. The agent is deluded into being, absurdly, in an *indifferent* position about her own ignorance/knowledge structure. This effect can be pictured as a sort of Homunculus Fallacy. The subject thinks herself almost as a double being: one part of her knows and ignores and another part can spot how much she knows and how much she ignores.

The fairly hidden Homunculus Fallacy is clear: the autoimmune mechanism suggests that the agent can judge about the

attainment of knowledge or the perception of ignorance, as if the judgment belonged to a distinct part, which directly knows or ignores. This illusory distinction allows us to also consider the property of *just apparent corrigibility* of the bubbles: “Since each of us is in his own epistemic bubble, the distinction between merely apparent correction and genuinely successful correction exceeds the agent’s command. [...] Within an epistemic bubble the distinction between belief-change and belief-correction is also “resolved” in favor of the latter” (Woods, 2005, p. 741). When the agent realizes that the belief she had was incorrect, or the knowledge she thought she had was illusory, the change of mind does not break the mechanism of the bubbles. Since she has to replace an information with another one and the only way to do it is to believe she gain a correct one, she simply *shift* from a bubble to another, maintaining the autoimmune mechanism unbroken. The bubble was not corrected, it just changed. The homunculus fallacy helps this dynamic because, for the agent, the change of mind is seen as a correction of a wrong statement (a mere belief) with a truthful one (knowledge) as she was able to spot the difference from the first-person perspective. We can see, from a third-person perspective, that the transition is from a belief to another one but this perception is unaffordable by the self-assured agent.

As it can be imagined, a similar structure is present in the account of ignorance-based bubbles: the “end” of a missing-ascription of ignorance happens when the obtained answer to a given doubt is just apparent. The missing-ascription of ignorance shifts to another problem, which arises in the presence of new collected information. While for the epistemic bubble there is a distinction between belief-change and belief-correction, which is resolved in favor of the latter, in the case of the ignorance-based bubble there is a distinction between change of doubt and ignorance-removal that is resolved in favor of the second. In conclusion, the autoimmune system provides the agent with an efficient and improvable mechanism of belief and doubt change without the loss of confidence in self-awareness.

Conclusion

The introduction of the problem of ignorance in the framework of a naturalization of logic involves problematic issues regarding the epistemological status of the “real agent”. First of all we have added to Woods’ Fallibilist principles what we have called the *negative affirmation*: this move rendered possible the examination of the naiveness of the individual agent about her own cognition, shifting the attention to the state of doubt (defined by Peircean dynamic) instead of belief. Thanks to this change of perspective, a new subtle reinterpretation of Woods’ “epistemic bubble” has favored the elicitation of that *autoimmune mechanism* that affects not only the system of belief creation and revision of a human agent – considered not able to distinguish what she knows and what she only thinks she knows – but also the relationship between doubt and ignorance-recognition. As belief is “the condition

of knowledge and the impediment of its attainment” (Woods, 2005), doubt is the requirement that permits the emerging of uncertainty while preventing the integral cognition of the agent’s ignorance. Hopefully further research concerning the immunized and ignorant part of human cognition will provide interesting new insights able to enhance the newborn field of the naturalization of logic, as much as the study of “errors of reasoning” has had so far.

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