Cognitive Bubbles and Firewalls: Epistemic Immunizations in Human Reasoning

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Abstract

John Woods defined the *epistemic bubble* as the inescapable state of first-person human rationality. In this paper we will propose, at a seminal level, how the fertility of such approach can be expanded beyond the logical-epistemic dimension: the emotional sphere as well seems to be deeply affected by self-immunization dynamics so that the *cognitive bubble* – rather than just epistemic – could define a characteristic framework of human cognition.

Keywords: Cognitive bubbles; immunization; doubt; emotions; religion; abduction.

Introduction

Different fields of human reasoning are characterized by what could be roughly indicated as epistemic or cognitive immunizations. A recent monograph has surveyed the areas, mostly pathologic, in which a decoupling between effective knowledge and the *feeling* of knowing takes place (Burton, 2008): our intent is to extend the investigation of such kind of decoupling to other, more common aspects of human cognition, and point to a logical, epistemic and cognitive theoretic modeling of how it functions.

We will analyze cognitive immunizations making use of the *Epistemic Bubble* Thesis as suggested by Woods (Woods, 2005), expanded into a Cognitive Bubble thesis (section 1). We will test the extendability of the cognitive bubbles to a shared dimension instead of concentrating on the individual level (section 2), then try to apply our conceptualization to fields of human cognition in which immunization processes seem frequent: the first presented case deals with moral reasoning (section 3), while the second with religion and belief in supernatural agents (section 4).

The Epistemic Bubble

American philosopher Charles Sanders Peirce had pointed out how belief formation rests on an emotional factor which cannot be ignored: the irritation of doubt. Such irritation occurs whenever we are in need of knowing something we don't know, or trying to make sense of some new unexplained signs, and so on. The basic concept of doubt can be considered as a red line connecting the most primitive kind of pragmatic perplexities with the highest intellectual and philosophical attitudes. The cognitive irritation coming from doubt is the state of cognition that prompts us to advance hypotheses and believe them in a wide range of situations: it happens when an agent wonders about who or what produced that crackle she just heard in the bush behind her, but also when she thinks about how to improve the reception of the cellphone she just bought, or when she keeps coming back to guessing what caused the bruises on her neighbor's forehead.[1]

In Peirce's account, thought is an inferential activity, that operates upon signs, whose output – belief – has the main purpose of placating an irritated cognition: "[t]he action of thought is excited by the irritation of doubt, and ceases when belief is attained; so that the production of belief is the sole function of thought" (Peirce, 1987, p. 261).

The Peircean perspective was further developed by logicians John Woods and Dov Gabbay, promoters of the agent-based approach to logics: what human reasoning is mostly about is achieving cognitive targets, which are marked by cognitive irritation. No matter the entity or complexity of the target, human cognition is essentially a more or less advanced problem-solving activity: examples of cognitive targets are knowing whether it is a bear or a boar hiding in the cave, or what powerful entity could have shaped that ridge so that it looks like a human face, or which combination of buttons, if pressed, can get our computer to run faster, but higher theoretical targets can be considered as well. A belief is what satisfies a cognitive target. The central issue is that a cognitive agent is very likely to take any kind of belief for knowledge: furthermore, Woods argues that belief can only *coincide* with a first-person attribution of knowledge (Woods, 2005).

(Belief as knowledge ascription). Whenever it is true for *Y* to say of *X* that *X* believes that *P*, it is also true that *X* takes himself as knowing that *P* (Woods, 2005, p. 738).

Of course the basic philosophical assumption is that *knowledge* and *belief* do not share the same epistemic status: even a true belief is different from knowledge insofar as knowledge presupposes the possibility of providing the statement with sufficient, relevant reasons. That is, "[o]ne knows that P only if one has at one's disposal a case of requisite strength to make for P"(Woods, 2005, p. 735).

Such distinction, that seems perfectly clear from a third-person perspective, is immaterial from the agent's first-person

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[1]It is commonly debated whether Peirce's definition of doubt comprises only mundane matters or can be extended to higher theoretical fields. The authors of this paper endorse the second possibility.

perspective. If we agree with Peirce's intuition about the nature of thought, if follows that *knowledge* is by no means required to placate cognitive irritation. The ideal model of target-attainment would require one and only one epistemic state to satisfy the cognitive target. Actually, from the real-agent's perspective, a poorer epistemic state can be embraced as long as it fosters the *feeling* of having attained the target by simply discharging (or placating) the original irritation.

Woods, by introducing the concept of epistemic bubble, points out how, even though the satisfaction of the cognitive quest is met by a positive final emotional appraisal (i.e. relief from irritation), such a positive appraisal is hardly a symptomatic sign of the proper attainment of the target:

> (Fugitivity of truth). [From a first person perspective] 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. 746).

It is significant to observe how this fallacious inference routinely performed by our cognitive systems is actually an innate kind of abduction (Magnani, 2009), which could be modeled as follows:

- Premise 1: *If I know target P* then *My irritation about P is relieved*;

- Premise 2: *My irritation about P is relieved*;

- Conclusion: *I know target P*

For an agent-like-us, *knowing* and *thinking of knowing* can hardly be told one from the other, but they are clearly not the same thing. This leads to the formulation of the Epistemic Bubble Thesis:

> When in an epistemic bubble, cognitive agents always resolve the tension between their thinking that they know *P* and their knowing *P* in favour of knowing that *P* (p. 738) [...] A cognitive agent *X* occupies and epistemic bubble precisely when he is unable to command the distinction between his thinking that he knows *P* and his knowing *P* (Woods, 2005, p. 740).

Woods is careful at stressing how this is a *constitutive* constraint of human beings, and not a matter of being more or less intelligent or cognitively unfit. Such disposition can be recognized theoretically and only in a hindsight dimension, but an awareness of the Bubble Thesis can never be operationalized with the scope of avoiding further *embubblements*. Considering the semi-transparency of the Bubble Thesis, and the inherence of its object to every aspect of human inferential activity, we shall from now on refer to it as *cognitive bubble*.

Cognitive Bubbles, the Fixation of Belief and its Intersubjective Dimension

Woods' account of our cognitive constraints concentrates on individual, isolated agents: could it be possible to enrich the

Cognitive-Epistemic Bubble Thesis and eventually investigate some of its social implications?

The Cognitive Bubble is clearly a consequence of our cognitive systems dealing with bounded information, lack of time and limited computational capacity: still, another consequence of such limitations is Simon's concept of *docility*, that is "[...] the tendency to depend on suggestions, recommendations, persuasion, and information obtained through social channels as a major basis for choice". Thanks to docility, humans can cope with their bound rationality and finite potentials by reducing the importance of first hand experience, on the basis that "(a) social influences will generally give us advice that is for our own good and (b) the information on which this advice is based is far better than the information we could gather independently", thus relying on a more distributed concept of experience (Simon, 1993, p. 156).

Peirce considered three main strategies aimed at the fixation of belief: the method of tenacity, that of authority and the method of science. Let us focus on the two first ones: needless to say that the method of authority relies on a social basis, but it can be argued that the method of tenacity as well may benefit of a social ground, as we mean to show.

> The instinctive dislike of an undecided state of mind, exaggerated into a vague dread of doubt, makes men cling spasmodically to the views they already take. The man feels that, if he only holds to his belief without wavering, it will be entirely satisfactory. Nor can it be denied that a steady and immovable faith yields great peace of mind. It may, indeed, give rise to inconveniences, as if a man should resolutely continue to believe that fire would not burn him, or that he would be eternally damned if he received his ingesta otherwise than through a stomach-pump. But then the man who adopts this method will not allow that its inconveniences are greater than its advantages (Peirce, 1877).

Tenacity could be seen as strictly related to Woods' *embubblement*. Our constitutive eagerness to take as true something that, in spite of being implausible, is able to calm our cognitive irritation *as something true would*, results in our reluctancy to easily discard such a belief. It can be suggested that not only this is what happens a from cognitive perspective: we also *like and need* this to happen, because no one would be comfortable about spending her life deeply wondering about everything, in a state of perennial indecision.

According to this perspective, the Bubble Thesis can be understood not necessarily as an impairment but rather as a neuron-cognitive architecture benefitting our cognitive welfare. Some cases of pathological indecision may show the impossibility of proper activation of an epistemic bubble: in an evolutionary perspective, Haig speculatively connects the presence of apories within human decision-making systems with the different development (and fitness-related behavior) of genes inherited from one's mother or from one's father, so that as for certain matters, "[some effects] of maternal

genes would be opposed by adaptations of paternal genes to increase the suasive power of conscience" (Haig, 2005, p. 21-22). On a different note, van Randenborgh, de Jong-Meyer, and Hüffmeier bring experimental results suggesting how in particular psychological states (such as dysphoria) processes of rumination – "a phenomenon at the intersection of cognitive and affective processes" (p. 230) – may foster severe indecision and less confidence in one's hardly-reached decisions, triggering states of deeper depression (van Randenborgh et al., 2010): such results seem to avail the necessary nature of the epistemic bubble as a protective mechanism in human cognition.

The obstinacy-defense we just sketched out seems corroborated by the fact that, notwithstanding discrete difference in individuals' abilities, human cognitive systems are structured and endowed in a roughly similar way. It is then possible to notice how *embubblement*, in spite of being a characteristic trait of individuals, can display mechanisms of mutual positive feedback favored by the social background: every agent's cognitive bubble is different and exclusive, but many bubbles can show similar traits, and such similarities are reinforced by their very presence.

Such a possibility of a *common embubblement* might help shedding light upon a characteristic of many kinds of arguments, such as the religious ones. Philosopher Jennifer Faust examined to what extent they manage to be persuasive (Faust, 2008). The problem with arguments about the existence, or the non existence of supernatural beings, but also about differences between cults and confessions, or between political ideologies, is that they often fail to persuade, that is to say, the fail in being recognized as good arguments by the other party.[2]

We can propose Faust's account using Woods' logical modeling. If we consider parties *X* and *Y*:

- Agent *x* and his peers occupy an epistemic bubble *B1* with respect to matter *P*.

  - *Within* the epistemic bubble, Agent *x* knows that *P1*, as his *feeling of knowing* is activated by belief *p1*.
  - Agent *x* is unable to command the distinction between his *knowing that P1* and his *thinking of knowing that P1*.

- Agent *y* and his peers occupy an epistemic bubble *B2* with respect to matter *P*.

  - *Within* the epistemic bubble, Agent *y* knows that *P2*, as his *feeling of knowing* is activated by belief *p2*.
  - Agent *y* is unable to command the distinction between his *knowing that P2* and his *thinking of knowing that P2*.

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[2]Epistemological and folk-epistemological considerations about an agent's appraisal of her own knowledge cannot be fully separated from the argumentative and rhetorical sphere (Hardy-Vallée & Dubreuil, 2010).

- According to our initial definition, an agent *knows P* if and only if he can provide a case of requisite strength to make for *P*.

  - From group *X*'s defining epistemic bubble *B1*, any case supporting *B2* cannot be accepted as endowed with the *requisite strength* to sustain *P2*.
  - From group *Y*'s defining epistemic bubble *B2*, any case supporting *B1* cannot be accepted as endowed with the *requisite strength* to sustain *P1*.

Within each group, every agent is locked in his first-person perspective and unaware of his occupying an epistemic bubble, but he can readily individuate the very same condition as far as members of an opponent group are concerned, assessing it by a third-person perspective.

According to Faust, this is not the case of question-begging theses: they do not assume what they aim at demonstrating as an hypothesis, but rather they "beg the doxastic question". An argument is accepted as sound with respect to its conclusions only inasmuch one already believes the very conclusions: instead of persuading the opposite party (that is, those who do not already believe in the conclusion), dialectic confrontation between differently configured cognitive bubbles produces escalating irritation.

One has little difficulty to imagine such a situation if she considers religious, ethical or political issues. Nevertheless, particular fields of scientific research, often with a high social impact, seem to be however prone to develop mechanisms akin to religion, such as "begging the doxastic question", or displaying incommunicability between opposing opinions: for instance nuclear energy, animal research and experimentation, genetically modified organisms.

Moral Bubbles and Their Collective Implementation in Ideologies

In the precedent sections we spelled out the Bubble Thesis and some of the cognitive dynamics to which this modeling can be applied. We shall now attempt, more specifically, to extend the application of Bubble Thesis to one of the most characteristic fields of human cognition, that is moral reasoning, and apply the definition of a *Moral Bubble* introduced in (Magnani, 2011).

The moral embubblement would in fact be homomorphic to the epistemic one: it is the result of impossibility of knowledge as relevant case-making and the result of a strategic cognitive need to reduce doubt and uncertainty as much as possible. Its very structure reflects the self-immunization postulated in Woods' Bubble Thesis.

(Immunization) Although a cognitive agent may well be aware of the Bubble Thesis and may accept it as true, the phenomenological structure of cognitive states precludes such awareness as a concomitant feature of our general cognitive awareness (Woods, 2005, p. 742).

Being constitutively and easily unaware of our errors is very often bound with the self-conviction that we are not at all aggressive in our performed argumentations. Unawareness of our error is often accompanied by unawareness of the deceptive/aggressive character of our speeches (and behaviors).

It is important to notice how our *Moral Bubble* hypothesis would provide a cognitive account, and not yet another moral one, to the problem of moral violence and its opaqueness, and particularly to a person's self-immunization to her own moral violence (Magnani, 2011). Within the moral bubble, the moral agent perceives his own moral principles as a given, just as much as a cognitive agents takes his beliefs as positive, genuine truth. We *think we know* the genuineness of our beliefs but actually we believe them just out of tenacity, customs and authority. An attack on our religious, moral or political beliefs triggers an immediate violent response, but not only of a dialectical kind: an overly zealous questioning of beliefs may hit on the hollow foundation on which they stand, thus threatening to *pop* the bubble. Cognitive bubbles are strategically vital to beings-like-us: a threat to our *embubbled* and *embubbling* beliefs is a direct, major threat to our state of cognitive quiet.

In our moral bubble hypothesis, the agent is minimally aware of his violence only as far as the *dialectic* level is concerned and she agrees to strike back on the same argument: this can happen in a polite and controlled way, but it is only the tip of the iceberg. The majority of the violent response is *not* a defense of the content of the questioned beliefs, but of the cognitive *tranquillity* that those beliefs allow, within the moral embubblement. As stated by Peirce "the instinctive dislike of an undecided state of mind, exaggerated into a vague dread of doubt, makes men cling spasmodically to the views they already take"(Peirce, 1877). Once a moral belief has been corrupted by doubt, the deployment of a vast amount of cognitive and emotional resources is required: the purpose is to individuate another fitting belief that can restore the previous state of mental welfare.[3] Such violent outburst is not perceived by the agent who performs it, because it is obliterated by the unquestioned conviction of the righteousness of her own principles. That is why we are extremely aware of other agents' violence (because they clash with our own bubble) but we are virtually immunized to our own. Furthermore, such description applies to "relativists" or, in a religious framework, to more or less "militant" atheists: willy-nilly, positions like relativism and tolerance presume as vast an assumption of beliefs as that of any positive credo. And the reason for this is that any moral position, as any theological one, is necessarily "doxastic": no relevant case can be provided to sustain the belief in God's existence, just as no case of the same nature can be presented to prove God's

non-existence. Similarly, any moral of tolerance, or even an *a*moral position, is ultimately as *moral* as any other positive one, thus prone to the dynamics of embubblement and self-immunization to one's own violent response to contrasting positions, with the scope of reducing as much as possible the agent's distress caused by epidemic doubt and irritation.

Within the moral bubble, the moral agent can only perceive his own moral principles as a given, just as much as a cognitive agents takes his beliefs as positive, genuine truth. Ideologies project a clear coalition level, in which each embubbled individual assures and corroborates the beliefs of his fellows. The whole ideology-projected group becomes blind to their own violence and are able to respond to instances of doubt with the synchronism of one organism and the power of several.

In extremis, should it be impossible to suppress the corrupting belief, the solution rests in the (often physical but sometimes metaphorical) suppression of the corrupted believer: if violence perpetrated outside of the group does not succeed in its scope, it can target one of weakest members of the group itself, labelled as a deviant or a traitor, as contended by Bandura (1999).

As a matter of fact, it is interesting to remember how the epistemic bubble is already a cognitive structure aimed at the reduction of irritation caused by doubt: consequently, any willing or unintentional behavior that clashes with one agent's bubble originates a negative emotional appraisal, that can sublimate in the denial of factual evidence[4] contrasting with the bubble. Over and above that, when the embubblement concerns several individuals united in a single group, the effect of any behavior, perceived as attempting to intrusively pop the bubble, can spark in human agents a particularly violent reaction, that can go beyond a *cognitive* and dialectical violence.

It is worth noticing how such violent consequences of common embubblement can be easily spotted in dynamics like religion, or politics, and less in science: this is not to say that in science they are totally absent, but the possibility of case-making, of displaying knowledge provided with better epistemic strength and factual experiences to sustain it, reduces the need for a heavy cognitive bubble; conversely, whenever cornered, religion and politics *have to* recur to the ultimate weapon of morals, as the strategy of case-making is out of their reach: in fact, requiring believers to provide cases, reasons for their beliefs is usually perceived by the very believers as *morally evil*.

It can be argued that, even if we accept that religious belief display an intrinsically cognitive-perceptional origin and not a moral one (Bertolotti & Magnani, 2010), their unquestionable moral relevance for beings-like-us allows us to label it as a "moral bubble". Religious beliefs most often enclose more or less explicit moral prescriptions, templates

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[3]Coherently with the view we are putting forward, Woods suggests that a revision of one's epistemic bubble is *de facto* impossible: one could only *change* her bubble with another, without actually performing a belief revision: that is possible only for *institutional agents* (i.e. science) which able to transcend the individual embubbled perspective (Woods, 2005).

[4]Denial can attend a perceptive and hence, unconscious level. Against, it's not necessarily the case of short-mindedness or stubborn obstinacy.

(Magnani, 2007) or guidelines according to which a believer should behave. Those moral beliefs, shared by the majority of members of the community, can seldom benefit of any relevant epistemic foundation, but on the other hand they seem perfectly sound to those who practice them, and appear to regulate the life of the community: such positive emotional appraisal subtly persuades agents about the truthfulness of their beliefs.

Consider ideology: it is something available "out there", stored in external devices and supports (other people, books, media, etc.) of a given social collective. People readily pick up external ideological "tools" of this kind, then re-represent them internally. The signaling consisting in swastikas, red stars, parades, styles of speech and even clothing fashions does not only posses a propagandistic meaning, but it mostly enforces and empowers those who already believe in it. The historical *topos* about the difference between an army and an armed mob should be clarifying: it is the army *ideology* that allows its superiority. It can be argued that even the military training is only afforded by the presence of a distributed ideology embedded in signs, flags, words, hierarchies and, last but not least, uniforms: the very term *uniform* is significative. The uniform is the *same* for *everyone*, making every subject feel similar, both exteriorly and psychologically equal to the others (Bollas, 1993).

That stated, we can further analyze this dimension that characterizes the moral bubble: ideologies rely on the distributed dimension of moral bubbles and on the mutual reinforcement of moral beliefs. Uniformed individuals (the oxymoron is not intentional but very significative), each in their own *individual* moral bubble, act together and combine their roughly similar moral belief into a *collective moral bubble*, which dramatically empowers its ordinary mechanisms. This collective bubble aims at defusing systematically all potential doubts, adding the action of one individual upon the other to the self-immunization with respect to violence, typical of the moral bubble. To sum it up quite briefly, it could be suggested that external (and therefore distributed) socio-cognitive structures are in fact nothing but a mirroring distribution of cognitive structures such as the embubblements we have been dealing with so far: could ideologies, and many other collective phenomena, be indicated as eco-cognitive embubblements?

The Relationship between Cognitive Bubbles and Cognitive Firewalls: the Case of Religion

In this final section of our paper, we mean to explore whether the Bubble Thesis can be applied to another typical dimension of human cognition: its propensity to hold and maintain beliefs in supernatural agency. Our contention is that such an application is possible insofar as religion seems characterized by a selective switching of certain beliefs with the varying of their application field.

Considering religion, we can witness how magic supernatural concepts – once they become part of the cultural patrimony of a group – come to constitute its religion by crystal-lizing into a set of more or less fixed narratives (Bertolotti & Magnani, 2010). These narratives play a role in the society as far as they support norms and commitments, which partially explains the persistent success of religion (Boyer, 2001) (Wilson, 2002) (Atran, 2005) (Bulbulia, 2009).

For religion to be effective, though, believers are expected to sincerely believe and commit themselves to the positive ontological and moral core of their *credo*. The problem is that a positive commitment to ontological oddities such as supernatural beings, in spite of the social advantages, can be rather dangerous. Atran stresses how this commitment to counterfactual entities should have proved particularly maladaptive for mankind: "[...] to take what is materially false to be true (e.g. people think and laugh and cry and hurt and have sex after they die and their body disintegrate) and to take what is materially true to be false (e.g., people just die and disintegrate and that's that) does not appear to be a reasonable evolutionary strategy" (Atran, 2005, chapter 1). The key to solve this issue seems to be that humans usually know when to believe (and behave) *as if* counterfactual entities really belonged to their ecologies and when to suspend this belief. As for this matter, Bulbulia claims that religious beliefs are characterized by a mental ®IMAGINE marker, thus illustrated:

®IMAGINE [Zugroo is Lord Creator]

practical inference: NOT TRUE [Zugroo is Lord Creator]

workspace inference: CERTAINLY TRUE [Zugroo is Lord Creator] (Bulbulia, 2009, p. 63).

The IMAGINE marker allows us to introduce a further kind of cognitive embubblement, that is the *Religious Bubble*. If the simple cognitive bubble had an illusional dimension, the religious bubble has a necessary self-deceptive dimension, which acts to reinforce the ontological commitment onto the belief itself, but simultaneously it defuses the practical inferences about our ecology, enhancing the moral ones.

Further studies should be carried on about this subject, still we mean to suggest that the solution to this conflict could have been coupled with the *confinement* of the supernatural to the dimension of the *holy*. Thus religion maximized the benefits (for the group) of (individual) commitment to supernatural agents reducing the ecological risks caused by an adoption of magical thinking as a strong cognitive bubble. The relegation of what is *holy* to a well-defined dimension of social life, a delineation that is conveyed through education as well, is reflected in the rise of specific *cognitive firewalls*[5] that prevent magical-supernatural concepts and inferences to

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[5]The notion of "cognitive firewall" belongs to a computational representation of the mind: Cosmides and Tooby define them as "computational methods for managing the threat posed by false, unreliable, obsolete, out-of-context, deceptive, or scope-violating representations. Cognitive firewalls - systems of representational quarantine and error correction - have evolved for this purpose. They are, no doubt, far from perfect. But without them, our form of mentality would not be possible" (Cosmides & Tooby, 2000, p. 105).

flood the areas of our mind-brain system dedicated to ecological survival.

Objects of belief in supernatural display an inferential richness, i.e. they "invite individual and collective elaboration" (Barrett & Lanman, 2008, p. 115), so they can be easily shared within a community. The community cannot warrant for the religious bubble as much as it does for the moral bubble: moral bubbles rest entirely on a group dimension, while the cognitive firewalls preventing the overflow of religious beliefs seem to evolve differently on an individual base. As a matter of fact, people display different strength as for cognitive firewalls, and even present-day religious believers may belong to a magic dimension - that is, deprived of any cognitive firewall. It must be pointed out that, even if such individuals remain in an ancestral magic dimension as for themselves, for the whole religious group they act as a further costly commitment (Atran, 2005), further enforcing the beliefs of the rest of the groups, but without affecting their individual way of coping with ecological material reality.

Conclusion

In this paper we have analyzed a series of rational domains in which cognitive and epistemic immunizations are fundamental. We challenged the original definition of Epistemic Bubble, in an attempt to shape a broader concept that we defined *Cognitive Bubble*, to highlight its fundamental presence in most kinds of human cognitive processes. We described how, consistently with other claims about constraints displayed by human rationality, the cognitive bubble is not a phenomenon concerning only isolated individuals but can instead be augmented by mechanisms of positive feedback so to form a kind of collective embubblement, which clearly appears in the rhetorical dimension characterizing social interactions. Such a theoretical apparatus could be applied to other dimensions of human reasoning in which immunizations and selective switching of acquired knowledge seem to play a crucial role: moral reasoning and religion. As for the former, the Moral Bubble hypotheses provides cognitive and emotional arguments for the (hard to perceive yet irrefutable) doxastic nature of moral stances, and for the opacity of those violent behaviors that moral beliefs trigger so easily; whereas, as for the latter, the presence of a Religious Bubble can be hypothesized to provide an account of the undying presence of counterfactual – and yet relatively harmless – beliefs concerning supernatural agents.

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