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## Emotions in knowledge production

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### Abstract

This synoptic review surveys the philosophical literature on the epistemology of emotions to identify the role of emotions in knowledge production. It analyses their evaluative, motivational, hermeneutical, and social functions as embedded in epistemic practices and cultures. The focus on situated epistemic emotions stresses the importance of developing an ethics of knowledge production. The review introduces some new proposals for fostering inquiry in this field, drawing from agency-based accounts of emotions (enactivism, in particular) and virtue epistemology.

**Keywords:** theories of emotion; epistemic emotions; science-making; epistemic cultures; virtue epistemology; situated affectivity; agency-based accounts of emotions; enactivism.

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## Introduction

Consider the excitement one feels while discovering some data that support one's intuition and the discouragement and bewilderment that can be felt when one meets a roadblock in the process of inquiry. These emotions are pretty widespread in doing science. Social processes of scientific knowledge production, such as group brainstorming, team science, and collaborative research are filled with affective dynamics and atmospheres. For instance, imagine the pride that can inflame a research team while achieving a significant milestone and the subsequent enthusiasm in moving the project further.

This synoptic review will survey the philosophical literature on the epistemology of emotions, i.e., the theory of emotional knowledge, to identify the role of emotions in knowledge production. It might be argued that emotion is simply a contextual factor without any relevant epistemic role. Why should excitement, discouragement, and pride matter to defending a new hypothesis, collecting data about a research topic, or finding solutions to a problem?

By exploring feeling theories, cognitive theories, perceptual theories, affective intentionality approach, the narrative process approach, agency-based accounts, and the multi-component approaches of emotions, I will show that emotions do matter to knowledge production. I will also explain in which sense they matter, namely because they have a role in the process of generating knowledge. I will then explore what epistemic functions they serve by analysing some of the emotion's key features according to these theories. I will analyse the evaluative, motivational, and hermeneutical functions. Emotions play an evaluative role when they help in assessing a situation, for example by providing relevant information; a motivational role when they stimulate the epistemic agent to pursue the inquiry, for example by directing the attention to something that matters; a hermeneutical role when they disclose and contribute to the generation of meanings. By challenging a merely functionalist approach, i.e., focusing only on the ways emotion functions, I will also explore some new steps that seem to be required for fully grasping the epistemic significance of emotion in science-making. First, I will introduce some hints from virtue epistemology. Virtue epistemology allows us to expand the analysis to the internal constitution of the epistemic agent and, so, to focus on those virtuous character traits that are supported by epistemic emotions in science-making, such as curiosity and wonder. Then, some issues concerning an individualist view of epistemic emotion will be considered. I will provide a solution to them by focusing on situated epistemic emotion and stressing their social significance. In this way I will detect a fourth function, the social one. The result is that epistemic emotions should be embedded in epistemic cultures to be effective. This means that

studying the social dimension of knowledge production along with an ethics of knowing should come first.

## 1. Why do emotions matter

After the widespread scepticism about a possible positive function of emotions in knowledge production that has characterised epistemology for centuries, new hopes have been instilled by some critical discoveries in the cognitive sciences in the last thirty years. In particular, significant evidence against the traditional dualism between rationality and emotion has been provided by neuroscience. For example, the work of the neurobiologist Antonio Damasio (1994) on emotion as an embodied process of self-regulation aimed at homeostasis and of Luiz Pessoa (2013) about the fundamental integration of cognition and emotion in the brain processes are the step stones for acknowledging an epistemic role to emotion. Emotions are now understood as a constitutive element of human rationality. Their role has been studied in different cognitive processes, such as deliberative thinking and predictive processes (Barrett 2017, Wilkinson et al 2019), and in various epistemic social practices, namely the activities that are undertaken by research teams for producing knowledge, for instance, cooperative inquiry (Candiotto 2022).

However, the fact that emotions take part in cognitive processes and epistemic practices does not necessarily guarantee that they are also truth-conducive. It might be argued that while they are indeed part of these processes, they are merely contextual factors or even obstruct the epistemic processes. Consequently, emotions would not be epistemic, i.e., they would not constitute nor even support the generation of knowledge. For replying to this object and arguing that emotions can instead play fundamental epistemic roles in knowledge production, I will present the different taxonomies of emotions provided in the research field of philosophy of emotion: feeling theories (1), cognitive theories (2), perceptual theories (3), the affective intentionality approach (4), the narrative process approach (5), the agency-based accounts (6), and the multi-component approaches (7). Then, in the following section, I will flesh out the key characteristics that can make them epistemic.

The first account is provided by the *feeling theories* (1) that identify emotions with feelings. The core intuition is that it feels a certain way to live through an emotion. The classical proponent is William James (1884), but there are also important references to emotion as a physiological response to external stimuli, namely as a “passion”, throughout the history of Western philosophy. A contemporary revival of the feeling theories is in part due to the already mentioned neurobiologist Antonio Damasio and his somatic marker hypothesis for which emotion plays a significant role in

decision-making by way of felt bodily changes. Core elements of feeling theories also appear in the work of Jesse Prinz (2004), Giovanna Colombetti (2014),<sup>1</sup> and, with a specific reference to Hume's sentimentalism, Demian Whiting (2020). (1) is very intuitive, and it is indeed hard to imagine what would be left of the emotion in the absence of such a feeling. Moreover, (1) has also found important scientific confirmation most notably with the work of Antonio Damasio. But there are also some issues. This account's main counterargument is that emotions are intentional (they are "about something"), and it is hard to see how mere feelings might have world-directed intentionality. Also, there is the classical problem of individuation that, in the case of the feeling theories, takes the shape of an unspecific model that seems to be incapable to account for the variety and subtlety of emotions.

The *judgment-based cognitive theories* (2) aim to reply to these concerns. They identify emotions with judgments. The core intuition is that emotions are not only intentional but have a mind-to-world direction of fit. This means that they purport to be about some evaluative matter that actually obtains (e.g., a loss, a danger, a mishap, an offense, a stroke of luck). The classical proponents are the Stoics, and the main contemporary proponents are Martha Nussbaum (2001) and the early Robert Solomon (1976). This account is critical because it points to the intelligence of emotions. For cognitive theories, emotions have a crucial role in reasoning, and they are not merely the obscurations of the mind that disrupt rational processes.

However, ascribing an evaluative function to emotions might sound exaggerated. The key point is to understand what "judgment" means in this context, and here, views vary widely among proponents of cognitive theories. For the neo-stoic approach of Nussbaum, a judgment is an assent to an appearance. Appearance, according to Nussbaum, is propositional, and so a judgment is an assent to a proposition. Emotions are evaluative in terms of what is valuable to the subject and so their judgments are all concerned with vulnerable externalities (Nussbaum 2004). For Solomon, instead, judgments are more like existential engagements and subjective interpretations than usual cognitive acts. Although being one of the most important and widely implemented approaches to emotions, for example, in therapy and education, (2) has received a lot of criticism. The main counter-argument to (2) is the "problem of emotionality," (Helm 2001) for which it is possible to have evaluative judgments without having the appropriate emotion or any emotion at all. This creates a problem with the bi-directionality of the core claim of cognitive theories. It might be the case that emotions are judgments, but judgments are not always emotional or are more than an emotion. So, what really

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<sup>1</sup> Notably, Colombetti's enactive account of emotion could be categorised differently and be listed in the agency-based account. The reason is that it turns the passivity of emotion, which is typically ascribed by the feeling theories, into the enactment of the constitutive relationship between an organism and its environment. However, it is a prominent example of feeling theories because emotions are considered embodied feelings. The difference is that these feelings are not understood as merely passive reactions to external stimuli in the enactive approach to emotion and, so, Colombetti's approach can fit the agency-based accounts as well.

means that emotions are judgments?

For replying to the shortcomings of both the feeling and the cognitive theories, the *perceptual theories* (perception-based cognitive theories) (3) have suggested understanding emotions as analogous to perceptions. The core intuition is that emotion, like perceptions but unlike judgments or beliefs, might persist even despite contrary evidence. I might know that the flight is safe, but my fear of flying persists; I experience my neighbor's dog as dangerous even though I know it is not. The main proponents of the perceptual theories are Christine Tappolet (2012), Sabine Döring (2007), and Robert C. Roberts (2003). (3) offers important advancements: by saying that emotions are *like* perceptions it overcomes the simplistic reduction of emotions to perceptions. Although this comparison could sound not enough to someone, it has the power to disclose some important features of emotion, for example, their directedness. But (3) has received some counter-arguments too. For example, it has been claimed that emotions seem to be more complex and more deeply self-involving than perceptual experiences. Since emotions take part in self-reflection processes, it follows that they are more than perceptions and require a conceptual dimension (Slaby 2020). Moreover, although perceptual states have been paradigmatically understood as passive, significant results in cognitive science have proved the active dimension of perception (Nöe 2004). So, (3) does not necessarily confine emotions to passive and reactive states but can grant active functions such as perceptions of affordances or bodily changes (Prinz 2004).

The core intuition of the *affective intentionality approach* (4) is that there seems to be something right about feeling theories and something right about cognitive theories, and so it tries to combine what is right in both. The proposal is to conceptualise emotions as a sui generis type of intentional state: feelings towards something, affective states that are world-disclosive. The classical proponents can be found in the phenomenological tradition, especially Max Scheler (1970) and, arguably, Martin Heidegger (1962).<sup>2</sup> The leading proponents in the contemporary debate are Bennett Helm (2001), Matthew Ratcliffe (2008), and Jan Slaby (2008). (4) effectively takes both the embodied and the cognitive dimensions of emotion. Its focus on intentionality can disclose the directiveness of emotions (as the perceptual theories) but in a more personal and existentially charged manner. The main counter-argument to (4) is that it might be reductive to identify emotions with a single type of mental state, namely the intentional one. But this counter-argument could indeed be addressed to most of the taxonomies of emotions that try to identify the key feature of an emotional experience. So, the criticism is directed more to the taxonomy itself than to (4).<sup>3</sup>

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<sup>2</sup> For an overview of the phenomenological account of emotion, see Szanto and Landweer 2020.

<sup>3</sup> A criticism to the attempt to define emotion with a clear-cut concept of definition has been notably addressed by Amélie Rorty (1980).

The *narrative process approach* (5) tackles the problem of identifying emotion with a single mental state precisely. For this approach, emotions are longer-lasting episodes in a person's life, combining different components and phases united through narratives. Therefore, the core intuition is that the majority of human emotions are not just mental states but more encompassing bundles of comportment. The leading proponent in the contemporary debate is Peter Goldie (2012), but there are also some crucial forerunners, such as Richard Wollheim (1999), with substantial references to psychoanalysis and literature.

(5) is also strictly linked to the *agency-based accounts* of emotions (6), for which emotions are active responses to matters of significance, and engagements with the natural and social environments. The core intuition is that many emotions seem to involve substantive activities on the part of the emoting agent, sometimes comparable to “playacting” (making a scene, angrily confronting an opponent, hiding away in shame or fear). The classical proponents are Jean-Paul Sartre (1994) and some pragmatists, especially John Dewey (1971; 1988). The contemporary proponents are Paul E. Griffiths and Andrea Scarantino (2008), but also some enactive thinkers, such as Giovanna Colombetti (2014) and Laura Candiotta (2019),<sup>4</sup> also with an essential link to the motivational account of emotion (Frijda 1986; Slaby & Wüschner 2014). There are also some variants of this approach, for example, the attitudinal theory of emotion, for which emotions are felt attitudes of action readiness (Deonna & Teroni 2012). The primary value of (6) is having stressed the motivational power that most emotions seem to have, also going beyond a mentalistic account of emotion by bringing them into the world as actions that produce effects. A prominent counter-argument to (6) is that it seems to fly in the face of the intuition that emotions are passively undergone. In replying to this objection, especially the proponents inspired by the phenomenological tradition inflate the distinction between passive and active by including the action-oriented dimension of feelings. In this way, (6) shares the core intuition of (4), namely that emotions are feeling towards something. But (6) is more radical about the intentionality of emotion because it argues for the constitution of worlds through emotions, not simply their disclosure.

These are the main approaches that have been proposed by the contemporary research field of philosophy of emotion in the last thirty years. The discussion is ongoing, and other new approaches are in the making. Also, it should be noted that there are some overlaps between these different approaches and that what I provided here is just a schematization of a vibrant and complex debate. For example, Colombetti's approach could be classified both within the feeling theories and the agency-based approach, but there are also essential features in common with the affective

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<sup>4</sup> In dialogue with other colleagues and traditions of thought, especially Pragmatism and Feminism, for example in Candiotta & De Jaegher 2021, Candiotta & Dreon 2021, and Candiotta & Piredda 2019.

intentionality approach. There are also the *multi-component* approaches (7) for which emotions cannot be equated to a single state or process, being it a judgment or an action, because they are complex clusters of different functions, such as perceptions, evaluations, bodily changes, feelings, action tendencies, and changes that can impact attention, memory, and thinking.<sup>5</sup> (7) seems to be well-equipped to describe the emotional experience's complexity without reducing it to a particular component. Also, the fundamental functionalist framework of (7) appears to be better suited to interdisciplinary research, especially in cognitive science and psychology. However, there is the risk of just taking many different functions together and adding items to a list when one discovers that something is not included. And this can bring emotional bloat that cannot help identifying what an emotion is specifically.

This overview of the theories of emotion is vital for orienting ourselves in investigating their epistemic features. Although there is no conclusive answer about the nature of emotional experience, I will use the conceptual tools acquired in this section to detect the different roles that emotion can play in our epistemic lives in the next section. I will do it by investigating the specific features of emotion that can make them epistemic.

## 2. The epistemic features

The Greek word *episteme* can be translated as knowledge and science. Although today knowledge, in its different and manifold uses and modalities, is not only related to science but it extends to other practices, the meaning of epistemic emotions can be found at the crisscross of knowledge and science. Therefore, epistemic emotions are those emotions that have to do with knowledge and science, as moral emotions are related to morality, and political emotions to politics. A typical example of an epistemic emotion is curiosity, like shame is for moral emotions, and anger is for political emotions. But these general definitions say little about the specific meaning and functions of emotions that many times outstrip these analytical boundaries. For example, a typical moral emotion such as shame can play a crucial epistemic function if embedded in processes of revision of unwarranted beliefs (Candiotto 2019b).

Different conceptualisations of epistemic emotions have been provided.<sup>6</sup> I differentiate these conceptualisations into two schools of thought. I call the first type the “strong view” and the second the “weak view” about epistemic emotions. The strong view says that certain emotions are epistemic if their formal object is the truth. Adam Morton’s conceptualization is exemplary of the “strong view”

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<sup>5</sup> This approach is quite common in the psychological literature on emotion, and it has recently been brought to the attention of philosophers, for example by Brady 2019.

<sup>6</sup> For an updated review of the different approaches, see Candiotto 2022 and Candiotto 2020.

because it focuses on emotions' capacity to detect the value of truth, motivate an agent towards it, and regulate inquiry accordingly (Morton 2010). The weak view understands epistemic emotions as contributing factors to epistemic processes. Epistemic emotions are, therefore, those emotions that contribute to the generation of knowledge. The weak view has the advantage of not circumscribing a class of emotions as epistemic. Instead, any emotion contributing to knowledge is ascribed to have an epistemic character. This perspective is more pluralistic and considers the epistemic functions fulfilled by emotions in epistemic processes like evaluation, deliberation, and belief revision (Hookway 2008; Livet 2016).

I cannot survey the rich debate on epistemic emotions here, but I will present a new proposal for integrating the strong and the weak views in the last section by focusing on epistemic cultures. What is more crucial for this survey is to explore the features that can make emotions serve an epistemic role in knowledge production. I will first consider the epistemic role of emotion that can be derived by (2) and (4). Then, I will focus more deeply on (6) because it allows us to conceive the fundamental motivational role played by emotion in a constitutive manner. From this analysis, I will get three fundamental features that can make emotions serve an evaluative, motivational, and hermeneutical function. In the following section, I will add a fourth function, i.e., the social one.

The cognitive theory (2) is the first candidate for granting a role to emotion in knowledge production. Since emotions are seen as cognitive states that express an evaluation of the world, it follows that if the evaluation is correct, this emotional judgment would be epistemic. However, it is not easy to say if it is the emotion per se to be epistemic or a more fundamental cognitive structure of these judgments, for example an insight on the nature of the phenomenon under analysis. For replying to this problem, cognitive theorists have focused on the notion of "fittingness". The aim is to assess if a particular emotion is appropriate for a specific situation. For instance, assessing if wonder correctly regulates the inquiry into the nature of the phenomenon. In the epistemic context, this means that a specific emotion as wonder is epistemic if the emotional judgments rightly represent a state of things. Wonder would fit the situation if the object recognized as wonderful is really worthy of receiving the attention and scrutiny that have been instigated by being in wonder at it. Just think about the wonder that triggers the scientists' interest of knowing more about their object of study. For the cognitive theories, this wonder would be epistemic *iff* it would represent a worthy object of study and not, on the opposite, diverge the scientist's attention from what really matters in their process of inquiry.

However, when one considers the role of emotions in knowledge production, it is important to investigate not only if emotions can disclose a truth about something, but if they are truth-conducive, namely if they can instigate epistemic processes. In this regard, both the affective intentionality

approach (4), which focuses on the specific kind of intentionality that is triggered by emotions, and the agency-oriented accounts (6), which stress the strategic and agentic significance of emotions seem to be good candidates for being truth-conducive. By focusing on the agent's affective engagement with a situation, these approaches can direct attention to the affective dispositions of the scientists in science-making. It might follow that not just the scientist's epistemic character, but also some emotions matter for knowledge production since they can motivate the scientist to inquire as subjective dispositions to the truth (Candiotta 2020). For example, the interest in a topic or the epistemic anxiety about a problem can activate the motivation to pursue an inquiry process by directing the attention toward what should be investigated.<sup>7</sup> The pragmatist tradition is crystalline in this regard. No scientific inquiry is possible without a genuine doubt. For Pierce (1986), a real doubt is an existentially charged question that addresses a belief one actually questions, not a pretended, skeptical attitude towards a purely hypothetical matter. The existential dimension of inquiry is affectively charged and it is seen as fundamental to knowledge building, not just as an add-on. It follows that the emotion's epistemic function would be an existential motivation to inquiry for solving real problems.

It might be argued that emotions as motivations can just activate some epistemic processes, but they do not constitute them. However, I think that this objection understands motivations in a relatively narrow and mechanical way, namely just as a flame that turns an engine on. The agency-oriented account (6), and in particular the enactive approach to emotions for which emotions as active processes of sense-making in a constitutive relationship with the natural and socio-cultural environments, can help provide a more profound account of emotions as motivations. For the enactive account, the dynamic interaction between an organism and its natural and socio-cultural environment is what causes cognition to emerge as an embodied activity. According to the enactive approach, the human mind is embodied in an organism's life processes that are embedded in a specific environment (Varela et al. 1991). The emphasis of the enactive perspective, particularly in Varela's autopoietic version that holds the life-mind continuity, is that cognition is an emergent property of the organism's embodied interactions with the environment. Cognition is produced by the reciprocal and continuous relationships between the brain, the body, and the world in terms of sense-making (Thompson 2007). According to autopoietic enactivism, "sense-making" is the ability that humans share with other living systems to understand the environment by being self-organizing and adaptive organisms (Di Paolo 2005).

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<sup>7</sup> For the epistemic emotions' crucial function of directing the attention to something that matter to the subject, see Brady 2013.

This enactive view on sense-making is relevant to our topic because it highlights a fundamental epistemic function of cognition, namely the hermeneutic one. In the continuity between life and mind, Giovanna Colombetti (2014) has added an important step, namely that it is not just cognition that comes out of living processes, but also emotion. Her work on affective sense-making is crucial for the research on the epistemic role of emotion in knowledge production because it highlights that affectivity is the primary way of making sense of ourselves and our worlds. More specifically, embodied emotions – a core feature of (1) – provide values that guide action by interpreting the situation with the organism's preferences. For enactive thinkers, embodied emotions are not just passive states, but they motivate behaviors, even of very simple organisms. For example, the attraction to sugar makes a motile bacterium swim toward higher concentrations of sugar and away from noxious substances. This attraction not only motivates the bacteria to swim toward sugar but also interprets the sugar as something pleasurable and good. Moving away from a mentalistic account to epistemic emotions, therefore, the enactive approach can contribute to our investigation by stressing that the emotion's hermeneutical function is enacted in an embodied manner, as the felt quality of the emotion experience ("affective valence", in technical terms), in the polarity of attraction and repulsion (Varela & Depraz 2005).

Some criticism might arise at this point. Why do embodied emotions matter to knowledge production? Isn't science an exercise of detachment from the body's idiosyncrasies and individual experiences after all? In replying to these worries, Candiotti 2019a has shown that affective sense-making does matter for knowledge production, especially in the social contexts of learning and building knowledge in groups, such as in scientific teams and classrooms. What is important for this enactive account is that the value of knowledge is experienced in the qualitative dimension of affective experience as pleasures and pains, as a tension that takes many forms, such as love/hate or attraction/rejection (Varela & Depraz 2005; Depraz 2008). These embodied tensions are seen as generative for knowledge processes and fundamental to social understanding because they direct the scientist's attention to what she cares about and kindle the interest to know more about what she cares about.

Here I find an essential overlap with the pragmatist tradition I mentioned before, especially regarding the motivational function. But the enactive approach, which accounts for the constitutive embodied interactions between the subjects and their environments and that sees the emotions as fundamental features of this structural coupling, helps understand this motivation more constitutively. The motivation expressed by these affective tensions is what constitutes affective sense-making as a strategic interaction with the environment. Motivation, in this case, turns emotions into strategic actions that pursue the organism's interest by replying to the felt quality of attraction and repulsion.

In this regard, motivation does not only trigger the process but also shapes and informs the interaction with and within a meaningful environment.

The key reference here is the programmatic article titled “Emotions in the Wild,” by Griffiths and Scarantino (2008), which I listed in the agency-based account (6). Griffiths and Scarantino have developed a naturalistic model for understanding emotions as social and intersubjective phenomena. This model is considered the best example of what is now called "situated affectivity", according to which emotions are strategic movements within environmental structures, that is, active engagements with the social worlds. Griffith and Scarantino assert that emotions are not internal states or processes independent of the environment. On the contrary, the environment participates in the production, shaping, and management of emotions. For instance, fear is not simply a subjective internal mental state about an object that is perceived as dangerous, but it is produced by encountering a situation that motivates one to escape, and find a strategy to cope with it, be it by running away or hiding. In this case, the motivation to escape is a strategy to cope with the scary situation. By enacting fear, the subject transforms the natural and socio-cultural environment as well: it has an effect. This means that the environment both influences and is influenced by the unfolding of emotions. Griffith and Scarantino particularly emphasized the social grounding of emotions. Therefore, their conceptual framework is effectively bidirectional and is based on the notion of a subject's strategic interaction with the environment. However, this is not just an evolutionary theory of emotion. Griffith and Scarantino understand emotions as social signals that constantly reframe relationships, for example in smiling.

But, again, why subjective motivations and strategic interactions with the environment, embodied or not, should be taken into account in discussing the role of emotions in knowledge building?

Although I posit that the enactive and situated account of emotions, as key actors of (6), can provide an answer to this question in their own terms, for example by focusing on affective science-making or analysing emotions as strategies in social epistemic practices, I would like to provide here an answer that extends (6). I do this because it can add to the debate a fundamental feature of emotional experience, which is its personal character. Focusing on the personal character of the emotional experience in science-making can help in understanding why a functionalist approach to epistemic emotions, which is quite widespread in most of the approaches I presented in the previous section,<sup>8</sup> is not enough. Emotions express the existential concerns and scientific values of the subject,

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<sup>8</sup> There are important exceptions, especially in those authors like Solomon (1976), Slaby (2008), Goldie (2012) and Colombetti (2014) that come from the phenomenological and existential traditions of thought.

in our case of a researcher. They speak about the subjective motivation for science-making, they do not simply reply to some universal functions.

The conceptual framework I add to (6) to explain how emotions can express scientific values is virtue epistemology. Virtue epistemology is one of the most important approaches in the contemporary debate on the theories of knowledge. It posits that knowledge is dependent upon the abilities and virtuous character traits of the agent.<sup>9</sup> By agent (which can be an individual, a group, or an AI system) I mean a being with the capacity to act. An epistemic agent is therefore a being with the capacity to act in the epistemic domain, for instance by doing inferences and addressing questions. In virtue epistemology, a specific piece of knowledge can be warranted if, for instance, the epistemic agent displays certain intellectual virtues, for example, humility, courage, reliance on others, scrutiny, and perseverance in a process of inquiry.

So, the last feature I would like to highlight by referring to virtue epistemology points to the scientist's epistemic character. Knowledge building is not a detached activity; its success criteria are not independent of the abilities and skills of the epistemic agents. Adam Morton (2010) has brought this approach to emotion research and has thus focused on the role of emotions in knowledge production as constitutive of the scientist's intellectual virtues. For example, Morton (2010) has focused on curiosity as a prominent case of an emotion that can motivate virtuous epistemic action. Michael Brady (2009; 2013) has further explored this claim by explaining why curiosity can be epistemic, namely by building salience patterns by directing attention toward a topic. Both Morton and Brady understand emotions from a virtue epistemology perspective for which the epistemic feature of emotion is found in the character traits of the epistemic agent. In this case, epistemic emotions are constitutive features of the virtuous epistemic character. Following this line of thought, epistemic emotions should not be seen just as subjective feelings that come and go. Instead, they can direct the inquiry to the truth by being regulated by intellectual virtues.

By focusing on the scientist's intellectual virtues, the virtue epistemology approach importantly focuses on the ethical dimension of scientific inquiry. This means that to fully appreciate the role of emotion in knowledge production, one cannot simply think of it in functionalist terms. It is crucial to study the role of emotion in knowledge building within the normative dimension of the ethics of knowing (Fricker 2007) and along with the concept of epistemic responsibility (Code 1987).<sup>10</sup> This is the fundamental answer to the question about the relevance of emotions to knowledge production. If emotions are not simply taken in functionalist terms but are seen as constitutive of the agent's

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<sup>9</sup> For an overview of the core features and different approaches in virtue epistemology, see Battaly 2018.

<sup>10</sup> A special issue of the journal *Humana.Mente* (vol. 14, n. 39, 2021) has recently been dedicated to this topic. See in particular the papers by Axtell (2021), Candiotta (2021), Pritchard (2021). This special issue has also highlighted that this implies exploring intellectual vices as well, by focusing on hermeneutical injustice or epistemic oppression. See in this regard the papers by Boncompagni (2021) and Rogers (2021).

epistemic character, as in the case of epistemic emotions in virtue epistemology, then it appears that their role is normative. So, the focus on the ethics of knowing replies to the second aspect of the question, namely about subjective motivations. But something is still missing and should be explicitly spelled out. I consider it in the following section, as a middle way between the strong and weak views about epistemic emotions. In doing so, I will also introduce some key steps for developing new paths of inquiry within (6).

### **3. What is still missing and what should be done**

The virtue epistemology approach to epistemic emotion has brought us to the ethics of knowing as a fundamental dimension for investigating the role of emotion in knowledge production. However, there is still something missing in this approach. The problem with the internalist approach undertaken by virtue epistemology is that it risks bringing us to epistemic individualism. The environment's role is underestimated and results in focusing on a single epistemic agent who can achieve knowledge thanks to the effort of her will (Montmarquet 1993, 2000). In replying to this problem, Candiotta (2022) has suggested a *situated account* of epistemic emotions in epistemic cultures, that by inheriting some crucial features from the enactive account of affective sense-making and situated affectivity I presented in the previous paragraph, stresses the importance of focusing on epistemic vices for emancipating ourselves from an idealistic view of virtue epistemology. In this last section of our review paper, I will first summarise this approach. Then I introduce some key elements that should be considered for developing new paths of inquiry into the role of emotions in knowledge production.

For Candiotta (2022), the epistemic role of an emotion does not come out from an intrinsic feature of the emotion, as for the strong view about epistemic emotions, but it is dependent upon the epistemic culture in which the emotion is embedded. This means that the context has a prominent role in shaping and managing the affective experience, as for the weak view about epistemic emotions. Candiotta has then differentiated epistemic cultures as virtuous and vicious. The former are the ones that support processes of knowledge building, for example, by promoting the development and employment of particular intellectual virtues as virtuous ways of conducting the inquiry; the latter, on the opposite, are the ones that hinder the processes of knowledge production by instilling, supporting and spreading intellectual vices, such as epistemic oppression and servility.

Consider the case of Hannah, as presented by Candiotta (2020). Hannah is a young scholar trained in theoretical physics. She is enthusiastic about her research and proud of having got some funding for pursuing her project recently. These emotions motivate her to work hard for getting some results. For example, they can motivate her to display the intellectual virtue of resilience in front of the

difficulties that can arise in the research process. However, Hannah might also feel anxious about getting those results, because she needs to provide some answers to the funding body. She might also fear that without these results her application for tenure will be unsuccessful. These emotions can also trigger some intellectual vices in scientific misconduct, for example, carelessness in analysing the data for getting to a publication quicker. These opposite scenarios are not just up to Hannah. They are dependent upon the situation she is in and the problems and expectations it unfolds.

Looking at the role of emotion in knowledge production from both the perspective of intellectual virtues *and* vices means investigating the specific arrangements, practices, and imaginaries that shape the emotional experience, for good or bad. For example, a co-inquiry epistemic culture can reinforce cooperative behaviors among the team members. Positive emotions, in our example, enthusiasm, can be the building blocks of prosocial intellectual virtues, such as resilience in the face of adversity and stress. But there are also epistemic cultures that can obstruct knowledge production. Consider for instance the publish or perish culture that can pressure Hannah in getting to quick, erroneous, or fraudulent results for succeeding in her academic career and so displaying the intellectual vice of carelessness.

This example cannot be generalised and we assist in many cases of epistemic responsibility in scientific research in which the publish and perish culture does not lead to carelessness. But this highlights the point I am making here. Emotions confer a personal significance to knowledge production that cannot be underestimated. However, personal significance should not be taken in individualistic terms.

The enactive approach to social understanding is relevant in this regard. I have already presented the enactive approach to cognition as sense-making while discussing (6). Hanne De Jaegher and Ezequiel Di Paolo (2007) have suggested employing enactive sense-making for conceptualising the participatory processes in place in social understanding. This is a significant step in the direction of a situated account of epistemic emotions because it offers the opportunity of focusing on the affective interactions among agents as processes of sense-making. This means that it is not just up to Hannah to enact certain intellectual virtues and vices. We need to see Hannah in her concrete social interactions and environments. This enactive approach to intersubjectivity strongly argues against the view of knowledge production as the outcome of a solitary being who at some point engages in a joint epistemic activity with someone else. Rather, the idea is that interactions (the structural coupling, in technical terms) between agents come first.

Starting from the interactions, instead of solitary beings, one can study the construction of meaning that arises in an intersubjective situation. This means that epistemic agents participate in creating meaning for, with, and through others. Participation does not mean a passive and accidental

sharing of interaction, but it implies the active engagement of each individual in the joint activity of sense-making. Participation is, therefore, the intentional act of taking part in a shared experience of construction of meaning, for example, and importantly for our topic, when scientists make science. In the case of Hannah, then, we can imagine that the interaction with her head of department can help her in developing the intellectual virtue of resilience, instead of the one of carelessness, in making sense of the issues she is facing regarding the timeline of her research project.

Linking the research on situated emotions in epistemic cultures to this enactive model of social understanding is crucial because it points to a new epistemic function that can be ascribed to emotions, the social one. This function is what enables participation in epistemic communities. This aspect aligns with what I have advanced in the previous section regarding the motivation function of epistemic emotions in enactive terms. But it helps extend it further because motivation is here seen as situated in the embodied epistemic interactions among agents within an epistemic culture. The focus is on the concrete epistemic agents in their interactions within an epistemic culture to build knowledge.

So, what is the main contribution of this extended version of (6) to epistemic emotions in knowledge production?

First, the situated approach to epistemic emotions points to the necessity of focusing on the actual practices of knowledge building in the labs, schools, and other epistemic institutions. For example, let's consider teamwork as a case of knowledge building. The motivation towards a common goal and the salience of the expected result can be expressed by a form of affectivity that is located in the relations between people, objects, and social spaces. We can imagine that if Hannah is not a solitary researcher but is part of a research team and that this team is working well, then the emergence of intellectual vices is less probable. There can be different motivating reasons, from distributed responsibility to a commitment to the ethics of knowledge. But the emotions that spread through relationships also constitute a particular affective context in which the team epistemic practices occur. In this case, the emotions do not only reveal a motivation of the individual or the group to work together. They also constitute the affective location of the epistemic practice.

It might be argued that certain emotions can constitute and reinforce social bonds, and so, for example, their function can be one of supporting cooperation (Candiotta 2017). In this case, the emotions that promote cooperation and trust in team members for achieving common objectives would be beneficial to the creation of knowledge in groups because they support the employment of intellectual virtues. But this does not mean that all epistemic emotions promote cooperation among the team members. Some contexts manipulate emotions in producing experiences contrary to the subject's dispositions. This is the case of the mind invasion phenomena (Slaby 2016), where specific

emotions are used for shaping beliefs, attitudes, mindsets, and behaviours against the subject's will or prior orientations. Slaby and colleagues have precisely described this phenomenon in team working (Slaby et al. 2017). So, one cannot exclude that this conditioning power of emotions is alien to processes of making science, as I highlighted in discussing Hannah's case. Indeed, if one focuses on epistemic oppression, epistemic corruption, and epistemic servility (Tanesini 2018; Kidd 2021; Rogers 2021), for example, many cases of mind shaping through emotions in research teams and institutions can be founded.

So, these negative outcomes stress the importance of understanding the role of emotion in knowledge production within a broader framework that conjunctly avoids epistemic individualism and tackles the ethical, social, and political dimensions of scientific inquiry as a practice embedded in epistemic cultures and institutions. Finally, this last paragraph's take-home message is that it is not enough to look for the emotion epistemic functions to detect their role in knowledge production. The research should be directed to situated emotions that are personal but embedded in specific epistemic cultures, enacted in epistemic practices, and scaffolded by the normative dimension of knowledge.

### **Conclusion**

In this paper, I have introduced and discussed some of the most important theories of emotions for detecting the key characteristic that can make emotions serve an epistemic function in knowledge production. After listing and assessing some of these features, I enlarged the perspective by focusing on concrete situations in which epistemic practices occur to avoid the risk of epistemic individualism. By doing so I detected the situated epistemic emotion's social function. This has enabled the discussion of the social dimension of emotions in knowledge production, also considering the overall ethical and political significance of this new path of inquiry into the ethics of knowing.

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