Emotion and Mental Imagery

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1. Summary of the research plan

Both emotions and mental imagery play a crucially important role in our mental life and both have played a central role in understanding a wide variety of mental processes. Somewhat surprisingly, there is no systematic attempt in philosophy to examine how these two mental phenomena interact. Mental imagery has traditionally been understood as an emotion-free state and in the discussion of emotions mental imagery is rarely brought up.

Try to imagine as vividly as you can being attacked by a rabid dog, foaming at the mouth, snapping at your feet. This is an important form of mental imagery and also an important form of emotional state. More generally, we acknowledge from a pre-theoretical point of view the existence of important interactions between emotions and imagery. In light of recent research, there is ample reason to think that this pre-theoretical point of view is on the right track.

The present research project aims to explore the rich interactions between emotions and mental imagery, which we think has important benefits both for the study of emotions and for the study of mental imagery. The project is structured around two main hypotheses. The first hypothesis is that a focus on imagery is key to resolve central issues in emotion research. In providing a much-needed middle-ground, appeal to imagery helps rise above the tired opposition between belief-centred accounts and perception-centred accounts. The second hypothesis is that a focus on emotions is key to resolve central issues in imagery research. Appeal to emotions helps stimulate a research that has for too long centred on "affect-free" imagery and appreciate the significant roles imagery plays in our mental lives. The central motivation behind the project is that understanding how emotions and imagery are intertwined is not only of philosophical interest, but that it can also contribute to debates in psychology, cognitive science and even in some forms of clinical practices.

In order to explore the relations between imagery and affective states, the project is divided into two subprojects that mirror the two main hypotheses. Subproject A explores the role of imagery in emotion. In this subproject, the focus is on how imagery affects the forming of emotions, their appraisal dimensions, and their manifestation in thought and action. Subproject B explores the role of emotions in imagery. In this subproject, the focus is on how emotions influence how we form mental imagery, the content of imagery and the various mental processes that rely on imagery. This division does not mean that the research on the subprojects will be conducted independently – on the contrary, the whole project is premised on the idea that there is much to gain by making the two research domains interact.

The project gathers the expertise of the Swiss Centre for Affective Sciences at the University of Geneva and the Centre for Philosophical Psychology at the University of Antwerp to approach the relations between emotions and imagery from a perspective informed by the most recent interdisciplinary research in both areas. The planned methodology relies on a lot of empirical research, partly because there is a wealth of empirical findings about the ways in which imagery and emotions interact from various branches in psychology and neuroscience (see Amit & Greene 2012 and Holmes & Matthews 2010 for summaries). The best and most efficient way in which philosophy can be not only empirically informed but also relevant to the empirical disciplines is for it to pay attention to theoretical issues not in one but in a variety of empirical disciplines (see 2.5 for detail). This is what we aim to do by bringing together two thus far rarely interacting experimental research programs on emotion and on mental imagery.

While the project is continuous with the empirical sciences, the proposed research is a theoretical one: there is no experimental component. What we aim to do is to build on the empirical research to trace the potential implications of the interaction between emotions and mental imagery for a number of experimental and even clinical paradigms. We do it by making explicit the assumptions empirical researchers use when studying these phenomena and develop them into an account of the interaction between emotions and imagery.

2.   Research plan

The present research project is built on the assumption that there is room for key developments in our understanding of both affective states and imagery if we pay attention to the deep and systematic interactions between the two. This may come as a surprise from a theoretical point of view, as these domains of research have until now failed to cross-fertilize. From a pre-theoretical point of view, the assumption seems, on the contrary, to be plain common sense: we readily acknowledge the existence of fundamental two-ways interactions between affective states and imagery. On the one hand, imagery dramatically affects emotions – it seems for instance that we have to appeal to imagery in order to make sense of what goes on in the mind of a fearful or angry person. On the other hand, the impact of emotions on imagery is equally significant – imagery that occupies our minds is very often under the control of our dominant mood or emotion, which sometimes alters its fabric and our capacity to control it. There is ample evidence, many aspects of which we present below, to think that this pre-theoretical point of view is on the right track.

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The present section first introduces the key concepts of mental imagery and of emotion and then present the current state of research in the fields of Subproject A and Subproject B. We then lay out our research plan and document the specific foreseen interactions between the two subprojects in section 2.3.

By *mental imagery*, we mean perceptual processing that is not triggered by corresponding sensory stimulation in the relevant sense modality. This is the sense in which psychologists and neuroscientists use this term (although philosophers often use it in a somewhat narrower sense). Here is the definition from a recent review article on mental imagery in the leading cognitive science journal *Trends in Cognitive Science*: "We use the term 'mental imagery' to refer to representations […] of sensory information without a direct external stimulus" (Pearson & al. 2015, see also Nanay 2018 for a philosophical summary).

When you close your eyes and visualize an apple, there is perceptual processing that is not triggered by corresponding sensory stimulation in the relevant sense modality: we know that there is activation as early as in the primary visual cortex and this activation is clearly not triggered by corresponding sensory stimulation (that is, retinal stimulation) because your eyes are closed. Closing your eyes and visualizing an apple is a voluntary exercise of mental imagery (Currie & Ravenscroft 2002). But mental imagery can be, and often is, triggered involuntarily. Flashbacks of unpleasant scenes would count as mental imagery, but they are not voluntary. The same goes for earworms, a paradigm example of auditory mental imagery. Both of these phenomena consist of perceptual processing that is not triggered by corresponding sensory stimulation in the relevant sense modality.

By *emotion*, we mean mental processes that involve at least the following components (e.g. Deonna & Scherer 2010; Deonna & Teroni 2012): (i) *cognitive bases*, (ii) *evaluation*, (iii) *action tendencies*, (iv)

attention and (v) *feelings*. In the philosophy of emotions, a sizable part of the debate focuses on how best to articulate and unify these various characteristic components (Prinz 2004). For the purpose of introducing this project, however, we can leave this issue aside and limit ourselves to saying what we mean by each of these components.

Emotions have (i) *cognitive bases*, i.e. presuppose psychological states that furnish the emotions with their objects (Brady 2013, Deonna & Teroni 2012, Tappolet 2016). Someone is afraid, say, of a dog that she sees in front of her: in that case, a visual experience is the cognitive base of her fear. In emotions, (ii) these objects are *appraised* or *evaluated* (Arnold 1960, de Sousa 1987, Deonna & Teroni 2014, Kenny 1963, Lazarus 1991, Scherer 2001): the dog is apprehended in terms of the danger it poses to the emoting subject. These appraisals (iii) initiate motor preparations and responses (often called '*action tendencies*') (Bull 1951, Deonna & Teroni 2012, Dewey 1895, Frijda 2007, Scarantino 2014) – in the case of fear, there is a preparedness to flee, freeze, etc. (iv) *Attention* plays an important role in all this process, as it is mobilized in order to channel the cognitive resources to deal with the appraised object (Brady 2013, Evans 1970, Frijda 2007, Scarantino 2014). In fear, attention is mobilized to explore the best possible means to avoid the negative impact of the object. And, of course, there are (v) *feelings* involved at many levels in these emotional processes (Deonna & Teroni 2020, Goldie 2000, Lambie & Marcel 2002, Stocker 1996, Pugmire 1998) – there's certainly "a way it is like" to undergo an episode of paralyzing fear.

1. Current state of research in the field

Subproject A: The role of imagery in emotion

Subproject A approaches the relations between imagery and emotions from the perspective of the different components of emotional processes. The overarching hypothesis here is that focussing on mental imagery in connection with all these components can shed light on these components and allow new solutions to come into view – regarding emotions in general, or particular types of emotions.

While there is nothing wide-ranging and systematic on the relation between emotions and imagery in the contemporary literature, the following important issues regarding how some components of the emotions relate to imagery have been considered (Teroni 2021).

i. One widely shared assumption is that, for most emotions, the foundational case involves a *cognitive base* that is perceptual. Emotions would be tailored to react to significant stimuli presented in this representational format. Emotions elicited in the absence of perception of the relevant objects or events must therefore have bases that somehow retain crucial traits of the foundational case. By mimicking the standard case, imagery makes it possible for the emotional system to be put into motion (Cochrane 2017, Robinson 2005, Salmela 2014, Siedlecka & Denson 2019, Holmes & Matthews 2005, 2008). The idea can be defended across all emotion types, or for some emotion types more specifically (Siedlecka & Denson 2019). One may think for instance that disgust, as opposed to, say, regret, essentially involves visual or olfactory perception or imagery. It is fair to say that there is to date no systematic exploration of how imagery relates to different types of emotions. While the claim is that in the absence of significant perceptual stimuli, mental imagery is *necessary* to engage the emotional system, we may wonder what would make such condition *sufficient*. Various options making reference to immersion (e.g., Gerrig 1993, Ryan 2003, Wolf 2017), vividness (Currie & Ravenscroft 2002, Jajdelska & al. 2011, Kind 2017), or the possibility for "non-committal states" to elicit emotions (Gerrans & Mulligan 2013) have chiefly attracted attention from scholars working in aesthetics.

ii. Objects or situations supplied by the cognitive bases are, in emotion, appraised or evaluated. How does imagery feature in this central *evaluation* component of emotional processes? One very influential idea in the contemporary literature is that the format of the evaluative representation is akin to perception. Fear would involve an appraisal of danger in the guise of a perception-like experience of danger (e.g., Deonna 2006, Döring 2007, Tappolet 2016). Another increasingly popular view is that emotions are reactions to value perceptions, feelings or intuitions (Mueller 2018, Mulligan 2010) – fear does not partly consist in a perception-like experience of danger, it is rather a reaction to such an experience. Now, it is widely acknowledged that emotions are often elicited in the

absence of their objects – the object may simply not be currently available for direct interactions, or it may lie in the distant past, the distant future or be fictional. For that reason, the concept of perception in talk of value perception (as a component or a causal elicitor of the emotions) is stretched to the limit. There is after all no clear and literal sense in which we perceive the values of objects or events that are not presently stimulating our sensory modalities (Deonna & Teroni 2012, Salmela 2011, Schroeter & al. 2015). Could imagery come to the rescue? And how do these issues regarding the evaluative nature of emotions in relation to imagery apply to other affective states such as moods?

iii. Regarding *action tendencies*, it is often claimed that they are structured around a goal that must be represented by the emoting subject. These goal representations have distinctive features linked to the different emotions at issue (Deonna & Teroni 2012, Frijda 1986, 2007, Scarantino 2014). In fear, the goal is to be at a safe distance from the feared object; in anger, the goal is to lash onto the object of one's anger, etc. Of course, these goals need not be represented in these abstract fashions. More plausibly, emotion processes would typically involve less demanding forms of goal representation in the shape of more concrete imagery (Evans 1970). The trend in the literature that claims emotions involve the apprehension (Hufendiek 2018) or creation (Shargel & Prinz 2017) of affordances is one (evocative but not always helpful) way of cashing out this idea. Be that as it may, emotions are naturally thought of in terms of anticipated engagement or disengagement with the emotional object. Fear might involve a felt anticipation of the impact of an object on one's body, of one's body absorbing this impact, of avoiding it altogether, of visualizing escape routes, etc. (Frijda 1986, Morton 2013). But how much imagery is implicated in these anticipations? How do these anticipations involve the combination of perceptual and kinaesthetic imagery? And is reference to affordances just a fancy way of emphasizing the role of action tendencies, or is it rather an alternative way of understanding the evaluation component of emotions (i.e. does the representation of danger in fear come down to the representation of an opportunity to flee?)? These important issues have received very little attention.

iv. Regarding *attention*, it is often claimed that emotions and imagery have intimate, perhaps essential relations to attention. On the one hand, it has been regularly emphasized that the main function of emotions is to capture and focus our attention so as to deal with the emotional situation (this is often discussed in relation to the "framing problem", see Damasio 1994 and de Sousa 1987), and that variations of intensity in emotions are related to variations in the amount of cognitive resources that are devoted to the emotional situation (Finucane 2011, Harmon-Jones & al. 2013, Brosch & al. 2013). But emotions not only capture attention, they consume attention by structuring it across time so as to deal with the emotional situation. This structuring of attention has been variously described in the literature. It may lead the subject to conduct epistemic enquiries whose aim is to confirm the significance of the situation as appraised (Brady 2013). Alternatively, attention is claimed to be structured so as to maintain or modify the subject's relation to the relevant object (Campbell 2002, Evans 1970). Attention, differently understood (i.e., as the manifestation of intrinsic, non-instrumental interest in the activity one is engaged in), has also been put to use in order to elucidate some types of pleasure, notably pleasures in activity (e.g., Ryle 1954). This last claim may or may not be closely related to contemporary attempts to elucidate pleasure and displeasure in terms of how experience "flows" (Csikszentmihalyi 2014, Deci & Ryan 1985, Johnston 2001) and to explore the difference between positive and negative emotions (Brady 2014). In this context, it is worth recalling that imagery has long been claimed to be attention-dependent (see Nanay 2015 for a summary). These different approaches to the relations between emotions, imagery and attention have failed to cross-fertilize and a systematic approach is still wanting.

v. The final component of emotions is *feelings*. In this respect, imagery has played a key role in connection with the Jamesian view, which pictures the emotions as essentially involving bodily feelings (James 1884). A classical issue with the Jamesian view is that emotions seem to occur in the absence of peripheral feedback (Cannon 1927). Advocates of the view have replied that in these cases emotional experience would rely on "as if loops" (Damasio & al. 2000, Prinz 2004) generating proprioceptive, kinaesthetic and hedonic imagery in the absence of peripheral feedback – this would be similar to the generation of visual or auditory experiences in the absence of stimulation of the

sense organs (as in hallucination or imagination). This idea is then put to use to explain a variety of "off-line" emotions that do not depend on the full activation of peripheral responses. Typical cases are ones where we project ourselves in various self-relevant counterfactual scenarios or simulate the perspective of another (Deonna & Nanay 2014). This being said, and quite aside from the question of whether it can help the Jamesian view, the manner in which such projection or simulation in emotion must be characterised has received little attention. As a result, the task of explaining how the so-called "emotions for", e.g., when one feels afraid for another person in a dangerous situation or feel sad for a fictional character, relate to imagery and how imagery helps or hinders drawing the self/ other boundary is still ahead of us.

While issues i. to v. concern the relation between imagery and emotion *at a time*, it is crucial to envisage the diachronic and dynamic aspects of this relation. As we shall see, the neo-sentimentalist framework (D'Arms & Jacobson 2010, Rabinowicz & Ronnow-Rasmussen 2004) and, within it, the idea of primitive scenarios (de Sousa 1987) will allow us to ask important questions regarding the role of imagery in our acquiring of concepts of the emotions, and from there, the value concepts that are tied to the emotions. Another important aspect of the dynamic relation between imagery and emotion regards emotional regulation (Gross 2014): the way our emotional lives unfold is often the result of our capacity to regulate our emotions (by e.g., invoking a happy event to ignore an unpleasant situation). We hypothesize that imagery plays key roles in these two diachronic aspects of our emotional lives (see 2.3 *Detailed research plan*).

Subproject B: The role of emotions in imagery

Subproject B approaches the relations between mental imagery and emotions from the perspective of the different ways in which our emotional life influences imagery. The overarching hypothesis here is that a focus on emotions is needed to open up new approaches to imagery and its cognitive roles: emotions are key determinants of the way we form mental imagery, of the content of mental imagery and of the various mental processes that recruit mental imagery. As in the case of Subproject A, there has not been a wide-ranging and systematic analysis of this connection.

By mental imagery, we mean perceptual processing that is not triggered by corresponding sensory stimulation in the relevant sense modality (Pearson & al. 2015, see Nanay 2018 for a philosophical summary). This definition of mental imagery is silent about a number of features of mental imagery. The most important of these in the present context is that mental imagery may be emotionally charged (but it does not have to be). If you visualize your long-deceased grandmother, this mental imagery can be emotionally charged, for example. But not all mental imagery is emotionally charged. When you close your eyes and visualize an apple, your mental imagery is unlikely to be emotionally charged (unless you really like (or hate) apples).

vi. *Emotional modulation of perception and mental imagery*. It is not just introspection that tells us that mental imagery can be an emotional affair. An important form of mental imagery is multimodal mental imagery, where the imagery is not triggered in a top-down manner by us trying to visualize something, but rather by stimuli in a different sense modality. So I can visualize Barack Obama's face and this counts as mental (visual) imagery. But the visual imagery of Obama's face can also be triggered by merely hearing his distinctive tone of voice (Hertrich & al. 2011, Pekkola & al. 2005). For example, if blindfolded subjects listen to different (familiar) sounds, their early cortical activity (in the primary visual cortex) is different (Vetter & al. 2014). In short, stimuli in the auditory sense modality can lead to mental imagery in the visual sense modality. And, as it turns out, emotionally charged stimuli in the auditory sense modality makes a difference in visual processing as early as the primary visual cortex (Vetter & al. 2016, see also Gerdes & al. 2014 for a summary). While there is a tremendous amount of empirical research on this connection, the philosophical import of these findings is largely unexplored.

vii. *Emotion spreading in imagery*. Another interesting set of empirical results that show how much mental imagery and emotions are intertwined is the following. Imagining an emotionally charged event or person at an emotionally neutral place confers emotional charge to the place (see Benoit &

al. 2019). It has been known for a while that seeing a negatively valenced event (say, a fight between two friends of yours) at a neutral place (say, the corridor in front of your office) makes this formerly neutral place inherit the negative valence of the event. So, in the future, when you see the corridor of your office, it triggers slight (or not so slight) negative emotions. The crucial finding is that the same process also takes place even if you merely imagine a negatively valenced event at a neutral place. In short, negatively valenced mental imagery confers valence on various components of the imagined scene, which then remain emotionally valenced. The philosophical implications of these findings are unclear and unexplored.

viii. *Mood congruency effect*. The degree to which imagery and affective states are intertwined is further emphasized by the mood congruency effect (Blaney 1986, Matt & al. 1992, Gaddy & Ingram 2014). The most famous example of mood congruency effect is mood congruent memory (Loeffler & al. 2013): we are more likely to recall scary memories when we are scared, for example. But mood congruency also works in the case of mental imagery: your general mood makes it more likely that you form mental imagery that is congruent with your mood. And it makes it less likely that you form mental imagery that is not congruent with your mood. We also encode emotionally salient stimuli in a more detailed manner, which makes it possible to form more vivid mental imagery (Yonelinas & Ritchey 2015, Hamann 2001, LaBar & Cabeza 2006, Phelps 2004). This is an underrated aspect of the forming of mental imagery and it also has important consequences for philosophical accounts of voluntary and involuntary mental imagery.

ix. *Emotion, imagery, decision-making*. The philosophy of emotion has not only focussed on 'serious' or 'committing' cognitive bases (belief, perception, memory), it has also given a lot of importance to the fictional cases in aesthetics, but much less attention has been devoted to the important cases of decision-making and planning that may essentially rely on imagination and imagery. Think back to some of the big decisions you have made over the years. Break up with your partner or not? Which college to choose? Go to grad school or not? Which job offer to take? Which house to bid on? And so on. The standard account of decision-making of this kind is the belief-desire model (Davidson 1980): we compare the satisfaction conditions of our desires given the two scenarios and our background beliefs. According to the main competitor of the belief-desire model, imagination plays a crucial role in making most of our important decisions. We make decisions of this kind by imagining ourselves in one of the two situations and then imagining ourselves in the other and then comparing the two (Nanay 2016). The imagination-based model may be an improvement on the belief-desire model, but it leaves out a crucial aspect of the imaginative episodes involved, namely, the importance of the affective content of the mental imagery involved. Neither the standard (belief-desire) model, nor the imagination-based model of decision-making has been taken to involve a significant affective component.

2.2. Current state of our own research

Fabrice Teroni is Associate Professor in philosophy at the University of Geneva, holding with J. Deonna the chair in philosophy of emotions. He is also project leader at the interdisciplinary Swiss Centre for Affective Sciences (CISA). His main areas of research are the philosophy of mind and epistemology. He has published three monographs and numerous papers on the emotions and on memory. While covering most topics associated with the emotions (individuation, intentionality, etc.), his work in this domain pays close attention to the evaluative aspect of the emotions. In trying to understand how emotions relate to values, he has developed in collaboration with J. Deonna (in *The Emotions: A Philosophical Introduction*, Routledge and several papers) an original attitudinal approach that is now widely discussed in the literature. Much of his recent efforts aim at developing and defending this approach. Teroni's work on the emotions is also distinctive in the interest it manifests in issues regarding the involvement of the self in emotional states and in the nature of the self as it reveals itself in self-reflexive emotions such as shame, pride, embarrassment and guilt (*In Defense of Shame*, Oxford University Press). This last book manifests the kind of interdisciplinary dialogue that Teroni is keen to promote, one in which philosophy takes into account the data and theories in psychology and cognitive science more generally, examines the underlying assumptions and carefully measures their impact on traditional or more recent philosophical issues. In the past few years, Teroni has been interested in the phenomenology and epistemology of episodic and semantic memory – topics that are also of central relevance to the present project – as well as in emotions directed to fictional entities and emotional valence. The present project lies at the intersection of his interests in affective states and in mental time travel.

Julien Deonna is Associate Professor in philosophy at the University of Geneva, holding with F. Teroni, the chair in philosophy of emotions. He is also project leader at the Swiss Centre for Affective Sciences (CISA). His main interests are in the philosophy of mind, mainly emotion theory, moral psychology and empathy. He has written in all these areas numerous articles in peer-reviewed journals or high-quality book collections and three monographs. Among the latter, his *The Emotions: a Philosophical Introduction* co-authored with F. Teroni (Routledge, 2012) is particularly important for the present project. The book offers an account of emotions in terms of attitudes that has received considerable attention in the recent literature. It has contributed to establish J. Deonna and F. Teroni as leading actors in the contemporary debates on the metaphysics of emotions. One strand of the research concentrates on developing various aspects of the account (which regard issues such as the role of bodily feelings in emotions, the individuation of emotions, the epistemology of emotions, the fitting analysis of value, etc.) all of which have important connections with the present project. The second strand of the research produced in the last decade has focused on Deonna's continuing interest in individual emotions that have particular resonance for ethical life broadly conceived. In many articles (and a book) on shame, on being moved, on contempt, Deonna investigates how these various emotions, the way they project themselves in imagination in the past, the future, or counterfactual situations, allow for more or less adjusted engagement with the physical and social environment. This together with his work on empathy, simulation and the philosophy of psychopathology (autism and more recently OCD) are of particular relevance for the present project on mental imagery.

Fabrice Teroni and *Julien Deonna* are the directors of *Thumos*, the Genevan Research group on Emotions, Values and Norms, around which they conduct most of their research activities. This group, thanks also to its implantation within the interdisciplinary environment of the CISA, constitutes an exceptional environment attracting young researchers from all over the world and an ideal setting for the present project (see: http://www.unige.ch/lettres/philo/thumos/Thumos/Home.html). Teroni and Deonna have been and continue to be deeply involved in the interdisciplinary research activities of the Centre. Their research also manifests their commitment to interdisciplinary work in the study of affective states – for instance, in their *In Defense of Shame*, a monograph on shame that features an in-depth exploration of the empirical data and psychological approaches on shame and related emotions and *The Emotions: A Philosophical Introduction*, whose insistence on the importance of action-tendencies for understanding the emotions is a consequence of their interest in the work of psychologist Nico Frijda, amongst others.

Bence Nanay is Professor of Philosophy and BOF Research Professor (ZAPBOF) at the Centre for Philosophical Psychology at the University of Antwerp and the co-director of the Centre. Since 2011, he

has served as the director of the European Network for Sensory Research, a network bringing together psychologists, neuroscientists and philosophers working on perception and the sensory domain. He received him PhD at the University of California, Berkeley in 2006 under the supervision of John Searle. He published three books, all with Oxford University Press, with four more under contract, also all with Oxford University Press. One of these is on mental imagery, which is especially relevant for the present project. He also edited two books and some journal special issues, including one for *Philosophical Transactions of the Royal Society B* on offline perception, which is also especially relevant for the present project. The books were widely reviewed both in specialized and general journals (like the *Times Literary Supplement*) and there were book symposia on them at various conferences and in various specialised journals. He has more than 120 peer-reviewed publications, the vast majority of which is single-authored. They appeared in generalist philosophy journals (like *Philosophical Studies, Analysis* or *Journal of Philosophy*), in philosophy of science journals (like *Philosophy of Science*), in cognitive science journals (like *Perception*), and in neuroscience journals (like *Cortex*). His H index is 27, which is exceptionally high in philosophy, where citation rates are normally very low. His i10 is 66. His overall citation number is 2259. He received a fair amount of grants in the last decade (altogether 7 Million Euros in the last 8 years). The most important of these is the ERC Consolidator Grant 2017-2022 (1,967,138 Euros) on unifying the philosophy, psychology and neuroscience of mental imagery and the FWO Odysseus Grant 2011-2019 (987,100 Euros) on the action-guiding features of perception. In 2016, he was awarded the Humboldt Foundation's Friedrich Wilheim Bessel Research Award, a distinction given to only 10 researchers across all disciplines every year. In the last 8 years, he had 31 postdocs and 11 PhD students.

Bence Nanay has been involved in interdisciplinary research ever since he was a PhD student (when he was member of the International Cognitive Science Institute at UC Berkeley, led by George Lakoff and Jerome Feldman). During his time at Syracuse University, he had a double affiliation: he was both assistant professor of philosophy and adjunct assistant professor of biology and spent a lot of time there interacting with biologists. He is now the co-director of the Centre for Philosophical Psychology at the University of Antwerp. He is also the director of the European Network for Sensory Research and the Centre for Philosophical Psychology is the European hub of the International Network for Sensory Research. This International Network is a network of three interconnected networks for sensory research: the North American International Network for Sensory Research led by Mohan Matthen at the University of Toronto (and supported by the Social Science and Humanities Research Council of Canada (SSHRC)), the UK-based Rethinking The Senses project, led by Colin Blakemore (and supported by the Arts and Humanities Research Council of the United Kingdom (AHRC)) and the European Network for Sensory Research, led by Nanay. This network connects empirical and theoretical/philosophical research centers across the world. Inasmuch as Nanay is the director of the European part of this network, he brings to the Geneva-Antwerp collaboration a dense infrastructure for scientific collaboration already in place.

There has already been intense collaboration between the two research centres in the recent past. Constant Bonard defended a joint PhD between the University of Geneva and the University of Antwerp (supervised by Julien Deonna and Bence Nanay) in February 2021 and three postdocs have shared their time between the Geneva and the Antwerp research groups (Federico Lauria, Laura Silva, Kris Goffin). The present scheme would build on an existing, even thriving, infrastructure of collaboration between the two research centres.

2.3. Detailed research plan

In this section, we present the research questions that structure the two Subprojects: A. The role of imagery in emotion and B. The role of emotions in imagery

Subproject A: The role of imagery in emotion

To recall, the overarching hypothesis here is that focussing on mental imagery in connection with emotion components can shed light on these components and allow new solutions to come into view. The research plan for Subproject A uses the same structure of our presentation of the state of research in the field: it is divided in 5 sections corresponding to the five components of emotional processes and in connection to

which the overarching hypothesis is specified: (i) *cognitive bases*, (ii) *evaluation*, (iii) *action tendencies*, (iv) *attention* and (v) *feelings*.

i. In relation to *cognitive bases*, our aim is to explore the various ways of developing the claim that imagery is necessary to set off the emotional system, as well as the added conditions that may make it sufficient. Regarding the sufficiency claim, we shall explore the respective merits of the following hypotheses: emotions get triggered or are more intense if a. imagery is vivid (Todd & al. 2012, Slofstra & al. 2018, Wicken & al. forthcoming), and perhaps the vividness must be created by elaborating a context that calls for immersion (Kampa 2018, Price 1969); b. imagery is part of a "committing" or "positing" psychological state, like a memory (positing the imaged event as having occurred) or an anticipation (positing the imagined event as something that will occur) or imagery that allows the subject to interact with the situation (Humbert-Droz & al. 2020, Meuleman & Rudrauf 2018); c. the relevant imagery is 'experiential' rather than 'perceptual' – according to the advocates of this hypothesis, the cognitive base itself is not only perceptual, but already emotionally charged (Jajdelska & al. 2011); d. imagery is embodied (e.g., Kuzmičova 2014) – the images concerned are copies of the deliveries of both external and internal senses, including thus images that are interoceptive (e.g., hunger), proprioceptive (e.g., balance) and motor/kinesthetic (e.g., acceleration) images, and often multimodal. Hypotheses c. and d. will be investigated in close connection with subproject B (vi) which focuses on the sense we should give to the idea that images can be emotionally charged (see below).

ii. As regards the *evaluation component* of emotional processes, we want to explore and assess the options that are open to advocates of perception of value once imagery enters the picture. The shape of the problem presented in section 2.1 – talk of value perception as a component or a causal elicitor of the emotions is stretched to its limit in the absence of the stimulus – itself suggests that imagery can come to the rescue. After all, if the evaluation component of the emotions is perception-like but can take place in the absence of the stimulus, we would then face a component of the emotions that qualifies as imagery. Yet the potential of imagery to develop a perceptual model of emotional evaluation has not been discussed in the literature. To make progress, the key question is of course which exact form this imagery takes. Here are two options that we shall examine. a. Some philosophers have pushed the idea that the relevant evaluative representation should be understood in terms of aspectual perception or perception as. In the same way as we can see a cloud as a dragon in the sky, fear would involve the experience of the dog under the aspect or in terms of danger (Roberts 2003, Pelser 2014). If we develop this idea of aspectual perception along imagistic as opposed to conceptual lines (and so reject Roberts' own way of developing the idea), then a perceptual approach may have the resources to deal with evaluation in absence. The sort of imagery involved here – think for instance of the imagery likely to occupy a fearful person's mind upon seeing a large dog – may actually go a long way toward explaining the phenomenology of emotions and how it relates to their intentionality (Morton 2013). b. An alternative we want to explore proceeds not in terms of aspectual perception and the role of imagery within it, but rather in terms of perception and its simulation by imagery. In the same way as we can entertain mental "images" (it is "as if" one was seeing the person or hearing the melody, as we say), we can entertain "images" that re-create evaluative percepts (it is "as if" one were emoting, i.e. perceiving the relevant value). But does the format of value representation in emotion allow for talk of "emotional images" (Debus 2007)? We want to explore the potential of this suggestive idea and how it compares with the aspectual perception approach to solve the worry of emotions in absence.

We expect the issues treated in this subproject to ramify over the affective domain beyond emotions, in particular over moods. Consider the traditional metaphor about moods supposedly 'colouring' the moody person's relation to her environment as a whole. Should we understand the condition of someone who apprehends their environment in general as threatening, inviting, obstructive, etc. in imagistic terms (Ratcliffe 2009)? What is striking with moods is that these properties of the environment are not clearly experienced as being bound to a specific object but have a more 'free floating' quality (Mendelovici 2014).

iii. The exploration of the relations between the *action tendencies* component of emotional processes and imagery is, we have observed, still in its infancy. In this part of the project, we want to use the rich literature concerning kinaesthetic or motor imagery (Butterfill & Sinigaglia 2014, Nanay 2020b) to shed light on the relations between action tendencies in emotions and imagery, the aim being to understand the way in which kinaesthetic imagery relates to goal representation or more generally the idea found in the literature that, in emotions, aspects of the world afford certain action (Deonna 2006) or even make demands on us (Poellner 2016, Mitchell 2019)? How do kinaesthetic and visual types of imagery combine to give rise to felt preparedness to act? Are these experiences rightly characterised as ones in which we are demanded to act in certain ways, and are there lessons here regarding the sense in which emotions might be more or less fitting to their objects (Deonna & Teroni 2012, 2015)? In order to explore these issues, we shall consider the idea that the imagery involved may be centred on the subject's perspective, or centred on another point of view from which the subject appears as one object among others (Goldie 2003, Morton 2003, Wollheim 1984), as this may prove crucial to understanding the kinds of imagery involved in different types of emotions. An intriguing additional idea here is that some reflexive or social emotions – e.g., shame and embarrassment – are essentially related to a switch of perspective which requires the subject to take an external or observer perspective upon themselves (Goldie 2003, Sartre 1943).

iv. In light of the intimate relations between emotions and *attention* sketched above, the hypothesis we want to explore is that emotions create the ideal conditions for a type of imagery directly connected to the challenges offered by the emotional situation. The key idea is that, in focusing the subject's cognitive resources on the significance the situation has for her given her present and various concerns, emotions generate, in the imagination, the exploration of possible outcomes given possible actions, inaction or other happenings (Mandel 2003, Morton 2013). Amongst the imagined scenarios, some will be desirable, some less so, some not at all, thereby steering the uncovering of solutions to the original challenge. In this common process, emotions generate imagery that in turn generates new emotions, which again trigger new imagery, etc., hopefully leading to a solution, or, in the case of positive emotions, to recreational mind-wandering within rewarding interactions or landscapes. These often-fruitful attentional processes may also sometimes fail to deliver any positive outcome, for example running in cycles of recurring images in which the subject may feel trapped. Our hypothesis is that this has strong links with the phenomenon of mood congruency that we investigate in Subproject B (viii).

v. Finally, as regards the *feeling* component of emotions, we think that progress can be made by focussing on how the different dimensions of proprioceptive, kinaesthetic and hedonic phenomenology get integrated with the phenomenology of appraisal to generate the kind of unified evaluative experiences that philosophers have traditionally focused on. In the present context, we are particularly interested in the role the imagery counterparts of all these different phenomenological dimensions contribute to the generation of these unified experiences. While it seems obvious that kinaesthetic and proprioceptive imagery will play a crucial role in this respect (see sections (iii) and (iv)), the idea that there could be imagery counterparts for arousal and valence ('as if' light/intense pain/pleasure) is much less plausible. This last dimension of the project will be carried out in close connection with Subproject B (vi) which addresses the question of whether emotional memories are, in a sense yet to be fully elucidated, already emotions.

While research questions (i) to (v) concern the role of imagery in emotion at a time, as advertised, we shall also be looking at its role from a more diachronic perspective. Within a neo-sentimentalist framework, central thick value concepts are said to be anchored in our understanding of the emotions. Our concepts of the amusing or the offensive, say, would be anchored in our understanding that distinct emotional reactions fit the primitive scenarios eliciting them (de Sousa 1987). Development of our emotional repertoire and, therefore, our thick value concepts would somehow proceed gradually from these primitive scenarios (D'Arms & Jacobson 2006, Deonna and Teroni forthcoming). We hypothesize that these primitive scenarios live in people's mind in the shape of memory images. We thus want to explore the role these images and their projection in new situations play in the progressive expansion of our emotional repertoire and the way they end up constituting the material out of which our thick value concepts are built

(more on this in Subproject B, (vii)). One key manifestation of this gradual development of our affective lives occurs when we regulate our emotional lives (Gross 2014). According to our understanding of the situation, an emotion we undergo may not be fitting, or a situation may call for an emotion that we do not happen to feel. Our hypothesis is that the influence this understanding can have on our affective lives crucially relies on our capacity to invoke imagery, whose role may be to disengage our attention from a situation eliciting an unfitting emotion, or to enhance our emotional involvement in a situation that calls for an emotional response. We foresee important interactions between this hypothesis and the research to be conducted in Subproject B (vii), (viii) and (ix).

Subproject B: The role of emotions in imagery

Here, the overarching hypothesis is that research on imagery will greatly benefit from close attention to emotional phenomena. The research plan for Subproject B also follows the structure used to present the state of research in the field. It is also divided in 4 sections characterizing the involvement of emotions in imagery and in connection to which the overarching hypothesis is specified: vi. *emotional modulation*, vii. *emotional spreading*, viii. *mood congruency*, ix. *imagery and decision making*.

vi. *Emotional modulation of perception and mental imagery*. The empirical literature on the emotional modulation of perception and mental imagery raises an important philosophical question. We have introspective and empirical evidence that mental imagery can be emotionally charged. But this can mean two different things. The first option is that mental imagery is emotionally charged in an intrinsic sense: emotionally charged mental imagery would then qualify as genuinely emotional. And the content of emotionally charged mental imagery would represent objects as emotionally relevant. The second option is that mental imagery is emotionally charged in an extrinsic sense: emotionally charged mental imagery would not itself count as a genuine emotional state. But it would have downstream emotional consequences. So each time we have this (not intrinsically emotional) mental imagery, this leads to distinct emotional states. Both views seem to be consistent with the empirical (and introspective) evidence, but they are very different views philosophically. In this part of the project, in connection with the hypothesis Subproject A (i) makes in relation to the image-like character of cognitive bases, we want to explore the first option by examining the idea that images may be emotionally charged in the sense of already incorporating proprioceptive and hedonic phenomenology/ information. This would then constitute a way of capturing the idea that images sometimes are emotionally charged in the intrinsic sense. Building on this, and this time in connection with Subproject A (v) on the relation between feelings and imagery, we shall examine a claim that seems to be a consequence of this fact, namely that an emotional memory qualifies as an emotion.

vii. *Emotion spreading in imagery*. The psychological findings about how imagining an emotionally charged event or person at an emotionally neutral place confers emotional charge to the place have far-reaching philosophical implications. One important such consequence is that imagining various emotionally charged events and scenarios has long-lasting effects on our mental and emotional economy. Luis Bunuel famously talked about 'the innocence of imagination': imagining even the most appallingly immoral deeds would still be, according to him, perfectly harmless. It turns out that this is not so (see also Green & Brock 2000). The research hypothesis is that imagination can have far-reaching effects on our mind in general. And we explore the consequences of this hypothesis for a number of debates about imagery and emotions. One such debate concerns imaginative resistance (Gendler 2000, Yablo 2002, Nanay 2010), the odd phenomenon that while we have no problem imagining impossible states of affairs, we are often incapable of imagining certain morally (or in some other ways) devious state of affairs. Imaginative resistance has widely been considered to be a dysfunctional quirk of the human mind. But if our hypothesis is correct, then it would explain why imaginative resistance may actually be a helpful cognitive strategy. Another debate concerns neo-sentimentalism (see 2.3 *Detailed research plan*, end of Subproject A), and how this framework fares in the light of the fact that each individual emotional repertoire is shaped by her own idiosyncratic

imagery sets. The question here is the impact of the existence of these different imagery sets on the claim that they constitute the material out of which our value concepts are built.

viii. *Mood congruency effect*. The mood congruency effect also applies to mental imagery: your general mood makes it more likely that you form mental imagery that is congruent with your mood. One important philosophical implication of this phenomenon is that the difference between voluntary and involuntary mental imagery needs to be re-evaluated. Mental imagery is often taken to be voluntary. You count to three and visualize an apple. It is easy to see that mental imagery can also be involuntary, for example, when you have flashbacks of an unpleasant events or earworms (little tunes that go through your head). Our research hypothesis is that the mood congruency effect shows that even in the most straightforward cases of voluntary mental imagery, there is a crucial involuntary aspect, namely, the one dictated by the mood congruency. This is especially salient when the subject is trapped in an emotion (you are angry at a superior on whom you depend) that finds no resolution and which keeps producing images of possible outcomes that bear the mood tonality of the initial emotion. This involuntary dimension of mental imagery will thus be investigated in close collaboration with Subproject A (iv) whose focus on the role of attention in emotion clearly overlaps with this question.

ix. *Emotion, imagery, decision-making*. In making important decisions, we rarely have a very clear idea about the exact scenarios we are choosing in between. So, we actually imagine ourselves in imagined situations – ones that can be more informed by films we have seen than by reality. But imaginative episodes of this kind are even more complicated (Mok & al. 2020). Imagination is used not even twice, but three times. Let's suppose I am making this decision now about whether to move to another country. Who am I imagining in that country? My current self will never be there, so imagining my current self would not be particularly helpful. It is my future self who has the chance to hang out in that country, but the problem is that we don't have any firm information about what our future selves will be like. So it is really my imagined future self who I should imagine. When we make these grand decisions, we imagine what we imagine to be our future selves in imagined alternative scenarios. Imagination is used three times (Nanay 2016). The research hypothesis here – combined with the hypothesized role played by attention in emotion in generating images that in turn generate news emotions, etc. (see Subproject A (iv)) – is that each of these three uses of the imagination allows for the comparison of the valence of two or more imaginative scenarios. This research hypothesis concerning the role of imagery and emotions in decision-making has far-reaching consequences for the role of emotions in motivation, action and our daily life in general. The claim that decision-making is an emotional affair is not new (Damasio 1994). But our research hypothesis gives a detailed analysis of how this emotional foundation of decision-making works by means of the role mental imagery plays in comparing the possible outcomes of the decision.

The general philosophical consequence of these research questions is a mutually reinforcing connection between mental imagery and emotion. Emotional states and moods influence what mental imagery we will form. And the emotional content of our mental imagery then has far-reaching effects on our emotional states and moods (see 2.3, Subproject B (vii)).

Interdisciplinarity

The methodology of this research programme is somewhat unusual within philosophy inasmuch as it uses, and relies on, a lot of empirical research. The continuity between the research programme and the empirical sciences is twofold. First, our arguments are based on actual experimental findings and experimental methodology. Second, the hypotheses and theories we formulate are, as a result of being empirically informed, specific enough to inform further empirical studies and even clinical practice. Psychologists and neuroscientists often accuse philosophers of mind of providing theories that are too general and abstract and of no use for the empirical sciences. Our aim is to give exact and testable hypotheses that empirical scientists can engage with. The hope is that this research, besides using

empirical studies, could also be used by future empirical research.

But it needs to be highlighted that the proposed research is a theoretical one: there is no experimental component. This theoretical framework is very much rooted in empirical results (see esp. Subproject (A/i) and (A/ii) as well as Subproject (B/vii) and (B/viii)) and it has important implications for experimental and clinical paradigms (see esp. Subproject (A/iv) and Subproject (B/ix)), but no actual experiments are planned.

The best and most efficient way in which philosophy can be not only empirically informed but also relevant to the empirical disciplines is for it to pay attention to theoretical issues not in one but in a variety of empirical disciplines. This is exactly what our proposal does by bringing together the neuroscience of mental imagery with the psychology of emotions (as well as some neighbouring empirical fields, such as the empirical study of episodic memory and of attention).

2.4. Schedule and milestones

	Theme	**Research questions**	**In Geneva**	**In Antwerp**
2022 Year 1	The role of imagery in emotion theory	(i), (v), (vi)	PhD student	Postdoc A
2023 Year 2	The role of emotions in theories of mental imagery	(ii), (vii)	Postdoc A *First workshop*	Postdoc B PhD student
2024 Year 3	Empirical and clinical applications	(iii), (viii)	Postdoc B PhD student	Postdoc C
2025 Year 4	Pulling it all together	(iv), (ix)	Postdoc C	PhD student *Second Workshop*

The planned outputs of the research project are as follows. i. Two international workshops (one in Geneva, one in Antwerp) bringing together experts in some of the central aspects of the project. ii. One co-edited volume published towards the end of the project (Oxford University Press has already expressed interest). iii. Writing of papers in collaboration (evident possibilities are one paper on attention and mood-congruency, another on evaluation and imagery). iv. Additional individual publications by all members of the research project (3 professors, three two-year postdocs and one PhD), v. Organization of talk series in Geneva and Antwerp in which all the members of the project will give talk so as to further intensify the exchanges.

We shall advertise the four positions and decide which more specific aspect of the project the postdocs and the PhD student will work on based on the strengths of the applications we shall receive.

We take the opportunity to comment on the fact that we plan to do the research with three two-year postdocs and one PhD. Two reasons make us think that this is the best distribution. First, the research environments in both Geneva and Antwerp already involve many PhD students, but far less postdocs. Second, working successively in close collaboration with three different postdocs will prove very beneficial for the PhD student who will have to work at the intersection of several research domains and disciplines.

2.5 Relevance and impact

The project would have significant impact not just in philosophy of mind, where there are very few topics that can be fully explored without making assumptions about the concept of emotion and of mental imagery, but also in other philosophical subfields and in empirical disciplines. The results would be especially relevant for epistemology (see Nanay 2020a) and, crucially, for psychology and cognitive science, and it would have important potential applications for psychiatric practice.

A relatively new development in some branches of psychiatry is to manipulate the mental imagery of patients with a wide range of mental disorders by means of techniques such as 'imaginal exposure', 'systematic desensitization' and 'imagery rescripting', in order to improve their condition. Reports of the success of this methodology in the case of mental disorders range from bipolar disorders, schizophrenia and post-traumatic stress disorder to obsessive compulsive disorder and depression (Holmes & al. 2010, James & al. 2015, see Pearson & al. 2015 for a summary). While the results are very promising, there is great variability of the efficiency of this method between subjects (see, for example, Blackwell & al. 2013, Williams & al. 2013).

It is important that this clinical method typically relies fully on the manipulation of the subjects' mental imagery and does not control for their emotional congruence: patients are asked to visualize a certain event consciously and voluntarily, for example by imagining that they are on a sunny beach. But as Subproject B aims to show, mental imagery is dependent on many emotion-related factors that might prevent the patient from succeeding in visualizing what they are asked to visualize (see Clark & al. 2016, Murphy & al. 2015, Slofstra & al. 2016).

A similar use of multimodal mental imagery could be suggested for fighting implicit bias. Research on implicit bias shows that we have unconscious attitudes towards certain racial and gender groups (that can be very different from our conscious convictions) (Dunham & al. 2008). This is demonstrated with the help of subjects' reaction time in the Implicit Association Test, which measures how closely one associates certain images and words with racial or gender terms.

It has recently been explored how visualizing and imaginative engagement (for example, by visualizing 'ingroup' and 'outgroup' faces or by putting ourselves imaginatively into an avatar of another racial or gender group) can reduce implicit bias (Peck & al. 2013, Ratner & al. 2014). Again, these methods, while promising, seem not to pay any attention to the emotional content of the mental imagery used.

Similar potential applications where emotion-laden mental imagery would provide a more efficient way of interfering than emotion-free mental imagery include treating addiction (see Papies & Barsalou 2016),

eating disorders (Cornil & Chandon in press) and pain treatment (Winterowd & al 2003, Berna & al. 2012).

This should lead us to explore the methodological constraints and possibilities of such treatments in future research.

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