

*Chemoaesthetics: An Enactive Approach to Collective Aesthetic Experiences*¹

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ABSTRACT

When one reads philosophical work on the emotional dynamics at work during collective aesthetic experiences in particular, and social cognition in general, one is struck by the difficulty of explaining the specific mechanisms by which these events unfold, particularly in situations of minimal interaction such as cinemas or concert halls. Given that in these situations it is likely that we do not speak to or even look at other members of the audience, how do we interact and share emotions with them? This paper offers a new way of approaching this question. I argue that we can further develop the embodied and embedded aspects of enactive accounts of certain collective aesthetic experiences by bringing chemosignals into the discussion. Recent empirical findings strongly suggest that these context-dependent volatile chemicals, which we constantly emit and inhale in the air we breathe convey emotional information from those who produce them and shape cognitive, affective, and behavioural dynamics in those who receive them. Drawing on research in this field, on Dan Zahavi's phenomenological work on the mechanisms by which we share emotional experiences, and on the philosophical analysis of collective aesthetic experiences, I will offer a discussion of the ways in which chemosignals may be regarded as one of the aspects contributing to what we experience and how we experience it by shaping processes of emotional contagion and emotional sharing in certain collective aesthetic experiences.

KEYWORDS

Chemosignals; aesthetic experience; enactivism; collective emotions;

1. Introduction

Imagine being in a cinema with other people. The experience, in a Deweyan sense (Dewey 1934), would be the integration of what you see, what you hear, the gestures and movements you make and see others make, the gazes you exchange, and so on. And yet, I

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think there is something else that connects us in these events. Something deeper, something that, despite its relevance, usually goes unnoticed. I am referring to the role of chemosignals. Largely ignored by both philosophy and science, recent empirical studies have provided evidence suggesting that the chemosignals (or chemical signals) we constantly produce and receive play a significant role in establishing, scaffolding, and shaping social cognition. Researchers refer to this phenomenon as chemical communication; that is, what “occurs when chemical compound(s) emitted from one or more individuals are received by one or more receivers, with the potential of influencing the receiver’s psychology, physiology, and behavior” (Loos *et al.* 2023, p. 16).

In this paper, I focus on the role that chemosignals might play in constraining those experiences in which we become part of an audience. There has been some recent work on collective aesthetic experiences while listening to music (Cochrane 2009, Polite 2019), watching films (Hanich 2019; 2022), and on some specific dynamics through which we share aesthetic experiences (Shanklin & Meyer 2019). However, what I intend to offer in the following pages, is slightly different. By focusing on chemosignals, I intend to develop an enactive² approach to a particular kind of aesthetic experience that takes into account bodily and embedded processes that have been previously overlooked: the impact of the physical presence of those with whom we share collective aesthetic engagements. It is essential to clarify that I do not support any physicalist or ontologically reductionist approach to aesthetic experiences; rather, my perspective is a culturally naturalistic one (see Dreon & Vara Sánchez 2022). Therefore, dynamics driven by chemosignals are neither necessary nor sufficient for aesthetic experiences, but they can play a role in certain situations along with many other cultural and natural dynamics.

When we attend a concert or a theatre performance, we are surrounded by a stable group of people for the duration of the event. My hypothesis is that this circumstance may affect how our experience unfolds and what it leads to, and that this might partly be due to chemosignals. Think of the case where you go to a cinema alone to watch a film and, although you do not exchange a word with the

² The enactive approach to cognition was initially developed in the book *The Embodied Mind: Cognitive Science and the Human Experience* (Varela, Thompson, & Rosch 1991). Nowadays, there are several enactive strands, but they all agree on one central idea: “instead of focusing on factors interiors to an agent, a good part of cognition is to be found in the link of coupling *between* an agent and the external world. This link is fluid, dynamic, and active in a variety of ways” (Ryan & Gallagher 2020, p. 2).

people sitting around you, their mere presence seems to constrain your own experience, turning it into something different from what you would have experienced if you had watched the same film alone. How can we explain social interaction in these events? There are certainly other aspects in which the role of chemosignals could be meaningful, such as the reciprocal effects between performers and spectators at concerts and other live performances; however, on this occasion, I will confine myself to exploring what takes place specifically between the members of the audience. As I see it, this is the basis on which to build further analyses.

I will begin by presenting some recent work on enactive aesthetics, as well as a characterization of some relevant phenomenological notions. I will continue by discussing some philosophical accounts of collective and shared aesthetic experiences. I will then offer some relevant conclusions drawn from research on chemosignals. Finally, I will develop a framework for the implications of these findings for the aesthetic experience of the audience from an enactive perspective as well as some possible future directions for research.

1. *Doing Things Together*

1.1 *Enactive Aesthetics*

Shaun Gallagher has offered an enactive characterization of the aesthetic experience of the performer – i.e., the musician, the actor, the dancer, etc – in the book *Performance/Art: The Venetian Lectures* as “the unified experience that is both (a) an attunement to the character being portrayed (the music being played, the dance being danced) and (b) the selfawareness of the performer in the meshed cohesive gestalt of the performance itself” (Gallagher 2021, p. 136). Gallagher contrasts his theory with Maria Brincker’s account of the observer’s aesthetic stance as a particular type of engagement with the environment characterized by an asymmetry and lack of reciprocity that invite a different kind of engagement and bring us to an “edge of action” (Brincker 2015, p. 123). From the creative tension between the two theories, Gallagher offers a relevant implication: “If the aesthetic experience is not the same for the observer as for the performer, [...] then we should not think that aesthetic experience is just one thing, or that there is any one phenomenology (or for that matter one signature neural pattern) of the aesthetic” (2021, p. 138).

I am very sympathetic to Gallagher's claim. In fact, I think that research on aesthetic experiences would benefit greatly from setting aside essentialist approaches and instead attempting to focus on "recovering the continuity of esthetic experience with normal processes of living" (Dewey 1934, p. 9). According to Dreon and Vara Sánchez (2022), this is what some enactivists are after. More specifically, those works are "characterized by an emphasis on those relational and dynamic processes that emerge from a sociocultural engagement between the agent and the environment" and, therefore, "try to account for the qualitative richness of aesthetic experiences and their tensions and continuities with general experience" (Dreon & Vara Sánchez 2022, p. 235).

1.2 *The Phenomenological Backbone*

To accomplish this task, I will draw on Dan Zahavi's philosophical work on two specific forms of social cognition involved in the emergence of the 'we' in face-to-face interactions: emotional contagion and emotional sharing (2014; 2015). There are several reasons for this. First, the other philosophical pillar on which enactivism grew alongside pragmatism was phenomenology. For this reason, phenomenological terms are very popular in the enactivist literature, and Zahavi's analysis provides a clear, precise, and detailed account built upon the work of some of the most relevant phenomenologists. Secondly, these terms, and Zahavi's work in particular, have been explicitly referenced and discussed by authors in the field of collective aesthetic experience, such as Hanich. Thirdly, empirical research on chemosignals also uses the same terminology.

Drawing on Max Scheler's phenomenology (2008), Zahavi argues that a key feature of emotional contagion is that you "literally catch the emotion in question [...] It is transferred to you" (2015, p. 87). According to this view, there is something sudden and immediate about the way you experience emotional contagion. It is a quality of experience that emerges abruptly from within. When you experience emotional contagion, "the feeling you are infected by is consequently not phenomenally given as foreign, but as one's own" (*Ibid*). You can "be infected by the feelings of others, by their joy or fear, not only without knowing anything about the other individuals, but also without knowing anything about their intentional objects" (Zahavi 2014, p. 117). For this reason, for this lack of awareness of others as distinct individuals, emotional contagion, according to Zahavi, "should not be conflated with emotional sharing" and "doesn't amount to or constitute a we-experience" (2015, p. 87).

With regard to emotional sharing, Zahavi adopts some of the work of Gerda Walther (1923) and Thomas Szanto (2015) to contend that it requires both plurality and integrity. In instances of emotional sharing, the emotional experiences undergone by those who share them, “rather than being independent of each other, are co-regulated and constitutively interdependent” (Zahavi 2015, p. 90). For this reason, these situations cannot be unconscious: they require a degree of mutual awareness. There has to be something that makes of an experience *our* experience, but without reaching a complete merging of experience – a sense of togetherness (Walther 1923). In Zahavi’s words, when emotional sharing happens “you can become aware of yourself as one of them or, rather and more accurately, you can become aware of yourself as one of us” (2015, p. 94). Unlike emotional contagion, emotional sharing certainly amounts to a genuine example of we-experience.

1.3 *Collective Aesthetic Experiences*

How do emotional contagion and emotional sharing combine and interact in the case of collective experiences? Tom Cochrane has discussed collective listening in two different types of musical performance –the “silent case” of an orchestral concert in a music hall and the “noisy case” of rock or jazz concerts—which, I believe, could be extrapolated to other collective aesthetic experiences. In the silent case situations, Cochrane suggests, there is “a preparedness to monitor the emotional responses of other listeners and an ability to accommodate differing reactions within the standard cognitive environment” (2009, p. 70). For this reason, Cochrane suggests, “certain micro-signals of the emotional arousal of others will be available that may well pass below the radar of conscious awareness”, while

[o]thers will be more obvious, such as the difference between someone sitting in a tense, alert position and another in a more languorous, detached way. Such signals can lead to emotional contagion, in which as a result of unconsciously imitating the expressive behavior of others, the corresponding emotional state is aroused (2009, p. 69).

Although he does not explicitly cite it, Cochrane seems to adopt the classic psychological definition of emotional contagion,³ which blurs some of the experiential differences between emotio-

³ According to Hatfield *et al.*, emotional contagion is “the tendency to automatically mimic and synchronize movements, expressions, postures, and vocalizations with those of another person and, consequently, to converge emotionally” (1992, pp. 153-154).

nal contagion and emotional sharing established by Zahavi, with the consequent loss of conceptual clarity. Given my interest in developing an enactive approach, Cochrane's emphasis on micro-signals is particularly relevant, as it resonates with Shaun Gallagher's Interaction Theory of social cognition. The main claim of Interaction Theory is that in most of our everyday encounters, "as we engage with others we see or more generally perceive in their bodily postures, movements, gestures, facial expressions, gaze direction, vocal intonation, etc. what they intend and what they feel, and we respond with our own bodily movements, gestures, facial expressions, gaze, etc." (Gallagher 2020, p. 101). Combining these two approaches, it could be argued that in the context of a concert hall, there is a direct perception of emotional states that leads others to enact similar emotions through minimally reflective processes. However, Cochrane's reliance on micro-signals opens his theory up to the same criticisms that have been made of Interaction Theory. Namely, the lack of an explanation of the perceptual processes underlying these experiential aspects (Schlicht 2023, p. 128). An additional issue is that Cochrane assumes the existence of joint attention, which for him "always occurs in a minimal fashion whenever one is in the (obvious) presence of other people – for example, on the street in daylight" (2009, p. 65). As a result, his account does not seem to consider the possibility of emotional contagion when we do not see other people directly, as would be the case in a dark concert hall or a cinema.

Focusing on filmgoers' experience, Julian Hanich has argued that "[w]hen we watch a film in a cinema or another co-viewing situation, we constitute and create a social experience that does not precede this event – it comes alive only through us and, during the film, continuously changes with and because of us" (2022, p. 137). Indeed, he goes as far as to claim that "the history of film theory has turned a blind eye to [...] the fact that the co-presence of other viewers always affects our film experience, for better or worse" (*Ibid*). According to Hannich, "[l]imiting research to the dyadic encounter between a single viewer and the film, artificially delimits and distorts the discussion about the film experience", because "the collective constellation is always a triadic one between individual viewer, film, and the rest of the audience" (*Ibid*). This also applies, he suggests, to other collective aesthetic experiences such as pop concerts, opera, theatre, or dance performances. In his account, these events have the potential to generate 'affective we-experiences' thanks to three relevant mechanisms: feeling together, shared

emotions, and emotional contagion. Hanich cites Zahavi's work several times. However, he makes some different claims. Unlike Zahavi, Hanich argues that both shared emotions and emotional contagion are forms of we-experience, but he does not conflate them either. While individuals who share emotions are responding to the same intentional object, emotional contagion "causally depends on someone else's emotions" (2022, p. 140). Hanich regards collective aesthetic experiences as composed of different forms of we-experience working simultaneously, leading to the generation of what he calls "pockets of the audience"; that is, a group of individuals sitting close to each other who have a we-experience while paying attention to the same intentional object (2022, p. 142). Hanich is also interested in the experiential side of "affective we-experiences". However, like Cochrane, he does not offer an account of the specific perceptual processes that may be involved in this particular type of experience. As a result, we continue to have an explanatory gap about the processes at work in these situations of minimally conscious interaction. This circumstance hinders the possibility of developing our knowledge of how collective aesthetic experiences unfold and how they relate to other instances of social interaction.

More generally, Bence Nanay has also recently focused on the interactional dimension of aesthetic experience. According to him, an aesthetic experience "is often (although not always) a form of social interaction", since it "often happens in the company of our friends or sometimes in a crowd with people we don't know" (2023, p. 10). On the specifics of this interaction, Nanay develops an argument similar to Hanich's triadic constellation: "sharing an aesthetic experience is also a form of interaction, not between two things (me and the artwork), but rather between three things (me, you, and the artwork). It is a form of triangulation" (2023, p. 10).

Taking these and other theories into account, it has been argued that the current literature on aesthetic experience with others presents two relevant problems: it lacks consistency in its use of terminology—"floating between *shared*, *parallel*, *joint*, *collective*, *concurrent*" (Drummond 2024, p. 2)—and is "marred by a lack of attention to the different ways in which different kinds of relations and interactions with different others in different settings can shape and modulate our interpersonal aesthetic experience" (*Ibid.*). Drummond argues that we need "an enactive approach that not only foregrounds embodiment and intersubjectivity in cognition, but duly explains how variations in them cause variations in cognition"

(2024, p. 1). I agree with Drummond's analysis. In his paper, he focused on establishing a taxonomy of these kinds of experiences. In my case, I am concerned with exploring a specific mechanism by which variations in interactions with others affect an aesthetic experience. This is necessary because the work I have mentioned, I believe, does not take into account the influence of bodily physicality in these situations where we spend a considerable amount of time surrounded by a constant group of people. Arguably, the spatial stability of the environment and the prolonged duration of the engagement make of collective aesthetic experiences a particular type of event. One in which we can expect meaningful interactions between the participants; one in which certain affective dynamics might emerge even in the absence of direct interaction. This is a gap in existing research on collective aesthetic experiences—a gap that a philosophical account informed by empirical research on chemosignals might help to fill.

2. *Chemosignals and Cognition*

2.1 *What Chemosignals Are and What They Do*

Humans breathe about 20,000 times a day. At rest, with each inhalation, we take in around 400 ml of air through the nostrils or mouth for women and 500 ml for men. This volume contains not only oxygen, nitrogen, carbon dioxide, and other gases. It also contains airborne molecules and volatile chemicals that can be detected by the olfactory sensory neurons in the nasal cavity. Among these molecules, we inhale small compounds excreted by those around us. Like other animals, humans constantly emit chemicals through their skin, breath, and body fluids. Their composition and quantity change depending on the short and long-term situation of the emitter in terms of emotional state, health, fitness level, age, etc (Doty 1981). Recent research has shown that these molecules – often referred to as chemosignals – have the potential to convey information about the current state of the emitter, while also shaping behavioural, affective, and cognitive processes in the receiver(s) when inhaled (see Calvi *et al.* 2020; Kostka & Bitzenhofer 2022, and Loos *et al.* 2023 for some recent reviews).

In the case of olfactory communication, receivers exposed to sweat excreted by individuals experiencing fear tend to adopt a fearful facial expression and increase visual vigilance of the surroun-

dings and air intake while performing emotionally neutral tasks. In contrast, sweat produced by people experiencing disgusting experiences correlates with facial configurations consistent with that emotion and triggers sensory rejection (de Groot *et al.* 2012). According to researchers, “these results can be considered unique in that they reveal a remarkable human capability, namely that chemosignals of fear and disgust establish correspondences between a sender and a receiver” (2012, p. 6). There is also evidence that similar mechanisms mediate the communication of happiness and other positive emotions (de Groot *et al.* 2015; Williams *et al.* 2016). Moreover, some studies suggest that chemosignals support not only human-human communication but also human-animal transference of emotions (D’Aniello *et al.* 2018). It is not surprising that chemosignals are considered capable of triggering emotional contagion (de Groot *et al.* 2012; Loos *et al.* 2023).

In terms of behavioural, affective, and cognitive effects, maternal chemosignals are known to increase infants’ visual attention, augment positive arousal, improve the sense of safety, and enhance interbrain synchrony (Endevelt-Shapira *et al.* 2021). In adults, a partner’s body odour reduces discomfort during stressful situations (Granqvist *et al.* 2019). Compared to other sensory cues, odours are believed to evoke more evocative and emotional memories – the so-called “Proust phenomenon” (Jellinek 2004). In terms of perception, chemosignals have been shown to modulate the attribution of emotional states to ambiguous human expressions (Zhou & Chen 2009). However, chemosignals also appear to be involved in more complex affective dynamics capable of shaping conscious decisions. For example, Agron and colleagues (2023) have proved that odourless chemosignals present in female tears can reduce aggressive behaviour in males by 44% during a competitive task.

Chemosignals do not just convey emotional information. Evidence suggests they have much more pervasive effects, such as favouring what appear to be evolutionarily conserved complex responses.

2.2 Chemosignals and Collective Experiences

How would chemosignals contribute to collective aesthetic experiences? They present two particularly relevant key features. On the one hand, all of the cognitive, affective, and behavioural effects mentioned are assumed to occur below conscious levels of attention. This means that we do not need to be aware that we are

smelling chemosignals for them to affect us. According to Loos and colleagues, there has been

the erroneous assumption that studying invisible molecules, unintentionally produced by emitters and the effects of which escape receivers' conscious awareness, is unimportant. However, 'unintentional and unnoticed' does not equate to ineffective and nonfunctional (think of pathogens, for example (2023, p. 3).

On the other hand, one emitter of chemosignals can affect many surrounding receivers. Due to their physical properties, gases spontaneously expand to fill any container. And so do airborne molecules. For example, researchers have studied how the concentration of volatile molecules in an enclosed space such as a cinema evolves according to the film genre and the emotional impact of the different scenes, suggesting that "the chemical accompaniment generated by the audience has the potential to alter the viewer's perception of a film" (Williams *et al.* 2016, p. 7).

However, for the sake of our hypothesis, it is important to ask what happens when several people are paying attention to the same audiovisual stimuli. Golland and colleagues (2015) have studied the processes of physiological and psychological synchronization in small groups of people paying attention to the same audiovisual stimuli. The researchers seated groups of three participants side by side on a long couch, where they were shown film clips (approximately seven and a half minutes in length) from two emotionally charged films. Critically, "participants were required to refrain from talking and making gross movements throughout the whole experiment" (Golland *et al.* 2015, p. 3). Each time, two people used devices to measure their heart rate and electrodermal activity during viewing. Afterwards, the participants were asked to rate the level of emotion triggered by the films. The results showed a significant alignment in both values when compared to participants who watched the same films in different groups. Moreover, those who watched the films together reported similar emotional ratings of the films. The researchers concluded that "while all the participants in the study were synchronized with the emotions elicited by the movie, the co-present ones were also synchronized with the emotional signals of each other" (2015, p. 10). In their opinion, the study shows that "the contagious spread of emotional signals can arise unintentionally in minimal social conditions", and, among the possible channels through which this could occur, they suggest "subtle peripheral cues (e.g. facial and postural emotional signals) from other individuals" and "chemosignals, which do not necessitate conscious allocation of attention" (*Ibid.*).

All things considered, there seems to be growing evidence that chemosignals not only communicate emotional states between human beings, but also affect cognition. In addition, they may be relevant in achieving coordinated physiological rhythms during aesthetic engagements, which in turn seem to correlate with similar reported experiences. Before going any further, however, it is important to emphasize that I am not committed to the claim that chemosignals trigger specific perceptual, memory, or behavioural processes. The view I defend is that chemosignals are part of the context that agents inhabit, and that these molecules can affect the likelihood of possible affective, cognitive, or behavioural events. At certain concentrations, they can increase the likelihood of certain dynamics and decrease the likelihood of others. Inhaling air with a significant density of fear chemosignals will not necessarily make you feel fear, but it will arguably make you more likely to react fearfully to ambiguous stimuli. In the case of collective aesthetic experiences, if you are undecided, being surrounded by a group of people who are enjoying a performance greatly might help to increase your chances of enjoying it.

3. Chemosignals and Collective Aesthetic Experiences

I will now discuss what I think might happen when you decide to go to the cinema to watch a film alone. As I have already argued, this situation highlights the potential role of chemical communication between members of an audience. Firstly, unlike other aesthetic engagements, such as theatre performances or concerts, there are no performers with whom a two-way communication might develop. And secondly, being surrounded by strangers in a dark room makes it very unlikely that verbal or gestural information will be exchanged with other people. I will distinguish several stages of such a hypothetical aesthetic engagement:

t0 – The film has not started yet. While you are waiting, the presence of other people in the theatre is just a fact that has no relevant meaning for you.

t1 – The film begins. As soon as the lights are off, you become oblivious to other members of the audience.

t2 – The film progresses. While you may remain unaware of the presence of other people, they are undergoing their own affective processes.

t3 – The film is approaching its key moments. You may ‘feel the energy’ of the room, which intensifies what you are experiencing.

t4 – The film ends. You might feel compelled to share some thoughts about the film with the person sitting next to you.

I think we can all relate to these moments of an experience. What I am going to do now is look at the specific potential role of chemosignals at these different stages.

Between t0 and t1 we should not expect any effect from chemosignals that bring rhythms and emotional states together, because there is no common stimulus. Being surrounded by the same people, even for a long time, is not enough to create a collective state. Think of a flight. Since everyone is paying attention to different things – gazing at the landscape through the window, reading, watching a TV series through some headphones, or sleeping – there will be many different affective states. It is only when something, such as going through some severe turbulence, captures most passengers' attention that emotional contagion and other collective processes can take place. However, the situation changes when the film starts.

Between t1 and t2 we can expect something similar to what has been described by Golland and colleagues (2015): a progressive correlation between physiological synchrony and psychological cohesion that emerges in closely seated individuals. In Hanich's terminology, we would have some pockets of audience: small groups of adjacent spectators among whom emotional contagion begins to occur. Considering the dark environment of a cinema and the existing empirical evidence, chemosignals seem to be distinctly suited to promoting the emergence of these experiential bubbles. There will certainly be differences in how different spectators react to what they are all watching, as well as variability in the amount or type of chemosignals emitted, but I suggest that within a few minutes some individuals would already be pre-reflectively constrained by the chemosignals emitted by those sitting nearby, if those molecules are similar. That is, if the film has a particularly salient mood,⁴ we can expect a resonant effect that amplifies the emotions it triggers; if the film is too ambiguous or dull, the influence of chemosignals would be less. On the other hand, those spectators whose emotions – and therefore the chemosignals emitted – are significantly different would not resonate with others; moreover, they would act as firewalls. They would hinder the emergence of chemosignal-driven experiential pockets in their proximity.

⁴ According to Williams and colleagues (2016), suspense and comedy films produce the most identifiable changes in the chemical composition of a cinema's air.

As the experience progresses from t2 to t3, the clouds of chemosignals are more likely to coalesce if the film presents a more or less definite emotional tone. This claim is supported by the experiment by Williams and colleagues (2016). They found that the concentration of certain chemosignals associated with specific emotions increased consistently across different screenings of the same film, and that the peaks in the levels of these molecules “were reproduced in all four screenings of the film at the same time, meaning that each set of cinemagoers broadcast chemicals into the air in synchrony to on-screen events” (2016, p. 4). At this point, I suggest, the experience can be at least minimally reflective (see Vara Sánchez 2022 for a general model of an enactive aesthetic experience). This means that those viewers who share the emotions of the majority might experience themselves as attuned⁵ to the ‘energy’ of the room, due to the underlying entrainment partly mediated by the converging chemosignals. In contrast, those who do not share the predominant emotion conveyed by the prevailing chemosignals may experience a sense of exclusion to other members of the audience.

‘Energy’ is a word we use in those situations where we are aware of something we feel, but because of our audiovisual bias we fail to acknowledge the senses through which we receive information about the environment, in this case the sense of smell through the chemosignals emitted by other individuals. Again, I am not claiming that the chemosignals dictate the emotions or thoughts of each viewer; rather, they would tip the scales towards certain affective outcomes. According to Zahavi’s definition, without evidence of mutual awareness, this would not be a situation of emotional sharing. However, an elevated concentration of chemosignals that entrain our cognition, affectivity, and behaviour can create a sense of collective attunement close to emotional sharing. If, after the film ends, you were asked by someone who was not at the film, you would have a pretty solid idea of whether people liked the film or not. This is not just emotional contagion. You may feel that your emotion is not just yours, but that it comes from your being part of the audience as a collective. You may feel that your experience of the film is being conditioned by the fact that you are in the cinema surrounded by others who seem to be experiencing similar emotions. You experience an attunement to

⁵ By attunement I mean “the quality of an experience where we perceive our actions, emotions, or thoughts as being shaped and shaping a given thing, event, or person within the surrounding world, in some cases owing to an underlying process of entrainment” (Vara Sánchez 2023, p. 61).

other viewers – a temporary bond that makes this unique, a sense of closeness with the audience as a whole. Coming back to Nanay's and Hanich's idea of watching a film as a triadic constellation (2022, p. 137), I would like to push these idea further and suggest that these collective aesthetic experiences are neither triadic nor the result of a triangulation. Rather, they should be regarded as events that have the potential to allow us to experience ourselves in the audience and through our being part of it. Not through each viewer or spectator, but through our being part of the collectivity of the audience. When we are in a cinema or a concert hall, but also when we are sitting on a couch with another person watching a TV series, sometimes, for better or for worse, we experience the aesthetic stimuli through this social entity that we are creating together with the people at our side or around us.

When the film ends at t4, if you have participated in a collective emotional situation, you may feel the urge to interact with someone sitting nearby: to exchange some words, a gesture, a gaze. Shanklin and Meyer (2019) have argued that conversations about aesthetic experiences enrich and prolong them. I agree with their analysis. However, I would add that in this particular situation these brief but meaningful social interactions would be the fully reflective consequences of the pre-reflective and minimally reflective antecedent processes affected by chemosignals. The impulse to interact with a stranger is an attempt to make explicit the collective bond that has been formed – a way of proving to yourself that the attunement you experienced as the film approached its climax was true. In this way, the situation could be one of emotional sharing. Because now you can confirm whether or not this person, as a representative of the audience, has experienced something similar to what you have experienced. This action is therefore the result of the experience of resonating with others while being exposed to the same audiovisual stimuli. It is the final link in the chain of interrelated processes that marked out the emergence and unfolding of a type of aesthetic experience; an experience that can partly be explained by the effects of chemosignals in social cognition.

4. Conclusion and Future Directions

In this paper, I have discussed a potential way for enactive approaches to cognition to become more embodied and embedded: the incorporation of chemosignals into characterizing social dyna-

mics. Empirical results support the idea that these molecules have the potential to propagate affective states, shape cognition, and generate complex behavioural responses, sometimes even under what are traditionally considered minimal social conditions. For this reason, chemosignals are a good candidate for being relevant to certain collective aesthetic experiences. Philosophical work on this topic has found it difficult to characterize specific mechanisms by which emotional contagion, emotional sharing, and other forms of we-experience might develop and shape each other. In this paper, I have argued that the transition from general experience to aesthetic experience for someone who is part of an audience is constrained by changes in the concentration of chemosignals. Physiological and psychological coordination contributed by chemosignals emitted by nearby individuals may lead to the emergence of pockets of audience. This would start as an instance of emotional contagion. Eventually, there may be a progressive collective entrainment to the general affective tone of the cinema due to an increasing concentration of certain chemosignals. Some individuals may become aware that they are attuned to the emotional state of the audience as a whole – they would feel the energy of the room. If the situation were to consolidate, it would be very similar to a dynamic of emotional sharing. However, to become a fully developed situation of emotional sharing, it requires a confirmation of reciprocal awareness. Most likely, this would be sought at the end of the film, bringing fulfillment to the whole experience.

I have focused on a specific type of experience, but I believe that research on chemosignals has the potential to inform approaches to other aesthetic engagements and social dynamics more generally. Chemosignals can help us better understand not only what happens within the audience but also, for example, some reciprocal interactions between performers and audience members. They may also be relevant to connecting the mechanisms by which we fall into synchrony and the rewards it offers in other social situations (Salmela 2021). To sum up, in chemosignals, enactivism and other 4E approaches to cognition have an ally in supporting non-representational accounts. They may not be *the* answer, but many results suggest that they are part of it. For this reason, I suggest that when we talk about the importance of gestures, movements, facial expressions, or vocal intonation in interacting with others (Gallagher 2020), we should start to add chemosignals to that list. Not only is the ‘we’ stronger than the ‘I’, but the ‘we’ cannot be explained without resorting to other senses beyond sight and sound.

References

- Agron, S. *et al.*, *A chemical signal in human female tears lowers aggression in males*, in "PLoS Biology", 21/12 (2023), e3002442.
- Brincker, M., 'The aesthetic stance: On the conditions and consequences of becoming a beholder', in A. Scarinzi (ed.), *Aesthetics and the Embodied Mind: Beyond Art Theory and the Cartesian Mind-Body Dichotomy*, Springer, Dordrecht 2015, pp. 117-138.
- Calvi, E. *et al.*, *The scent of emotions: A systematic review of human intra- and interspecific chemical communication of emotions*, in "Brain and Behavior", 10 (2020), e01585.
- Cochrane, T., *Joint Attention to Music*, in "British Journal of Aesthetics", 49/1 (2009), pp. 59-73.
- D'Aniello, B. *et al.*, *Interspecies transmission of emotional information via chemosignals: From humans to dogs (Canis lupus familiaris)*, in "Animal Cognition", 21(1), pp. 67-78.
- de Groot, J. H. B. *et al.*, *A sniff of happiness*, in "Psychological Science", 26/6 (2015), pp. 684-700.
- de Groot, J. H. B. *et al.*, *Chemosignals communicate human emotions*, in "Psychological Science", 23/11 (2012), pp. 1417-1424.
- Dewey, J., *Art as Experience*, Perigee Books, New York 1934.
- Doty, R. L., *Olfactory communication in humans*, in "Chemical Senses", 6/4 (1981), pp. 351-373.
- Dreon, R. & Vara Sánchez, C., *Naturalistic Trends in Current Aesthetics*, in "Studi di Estetica", 22 (2022), pp. 221-244.
- Drummond, H., *Aesthetic experiences with others: an enactive account*, in "Phenomenology and the Cognitive Sciences", (2024), pp. 1-21.
- Endevelt-Shapira, Y. *et al.*, *Maternal chemosignals enhance infant-adult brain-to-brain synchrony*, in "Science Advances", 7/50, 6867.
- Gallagher, S., *Performance/Art: The Venetian Lectures*, Mimesis International, Milan 2021.
- Gallagher, S., *Action and Interaction*, Oxford University Press, Oxford 2020.
- Golland, Y. *et al.*, *The mere co-presence: Synchronization of autonomic signals and emotional responses across co-present individuals not engaged in direct interaction*, in "PLoS ONE", 10/5 (2015), e0125804.
- Granqvist, P. *et al.*, *The scent of security: Odor of romantic partner alters subjective discomfort and autonomic stress responses in an adult attachment-dependent manner*, in "Physiology & Behavior", 198 (2019), pp. 144-150.

- Hanich, J., 'Shared or spread? On boredom and other unintended collective emotions in cinema', in D. Trigg (ed.), *Atmospheres and Shared Emotions*, Routledge, New York 2022, pp. 135-151.
- Hanich, J., *The Audience Effect: On the Collective Cinema Experience*, Edinburgh University Press, Edinburgh 2018.
- Hatfield, E. et al., 'Primitive Emotional Contagion', in M. S. Clark (ed.), *Emotion and Social Behavior*, SAGE Publishing, New York 1992, pp. 151-177.
- Jellinek, J.S., *Proust remembered: Has Proust's account of odor-cue autobiographical memory recall really been investigated?*, in "Chemical Senses", 29/5 (2004), pp. 455-458.
- Kostka, J. K. & Bitzenhofer, S. H., *Hot the sense of smell influences cognition throughout life*, in "Neuroforum", 28/3 (2022), pp. 177-185.
- Loos H. M. et al., *Past, Present, and Future of Human Chemical Communication Research*, in "Perspectives on Psychological Science" (2023), pp. 1-25.
- Nanay, B., *Aesthetic Experience as Interaction*, in "Journal of the American Philosophical Association" (2023), pp. 1-13.
- Polite, B., *Shared Musical Experiences*, in "British Journal of Aesthetics", 59/4 (2019), pp. 429-447.
- Ryan, K. J. & Gallagher, S., *Between Ecological Psychology and Enactivism: Is There Resonance?*, in "Frontiers in Psychology", 11 (2020), 1147.
- Salmela, M., 'Joint Improvisation as Interaction Ritual', in S. Ravn et al. (eds.), *Philosophy of Improvisation*, Routledge, New York 2021, pp. 122-139.
- Scheler, M., *The Nature of Sympathy*, Transaction Publishers, London 2008.
- Schlicht, T., *Philosophy of Social Cognition*, Palgrave Macmillan, London, 2023.
- Shanklin, R. & Meyer, M., *Going Together: Toward an Account of Sharing Aesthetic Experiences*, in "The Journal of Aesthetic Education", 53/3 (2019), pp. 106-124.
- Szanto, T., *Husserl on Collective Intentionality*, in A. Salice, H. B. Schmid (eds.), *Social Reality*, Springer, Dordrecht 2015, pp. 145-172.
- Vara Sánchez, C., *Aesthetic Rhythms*, Aesthetica Edizioni, Milano 2023.
- Vara Sánchez, C., *Enacting the aesthetic: A model for raw cognitive dynamics*, in "Phenomenology and the Cognitive Sciences", 21 (2022), pp. 317-339.
- Varela, F., Thompson, E., & Rosch, E., *The Embodied Mind: Cognitive Science and Human Experience*, MIT Press, Cambridge 1991.

- Walther, G., 'Zur Ontologie der sozialen Gemeinschaften', in E. Husserl (ed.), *Jahrbuch für Philosophie und phänomenologische Forschung* VI, Niemeyer, Halle 1923, pp. 1-158.
- Williams, J. et al., *Cinema audiences reproducibly vary the chemical composition of air during films, by broadcasting scene specific emissions of breath*, in "Scientific Reports", 6 (2016), 25464.
- Zahavi, D., *You, Me, and We – The Sharing of Emotional Experiences*, in "Journal of Consciousness Studies", 22/1-2 (2015), pp. 84-101.
- Zahavi, D., *Self & Other – Exploring Subjectivity, Empathy, and Shame*, Oxford University Press, Oxford 2014.
- Zhou, W. & Chen, D., *Fear-related chemosignals modulate recognition of fear in ambiguous facial expressions*, in "Psychological Science", 20/2 (2009), pp. 177-183.