

# ***Interdisciplinary perspectives on Beauty and Change***

**17-19 October 2022 - Fondazione Giorgio Amendola,  
Torino Via Tollegno, 52 - Torino**

## **Book of Abstract**

### **Keynote lectures:**

1. **Niels Chr. Hansen**, Aarhus Institute of Advanced Studies & Center for Music in the Brain, Aarhus University.

*What can the expectancy dynamics of melodic cognition, composition, and improvisation reveal about the aesthetic appreciation of music?*

**Abstract:** Although predictive processing has long been thought to underlie the aesthetic appreciation of music, suitable theoretical frameworks and adequate empirical tools to study this fascinating relationship have only recently started becoming available. Yet, despite fruitful inspiration from cognitive neuroscience and information theory, confirmation and violation of musical expectations can rarely be mapped seamlessly unto concepts borrowed from reinforcement learning and predictive coding theory. Sensory prediction errors, for example, have often been conflated with reward prediction errors. Predicting what the next note might be fundamentally differs from predicting reward value or the source of sensory signals. More music does not in itself imply greater pleasure. Musical expectations rather entail an intricate interplay of dynamic changes in stimulus structure and listener expertise over time.

The emergence of digitally encoded musical corpora and computational tools has allowed music scientists to more clearly dissociate the sometimes

complementary roles of retrospective surprise and prospective uncertainty in the cognition, composition, and improvisation of musical melodies. This has crucial ramifications for the understanding of aesthetic appreciation of music in that maximal pleasure appears to be experienced during states of low uncertainty and high surprise or states of high uncertainty and low surprise. In this talk, I will review computational, behavioural, and neuroscientific research in this area, and based upon pertinent findings, I will discuss and expand upon their potential implications for the aesthetic dimension of musical experience

2. **Sander van de Cruys**, Antwerp Social Lab, University of Antwerp; Brain & Cognition department (GestaltReVision), University of Leuven.

### *The comfort of insight*

**Abstract:** What do people mean when they say that a piece of art (be it literature, visual art, or music) has helped them beat difficult times? Clearly, they do not mean this in the literal sense of ‘helping’: Art does not eliminate the worldly source of suffering; it does not help, like antibiotics do. Helping implies the helping agent has some form of (perceived) control over the causes or circumstances of the distress, and so acts on them to reduce or resolve them. Rather, art provides comfort (distress relief) by modifying our mental states —our construction of the brute, uncontrollable facts of the world. Hence, consolation (of art) has a strong ‘Erzatz’ or compensatory quality to it —replacing or compensating for something hurtful that cannot be removed itself. Consolation is accomplished not by changing the environment but rather its meaning, i.e. by an internal cognitive change causing emotional relief. Similarly, art consoles us in times of distress by changing how the world is being constructed in mind. Observe that this is not simply a matter of concocting a more favorable account of the world. Just consider all the suffering featured in art, or the evil featured in religion, yet another common source of consolation. Nor is consolation a matter of simply ‘folding’ to the prior expectations and familiar concepts of the to-be-consolated party. I will propose that the tension-and-release that is intrinsic to intense aesthetic experiences and to intense epistemic (insight or ‘aha’) experiences, is also at the core of consolation, in that it empowers and (re)focuses one’s actions and values (i.e., an ethical experience). Indeed, the result of consolation is not limited to emotional relief, but is often described as feeling “at home in the world again”, and entails a renewed autonomous agency and motivation to explore a precarious world (and novel ideas) again. As example cases, I will

look at how this epistemic-aesthetic-ethic nexus plays out in art, divination, conspiracy theory, and psychotherapy.

### 3. **Alice Mado Proverbio**, University of Milano-Bicocca

#### *The neuroaesthetics of music*

**Abstract:** We will explore how music, which originated as a form of social communication, is able to convey emotions and aesthetic sensations. Through an interdisciplinary approach, based on biological, neuroevolutionary and psychological data, we will try to unravel the following questions

I. Interpersonal resonance – Music as a communication tool; II. How the brain processes the melodic profile of speech, vocalizations and instrumental music; III. Are there innate and universal aesthetic sensations and psychophysiological reactions to music? IV. Can music clearly convey precise semantic and affective information? A unified neural model will be presented that considers and explains the nature of some innate and universal effects of listening to music on our brains.

### 4. **Wolfgang Tschacher**, University of Bern

#### *Beauty, change, and synchrony*

**Abstract:** The perennial philosophical problem of the mind-body relationship has become a topic of intense research activity in current cognitive and social science. A variety of empirical studies have resulted, which examined the reciprocity of mind and body in psychology and increasingly also in psychotherapy research. The concepts of Embodiment, Enactivism, Embedded cognition, and Extended cognition, hence '4E cognition', have led to a new understanding of cognition and mind altogether – mental processes should be viewed in their bodily contexts (<https://www.embodiment.ch>). The embodiment paradigm has also changed our understanding of the interaction dynamics of people, now seen as embodied agents, with implications for the evolution of the therapeutic relationship. Here, in the context of psychotherapy, the nonverbal and physiological synchrony between therapists and patients is concerned and has been found correlated with the their relationship, with positive affect and finally therapy outcome.

Psychopathological states such as schizophrenia spectrum and autism spectrum disorders are characterized by reduced interpersonal synchronies.

But how is synchrony associated with beauty? Recently, we conducted studies of the bodily resonance within concert audiences in the project Experimental Concert Research (<https://experimental-concert-research.org/?lang=en>). Both movement and physiological synchronies were found to be significantly present in audiences of live classical concerts. In addition, audience synchrony was associated with self-report measures of aesthetic appreciation received from listeners after the performances.

Hence it may be true that synchrony is not only linked with prosocial aspects as found in psychotherapy research, but also constitutes a signature of aesthetic experience. Based on these results, I will attempt to translate back and forth between the fields of empirical aesthetics and psychotherapy research. With the goal of deriving practical implications for psychotherapy, I will discuss open questions: Is there a role of beauty in psychotherapy sessions, and can it promote change? Is nonverbal synchrony always a prosocial signature and thereby helpful? Is it reasonable for therapists to enhance synchrony intentionally?

## 5. **Jan Roubal Masaryk**, University in Brno, Czech Republic

### *Resonances in depressive field*

**Abstract:** With depressive clients, therapists experience loss of vitality and creativity, they doubt about themselves, they lose hope. This can be understood as interpersonal resonance as if the therapists get infected by depression. However, it can also be understood from the field theory perspective where both the client and the therapist are being taken by the dynamics of the depressive field. Results and implications of the exploratory research of therapists experiences with depressive clients will be presented to elaborate the interpersonal and field theory perspectives on resonances in depression.

## 6. **Vittorio Gallese**, Dept. of Medicine & Surgery, Unit of Neuroscience, University of Parma, Italy; Italian Academy, Columbia University, New York, USA

## *How we relate to images. Embodied simulation and aesthetic experience*

**Abstract:** By exploiting the empirical approach of neuroscience and physiology, we can investigate the brain-body mechanisms enabling our relationship with man-made images, shedding light on the functional mechanisms enabling their perceptual experience. In so doing we can deconstruct some of the concepts we normally use when referring to aesthetics and cultural artifacts.

I will present some results of our research showing that creative expressive processes, in spite of their progressive abstraction and externalization from the body, keep their bodily ties intact. Creative expression is tied to the body not only because the body is the instrument of creative expression, but also because it is the main medium allowing its experience.

### 7. **Gianni Francesetti**, Psychiatrist, Gestalt Therapist, International Trainer and Supervisor; University of Turin

#### *Aesthetic diagnosis in psychopathology and psychotherapy*

**Abstract:** The aim of this contribution is to describe a diagnostic process in psychopathology and psychotherapy using an aesthetic evaluation. Unlike the classical diagnostic process, which presents a result of comparing clinicians' observations with an extrinsic diagnostic system (DSM, ICD, etc.), the aesthetic evaluation is a pre-reflexive, embodied and preverbal process. A phenomenological and Gestalt Therapy theoretical frame is used to introduce the concept of the aesthetic diagnostic process. During this process, the clinicians use their own here-and-now presence, which takes part in the co-creation of the shared relational field during the therapeutic session. The clinician becomes an antenna of the intrinsic tensions of the field, i.e. the intentionalities. The diagnosis is not aimed any more to detect the inner functioning of the patient: the clinicians use their sensitivity in order to discover in which landscape they emerge and meet the patients. Here, diagnosis and therapy are coincident. A short clinical example illustrates this perspective.

### 8. **Tonino Griffero**, University of Rome, Tor Vergata, Italy

## *Meeting the neo-phenomenologic challenge. Felt body, atmospheres and psychopathology (without psyche!)*

**Abstract:** Moving from a (new) phenomenological theory of the lived body (Leib), a pathic-atmospherological aesthetics outlines the felt-body's constitutive (pre-reflective) role in human experience but especially in aesthetic (aesthesiological) perception. Against every reductionist and introjectionist objectification of the lived experience, every explanatory hypothesis of associationist and projectivist type, this approach – that emphasizes the affective involvement that the perceiver feels unable to critically react to or mitigate the intrusiveness of – seems an adequate investigation of the felt body as sounding board of outside atmospheres and Stimmungen. By means of its specific dynamics and lived “isles”, in fact the felt body feels what happens in the surrounding area without drawing on the five senses and the perceptual body schema, experiences an affective-synaesthetic first impression of the expressive qualities (or affordances) ontologically rooted in environment's things and quasi-things. This way felt-bodily isles turn out exactly to be both a tool for sensing the affective radiation provoked by atmospheres and quasi-things, i.e surfaceless „places“ that, communicating with each other and with our consciousness, are themselves quasi-things.

As is well known, the notion of “atmosphere” has boomed recently in the Humanities. Mostly relying on the neophenomenological radical externalisation of the affective and starting half a century ago from psychiatry (Tellenbach) and philosophy (Schmitz's phenomenology), the atmospheric approach provides now a wide application in all scientific fields that have to do with human and not strictly functional-measurable parameters.

Atmospherology is a part of a larger neo-phenomenological project that aims at challenging every (biological, neurological or physical) reductionism and naturalisation, at better understanding the actual and spontaneous life experiences that we normally describe in terms of conscious self-reflection, self-awareness and first-person perspective (“how one feels in her environment”), and even at finding a better way of living. A reductionist approach, in fact, culpably underestimates the “what is it like” of a lived phenomenon and makes of it nothing but a subjective and irrelevant epiphenomenon.

A “good” neophenomenological-atmospherological psychotherapy, in particular, should 1) carefully describe the “how” of a self-showing suffering, 2) establish a close link between atmospheres and psychotherapy, given that people in mental distress are probably the most vulnerable subjects (and sounding boards) to atmospheric effects, 3) cooperate with the societal atmospheric theoretical but also practical approach to the health of its

psychologically disturbed members. A neo-phenomenology-based atmospheric therapy aims at a) restoring the correct “competitive” felt-bodily dynamics, possibly even through the right distance that is however in its own way a form of felt-bodily communication, b) ensuring the fluid oscillation between (personal) emancipation and regression, c) re-balancing the interconnection between different levels of the personal situation.

## Oral presentations

### - **Aesthetics and learning:**

1. *Recipe for a good meme: predicting internet meme appreciation with cross-validated exploratory factor analysis.* Samrawit Ayele, Luca Cecchetti, Rolf Reber IMT Lucca, University of Oslo

**Abstract:** Internet memes are digital media artifacts humans interact with on a daily basis. When engaged with an internet meme, people are making value judgments by further liking, sharing, reacting, commenting, or not. While most memes tend to flop, others make it to the front page of Reddit or garner other social rewards. We wanted to know what are the cognitive and emotional ingredients that make up these valuable internet memes. Guided by previous literature in processing fluency, metaphor theory, and humor, we collected survey data on 300 internet memes. Online participants (n = 1157) evaluated up to 15 random selections. First, they judged their overall liking of the memes on a scale of 0.5 to 5 stars, including half-steps. Then, they rated 9 cognitive features (e.g. prototypicality, aptness, incongruity) and the elicited intensity of 16 emotional categories (e.g. amusement, boredom, confusion). Using a machine learning approach, we first split the dataset into 80% training and 20% test data. We implemented an exploratory factor analysis on the training data to uncover 5 latent components from the measured cognitive and emotional variables. Using a 10-fold cross-validated multiple regression model, we find that two components are the best predictors of the overall value of a meme. The first component is loaded with fluency variables like speed of processing and level of understanding. The second component is loaded with humor variables like amusement and incongruity. We generalized our model to new memes by predicting the overall values of the test data memes. We find that our cognitive aesthetics model can accurately predict the

value of the unseen internet memes (RMSE = 0.25, adjusted R-squared = 0.90) using just these 5 latent variables.

2. *The unexplored link between aesthetic perception and creativity: a theory-driven meta-analysis of fmri studies in the visual domain.*

Giulia Tomasetig, Lucia Maria Sacheli, Margherita Adelaide Musco, Stefano Pizzi, Gabriella Bottini, Luigi Pizzamiglio, Eraldo Paulesu

**Abstract:** Aesthetic appreciation (related to art-viewing) and creative production (related to art-making) are inherently linked in visual arts, but their relationship has never been explored explicitly in cognitive neuroscience, nor the nature of such connection. Yet, existing literature allows generating two alternative hypotheses on what common cognitive processes could possibly ground these two experiences: motor simulation or inhibitory control. We adopted a meta-analytical approach to formally compare these alternative hypotheses, exploring the neural correlates of the aesthetic and creative experience, and their possible overlaps. We thus performed two separate meta-analyses of fMRI studies on the aesthetic experience of visual art (22 experiments) and on visual creativity (12 experiments); we then computed a conjunction analysis with a twofold purpose. First, it aimed to investigate whether shared neurofunctional underpinnings may support both the aesthetic and creative experience in the visual domain. Second, we examined whether any shared brain activation may reflect either motor simulation or inhibitory processes. We ran the meta-analyses in GingerAle, using the Activation Likelihood Estimation Method. The conjunction analysis revealed a common involvement of the pre-SMA in both classes of studies, a brain region, if anything, more concerned with top-down inhibitory motor and volitional cognitive control rather than bottom-up motor simulation. These mechanisms could lead to learn (during art perception) or generate (during creative production) something new. In the art-viewing domain, this finding was primarily driven by figurative rather than abstract art. However, these results are constrained by methodological limitations in the available literature on visual art, and by the limited number of studies available. In conclusion, while not solving the issue of what model best captures similarities and differences between art appreciation and creation, this meta-analysis paves the way for future investigations that could expand the existing findings.



3. *Implicit learning and musical consonance: a developmental perspective.* Paolo Barbieri, Pietro Sarasso, Alice Rossi Sebastiano, Katuscia Sacco Francesca Garbarini, Irene Ronga  
Department of Psychology, University of Turin

**Abstract:** Our recent models in neuroaesthetic highlight the relationship between the subjective sense of beauty and learning. The study of Sarasso and colleagues (2021) suggest that participants' implicit learning processes are enhanced by sound sequences composed of subjectively more valued chords, either fifth consonant or tritone dissonant chord; according to literature, most of our participants preferred consonant sounds. However, when the advantage for consonance emerges within ontogeny, whether it is innate or acquired and the role of experience are still debated.

To investigate how consonance modulates perceptual learning dynamic in newborns, we replicated the same experiment mentioned above. We expected to find different mechanism to process consonant and dissonant stimuli.

Twenty-two full-term healthy newborns were recruited for the experiment, and they perform an auditory roving paradigm task while their neural activity was recorded with the EEG. The task alternate sequences of frequency (Hz) standard, repeated, and deviant, novel, sounds. Participants performed 6 runs of the auditory task with trains of 288 stimuli per run; In 3 runs only fifth consonant intervals (high pitch and low pitch) were presented, whereas in the remaining 3 trials only tritones dissonant (high pitch and low pitch) were presented. We computed mismatch responses (MMR), a well-validated index of perceptual learning by comparing newborns' neural response to Standard and Deviant sounds differently for consonant (i.e., Fifth) and dissonant (i.e., Tritone) chords.

Results show that consonant stimuli elicit an adult-like negative mismatch response (MM-R) while dissonant elicit a positive mismatch response (MMR-p). Previous studies suggest that the polarity of MMR is modulated by several factor, including newborns development stage and the similarity between presented stimuli and native language. Our prelaminar result show different mechanism to process consonant and dissonant stimuli and, crucially, consonant stimuli seem to elicit an adult-like MMR-N, considered an index of developmental maturity.

- **Interpersonal Resonance**

1. *Moved to action: callings, discernment, and moral-emotional engagement with religious material culture.* Jacob Lang, Despina Stamatopoulou, and Gerald C. Cupchik Department of Psychology, University of Toronto, Canada, Department of Philosophy and Social Studies, University of Crete, Greece

**Abstract:** Diverse mystical practices lean on elements of the material world to attain closeness to the Sacred. To an awestruck believer, an icon—a sublime stimulus-in-context—is a material access point to the transcendent that *moves* one to action through emotional and moral engagement with a social scene and theological premises. Roman Catholic prayers often involve affectively charged experiences, such as vicarious participation, in which the believer feels *for* and *with* the person/concept represented. In the Byzantine tradition, one is in relationship to the saint through anti-naturalistic representation of a glorified form. Being moved in the presence of beauty or the sublime is at play in *callings to vocation* that spur *discernment* of major life changes.

2. *Beauty as a nudge toward sustainable practices: an investigation on affordances and materials of everyday objects.* Eduardo Naddei Grasso, Anna M. Borghi & Claudia Scorolli Department of Philosophy and Communication Studies, University of Bologna

**Abstract:** Most empirical work in cognitive science has focused on the shape and size of objects (es. Ellis & Tucker, 2000), neglecting the analysis of other visual properties, such as texture, investigated instead by designers of everyday objects (Xenakis & Arnellos, 2013). Texture depends on the type of material used, and in turn, the material influences the familiarity of the object, its aesthetics, and even the possibilities for action(s) offered. Our pilot study aims to explore the role of materials, more or less sustainable (plastic vs. wood), in activating the affordances of everyday objects with varying degrees of familiarity and pleasantness. The possible role of participants' specific environmental sensitivity will be investigated by selecting two samples of participants through the Pro-Environmental Behaviours Scale (Italian version, Menardo et al. 2019). Re-adapting a well-established paradigm (Ambrosini et al. 2012), objects (same shape, but different material) are shown in the reachable and unreachable space, followed by the presentation of a verb compatible or not with the object. Objects are evaluated for familiarity and pleasantness by a different group. We expect an advantage for objects placed in the near portion of space followed by action verbs, particularly for

canonical objects (e.g., plastic vs. wooden bottle). However, we expect this difference to be less pronounced for participants with high environmental sensitivity for whom the canonicity of the object conflicts with its sustainability. The beauty of the object should transversely promote the activation of affordance. The results will be interpreted in light of a broader, interdisciplinary perspective (cognitive science and design) where beauty can be rethought as a nudge for slow change toward sustainability. Therefore, at a second stage our project will investigate the role that beauty might play within the aesthetic experiences that people engage with various kinds of sustainable materials.

3. *Game aesthetics: the beauty of playing video games.* Del Fante Elena, Sarasso Pietro, Barbieri Paolo, Piovesan Francesca, Ronga Irene, Sacco Katuscia; BiP Group, Department of Psychology, University of Turin

**Abstract:** Playing games is a great way to unwind from a hard and long day. Many contemporary video games are characterized by rich three-dimensional spaces that can be navigated in real time and, they are commonly described as phenomena that combine aesthetic, social and technological elements. Inasmuch as it can be studied videogames from a variety of perspectives, including an aesthetic approach. “Game aesthetics” refers to the sensory phenomena that the player encounters in the game (visual, auditory, tactile) and as an expression of the game experiences, such as pleasure, emotion, and sociability (aesthetic experience). The player is usually situated as the protagonist in-game and, indeed, constantly called upon to respond to a series of narrative cues. Nowadays, players can play with others while being in different rooms or parts of the world, entering in a state of “affective resonance”, based on a reciprocity between individuals. Indeed, gaming is a place for rich interaction between participants, where players can interact with others and, by opening to encounter and sympathize with another individual, it could be possible enjoy a state called “aesthetic resonance”. The aim of this study is to investigate if affective resonance – experienced through cooperative videogame – can improve implicit learning. 21 healthy subjects were asked to play “Overcooked2!” for approximately fifteen minutes (i.e., ‘Gaming session’) in three different conditions of gaming modality: alone (i.e., Single-Player); with another player, who is possible to verbally interact with (i.e., Multiplayer +); and with another player, without verbal interaction (i.e., Multiplayer - ). Following each condition, participants listened to a stream of sounds presented according to a roving paradigm, while we recorded their EEG (i.e., EEG MMN task). The roving paradigm was composed of auditory stimuli differing in their frequency (high and low pitch). Within the sequence,

standard-repeated tones alternated with novel-deviant tones. To explore the effect of each gaming condition on neural responses, we then computed the MMN (i.e., deviant minus standard responses), a well-validated index of implicit learning. As expected, the amplitude of MMN responses was significantly greater in Multi-player + compared to Single-Player condition and as compared to Multi-player -. Surprisingly, the t-test comparing Single-Player and Multi-player conditions was not statistically significant. These results indicate that, in virtual environment, implicit learning processes are enhanced only in the case of an active, verbal interaction between players, as in Multi-player + condition. It is possible that, in virtual environments, verbal communication among participants is necessary to trigger a state of affective resonance able to develop an aesthetic experience, thus improving motivation and, consequently, implicit learning. This finding, if confirmed, may have interesting implications in the study of learning in virtual environments.

## **Symposium: Creativity and aesthetic experience in facing daily life challenges through the life-span**

1. *Creative potentials in neurodevelopmental disorders: Evidence from dyslexia and Tourette's Syndrome*. Alice Cancer & Laura Colautti, Department of Psychology, Catholic University of the Sacred Heart, Milan, Italy
2. *CREC: a creative thinking training for enhancing cognitive skills in aging*. Maura Crepaldi, Department of Human and Social Sciences, University of Bergamo, Bergamo, Italy
3. *CREC: a creative thinking training for patients with Mild Cognitive Impairment (MCI)*. Giulia Fusi, Department of Human and Social Sciences, University of Bergamo, Bergamo, Italy

4. *Preferences for audio and visual artworks in Dementia*. Fatima M Felisberti, Psychology Department Kingston University London, UK

5. *Basal Ganglia Function in Aesthetic Experience and Creative Expression*. Marco Treven, Medical University of Vienna, Austria

**Abstract:** The symposium includes five contributions aimed at highlighting the potentiality of creativity and aesthetic experience in enhancing and recovering different cognitive functions throughout the lifespan. The first three contributions will focus on the role of creative potentials and abilities to trigger original and useful strategies in daily life issues and improve psychological wellbeing at different ages. The fourth examines the preferences for audio and visual artworks in dementia and the last focuses on how the subcortical basal ganglia system influences our engagement with the surrounding physical and social environment. The first contribution (presenting authors: Alice Cancer and Laura Colautti) considers developmental age, in which several studies show that children and adolescents with neurodevelopmental disorders such as dyslexia and Tourette's Syndrome (TS) exhibit higher creativity strengths than their typically developing peers. Such enhanced creative skills can be useful to overcome the impairments associated with these conditions. For example, children with dyslexia with the most impaired reading performance were found to be the most cognitively flexible, as evidenced by performance in the figural test of creativity. Furthermore, tics appear to be less intense when TS patients are engaged in creative and artistic performances, such as dancing, painting, or listening to music. In line with the compensatory cognitive benefit hypothesis, these findings emphasize the possibility to support children with neurodevelopmental disorders by exploiting their creative potential.

Similarly, the second (presenting authors: Maura Crepaldi) and third contribution (presenting authors: Giulia Fusi) highlight how the ability to think in a divergent way, a pivotal index of creative potential and a predictor of cognitive reserve, is critical for active and successful aging and seem to represent an optimal resource for cognitive training programs both in healthy elderly and individuals affected by mild cognitive impairments. A new training program, i.e., CREC (CReativity in Everyday-life Challenges), which stimulates creative thinking abilities will be presented and described in detail. The two contributions will exhibit preliminary evidence of the beneficial effects of the training in a sample of healthy elderly (online administration) and in a

sample of patients affected by mild cognitive impairment (in presence administration).

The fourth contribution (presenting author: Fatima M Felisberti) will be focused on aesthetic preference in dementia patients and in a neurotypical control group. Aesthetic preferences to works of art can remain stable over time (*island of stability effect*, ISE) or vary with repeated exposures (*mere exposure effect*, MEE), but studies about such preferences in dementia patients (DPs) are still rare. In this study, mild-to-moderate DPs and neurotypical controls (CNs) were asked to rate how much they liked music clips, colour cards, and paintings to examined whether those ratings conformed to the *ISE* or the *MEE* predictions. The 212 participants rated a set of stimuli repeated three times at weekly intervals: images of Picasso's paintings (figurative vs abstract), PANTONE colour cards (muted vs vibrant), and avant-garde music clips (voice vs instrumental). The findings showed that DPs and CNs aesthetic (i.e., hedonic) preferences were stable over the three weeks exposure period, in line with the predictions of the *ISE* model. Moreover, there was a marked dampening of aesthetic ratings in DPs as opposed to CNs. Curiously, a Latent Growth model revealed that underlying the averaged stability of the cohort responses there were marked differences in preferences at the individual level. The two cohorts displayed clusters of different responses over the time evaluated, which seemed to support the predictions of the *MEE* model. In short, the wide range of DPs aesthetic responses could be related to the different stages (and types of) dementia and are important to therapeutic interventions aiming at the well-being of patients involving audio and visual stimulation. The findings are also relevant to the design of spaces that offset the decline in aesthetic experiences affecting seniors with cognitive impairments.

The fifth contribution aims to answer the following question: how is the subcortical basal ganglia system, the "dark basement of the brain", influencing our engagement with the surrounding physical and social environment? The role of this general selector system in motor program selection, decision making, and different learning functions is widely studied. However, the gain function of basal ganglia feedback also reinforces perceptual salience, placing it nicely within the active inference framework that integrates movement with expected sensations. Thus, enhanced basal ganglia feedback could manifest in over-responsiveness to environmental stimuli, while reduced basal ganglia feedback may lower the ability to change existing routines and prior beliefs when facing new evidence. The resulting axis between novel data and existing knowledge, proneness to detail and an ability to generalise, should strongly influence aesthetic experiences and perceptual learning. Intriguingly, this seems to be reflected by preferred patterns of creative expression in individuals affected by various neuropsychiatric conditions with basal ganglia

involvement, including autism spectrum conditions (ASC), obsessive-compulsive disorder (OCD), or Parkinson's disease (PD). While such phenomena may be overlooked in routine clinical settings, they are crucial for personal meaning, quality of life, engagement with the surrounding environment and cultural artefacts, and social interactions. This contribution outlines the role of the basal ganglia from an active inference perspective and explores some of the implications. Besides a better contextualisation of findings related to aesthetic experience in neuropsychiatric disorders, this includes potentially novel approaches for art and occupational therapies and possible empirical studies at the interface of clinical and social neuroscience.

## **Symposium: Aesthetic appreciation and predictive processes**

1. *Art and learning: from aristotle to the bayesian brain.* Jacopo Frascaroli Department of Philosophy, University of York

**Abstract:** According to an age-old philosophical tradition, aesthetic pleasure is epistemic in nature and has to do with knowledge acquisition. In other words, successful artworks and beautiful objects would please and attract us because they afford learning. This intuition runs throughout the history of aesthetics: it forms the basis of Aristotle's explanation of the pleasure of imitative arts (*Poetics*, 1448b 13-19; *Rhetoric*, 1371b 4-10); it underlies Baumgarten's claim that aesthetics is concerned with the "perfection of sensitive cognition" (1936/1750), as well as Kant's (1987/1790) view that the experience of the beautiful is linked with the intuition of "a formal purposiveness" in the manifold of experience; and it motivates Dewey's (2005/1934) and Johnson's (2018) view that the arts offer "intensified, nuanced and complex realizations of the processes of meaning in everyday life" (Johnson, 2018, p. 25). The aim of this talk is to take stock of this important philosophical tradition and link it with the burgeoning psychological and neuroscientific research that characterises perceptual pleasure as a marker of successful assimilation of sensory information (Biederman and Vessel, 2006; Schoeller and Perlovsky, 2016; Sarasso et al., 2020; Van de Cruys et al., forth.). I will show how the philosophical debate may give focus and historical depth to current psychological and neuroscientific research, and how, in turn, psychology and neuroscience may operationalise and give

empirical substance to age-old philosophical questions. The upshot will be a programme for further interdisciplinary research in which philosophers, artists, psychologists and neuroscientists can collaborate as equal partners in illuminating crucial aspects of the human mind.

2. *Learning changes aesthetic judgments over time.* Aenne Brielmann, Max Berentelg & Peter Dayan Max-Planck Institute for Biological Cybernetics, Tuebingen, Germany

**Abstract:** Listening to music, watching a movie, looking at the sunset – all of these experiences can give us great pleasure. Why? We propose that sensory experiences are rewarding because they serve the ethologically-grounded task of fashioning a sensory system that effectively processes objects that it expects to encounter, both now and in the future. Our theory is realized as a computational model in which the sensory system comprises a generative model of objects in the sensory environment. Crucially, this model is shaped through learning and thus predicts systematic changes in aesthetic judgments over time. In an image rating task participants (N = 59) rate how much they like dog images (n = 55) that we created using the NeuralCrossbreed morphing algorithm. The full theory specifies a recurrent interaction – with viewing choices being influenced by aesthetic values which, in turn, depend on internal stimulus representations that are adapted by those very choices. Here, we assess how well we can predict the dynamics of individual aesthetic values with this model when stimulus representations are based on hidden layer activities in deep neural nets pretrained on image recognition (e.g., VGG-16).

A realization of our model captures liking judgments on a trial-by-trial basis (median  $r=0.65$ ) and far outperforms predictions based on population averages (median  $r=0.01$ ). Importantly, we lose 17% of explained variance when discarding the true order, underlining that the precise predictions that our model makes regarding sequential effects matter. In sum, we show that a computational model that exploits DNN-derived object representations can capture the dynamics of individual sensory value judgments. Our research adds to recent evidence that DNNs can be useful for understanding aesthetic judgments just as object recognition.

3. *Beauty, self-organization and change.* Pietro Sarasso Department of Psychology, University of Turin



**Abstract:** Within the framework of current "learning theories" in neuroaesthetics this presentation will discuss how aesthetic emotions signal transitions in self-organization patterns. Aesthetic emotions are indeed essential to tolerate transient states of sensory entropy for the seek of allostatic regulation and to further promote learning and change. Empirical evidence that supports this notion, both at a neural and behavioral level, will be analyzed.