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Naturalizing Aesthetic Learning and Development in Creative Explorations: An Interactivist-Constructivist Model of Aesthetics

by
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Abstract: Traditional aesthetic theories and modular cognitive frameworks have long treated aesthetics as a passive process of recognizing fixed properties, failing to account for its dynamic, developmental, and creative dimensions. In this article, I challenge these perspectives and propose the Interactivist-Constructivist Model of Aesthetics, which redefines aesthetic engagement as an active, exploratory process guided by Self-Directed Anticipative Learning (SDAL). Central to this framework is the Interactive-Aesthetic Sense, a regulatory mechanism that enables learners to navigate uncertainty, refine their aesthetic understanding, and construct novel responses to creative challenges. Through iterative evaluation and reflection, aesthetic learning emerges as a self-directed, adaptive process rather than mere pattern recognition. By integrating aesthetics with learning and creativity, this model bridges the gap between aesthetic experience and creative innovation, positioning aesthetics as a fundamental driver of cognitive development and meaning-making. In doing so, it offers a constructivist alternative to traditional models, better suited for addressing complex, open-ended problems in contemporary design, art, and education.

Keywords: Aesthetic Learning, Development, Self-Directed Anticipative Learning, Interactivist-Constructivist Model of Aesthetics, Creativity

Abstract: Le teorie estetiche tradizionali e i modelli cognitivi modulari hanno a lungo considerato l'estetica come un processo passivo di riconoscimento di proprietà fisse, senza tener conto delle sue dimensioni dinamiche, evolutive e creative. In questo articolo, metto in discussione queste prospettive e propongo il Modello Interattivista-Costruttivista dell'Estetica, che ridefinisce l'impegno estetico come un processo attivo ed esplorativo guidato dall'Apprendimento Anticipativo Autodiretto. Al centro di questo quadro concettuale c'è il Senso Estetico Interattivo, un meccanismo regolatorio che consente ai discenti di navigare nell'incertezza, affinare la loro comprensione estetica e costruire risposte innovative alle sfide creative. Attraverso una valutazione e una riflessione iterative, l'apprendimento estetico emerge come un processo autodiretto e adattivo piuttosto che

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come un semplice riconoscimento di modelli. Integrando l'estetica con l'apprendimento e la creatività, questo modello colma il divario tra l'esperienza estetica e l'innovazione creativa, posizionando l'estetica come motore fondamentale dello sviluppo cognitivo e della creazione di significato. In questo modo, offre un'alternativa costruttivista ai modelli tradizionali, più adatta ad affrontare problemi complessi e aperti nel design, nell'arte e nell'istruzione contemporanei.

Keywords: apprendimento estetico, sviluppo, apprendimento anticipativo autodiretto, modello interattivista-costruttivista dell'estetica, creatività

1. *Rethinking Aesthetic Learning*

Aesthetic learning has traditionally been framed as the recognition of aesthetic properties in artistic works. Philosophers like Matravers and Levinson[1] argue that aesthetic properties – such as balance, harmony, or expressiveness – are metaphysically dependent on underlying perceptible features of objects, such as color, shape, or texture. This perspective, grounded in the assumption that aesthetic value is embedded within objects, has shaped both philosophical and educational discussions, reinforcing the idea that aesthetic learning is a process of cultivating perceptual and imaginative capacities to better recognize these properties.

However, most theoretical models in aesthetic cognition focus on aesthetic perception and appreciation while overlooking their implications for aesthetic learning as a developmental process. Cognitive models, such as Leder's[2] framework of aesthetic appreciation and Jacobsen's[3] model of aesthetic processing, explain how aesthetic perception and judgment operate but do not address how aesthetic knowledge develops or transforms over time. Similarly, fluency-based

[1] D. Matravers-J. Levinson, *Aesthetic Properties: I—Derek Matravers*, «The Aristotelian Society, Supplementary Volume» 79/1 (2005), pp. 191-210, p. 202.
[2] H. Leder-B. Belke-A. Oeberst-M. D. Augustin, *A Model of Aesthetic Appreciation and Aesthetic Judgments*, «British Journal of Psychology» 95/4 (2004), pp. 411-543.
[3] T. Jacobsen, *Bridging the Arts and Sciences: A Framework for the Psychology of Aesthetics*, «Leonardo» 39/2 (2006), pp. 155-162; T. Jacobsen-S. Beudt, *Domain Generality and Domain Specificity in Aesthetic Appreciation*, «New Ideas in Psychology» 47 (2017), pp. 97-102.

models like Hekkert's[4] and appraisal theories like Silvia's[5] account for how aesthetic preferences emerge but do not examine how individuals construct novel aesthetic experiences through learning.

Even theories that incorporate dynamism, such as Berlyne's[6] psychobiological model and Martindale's[7] encoding-based framework, still frame aesthetic engagement as pattern refinement rather than knowledge construction. Berlyne attributes aesthetic preference formation to arousal-based exploratory behavior, but his model does not explain how entirely new conceptual structures emerge. Martindale treats aesthetic novelty as the recombination of existing aesthetic encodings, reinforcing an *innatist*[8] perspective rather than one of emergent meaning-making. As Xenakis and Arnellos[9] argue, these models assume aesthetic properties are predefined, reducing aesthetic perception to a passive mechanism of recognizing encoded structures rather than actively constructing them.

The literature on aesthetic learning itself remains limited. One of the few models attempting to address it is Parsons'[10] developmental framework, which describes how individuals refine their ability to recognize aesthetic properties over time. However, it is built upon existing theories of aesthetic perception rather than providing a model of how individuals learn to construct aesthetic knowledge. While Parsons explains how aesthetic sensitivity evolves, his model does not account

[4] P. Hekkert-H. Leder, *Product Aesthetics*, in H. N. J. Schifferstein-P. Hekkert (eds.), *Product Experience*, Elsevier, San Diego 2007, pp. 259-285.

[5] P. J. Silvia, *Human Emotions and Aesthetic Experience: An Overview of Empirical Aesthetics*, in A. P. Shimamura-S. E. Palmer (eds.), *Aesthetic Science: Connecting Minds, Brains, and Experience*, Oxford University Press, New York 2012, pp. 250-275.

[6] D. E. Berlyne, *Aesthetics and Psychobiology*, Appleton-Century-Crofts, New York 1971.

[7] C. Martindale, *Biological Bases of Creativity*, in R. J. Sternberg (ed.), *Handbook of Creativity*, Cambridge University Press, New York 1999, pp. 137-152; C. Martindale, *Recent Trends in the Psychological Study of Aesthetics, Creativity, and the Arts*, «Empirical Studies of the Arts» 25/2 (2007), pp. 121-141.

[8] Innatism posits that cognitive structures are innate, either as fixed encodings or predispositions. While weak innatism allows for refinement through experience, it cannot explain the emergence of entirely novel encodings, as it presupposes pre-existing knowledge. For a critique of innatism, see J. L. Elman *et al*., *Rethinking Innateness: A Connectionist Perspective on Development*, The MIT Press, Cambridge, MA 1996.

[9] I. Xenakis-A. Arnellos, *Ontological and Conceptual Challenges in the Study of Aesthetic Experience*, «Philosophical Psychology» 36/3 (2023), pp. 510-552.

[10] M. J. Parsons, *Can Children Do Aesthetics? A Developmental Account*, «Journal of Aesthetic Education» 28/3 (1994), pp. 33-45.

for the transformative processes that enable creative innovation.

The persistence of Faculty Psychology and modular assumptions in cognitive aesthetics[11] has further constrained discussions on aesthetic learning. Rooted in Kantian universality and Aesthetic Realism[12], these perspectives – shaped by Fechner's[13] psychophysics and Fodor's[14] modular mind – treat aesthetic engagement as passive recognition rather than active meaning construction. They assume that aesthetic properties are encoded in objects and decoded by fixed cognitive faculties, leaving no space for the feedback, imagination, and innovation essential for learning.

This modular doctrine also reinforces the divide between aesthetics and creativity, treating them as parallel but separate fields[15]. Martindale exemplifies this by offering distinct frameworks for aesthetic and creative processes, while Tinio's[16] "mirror model" attempts to bridge them by suggesting that creators both observe and apply "creative properties". However, it fails to explain how these properties foster genuine novelty, exposing broader limitations in linking aesthetic learning to creative innovation.

I will challenge this aesthetic doctrine by demonstrating how aesthetic learning requires an interactive, constructivist approach rather

[11] Enactivist, embodied simulation, and predictive processing approaches aim to move beyond modularity and psychophysics, emphasizing dynamic, context-sensitive cognition. However, their application to aesthetics remains largely theoretical and often retains elements of structured representations, particularly in their reliance on neural encoding mechanisms. These frameworks do not sufficiently account for aesthetic learning as an emergent, constructive process, which is the central concern of this paper.

[12] For an extensive analysis on how these traditions influence aesthetic science see I. Xenakis-A. Arnellos, *Ontological and Conceptual Challenges,* cit., and Id., *Aesthetics as Evaluative Forms of Agency to Perceive and Design Reality: A Reply to Aesthetic Realism*, «New Ideas in Psychology» 47 (2017), pp. 166-174.

[13] G. T. Fechner, *Vorschule Der Asthetik [Preschool of aesthetics]*, Druck und Verlag von Breitkopf und Härtel, Leipzig 1876.

[14] J. A. Fodor, *The Modularity of Mind: An Essay on Faculty Psychology*, The MIT Press, Cambridge, MA 1983.

[15] P. P. L. Tinio, *Creativity and Aesthetics*, in J. C. Kaufman-R. J. Sternberg (eds.), *The Cambridge Handbook of Creativity*, Cambridge University Press, Cambridge 2019, pp. 691-708; O. Vartanian, *Empirical Aesthetics: Hindsight and Foresight*, in P. P. L. Tinio-J. K. Smith (eds.), *The Cambridge Handbook of the Psychology of Aesthetics and the Arts*, Cambridge University Press, Cambridge 2014, pp. 6-34.

[16] P. P. L. Tinio, *art. cit.*

than a recognition-based one. Building on Xenakis and Arnellos's[17] critique, I highlight the ontological and conceptual challenges in aesthetic experience, emphasizing the need to move beyond passive perception models toward a framework that accounts for the constructive nature of aesthetic engagement.

To address this gap, I critique the metaphysical and methodological assumptions underlying traditional frameworks and propose the Interactivist-Constructivist (I-C) Model of Aesthetics. This model reconceptualizes aesthetic engagement as an adaptive, interaction-driven process rather than a passive decoding of pre-encoded properties. By integrating aesthetics with constructive learning, anticipative feedback, and creative exploration, it provides a foundation for understanding how individuals refine, innovate, and construct aesthetic knowledge rather than merely recognizing it.

2. *Transcendental Idealism, Aesthetic Realism, and the Empirical Turn*

Kant's transcendental idealism establishes an epistemological divide between phenomena (the world as we perceive it) and noumena (the world as it exists beyond human cognition). This distinction confines human cognition to appearances structured by a priori conditions, denying direct epistemic access to things in themselves. While this framework resolves key metaphysical problems, it introduces a significant challenge for aesthetic judgment: if beauty is neither an objective property of objects nor a purely subjective affective response, then where does it reside?

This challenge is rooted in a longstanding tradition that models aesthetics as a Platonic ideal ontology – where beauty exists independently of human cognition – but still requires some grounding in reality, since artworks are undeniably real. In attempting to reconcile these tensions, Kant introduces disinterested aesthetic judgment, which asserts that beauty must be universally valid yet independent of conceptual determination.

Kant's formulation of disinterested aesthetic judgment provided a model of aesthetic perception that, despite rejecting metaphysical realism, preserved its epistemic structure. While Kant argues that aesthetic experience is grounded in subjective faculties rather than

[17] I. Xenakis-A. Arnellos, *Ontological and Conceptual Challenges*, cit., p. 6.

in objective properties, his framework still demands universal validity and a structured mode of aesthetic recognition – ideas that later aesthetic realists inherit and modify[18].

This formulation had a profound influence on later theories of Aesthetic Realism, which argue that aesthetic properties exist independently of the perceiver and are detected through disinterested cognitive mechanisms[19]. Although Kant rejects metaphysical (aesthetic) realism, his claim for disinterested aesthetic processing and universal validity persists, inadvertently providing the structural basis for aesthetic cognition, which in turn creates a misleading metaphysical foundation for empirical aesthetics[20]. By treating aesthetic experience as universally valid yet non-conceptual, aesthetic realism reinforces the idea that beauty is recognized rather than constructed, a core assumption that persists in both aesthetic realism and empirical aesthetics – since in this framework, beauty cannot be created purposively.

The notion that aesthetic perception is immediate, non-inferential, and universally shareable became foundational in 20th-century aesthetic realism. Even criticism from Levinson and Matravers acknowledges that there is always some part of reality that initiates aesthetic recognition. Kant's aesthetic framework, particularly his emphasis on disinterested judgment and universality, necessitates a structured mode of aesthetic recognition, even if he does not explicitly claim that aesthetic properties exist as fixed metaphysical entities.

While Kant does not claim that aesthetic properties are fixed in a metaphysical sense, his framework structurally requires a shared mode of aesthetic recognition. This epistemic structure, though not itself empirical, was later appropriated by Fechner's psychophysics, which transformed aesthetic perception into a measurable, stimulus-driven model. In doing so, Fechner shifted the focus from Kant's reflective judgment to empirical aesthetic measurement, reinforcing the idea that beauty is a structured material rather than an emergent, interactive process.

By assuming that beauty is embedded in external formal struc-

[18] P. Guyer, *Kant and the Claims of Taste*, Cambridge University Press, Cambridge 1997; H. E. Allison, *Kant's Theory of Taste: A Reading of the Critique of Aesthetic Judgment*, Cambridge University Press, Cambridge 2001.
[19] D. Matravers-J. Levinson, *Aesthetic Properties: II – Jerrold Levinson*, «The Aristotelian Society, Supplementary Volume» 79/1 (2005), pp. 217-219; F. Sibley, *Aesthetic and Nonaesthetic*, «The Philosophical Review» 74/2 (1965), p. 136.
[20] I. Xenakis-A. Arnellos, *Ontological and Conceptual Challenges*, cit.

tures, empirical aesthetics reinforced Kant's structured mode of aesthetic recognition, even as it replaced transcendental idealism with empirical methods. The result is a quantifiable, modular model of aesthetic perception, where beauty is understood as a stable external feature that is detected rather than interactively constructed.

3. *The Epistemic Problems of Aesthetic Properties*

This tradition hinders an understanding of aesthetic engagement as a developmental and innovative process. If aesthetic properties are grounded in aspects of reality that exist independently of the perceiver, they are presumed to be a priori features of objects, possessing normative qualities that are inherently correct and immune to error – qualities that the learner must recognize rather than generate. This framework reinforces innatism and fails to account for the novelty and emergence of aesthetic properties.

Since new cognition toward aesthetic properties is impossible in this model, aesthetic properties should emerge in reality rather than in interaction with the perceiver[21]. This means that emergent aesthetic properties must introduce new, irreducible qualities that cannot be fully explained by or reduced to their base components. In the case of "garishness", for example, while one can always perceive base properties such as brightness and saturation, the emergent aesthetic property itself cannot be directly perceived without contextual or cognitive engagement. The failure of transcendental idealism and aesthetic realism to explain how emergent properties like "garishness" arise – beyond the mere summation of base properties – reveals a fundamental limitation in their explanatory scope.

This static treatment of aesthetic properties as entities to be revealed to learners, like the model of Parsons[22], rather than constructed through interaction fundamentally misrepresents the nature of learning. Learning is not passive recognition; it is a dynamic process of engagement with the external world, where individuals evaluate their surroundings, refine perception through feedback, and construct new meanings. Seminal works on learning and develop-

[21] J. Levinson, *Aesthetic Supervenience*, «The Southern Journal of Philosophy» 22/S1 (1984), pp. 93-110.
[22] M. J. Parsons, *art. cit.*

ment[23] emphasize that learning is a feedback-driven, interactive process involving error correction, perceptual refinement, and adaptive goal alignment – all of which are absent in aesthetic realism's passive model of recognition.

In contrast, transcendental idealism and aesthetic realism preclude these mechanisms by treating perception as passive recognition rather than active construction. This reduction of the perceiver's role to decoding predefined properties eliminates the possibility of developmental or innovative aesthetic processes. Moreover, as Xenakis and Arnellos argue, this tradition assumes that aesthetic objects (e.g., works of art) are ontologically distinct from everyday objects, reinforcing a dichotomy that excludes the everyday environment from aesthetic inquiry. This perspective artificially narrows the scope of aesthetics, limiting it to select, predefined entities and excluding interactive and emergent aesthetic engagements. The next section critically examines why modular cognitive models – built upon this tradition – fail to account for aesthetic learning.

4. *The Modular Mind and Its Limitations in Aesthetic Learning*

Modular theories of mind, rooted in Faculty Psychology, conceptualize cognition as a system of innate, domain-specific modules responsible for processing discrete types of information. These theories frame cognition as the recognition of fixed correspondences between physical and psychological entities (pre-encoded inputs), rejecting the possibility of development or adaptation. In Fodor's[24] cognition operates at a single level, fundamentally incompatible with the multi-level developmental approach central to Piaget's[25] constructivism.

[23] J. Piaget, *Psychology of Intelligence*, Routledge, London 2001; M. H. Bickhard-L. Terveen, *Foundational Issues in Artificial Intelligence and Cognitive Science: Impasse and Solution*, Elsevier Science Publishers, North-Holland 1995; E. Thelen-L. B. Smith, *A Dynamic Systems Approach to the Development of Cognition and Action*, The Mit Press, Cambridge, MA 1994. D. A. Schön, *The Reflective Practitioner: How Professionals Think in Action*, Basic Books, New York 1983; L. S. Vygotsky, *Mind in Society: The Development of Higher Psychological Processes*, Harvard University Press, Cambridge MA 1978.

[24] J. A. Fodor, *op. cit.*

[25] J. Piaget, *The Origins of Intelligence in Children*, International Universities Press, Inc., New York 1956.

In cognitive aesthetics, modularity has influenced models derived from Fechner's [26] psychophysics, where innate transducers are thought to internalize sensory inputs into domain-specific modules. These modules activate aesthetic encodings – such as symmetry, balance, harmony, or contrast – that are assumed to be universal and context-independent. This perspective reduces aesthetic engagement to a passive recognition process, contrasting with emergent constructs that arise dynamically through interaction.

5. *The Static Nature of Modular Learning and its Implications for Creativity*

Empirical aesthetics has inherited the metaphysical commitments of both transcendental idealism and aesthetic realism, often blending them into a mixed metaphysical framework. This synthesis combines Kantian assumptions of aesthetic autonomy with an empirical methodology aimed at verifying universal aesthetic properties [27]. By isolating aesthetic experience from broader cognitive processes, these models reinforce a static, recognition-based paradigm that leaves no space for representational emergence or creative transformation.

A critical limitation of modular theories is their lack of feedback-driven processes necessary for exploratory learning. Without mechanisms to challenge or reorganize representations, individuals cannot differentiate weak ideas from promising ones, preventing the kind of self-directed exploration necessary for innovation. This constraint is evident in Martindale's model, where novelty is framed as the recombination of pre-existing aesthetic encodings rather than the creation of genuinely new conceptual structures. The boundaries of creativity are thus predetermined, as learners are restricted to manipulating known properties rather than generating new conceptual spaces.

Moreover, modular models lack anticipatory differentiation and adaptive learning mechanisms. Since aesthetic encodings are treated as fixed and error-free, learning is reduced to combining predefined properties rather than constructing new representational forms. This perspective fails to account for how individuals develop new ways of engaging with aesthetics, limiting both learning and creative discovery.

[26] G. T. Fechner, *op. cit.*
[27] A. Chatterjee *et al.*, *The Assessment of Art Attributes*, «Empirical Studies of the Arts» 28/2 (2010), pp. 207-222.

5.1 *Cognitive Constraints on Learning and Creativity in Modular Theories*

Modular theories of mind inherently constrain both learning and creativity by treating cognition as a process of recognizing pre-encoded aesthetic structures rather than constructing new ones. Since these models assume aesthetic properties are fixed and innate, they reduce learning to refining perceptual sensitivity rather than developing new aesthetic trajectories. Without mechanisms for anticipatory differentiation and representational adaptation, modular models fail to explain how individuals construct new forms of aesthetic knowledge, ultimately restricting the potential for both learning and creative discovery.

A fundamental limitation of modular theories is their lack of iterative feedback mechanisms, which are essential for adaptive learning and innovation. Since modular aesthetic encodings are presumed to be error-free, learning is reduced to combining predefined properties rather than generating novel aesthetic structures. Without the capacity to challenge and reorganize representations, individuals cannot distinguish between weak and promising ideas, hindering the self-directed exploration necessary for innovation. As Xenakis and Arnellos[28] argue, the absence of internal error-feedback forces modular theories to depend on external validation, raising the unresolved question of how an external validator determines what is correct or incorrect.

This lack of self-directed error-detection prevents modular models from accounting for the emergence of new representational structures. Instead, they assume that novelty arises solely through recombination rather than through conceptual transformation. This is particularly evident in Martindale's model, where aesthetic novelty is framed as the realization of new analogies between pre-existing encodings. Because this approach limits creativity to the rearrangement of predefined aesthetic elements, it fails to explain how genuinely new conceptual spaces emerge through learning and exploration.

This rigid framework fails to account for how individuals generate and refine aesthetic knowledge over time. Without a mechanism for constructing new aesthetic representations, modular models cannot explain how creative thinkers break from conventional paradigms, reframe aesthetic problems, or construct novel design logics. Instead, these theories assume that creativity is merely the combination or

[28] I. Xenakis-A. Arnellos, *Aesthetics as Evaluative Forms of Agency*, cit.

reconfiguration of existing encodings, rather than the emergent transformation of conceptual structures. Consequently, modular approaches limit the capacity for sustained creative evolution, confining aesthetic engagement to pattern recognition rather than meaningful innovation.

5.2 *Absence of Metacognitive Feedback and the Limits of Aesthetic Experience*

Aesthetic experience is inherently metacognitive, requiring individuals to reflect on, regulate, and refine their perception, interpretation, and creative engagement over time. Modular theories, however, preclude the higher-order feedback loops necessary for self-regulation, adaptation, and long-term creative growth. Without metacognitive oversight, learners cannot track how their aesthetic sensibilities evolve, evaluate the coherence of their interpretations, or critically assess their own creative trajectories.

Metacognition enables aesthetic engagement to be more than an immediate sensory reaction – it allows individuals to question their initial judgments, compare experiences across different contexts, and refine their appreciation through iterative learning. In contrast, modular models reduce aesthetic engagement to a fixed recognition process, where perception is treated as a passive decoding of pre-encoded properties rather than an active and evolving construction of meaning. Without an ability to monitor and adjust aesthetic judgments, learners are confined to static pattern-matching, unable to develop the depth of insight that aesthetic experience requires.

Furthermore, the absence of metacognitive adaptation in modular models severs aesthetic cognition from historical, social, and cultural evolution. Aesthetic experience is not merely about perceiving a set of universal properties but about navigating and reinterpreting aesthetic meaning across changing contexts. Without reflective monitoring and anticipative differentiation, learners cannot engage with the broader philosophical, artistic, and social dimensions that shape aesthetic understanding. This makes genuine aesthetic experience impossible, as it relies on dynamic engagement, conceptual transformation, and the ability to construct new interpretative frameworks – all of which require metacognition.

This lack of metacognitive processes directly impacts creative development. Without mechanisms to evaluate and differentiate between weak and promising ideas, learners are unable to refine their creative

output systematically[29]. As a result, modular approaches reinforce a static aesthetic framework that cannot support the complex, evolving nature of aesthetic cognition. These limitations extend into aesthetic education, where modular models prioritize the recognition of predefined aesthetic properties rather than fostering the ability to construct new aesthetic meanings. This failure to integrate metacognition into aesthetic learning fundamentally limits the potential for creativity, innovation, and long-term artistic growth.

6. *Implications for Aesthetic Education*

The philosophical tradition of aesthetic realism and its empirical extensions leads to an inescapable dead end in aesthetic education. If aesthetic properties are innate, pre-encoded correspondences that are universally valid, as this framework suggests, then learning aesthetics is reduced to passively refining the ability to detect these properties rather than constructing new aesthetic meanings or novel engagements. This tradition eliminates the developmental and interactive dimensions of learning, treating aesthetic experience as recognition rather than creative exploration.

This failure is apparent in Hagen[30], who argues that aesthetic learning does not follow a trajectory of development, rejecting the notion that artistic styles evolve toward higher levels of sophistication. Similarly, Elkins[31] contends that art cannot be systematically taught, as the mechanisms of artistic creation resist formalization. Dewey[32] reinforces this critique, emphasizing that aesthetic sensibility cannot be transferred through direct instruction but emerges from environmental engagement and personal exploration. These

[29] A. Efklides, *Metacognitive Experiences in Problem Solving: Metacognition, Motivation, and Self-Regulation*, in A. Efklides-J. Kuhl-R. M. Sorrentino (eds.), *Trends and Prospects in Motivation Research*, Kluwer Academic Publishers, Dordrecht 2001, pp. 297-323; Id., *Metacognitive Experiences: The Missing Link in the Self-Regulated Learning Process*, «Educational Psychology Review» 18 (2006), pp. 287-291.
[30] M. A. Hagen, *There is No Development in Art*, in N. H. Freeman-M. V. Cox (eds.), *Visual Order: The Nature and Development of Pictorial Representation*, Cambridge University Press, Cambridge, NY 1985, pp. 59-77.
[31] J. Elkins, *Why Art Cannot Be Taught: A Handbook for Art Students*, University of Illinois Press, Urbana 2001.
[32] J. Dewey, *Democracy and Education*, Free Press, New York 1997.

perspectives collectively undermine the notion that aesthetics can be learned within a pre-encoded, modular framework.

Modular approaches to aesthetic education further reinforce this limitation by prioritizing the recognition and application of predefined aesthetic forms, such as symmetry, balance, and harmony, as universal markers of aesthetic quality. While this ensures technical proficiency, it fails to cultivate the cognitive flexibility required for creative transformation. Instead of fostering self-directed exploration, such models train students to conform to static frameworks, limiting their ability to construct new aesthetic meanings or adapt to evolving artistic and cultural contexts.

Without mechanisms for anticipatory differentiation and self-directed exploration, learners struggle to engage with the uncertainty inherent in creative processes. Aesthetic education, when rooted in modular assumptions, encourages passive recognition rather than active transformation. In contrast, an approach that integrates metacognitive reflection and interactive learning would allow students to refine and redefine aesthetic concepts, fostering both creativity and adaptability.

7. *An Interactivist-Constructivist Approach to Aesthetic Learning and Development*

The Interactivist-Constructivist (I-C) Model of Aesthetics is grounded in a process-based, naturalistic account of mental phenomena which emerge from the biological organization of living systems[33]. Unlike modular or encoding-based frameworks, I-C provides a normative account of mental emergence, explaining how cognition arises as an adaptive function within self-maintaining, interactive systems. This model is built upon genuine metaphysical emergence, which in turn presupposes an underlying process metaphysics[34]. By rejecting the substance metaphysics of classical cognitive science, I-C fundamen-

[33] I. Xenakis-A. Arnellos, *Relating Creativity to Aesthetics Through Learning and Development: An Interactivist-Constructivist Framework*, «Phenomenology and the Cognitive Sciences» (2025), DOI: 10.1007/s11097-025-10084-5.

[34] M. H. Bickhard, *Should Psychology Care About Metaphysics?*, in B. D. Slife-S. C. Yanchar-F. C. Richardson (eds.), *Routledge International Handbook of Theoretical and Philosophical Psychology: Critiques, Problems, and Alternatives to Psychological Ideas*, Routledge, New York 2021, pp. 98-110.

tally opposes the notion that cognition consists of predefined symbolic representations or fixed mental structures.

Rooted in the pragmatic tradition[35] of knowledge and representation, with action-based epistemology, the I-C model emphasizes the normativity of functional organization in autopoietic systems. Drawing from Piagetian constructivism[36], I-C treats cognition as an interactive, self-organizing process in which representations emerge dynamically through engagement with an ever-changing environment rather than being pre-encoded mappings of reality[37].

This paradigm shares affinities with the organizational account of biological functions[38] and resonates with situated and dynamical approaches to cognition[39]. It also resonates with embodied, integrated, and constructivist approaches to meaning-making, representation, and emotions[40]. However, I-C directly challenges[41] classical cog-

[35] See H. S. Thayer, *Meaning and Action: A Critical History of Pragmatism*, Hackett Pub. Co. Inc., Indianapolis and Cambridge 1981.

[36] M. H. Bickhard, *Piaget and Active Cognition*, «Human Development» 40/4 (1997), pp. 238-244; C. A. Hooker, *Regulatory Constructivism: On the Relation between Evolutionary Epistemology and Piaget's Genetic Epistemology*, «Biology and Philosophy» 9 (1994), pp. 197-244.

[37] M. H. Bickhard, *Interactivism*, in J. Symons-P. Calvo (eds.), *The Routledge Companion to Philosophy of Psychology*, Routledge, New York 2009, pp. 346-359; Id., *The Interactivist Model*, «Synthese» 166 (2009), pp. 547-591; Id., *Interactivism: A Manifesto*, «New Ideas in Psychology» 27/1 (2009), pp. 85-95; Id., *Interactive Knowing: The Metaphysics of Intentionality*, in R. Poli-J. Seibt (eds.) *Theory and Applications of Ontology: Philosophical Perspectives*, Springer Science & Business Media, Dordrecht 2010, pp. 207-229.

[38] A. Arnellos-A. Moreno, *Cognitive Functions Are Not Reducible to Biological Ones: The Case of Minimal Visual Perception*, «Biology & Philosophy» 37/4 (2022), pp. 1-25; A. Moreno-M. Mossio, *Biological Autonomy: A Philosophical and Theoretical Enquiry*, Springer, New York 2015.

[39] L. W. Barsalou, *Situating Concepts*, in P. Robbins-M. Aydede (eds.), *Cambridge Handbook of Situated Cognition*, Cambridge University Press, New York 2008, pp. 236-263; E. Thelen, *Self-Organization in Developmental Processes: Can Systems Approaches Work?*, in M. H. Johnson-Y. Munakata-R. O. Gilmore (eds.), *Brain Development and Cognition: A Reader*, Blackwell Publishing, Malden 2002, pp. 336-374.

[40] L. F. Barrett-J. A. Russell, *An Introduction to Psychological Construction*, in L. F. Barrett-J. A. Russell (eds.), *Psychological Construction of Emotion*, Guilford Publications, New York 2015, pp. 1-17.

[41] For a detailed criticism, see M. H. Bickhard, *Inter- and En- activism: Some Thoughts and Comparisons*, «New Ideas in Psychology» 41 (2016), pp. 23-32; M. H. Bickhard-D. M. Richie, *On the Nature of Representation: A Case Study of James Gibson's Theory of Perception*, Praeger Pub, New York 1983; M. H. Bickhard, *Probabilities over What?:*

nitivist models[42], which assume that cognition is encoded, stored, and retrieved in a modular fashion. Unlike modular theories, which treat cognition as an assembly of fixed mental faculties, I-C posits that knowing is an anticipatory, dynamic process that evolves through variation and selection rather than relying on predefined encodings.

I-C provides a developmental and evolutionary account of cognition, explaining how agents construct knowledge through error-detection, feedback, and adaptive reorganization. At its core lies Self-Directed Anticipative Learning (SDAL), a constructivist framework that models learning as an agent-driven, self-scaffolding process[43]. Rather than accumulating static representations, cognitive systems differentiate, test, and refine their anticipatory structures through active engagement with their environment. By allowing for the development and transformation of representational content, I-C offers a process-based alternative to modular and encodingist accounts, making it uniquely suited to explaining aesthetic creativity, meaning-making, and innovation[44].

Commentary on Tourmen, «Human Development» 59/1 (2016), pp. 34-36; R. Mirski-M. H. Bickhard-D. Eck-A. Gut, *Encultured Minds, Not Error Reduction Minds*, «Behavioral and Brain Sciences» 43 (2020), art. e109.

[42] A more detailed comparison clarifies how I-C relates to contemporary frameworks in cognitive science. While enactivism critiques classical representationalism, it struggles to account for the emergence of representation itself, often treating cognition as self-maintenance without specifying how representational structures develop. Predictive processing provides a valuable perspective on anticipation and inference but models cognition primarily as error minimization over predefined hypothesis spaces, whereas I-C focuses on the generation of entirely new representational structures through self-directed learning and interaction. Similarly, ecological psychology emphasizes direct perception and affordance-based cognition but lacks an explicit mechanism for the emergence of internal representations that can adapt beyond immediate environmental contingencies. I-C shares affinities with these approaches in rejecting static, encoding-based cognition but provides a more explicit developmental account of representation formation and learning.

[43] M. H. Bickhard, *Functional Scaffolding and Self-Scaffolding*, «New Ideas in Psychology» 23/3 (2005), pp. 166-173; R. P. Farrell-C. A. Hooker, *Applying Self-Directed Anticipative Learning to Science I: Agency, Error, and the Interactive Exploration of Possibility Space in Early Ape-Language Research*, «Perspectives on Science» 15/1 (2007), pp. 87-124; Id., *Applying Self-Directed Anticipative Learning to Science II: Learning How to Learn Across a Revolution in Early Ape Language Research*, «Perspectives on Science» 15/2 (2007), pp. 222-255.

[44] I. Xenakis-A. Arnellos, *Aesthetic Perception and its Minimal Content: A Naturalistic Perspective*, «Frontiers in Psychology» 5 (2014), art. 1038; Id., *Aesthetics as an Emotional Activity That Facilitates Sense-Making: Towards an Enactive Approach to Aesthetic*

SDAL extends beyond standard models of self-directed learning [45] by integrating anticipation as a core function, enabling cognitive systems to actively project, differentiate, and refine potential trajectories rather than merely reacting to past experiences. This anticipatory capacity is crucial for creative exploration, where novelty arises not from the passive accumulation of encoded structures but from the agent's ability to generate and evaluate emergent possibilities in real time. By embedding normative adaptation within a process of variation and selection, SDAL ensures that learning is not confined to optimizing predefined aesthetic properties but is instead an iterative, open-ended construction of novel aesthetic meanings. In this way, creative development unfolds as a dynamic, self-sustaining process, where representational content evolves through cycles of interaction, feedback, and structural transformation, continuously aligning cognition with the demands of an evolving aesthetic landscape.

8. *Aesthetic Evaluations as Functional Guides in Creative Exploration: The Role of Self-Directed Anticipative Learning (SDAL)*

Creative exploration, within this framework, unfolds as an iterative and recursive interplay of learning and development, mediated by feedback mechanisms operating across varying levels of abstraction [46]. These mechanisms allow for real-time adaptation and long-term transformation in cognitive trajectories. Learning refines immediate capacities, enabling adaptive responses to current challenges, while development enhances the learner's ability to engage with increasingly complex tasks and metacognitively reflect on their effectiveness within a historical trajectory of interactions. These interwo-

Experience, in A. Scarinzi (ed.), *Aesthetics and the Embodied Mind: Beyond Art Theory and the Cartesian Mind-Body Dichotomy. Contributions to Phenomenology*, Springer Netherlands, Dordrecht 2015, pp. 245-259; A. Arnellos-I. Xenakis, *Aesthetic Perception: A Naturalistic Turn*, «New Ideas in Psychology» 47 (2017), pp. 77-79.

[45] M. Knowles, *Self-Directed Learning: A Guide for Learners and Teachers*, Cambridge Book Co, New York 1975; D. R. Garrison, *Self-Directed Learning: Toward a Comprehensive Model*, «Adult Education Quarterly» 48/1 (1997), pp. 18-33.

[46] M. H. Bickhard, *Piaget on Variation and Selection Models: Structuralism, Logical Necessity, and Interactivism*, «Human Development» 31/5 (1988), pp. 274-312; D. H. Feldman, *The Development of Creativity*, in R. J. Sternberg (ed.), *Handbook of Creativity*, Cambridge University Press, New York 1999, pp. 169-186.

ven processes construct emergent trajectories of thought and action, fostering innovative solutions that align with systemic goals.

The I-C Model of Aesthetics conceptualizes aesthetic evaluation not as a passive recognition of static properties but as an active, functional process that regulates creative exploration. Within SDAL, aesthetic evaluations (based on their emotional power[47]) operate as anticipative regulatory signals, guiding interaction by enabling the creative thinker to differentiate between interaction affordances, misalignments, and potential opportunities within their evolving ideation or creative trajectory. These evaluations are not abstract judgments but dynamically emerging self-generated signals that help creative learners refine their cognitive actions in real time.

Aesthetic evaluations are not judgments about physical objects per se – such as artworks or design artifacts – but emergent, interactive differentiations of affordances. Affordances[48] in this sense, are not fixed qualities but indications of action possibilities, which the creative thinker constructs through SDAL trials within a goal-directed engagement with the context. For instance, in architectural design, an evolving spatial arrangement does not simply "possess" balance or coherence; these are constructed through interaction, as aesthetic evaluations help anticipate and refine how design elements will function within a broader sociocultural and material context.

These evaluations emerge dynamically, shaped by the individual's ongoing engagement with their environment, rather than being predetermined by external rules or universal aesthetic laws. Their function is to generate an Interactive-Aesthetic Sense of the situation, enabling the thinker to anticipate and assess how well their evolving structure aligns with broader creative goals. Because aesthetic evaluations are inherently goal-directed, their content is normative – guiding creative processes beyond mere sensory preferences. Rather than being passive reactions, they operate as future-oriented regulatory signals, shaping anticipations of interaction and continuously refining creative trajectories through anticipative differentiation and selection.

Unlike modular models, which isolate aesthetic perception from cognition, the I-C Model of Aesthetics embeds aesthetic evaluation directly within creative problem-solving. Rather than an external-

[47] I. Xenakis-A. Arnellos-J. Darzentas, *The Functional Role of Emotions in Aesthetic Judgment*, «New Ideas in Psychology» 30/2 (2012), pp. 212-226.
[48] I. Xenakis-A. Arnellos, *Aesthetic Perception and its Minimal Content*, cit.

ized judgment, aesthetic evaluations function as internal regulatory mechanisms, ensuring creative exploration remains adaptive, self-directed, and responsive to systemic constraints.

For example, an architect designing a public pavilion must navigate multiple levels of abstraction, integrating concerns about structural integrity, spatial experience, and sociocultural engagement. Throughout this process, aesthetic evaluations function as self-generated regulatory signals, guiding the architect in sensing whether the evolving ideation aligns with intended functional, experiential, and contextual goals. These signals emerge through interactive differentiation, enabling the architect to detect when a spatial arrangement lacks coherence or fails to evoke the intended social or environmental interactions. Rather than relying on fixed stylistic principles or predefined aesthetic norms, these evaluations dynamically shape the architectural intervention, ensuring that the final structure remains adaptive, contextually embedded, and experientially meaningful.

Within Self-Directed Anticipative Learning (SDAL), aesthetic evaluation is not merely an assessment of form or coherence but an essential learning mechanism that actively facilitates explorations towards new knowledge construction and drives innovation. Unlike traditional learning models that assume conceptual mastery through static accumulation of information, SDAL operates through dynamic differentiation, where each new interaction refines an evolving cognitive trajectory [49].

8.1 *Aesthetic Evaluations as Generators of Creativity and Innovation*

Innovation requires learners to move beyond existing knowledge structures, engaging in transformative learning processes that construct novel design representations (ideas). Aesthetic evaluations drive this process by generating new pathways of exploration and revealing opportunities for conceptual expansion [50]. When an aesthetic evaluation signals misalignment between an emerging structure and creative goals, it does not indicate failure but instead serves as an anticipative

[49] W. D. Christensen-C. A. Hooker, *An Interactivist-Constructivist Approach to Intelligence: Self-directed Anticipative Learning*, «Philosophical Psychology» 13/1 (2000), pp. 5-45.
[50] I. Xenakis-A. Arnellos, *The Relation between Interaction Aesthetics and Affordances*, «Design Studies» 34/1 (2013), pp. 57-73.

differentiation cue, prompting the learner to search for alternative trajectories and expand beyond conventional solutions. This process transforms error-detection into innovation, ensuring that creative development remains dynamic and continuously evolving.

As Feldman[51] argues, creativity and innovation inherently require significant transformations in the existing body of knowledge, demanding that learners break away from rigid, predefined solutions and construct entirely new conceptual spaces. Aesthetic evaluations facilitate this process by destabilizing entrenched patterns, introducing tensions that reveal conceptual blind spots, inconsistencies, or underexplored affordances. Unlike corrective feedback that merely refines existing representations, these evaluations disrupt familiar structures, prompting learners to expand their cognitive framework rather than optimizing within it. They guide anticipative differentiation, allowing learners to explore alternative solutions by generating representational variations before stabilizing a new ideation trajectory. This ensures that innovation emerges dynamically rather than being arbitrarily imposed. Since aesthetic evaluations are self-generated and goal-directed, they enable conceptual restructuring, allowing learners to reorganize representational content and construct entirely new design logics, theoretical paradigms, and expressive vocabularies rather than refining pre-existing ones.

For instance, an architect designing an urban space does not merely apply pre-learned spatial principles but instead develops an evolving understanding of spatial dynamics, social interaction, and environmental integration through iterative cycles of anticipative feedback. As they experiment with different configurations, aesthetic evaluations function as destabilizing prompts, signaling conceptual gaps, contradictions, or misalignments that compel them to innovate beyond conventional ideation strategies. Over time, these evaluations foster higher-order knowledge transformations, allowing the architect to construct a radically new understanding of spatial affordances, inclusivity, and cultural integration.

8.2 *From Learning to Systemic Innovation*

Because aesthetic evaluations function as interactive regulatory

[51] D. H. Feldman, *Creativity: Proof that Development Occurs*, in W. Damon (ed.), *Child Development Today and Tomorrow*, Jossey-Bass, San Francisco 1989, pp. 240-260.

signals rather than fixed judgments, they generate a continuous feedback loop that extends beyond immediate creative refinement toward systemic innovation. By progressively differentiating weak representational structures and reinforcing novel emergent forms, SDAL transforms aesthetic learning into a self-directed innovation process, where each iteration expands the learner's epistemic landscape instead of merely refining pre-existing categories. This ensures that creative exploration remains open-ended and dynamically adaptive rather than constrained by fixed aesthetic conventions.

Within this framework, aesthetic evaluation is not only a self-regulatory mechanism but also a functional driver of knowledge expansion and innovation. By identifying misalignments, generating alternative pathways, and guiding anticipative differentiation, it ensures that learning is not confined to optimizing known solutions but is actively engaged in constructing new conceptual frameworks. This dynamic integration of aesthetic sensitivity with SDAL positions aesthetic cognition as an intrinsic force in knowledge transformation and creative discovery, embedding innovation within the learning process itself.

9. *Aesthetic Evaluations as Multidimensional Regulatory Processes in Creative Explorations*

Aesthetic evaluations within SDAL facilitate creative knowledge construction across multiple levels of processing, where higher-order processes monitor and guide lower-level activities. *Synchronic* processing involves immediate, task-specific engagement, such as analyzing spatial dynamics or individuals' interactions. *Diachronic* processing, by contrast, integrates these synchronic insights into a cohesive trajectory aligned with systemic, long-term goals. Diachronic processes establish hierarchical levels of knowing, providing the foundation upon which creative thinkers explore, learn, and evolve their capacities. These feedback loops act as metaprocesses that monitor and regulate lower-level interactions, ensuring that each iterative engagement contributes to a broader developmental trajectory.

Aesthetic evaluations play a crucial preparatory role by embedding knowledge construction within a structured yet dynamic anticipative framework. Functionally integrated into horizontal and vertical SDAL trails, these evaluations generate an Interactive-Aesthetic

Sense that actively guides creative exploration. Horizontal trails shape idea trajectories by highlighting paths that align with both contextual affordances and the learner's evolving goals, spanning affective, high, and higher-order emotional dimensions. The Aesthetic Sense operates dynamically, proposing ideation trajectories, evaluating affordances, and ensuring their alignment with adaptive exploration. Vertical SDAL trails, on the other hand, support meta-aesthetic evaluations – long-term assessments of the creative process itself. By comparing present ideation strategies to past explorations, learners refine their creative trajectory, identifying affordances for further development and adjusting their approach accordingly. These meta-trails provide essential feedback on factors such as uncertainty, novelty, and systemic coherence, reinforcing the adaptive and evolutionary nature of creative exploration.

This perspective positions aesthetic evaluation and aesthetic experience as evolving cognitive processes shaped by iterative feedback and anticipative recalibration. As SDAL trials progress, learners refine their interaction states, aligning them with their multilevel goal structures. When alignment reaches a critical threshold, learners often experience an "aha-insight moment," signifying the construction of new knowledge and the system's ability to transform uncertainty into innovation. These moments illustrate how synchronic actions, guided by diachronic oversight, converge to form adaptive, creative trajectories.

The quality of this creative flow constitutes the aesthetic experience as a unified and meaningful ideation trajectory, shaped by the evolution of diachronic aspects of knowing. Higher-order SDAL regulations facilitate metacognitive awareness allowing learners to reflect on their constructive processes and integrate past insights into present explorations. Unlike conventional models that emphasize predefined principles, this framework enables learners to actively construct their own methodological approaches, continuously developing and refining their ideation process.

Through these developmental metaprocesses, learners construct higher-order meanings, such as the deep understanding of social, ethical, and other abstract concepts. They simultaneously gain an appreciation for their capacity to regulate the ideation flow assess creative methodologies, and refine their systemic approach to innovation. Diachronic reflections address essential questions, such as: "How effective am I at approaching my design challenges? How well

can I select values, develop my design methodology, or evaluate the quality of my results? And how can I improve in all these aspects?".

By dynamically integrating these levels of processing, SDAL equips learners to construct frameworks that are contextually responsive and developmentally aligned. Through iterative exploration and anticipative reflection, creative thinkers navigate the complexities of art and design, achieving outcomes that are both innovative and systemic. This dynamic approach aligns with the principles of the I-C Model of Aesthetics, which rethinks aesthetic engagement within the framework of autonomous agency.

Development is central to I-C Model of Aesthetics, particularly in high-uncertainty contexts where existing knowledge is insufficient to meet creative goals. The Aesthetic and meta-Aesthetic Sense guide the progressive refinement of weak ideation trajectories, elevating the thinking process to higher levels of knowing where novel insights and strategies emerge. Aesthetic feedback evaluates potential affordances and inconsistencies, dynamically adjusting both short-term (synchronic) and long-term (diachronic) preferences in creative decision-making. Through iterative refinement, learners develop the ability to assess whether elements of the context or their ideation pathways afford further exploration or require recalibration, fostering innovation and adaptability throughout the creative process.

The I-C Model of Aesthetics diverges from traditional, domain-specific conceptions of the aesthetic mind. Rather than treating aesthetics as a set of static properties encoded in objects and passively recognized by specialized faculties, this model reconceptualizes aesthetics as an inherent and functional dimension of cognitive activity. It rejects the notion that aesthetic experience is a distinct or supplemental feature of creative exploration. Instead, the I-C Model of Aesthetics unifies the processes underlying traditionally artistic and everyday aesthetic experiences, challenging the conventional dichotomy that separates them. Whether a learner is generating concepts for an urban intervention or making art, the same cognitive mechanisms operate ensuring coherence across multiple levels of knowing.

For the I-C Model of Aesthetics, the aesthetic is not an isolated ontology or a specialized module within the mind, nor can it be reduced to discrete mental faculties such as emotions, perceptions, or representations. Instead, it functions as an integral aspect of the entire knowing ontology, directly contributing to the preparatory processes for creative interaction. Its role is inherently functional and dynamic,

actively guiding creative thinkers toward more effective and innovative goal achievements by navigating the uncertainty inherent in ideation[52].

Unlike conventional models of aesthetic encodings, the aesthetic sense is inherently dynamic. Creative thinkers actively construct their own conceptual frameworks, translating opportunities into actionable ideas that align their goals while simultaneously refining the methodologies needed to implement them. Successful approaches can be generalized to inform broader creative endeavors, reinforcing a self-directed, adaptive, and innovation-driven learning process. Horizontal and vertical SDAL trails enable learners to iteratively evaluate and refine current frameworks, ensuring that their creative trajectory remains open-ended rather than constrained by externally imposed conventions. If a creative pathway is anticipated to fail to foster the learner's goals, SDAL enables real-time reassessment and adaptation ensuring alignment with their broader creative aspirations. This self-directed evaluation extends beyond immediate design choices to the process itself, prompting reflective questions such as: "Are my methods effective for exploring these ideas? How can I enhance my approach to achieve more innovative outcomes?" This iterative refinement fosters a deeper aesthetic experience, enabling the learner to dynamically evolve their strategy of the creative process.

By embedding aesthetic evaluation within the I-C Model of Aesthetics, this framework positions aesthetic sensitivity as a core driver of learning and innovation. Through SDAL, creative exploration is transformed into a dynamic, self-directed process of knowledge construction, where aesthetic evaluations serve as the primary mechanism for navigating uncertainty, guiding interaction, and fostering systemic coherence across levels of knowing.

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[52] I. Xenakis, *Reducing Uncertainty in Sustainable Interpersonal Service Relationships: The Role of Aesthetics*, «Cognitive Processing» 19 (2018), pp. 215-229.