Emotional displays as windows on the cultural world: open directions for developmental research

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Abstract: The emotional expressions exhibited by others are crucial tools to retrieve relevant social information. This is particularly apparent in *affective observation*, where observing emotional reactions in third-party interactions enables observers to safely acquire cultural information essential for navigating complex social environments, especially when encountering unfamiliar and "culturally opaque" content. The idea that novel members of a social group, such as infants and young kids, can use others' emotional expressions to assimilate unfamiliar content aligns with research indicating that humans, from a very early developmental stage, actively seek and selectively filter information to understand their environments (i.e., selective trust). However, much remains to be clarified regarding the developmental progression of the mechanisms involved in the strategic retrieval and utilization of emotional cues for cultural learning. Here, building upon a review of current theories of affective social learning and focusing on the active and selective exploration of the environment by naïve learners, we propose new directions for developmental research. Specifically, we highlight the need to investigate how the observation of emotional displays contributes to the acquisition of culturally relevant knowledge and to identify additional factors that may impact this process. The proposed research directions aim to contribute to a deeper understanding of the complex interplay between emotion and cognition in cultural learning throughout development.

Keywords: Emotional displays, cultural learning, observational learning, cognitive development.

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1. *Introduction*

Emotions are thought to have played a crucial role in the evolution of humans and other animals, acting as adaptive responses to environmental stimuli[1]. They assist individuals in making quick and effective decisions in reaction to threats and opportunities. Emotions are functional not only at the intrapersonal level but also convey critical information about others. For instance, emotional displays, such as facial expressions of emotion, can be used to predict others' behavioral intentions (e.g., approach or avoidance) and tendencies[2], thus serving as a valuable source of information for navigating the social environment. Indeed, many theories suggest that while the original adaptive function of emotions and affective displays was related to internal physiological regulation, they evolved to fulfill social functions as well, as posited in the "two-stage model of emotion-expression"[3]. In this context, emotional displays are instrumental in managing social interactions[4] and influencing the thoughts and actions of others[5].

There is still much to learn about the evolution of emotional displays, their signaling value[6], and their social function[7]. However, there is substantial evidence that displays of emotion can be viewed as vessels of information accessible to observers[8], which provide insights into the expressers' appraisal

[1] Charles Darwin, *The Expression of the Emotions in Man and Animals*, John Murray, London 1872; Azim F. Shariff, Jessica L. Tracy, *What Are Emotion Expressions For?*, "Current Directions in Psychological Science", 20, 6, 2011, pp. 395-399.

[2] Reginald B. Adams, Nalini Ambady, Neil C. Macrae, and Robert Kleck, *Emotional Expressions Forecast Approach-Avoidance Behavior*, "Motivation and Emotion", 30, 2, 2006, pp. 177-186.

[3] John Tooby, Leda Cosmides, *The Past Explains the Present*, "Ethology and Sociobiology" 11, 4-5, 1990, pp. 375-42.Gerben A. van Kleef and Stéphane Côté, *The Social Effects of Emotions*, "Annual Review of Psychology", 73 1, 2022, pp. 629-658.

[4] Dacher Keltner, Disa Sauter, Jessica Tracy, and Alan Cowen, *Emotional Expression: Advances in Basic Emotion Theory,* Journal of Nonverbal Behavior 43, 2, 2019, pp. 133-160; Azim F. Shariff , Jessica L. Tracy, *What Are Emotion Expressions For?*, cit., pp. 395-399.

[5] Roy F. Baumeister, Kathleen D. Vohs, Nathan C. DeWall, and Liqing Zhang, *How Emotion Shapes Behavior: Feedback, Anticipation, and Reflection, Rather Than Direct Causation*, "Personality and Social Psychology Review", 2, 2007, pp. 167-302; Matthew J. Hertenstein and Joseph J. Campos, *The Retention Effects of an Adult's Emotional Displays on Infant Behavior,* Child Development 75, 2, 2004, pp. 595-613; Brian Parkinson, *Emotions Are Social,* "British Journal of Psychology" 87, 4, 1996, pp. 1071-1084.

[6] Lisa Feldman Barrett, *Was Darwin Wrong About Emotional Expressions?*, "Current Directions in Psychological Science", 20, 6, 2011, pp. 400-406.

[7] Brian Parkinson, *Do Facial Movements Express Emotions or Communicate Motives?*, "Personality and Social Psychology Review", 9, 4, 2005, pp. 278-311; G. van Kleef and S. Côté, *The Social Effects of Emotions*, cit., pp. 629-658.

[8] Shlomo Hareli, Ursula Hess, *The Social Signal Value of Emotions*, "Cognition & Emotion", 26, 3, 2012, pp. 385-389.

of a referent or their internal state[9]. In fact, emotional displays can rapidly convey relevant information to conspecifics[10], even when such emotions are displayed unintentionally and non-ostensively. As De Leersnyder[11] noted: "emotions are not merely subjective feelings, they are, above all, stances in our social world" (p. 208). Furthermore, Gergely and Kiraly suggest that, given their evolved communicative function, social emotions may be regarded as "special types of ontological kind concepts that form part of the culturally shared ontological kind categories that humans possess and have in common with other social agents in their cultural community"[12] (p. 101).

Since the recognition of others' emotional expressions is crucial to navigate the social environment and to anticipate others' behavior and attitudes, humans have developed an adaptive capability to identify and disambiguate emotional displays and their target[13], a skill that seems to appear at a very young age, as shown by previous research[14]. Additionally, while the debate on the universality of emotional expressions continues, they seem to be pervasive in every society and to share many cross-cultural similarities[15], particularly for basic valences of emotions such as anger and happiness[16]. Therefore, given the critical role of the observation of emotional displays for naïve members in

[9] Ursula Hess, Agneta Fischer, *Emotional Mimicry: Why and When We Mimic Emotion*s, "Social and Personality Psychology Compass", 8, 2, 2014, pp. 45-57.

[10] Robert James R. Blair*, Facial Expressions, Their Communicatory Functions and Neuro–Cognitive Substrates*, C.D. Frith, D.M. Wolpert (eds), "Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences", 358, 1431, 2003, pp. 561-572.

[11] J. De Leersnyder, *Insights from culture and emotion research for affective social learning: Emotional enculturation and acculturation,* in Daniel Dukes, Fabrice Clément (eds.), *Foundations of affective social learning: Conceptualizing the social transmission of value*, Cambridge University Press, 2019, pp. 205-233.

[12] Gyorgy Gergely, Idiko Kiraly, *Natural pedagogy of social emotions*, in D. Dukes, F. Clément (eds.), *Foundations of affective social learning*, cit., pp. 87-114.

[13] Magali Batty, Margot J. Taylor, *Early Processing of the Six Basic Facial Emotional Expressions,* "Cognitive Brain Research", 17, 2003, pp. 613-620.

Christian Mumenthaler, David Sander, Antony Manstead, *Emotion Recognition in Simulated Social Interactions*, "IEEE Transactions on Affective Computing", 2018.

[14] Sabine Hunnius, *Facing Threat: Infants' and Adults' Visual Scanning of Faces with Neutral, Happy, Sad, Angry, and Fearful Emotional Expressions*, "Cognition & Emotion", 25, 2011, pp. 193-205; Ann T Phillips, Henry M Wellman, and Elizabeth S Spelke, *Infants' Ability to Connect Gaze and Emotional Expression to Intentional Action*, "Cognition", 85, 2002, pp. 53-78.

[15] Paul Ekman, Wallace V. Friesen, *Constants across Cultures in the Face and Emotion*, "Journal of Personality and Social Psychology", 17, 1971, pp. 124-129; Hillary A. Elfenbein, Nalini Ambady, *On the Universality and Cultural Specificity of Emotion Recognition: A Meta-Analysis*, "Psychological Bulletin", 128, 2002, pp. 203-235.

[16] Paul Ekman, Daniel Cordaro, *What Is Meant by Calling Emotions Basic*, "Emotion Review", 3, 2011, pp. 364-370; D. Keltner, D. Sauter, J. Tracy, and A. Cowen, *Emotional Expression: advances in basic emotion theory*, cit.; Michelle S. M. Yik, James A. Russell, I*nterpretation of Faces: A Cross-Cultural Study of a Prediction from Fridlund's Theory*, "Cognition & Emotion", 13, 1999, pp. 93-104.

determining appropriate behavior in unfamiliar contexts and assimilating the complex cultural content necessary to integration in a social group[17], future research should empirically investigate how emotional cues facilitate the formation of predictions and judgments about others' expectations and evaluations. This would involve identifying social rules and shared evaluations, which can ultimately influence behavior (e.g., avoiding actions associated with negative reactions to avoid punishment and adverse consequences) and beliefs concerning the value of a certain activity, object, action, or situation.

In this context, building on recent conceptualizations concerning the affective mechanisms underlying cultural learning, we propose to highlight open directions for future developmental research. Specifically, future research should investigate the proactive role of infants and young children in seeking information (i.e., information-seeking), discerning reliable sources (i.e., epistemic trust), and utilizing emotional information to strategically learn about their environment beyond direct teaching and instruction-based contexts (i.e., observational learning).

2. *Emotional displays as social information*

The emphasis on the interpersonal significance of emotional displays has led to many attempts to describe how emotions influence social life and the navigation of our cultural environment[18]. An illustration of this is the "Emotions as social information" (Easi) theory[19], which proposes that emotions act as tools to enhance coordination among individuals and to facilitate learning in social settings[20]. Specifically, the theory suggests that emotional displays can trigger affective reactions (e.g., emotion contagion) and inferential processes, which in turn affect observers' appraisal of the situation (i.e., social appraisal), ultimately influencing observers' attitudes and behavior[21].

Furthermore, alternative views on emotions as social information, such

[17] D. Dukes, F. Clément, *Foundations of Affective Social Learning,* cit.

[18] Shlomo Hareli, Brian Parkinson, *What's Social About Social Emotions?*, "Journal for the Theory of Social Behaviour", 38, 2008, pp. 131-156.

Michael Lewis, Jeannette M. Haviland-Jones, and Lisa Feldman Barrett (eds.), *Handbook of Emotions*, 3rd ed, 2008.

[19] Gerben A. Van Kleef, *How Emotions Regulate Social Life: The Emotions as Social Information (EASI) Model*, "Current Directions in Psychological Science", 18, 2009, pp. 184-188.

[20] Gerben A. Van Kleef, Evert A. Van Doorn, Marc W. Heerdink, and L. F. Koning, *Emotion Is for Influence*, "European Review of Social Psychology", 22, 2011, pp. 114-163.

[21] Brian Parkinson, Gwenda Simons, *Affecting Others: Social Appraisal and Emotion Contagion in Everyday Decision Making*, "Personality and Social Psychology Bulletin", 35, 2009, pp. 1071-1084.

as the Spec (Social perception of emotions in context) framework[22], propose that observing emotional cues can also lead to judgments about the norms endorsed by a specific social group. Emotional displays may also be used to infer which emotional response is expected to be displayed in a specific situation ("appropriate reaction"), based on the previously observed evaluations. The anticipation of a particular emotional reaction is also related to the identification of specific social norms and standards. For instance, an emotional reaction can violate an expectation (i.e., an emotional display rule) either qualitatively (e.g., expressing an inappropriate emotion) or quantitatively (e.g., expressing the appropriate emotion but with inappropriate intensity)[23]. Therefore, emotional information provides insights into the expectations and evaluations of others, enabling the formation of predictions about their future reactions to a particular event or situation[24]. This is particularly useful for navigating the complex social environments humans inhabit. In fact, others' emotional expressions can guide new, inexperienced learners (e.g., infants and young children) in understanding how to act or assess a situation, particularly in ambiguous situations typical of humans' socio-cultural contexts, which are characterized by numerous rituals, conventional social practices, and specific ways of behaving.

The uncertainty often inherent in cultural content is linked to a crucial factor in the processing of emotional information: the observer's epistemic motivation, which refers to an observer's inclination to learn more about a specific situation. This motivation leads to more accurate and intense processing of emotional information[25]. As suggested by Bruder and colleagues under the uncertainty hypothesis[26], in unfamiliar contexts, indirect emotional information becomes an essential tool for learning about the environment and others. Novel, ambiguous, and uncertain situations are believed to increase an observer's epistemic motivation, making emotional information more likely to provoke counterfactual thinking, attributional activity, and formation of anticipations[27]. Consequently, this enhances the predictive power of strategic inferences based on emotional cues[28].

22 S. Hareli and U. Hess, *The Social Signal Value of Emotions*, cit., pp. 385-389.

23 G. van Kleef and S. Côté, *The Social Effects of Emotions*, cit., pp. 629-658.

24 B. Parkinson, G. Simons, *Affecting Others*, cit.

25 C. Mumenthaler, D. Sander, and A. Manstead, *Emotion Recognition in Simulated Social Interactions*", cit.; Van Kleef *et al.*, *Emotion Is for Influence*, cit., pp. 114-163.

26 Martin Bruder, Agneta Fischer, and Antony S. R. Manstead, *Social Appraisal as a Cause of Collective Emotions*, in Christian von Scheve and Mikko Salmela (eds.), *Collective Emotions*, Oxford University Press, 2014, pp. 141-155.

27 F. Baumeister, K.D. Vohs, N.C. DeWall, and L. Zhang, *How Emotion Shapes Behavior*, cit., pp. 167-203.

28 Gerben A. Van Kleef, Carsten K.W. De Dreu, and Antony S.R. Manstead, A*n Interperson-*

Naïve learners, such as infants and young children, may discern expected behaviors and rules in unfamiliar social situations by interpreting others' emotional expressions (e.g., an angry reaction may signal the violation of a social norm). Thus, observing others' emotional displays serves as a crucial avenue for acquiring unfamiliar cultural content[29]. Observers can gauge the appropriateness of behaviors by observing others' affective displays[30], making them attuned to emotional signals. Conversely, emotional displays are used by the expressers to teach what is 'good', 'allowed', or 'normal' within their community. Overall, affective processes are increasingly recognized as pivotal in driving fundamental cognitive mechanisms like attention, learning, and decision-making. They are also thought to play a major role in how we determine the cultural values shared in our social environments. Consequently, it is not surprising that a publication co-authored by over sixty researchers worldwide[31] inquired whether we are entering a new epoch of cognitive research: the era of affectivism. Despite the burgeoning interest in the impact of emotions on social life, our understanding of the processes underpinning the computation of emotional information and its developmental trajectory remains limited, with a notable absence of systematic exploration in the various dimensions that might influence affective cultural learning.

3. *Affective Social Learning*

A recent framework that explores the pivotal role of affective processes in transmitting culturally shared values is the Affective Social Learning (Asl) framework[32]. The Asl account delineates a continuum ranging from simple, unintentional, non-ostensive and automatic learning processes to more elaborated ones, where social interaction, intentionality, and joint commitment (between "learner" and "teacher") play a fundamental role. This continuum is crucial for the transmission and acquisition of cultural

al Approach to Emotion in Social Decision Making, "Advances in Experimental Social Psychology", 2010, pp. 45-96.

[29] D. Dukes, F. Clément, *Foundations of Affective Social Learning,* cit.

[30] Antony S.R. Manstead and Agneta H Fischer, *Social Appraisal: The Social World as Object of and Influence on Appraisal Processes*, in Klaus R Scherer, Angela Schorr, and Tom Johnstone (eds.), *Appraisal Processes in Emotion*, Oxford University Press, New York 2001.

[31] Daniel Dukes, Kathryn Abrams, Ralph Adolphs… and David Sander, *The Rise of Affectivism*, "Nature Human Behaviour", 5, 2021, pp. 816-820.

[32] F. Clément, D. Dukes, A*ffective Social Learning: A Lens for Developing a Fuller Picture of Socialization Processes*, in D. Dukes, Andrea C. Samson, Eric A. Walle, *The Oxford Handbook of Emotional Development*, Oxford University Press, 2022.

values and, more broadly, unfamiliar cultural content. The Asl framework encompasses four primary dimensions, illustrated in Figure 1: (i) Emotion contagion, (ii) Affective observation, (iii) Social referencing and (iv) Natural pedagogy. While these dimensions represent distinct phenomena, they should be considered as regions of a continuum which sometimes overlap, without clear-cut distinctions between them.

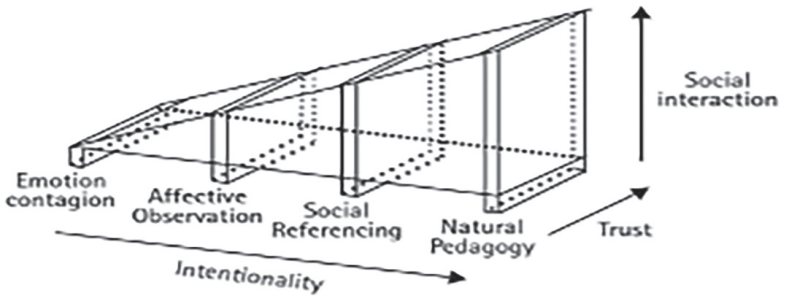

Fig. 1. D. Dukes, F. Clément, *Foundations of Affective Social Learning,* cit.

On the left side of the spectrum, emotional contagion refers to the process by which one person's emotion or mood can be directly influenced by others' displays of emotion[33], such as a group of people cheering at the stadium or getting excited about an event, subsequently influencing the person's attitudes and behavior. This phenomenon, sometimes called "primitive emotional contagion" or "affective infusion", is thought to enhance interpersonal understanding, closeness, and coordination among the members of a group[34]. It does not involve an intentional seeking of information from the "learner" or a deliberate intention to transmit specific information from the 'teacher(s)': instead, emotional contagion represents the most basic and automatic process of social learning involving emotions[35].

A more complex, yet still basic mechanism is affective observation, also

[33] Lars-Olov Lundqvist, Ulf Dimberg*, FaciaI Expressions Are Contagious*, "Journal of Psychophysiology", 9, 3, 1995, pp. 203-2011.

[34] Sigal G. Barsade, *The Ripple Effect: Emotiona*l Contagion *and Its Influence on Group Behavi*or, "Administrative Science Quarterly", 47, 2002, pp. 644-675.

[35] For a review, see Hillary Anger Elfenbein, *The Many Faces of Emotional Contagion: An Affective Process Theory of Affective Linkage*, "Organizational Psychology Review", 4, 2014, pp. 326-362.

known as emotional eavesdropping[36]. This concept describes how a 'learner' actively seeks and gathers pertinent information by observing interactions between others[37]. Unlike traditional learning scenarios, in affective observation, the 'teacher' does not deliberately aim to impart any specific knowledge to the 'learner'. Rather, the learner proactively seeks out and acquires information indirectly through observing the emotional expressions of others. Affective observation is particularly interesting in the context of the non-explicit transmission of social information, as the learner actively observes others' spontaneous affective reactions to infer the value of an event, activity, or person in absence of an instruction-based context, characterized by direct interaction and recognition of communicative intentions from the 'teacher'.

As the complexity of social interactions increases, social referencing comes into play. This phenomenon occurs when a "learner", faced with an ambiguous and unfamiliar stimulus, intentionally looks at a knowledgeable individual who responds with guidance about how to appraise it by displaying an emotional cue (e.g., infants relying on the evaluation of a caregiver whether continuing to move or stop when encountering a cliff [38]) that will influence the learner's behavior. In social referencing, direct social interaction and the role of a communicative intention from the teacher are more significant[39], but to a lesser extent than in mechanisms at the right end of the spectrum, where the learning and teaching mechanisms of natural pedagogy are found.

The natural pedagogy hypothesis proposes that humans have developed species-specific adaptive cognitive mechanisms that enhance the learnability and the generalizability of shared cultural knowledge[40]. Knowledgeable individuals in a social group are naturally inclined to ostensively communicate their knowledge to naïve conspecifics to facilitate their cultural learning process. Conversely, "novice learners" (e.g., infants) have a natural inclination to learn from knowledgeable individuals[41], displaying great sensitivity to ostensive signals (e.g., "direct eye-contact", "eyebrow raising", "being addressed by their name") that indicate teaching contexts. Furthermore, information

[36] Betty M. Repacholi and Andrew N. Meltzoff, *Emotional Eavesdropping: Infants Selectively Respond to Indirect Emotional Signals*, "Child Development", 78, 2007, pp. 364-378.

[37] D. Dukes, F. Clément, *Foundations of Affective Social Learning*, cit.

[38] James F. Sorce, Robert N. Emde, Joseph J. Campos, and M. D. Klinnert, *Maternal Emotional Signaling: Its Effect on the Visual Cliff Behavior of 1-Year-Olds*, "Developmental Psychology", 21, 1985, pp. 195-200.

[39] For a review, see Eric A. Walle, Peter J. Reschke, and Jennifer M. Knothe, *Social Referencing: Defining and Delineating a Basic Process of Emotion*, "Emotion Review", 9, 2017, pp. 245-252.

[40] Gergely Csibra and György Gergely, *Natural Pedagogy as Evolutionary Adaptation*, Philosophical Transactions of the Royal Society B: Biological Sciences 366, 2011, pp. 1149-1157.

[41] Gergely Csibra and György Gergely, *Natural Pedagogy*, "Trends in Cognitive Sciences" 13, 2009, pp. 348-353.

about a specific referent (an object or an action), communicated in presence of ostensive signals, is interpreted as conveying universally shared cultural knowledge, meaning that the manifested knowledge is represented as relevant and generalizable information shared by other members of the social group[42]. Finally, "novice learners" are not only able to recognize relevant information transmitted to them but also actively seek out this kind of information. For example, infants use pointing to express their wish to receive information about a specific referent[43] and show a tendency to actively seek out relevant information from emotional expressions of others[44].

4. *Beyond teaching: an active exploration of the environment*

The Asl framework highlights that, beside the significant benefits emphasized by the natural pedagogy approach, there appear to be alternative means for accessing and facilitating the transmission of shared cultural knowledge. These methods do not necessarily rely on scaffolding naïve members' learning processes through teaching mechanisms characterized by the primacy of direct communication.

One particularly notable method is affective observation, where naïve learners, such as infants or young children, take an active role in retrieving and utilizing information to learn about their environments without engaging in direct interaction with caregivers or other individuals[45]. However, much remains to be explored concerning the development of the abilities required to utilize affective observation effectively. This involves the observational learning of emotional displays to make both predictions and evaluations that assist in navigating diverse cultural contexts.

This direction presents a significant opportunity for future research. In fact, as highly emphasized, emotional displays have evolved to quickly convey socially relevant information, helping individuals in optimizing their learning about the environment. Moreover, observational learning such as affective observation, is a critical tool for extracting relevant information about the environment beyond formal teaching contexts. This process avoids the risks as-

[42] Katalin Egyed, Ildikó Király, and György Gergely, *Communicating Shared Knowledge in Infancy*, Psychological *S*cience 24, 2013, pp. 1348-1353;. G. Gergely, K. Egyed, I. Király, *On Pedagogy,* "Developmental Science", 10, 2007, pp. 139-146.

[43] Victoria Southgate, Catharine van Maanen, Gergely Csibra, *Infant Pointing: Communication to Cooperate or Communication to Learn?,* "Child Development" 78, 2007, pp. 735-740.

[44] Sabina Pauen, Stefanie Hoehl, *Preparedness to Learn About the World: Evidence from Infant Research*, in Thiemo Breyer (ed.), *Epistemological Dimensions of Evolutionary Psychology*, Springer, New York 2015, pp. 159-173.

[45] B.M. Repacholi, A.N. Meltzoff, *Emotional Eavesdropping*, cit., pp. 503-521.

sociated with first-hand experience and direct interaction with others, such as punishment and reputation-loss[46]. Consequently, infants and young children may have some predispositions for learning through observation of others' displays when not in teaching situations, thereby enhancing their learning opportunities while minimizing negative outcomes.

In support of this idea, previous research has shown that, from infancy, children are capable of engaging in observational causal learning even when the emotional display of an expresser is directed toward another individual[47]. These indirect emotional cues can regulate and influence behavior on multiple levels, including imitation, looking time, and interaction with objects[48]. This suggests that associative learning may assist infants in using information retrieved during affective observation to predict others' reactions to a specific action, thereby guiding and modulating their own behavior in light of the expectations shared by other individuals who are present at that moment[49], even after two weeks after being exposed to others' emotional displays[50]. These findings suggest that, from early development stages, naïve observers are prone to detect what is socially relevant and use another individual's emotional displays to gauge, to some extent, the most appropriate behavior to adopt in order to circumvent negative reactions.

The mentioned studies highlight the proactive role of infants and young children in engaging in social learning beyond formal teaching contexts. They do this to grasp the values of objects and to comprehend prevailing behavior norms. This readiness to acquire information from contextual emotional cues aligns with contemporary views of infants and young children as active and rational explorers, rather than merely passive receivers of information[51]. Indeed, prior research has shown that infants and young children actively explore their environments, seeking out information and employing certain cues to selectively learn from other individuals[52].

46 Andreas Olsson, Oriel Feldman Hall, Jan Haaker, and Tove Hnsler, *Social Regulation of Survival Circuits through Learning*, "Current Opinion in Behavioral Sciences", 24, 2018, pp. 161-167.

47 Bridget L. Callaghan et al., *Being the Third Wheel: Toddlers Use Bystander Learning to Acquire Cue-Specific Valence Knowledge*, "Journal of Experimental Child Psychology", 219, 2022, 105391.

48 M.J. Hertenstein, J.J. Campos, *The Retention Effects of an Adult*'s *Emotional Displays on Infant Behavior*, cit.; B.M. Repacholi, A.N. Meltzoff, *Emotional Eavesdropping*, cit., pp. 503-521.

49 Betty M. Repacholi, Andrew N. Meltzoff, Tamara S. Toub, and Ashley L. Ruba, I*nfants' Generalizations about Other People's Emotions: Foundations for Trait-like Attributions*, "Developmental Psychology", 52, 3, 2016, pp. 364-378.

50 B.L. Callaghan *et al*., *Being the Third Wheel*, cit.

51 W.E. Frankenhuis, A. Gopnik, *Early adversity and the development of explore–exploit tradeoffs*, "Trends in Cognitive Sciences", 27, 7, 2023, pp. 616-630.

52 Irene Cogliati Dezza, Eric Schulz, Charley M. Wu (eds.), *The Drive for Knowledge: The Science of Human Information Seeking*, Cambridge University Press, 2022.

5. *Attentive explorers: a selective attitude*

It is crucial to acknowledge that young children are not blank slates who uncritically accept everything they are told or observe[53]. Many studies have been conducted in the last years to explore human epistemic trust, finding support for the existence of specific mechanisms that filter communicated information from very early age, known as epistemic vigilance. For instance, studies have demonstrated that children as young as 3 can monitor an informant's accuracy, thereby assessing their competence and reliability[54], and exhibit selective trust. Additionally, there is evidence suggesting humans prefer information from benevolent sources. For instance, 3- and 4-year-olds are more likely to consider a benevolent informant (e.g., someone exhibiting kind behavior) as more reliable and trustworthy compared to a malevolent one (e.g., someone displaying an aggressive behavior)[55].

Competence, accuracy, and benevolence are key but not the sole cues for epistemic trust. Research has showed that children use a variety of cues to assess the reliability of incoming information, including consensus among sources[56] and the informant's familiarity[57]. Hence, information conveyed by a trustworthy and competent individual is likely to be perceived as being more salient and relevant than the information provided by an unreliable informant, and this might be true also for information retrieved from the observation of emotional displays. This assumption is in line with what has been called the "reliability hypothesis"[58] in the context of social appraisal, suggesting that the competence and trustworthiness of the source(s) of emotional information (i.e., the individuals displaying an emotional reaction) can influence an observer's likelihood to utilize such information to appraise the situation and form an evaluation. Furthermore, reliability traits might also be affected by factors related to group-related variables: emotional displays from group members, particularly those with high status within the group,

[53] F. Clément, *To Trust or Not to Trust? Children's Social Epistemology*, "Review of Philosophy and Psychology", 1, 2010, pp. 531-549; Paul L. Harris, Melissa Koenig, Kathleen H. Corriveau, and V.K. Jaswal, *Cognitive Foundations of Learning from Testimony*, "Annual Review of Psychology", 69, 2018, pp. 251-273.

[54] F. Clément, M. Koenig, P.L. Harris, *The Ontogenesis of Trust*, "Mind & Language", 19, 4, 2004, pp. 360-379; Kathleen Corriveau, Paul L. Harris, *Preschoolers Continue to Trust a More Accurate Informant 1 Week after Exposure to Accuracy Information*, "Developmental Science", 12, 1, 2009, pp. 188-193.

[55] Olivier Mascaro, Dan Sperber, *The Moral, Epistemic, and Mindreading Components of Children's Vigilance towards Deception*, "Cognition", 112, 2009, pp. 367-380.

[56] K.H. Corriveau, Maria Fusaro, P.L. Harris, *Going With the Flow: Preschoolers Prefer Nondissenters as Informants*, "Psychological Science", 20, 2009, pp. 372-377.

[57] K. Corriveau, P.L. Harris, *Choosing Your Informant: Weighing Familiarity and Recent Accuracy,* "Developmental Science", 12, 2009, pp. 426-437.

[58] M. Bruder, A. Fischer, A. Manstead, *Social Appraisal as a Cause of Collective Emotions*, cit.

tend to impact observers' affective reactions and evaluations more than those of strangers, out-group members, or unfamiliar individuals[59].

However, the issue extends beyond mere selective attributions of trustworthiness, as demonstrated by an expanding body of research that outlines the developmental trajectory of children's discernment in information gathering. From an early age, children are able to exploit patterns in their environments to refine the efficiency of their search strategies[60]. This sensitivity to context increases throughout the course of development, enabling children to better adapt their goal-directed behavior to their environments as they mature[61]. This adaptability is largely attributable to the extraction of statistical regularities[62] and understanding of categorical hierarchies[63], coupled with a growing ability to discern gaps in one's own knowledge[64].

6. *Curiosity in context*

It appears that both children and adults learn more quickly when information is accompanied by signals which make it perceived as being socially relevant. In situations where individuals had to learn associations between spontaneous cues and rewards, social cues were found to be the most efficient in directing attention and producing more rapid, robust associations[65]. This supports the view that it might be challenging to clearly demarcate the processing of affective information from a more general conception of information processing in the context of social learning[66]. Given that emotional

[59] Patrick Bourgeois, Ursula Hess, *The Impact of Social Context on Mimicry,* "Biological Psychology", 77, 3, 2008, pp. 343-352; Vincent Yzerbyt, Muriel Dumont, Daniel Wigboldus, and Ernestine Gordijn, *I Feel for Us: The Impact of Categorization and Identification on Emotions and Action Tendencies,* "British Journal of Social Psychology", 42, 2003, pp. 533-549.

[60] Costanza De Simone, Azzurra Ruggeri, *Searching for information, from infancy to adolescence*, in I. Cogliati Dezza, E. Schulz, C.M. Wu (eds.), *The Drive for Knowledge*, cit., pp. 77-100.

[61] Andreas Domberg, Karla Koskuba, Anselm Rothe, and A. Ruggeri, *Goal-Adaptiveness in Children's Cue-Based Information Search,* cit.

[62] Björn Medere, Jonathan D. Nelson, Matt Jones, and A. Ruggeri, *Stepwise versus globally optimal search in children and adults*, "Cognition", 191, 2019, A103965.

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expressions from others are highly salient social signals, they are integral to social learning, serving as a crucial means through which infants and young children can develop the ability to make more complex deductions from their social surroundings.

Specifically, the processing of affective cues, especially when they are multimodal, emerges in infancy[67]. Moreover, by the age of 5, children can successfully process emotional displays that are not particularly nuanced[68] and seem to finally achieve adult-like interpretations of emotional displays around 10 years of age.

This early reliance on emotions for information may be due to the fact that their epistemic content is among the most salient in our environments[69]. Evidence of this includes children's ability to draw inferences from the behaviors and emotional displays of others. For instance, 12-month-olds already expect congruency between outcomes and emotional displays[70], but only around 5 years of age they are used to make inferences that help to generate new evidence and facilitate learning in others[71].

Moreover, the ecological approach to active learning is valuable because it takes into account one's environment and primarily focuses on goals defined externally. Recent related work also emphasizes the importance of intrinsic goals within the context of active learning[72], and how these goals can influence one's perception of information. This research challenges the often implicit assumption that views goals as external to the individual. Instead, it explores the hierarchy of goals that individuals navigate as they engage in decision-making behavior. Investigating the factors driving self-motivated learning and the cognitive resources one draws upon to implement it[73] has contributed to a deeper

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67 Donna L. Mumme, Anne Fernald, Carla Herrera, *Infants' Responses to Facial and Vocal Emotional Signals in* a *Social Referencing Paradigm,* "Child Development", 67, 6, 1996, pp. 3219-3237.

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68 Karine Durand, Mathieu Gallay, Alix Seignouric, Fabrice Robichon, and Jean-Yives Baudouin, *The Development of Facial Emotion Recognition: The Role of Configural Information,* "Journal of Experimental Child Psychology", 97, 1, 2007, pp. 14-27.

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70 Peter J. Reschke, Eric A. Walle, Ross Flom, Darren Guenther, *Twelve-Month-Old Infants' Sensitivity to Others' Emotions Following Positive and Negative Events,* "Infancy", 22, 6, 2017, pp 874-881; Amy E. Skerry, Elizabeth S. Spelke, *Preverbal Infants Identify Emotional Reactions That Are Incongruent with Goal Outcomes,* "Cognition", 130, 2, 2014, pp. 204-216.

71 Hyowon Gweon, *Inferential Social Learning: Cognitive Foundations of Human Social Learning and Teaching,* "Trends in Cognitive Sciences", 25, 10, 2021, pp. 896-910.

72 Gaia Molinaro, Anne G.E. Collins, *A Goal-Centric Outlook on Learning,* "Trends in Cognitive Sciences", 27, 12, 2023, pp. 1150-1164.

73 Lucy M. Cronin-Golomb, Patricia J. Bauer, *Self-Motivated and Directed Learning across the*

understanding of an individual's desire for information. Given the significance of intrinsic motivation with regard to the interwoven phenomena of information search, curiosity, and active learning, it is also vital to consider how one's internal states and their regulation affect their interaction with information. Decades of infant research using the violation of expectation paradigm[74] have shown that there is an intrinsic drive to gather information from a very early age[75].

Furthermore, it appears that curiosity – the extent to which an individual is motivated to gather information from a particular source or within a particular domain – is mediated by one's perception of their informational environments[76]. This dynamic is further complicated by individuals' strong tendencies to avoid negatively valence information, leading to a reluctance to engage with content that could adversely affect their emotional states by generating social or physical uncertainty[77].

Even at the cost of accuracy, individuals often choose to expose themselves to information that provides personal validation[78]. This phenomenon, also referred to as the congeniality bias, is not just a passive behavior. Information is frequently used to enhance internal states, with individuals making predictions about the impact information might have on their affective states to inform their information-seeking behavior[79]. However, this is not limited to merely acquiring information; emotional states also influence how information is perceived. Emotional responses to information can affect both one's estimations of risk[80] and their corresponding behavior[81]. Therefore, the centrality of one's affective condition cannot be understated when considering learning in social contexts, as it skews both our interpretation of information and the

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74 Aimee E. Stahl, Melissa Kibbe, *Great expectations: The construct validity of the violation-of-expectation method for studying infant cognition*, "Infant and Child Development", 31, 6, 2022, e2359.

75 Katarina Begus, Victoria Southgate, *Infant pointing serves an interrogative function,* "Developmental Science", 15, 5, 2022, pp. 611-617.

76 Katarina Begus, Victoria Southgate, *Curious Learners: How Infants' Motivation to Learn Shapes and Is Shaped by Infants' Interactions with the Social World*, in M.M. Saylor, P.A. Ganea (eds.), *Active Learning from Infancy to Childhood*, Springer International Publishing, 2018, pp. 13-37.

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79 I. Cogliati Dezza, C. Maher, and Tali Sharot, *People Adaptively Use Information to Improve Their Internal States and External Outcomes,* "Cognition", 228, 2022.

80 Lara Bertram, Eric Schulz, Jonathan D. Nelson, *Subjective Probability Is Modulated by Emotions,* preprint PsyArXiv, 2021.

81 Daniel Thomas Jäger, Celine Behrens, and Jascha Rüsseler, *Current and Expected Affective Valence Interact to Predict Choice in Recurrent Decisions,* "Cognition and Emotion", 36, 2022, pp. 560-567.

amount of information exposure. It is therefore essential to take into account the affective states of individuals within any learning context when trying to understand the transmission of socially relevant information. Not only does the affective state of the individual skew their perception of their environments, but their observations of others' emotional displays inform their interpretations of the social structures they inhabit. Consequently, individuals of all ages use emotional displays to more effectively navigate their informational environments as they explore, learn, and interact with their social reality.

7. *Directions for future developmental research*

7.1 *Observed emotional displays and communication in acquiring shared cultural knowledge*

Recent advancements in social learning research have illuminated the dynamic role of infants and young children. These young members are not merely passive recipients of information but seem actively explore their environment to understand it. Observational learning, particularly of emotional displays, empowers individuals to actively acquire culturally shared knowledge and, more generally, socially relevant information, circumventing the costs and the risks associated with direct communication. However, the developmental trajectory of affective observation, specifically how emotional displays observed in third-party interactions facilitate cultural learning in the absence of ostensive teaching, remains under-explored.

Future research should systematically investigate the emergence of affective observation in developmental stages and describe how such a basic and low-level process may lead to an understanding of the many elements populating humans' complex cultural environments. More specifically, it would be relevant to empirically test how young learners use emotional displays directed at others to form generalized assumptions about the evaluations prevalent within a social group. This process of generalization is crucial for quickly assimilating social norms and rules from limited observations. Since the generalizability of social information has been primarily studied in relation to direct communication and teaching contexts[82], an open direction for future research is to investigate whether individuals generalize information retrieved through affective observation, even in total absence of communicative elements, or if emotional displays are invariably interpreted as being communicative signals (the absence of ostension merely represents a lesser degree of

[82] G. Gergely, K. Egyed, I. Király, *On Pedagogy*, cit., pp. 139-146.

communication). Since ostensive cues intentionally point out the relevance of the information transmitted, and automatic emotional displays offer more spontaneous access to other individuals' evaluations, future research should also consider whether there are any dimensions, such as automatic versus ostensive communication, along which emotional cues are hierarchically ranked in terms of epistemic value. Interestingly, the affective reactions which are perceived to be produced automatically, as opposed to the ones that are produced deliberately to achieve ostensive communication, may be seen as being more genuine and therefore more trustworthy.

7.2 *The active filtering and selection of information retrieved during affective observation*

Additionally, future research should also explore any additional factors influencing the perception and utilization of information retrieved through affective observation, such as the perceived reliability of the source of information (i.e., the expresser of the emotional reaction). Therefore, it would be relevant to investigate whether judgments of reliability, regarding the individual expressing the emotion, impact the perceived saliency and reliability of the retrieved information, as this might consequently affect the processing of emotional information and the tendency to interpret it as the signaling of universally shared cultural knowledge (i.e., an evaluation shared by all the individuals of a social group) or to discard it. Given these considerations, it would be important to investigate how reliability judgments based either on person-perception traits or on more explicit evaluations influence observers' filtering of emotional information. Testing whether either epistemic factors, such as knowledgeability and competence, or socially relevant factors, such as dominance status and pro-sociality, drive observers' selective trust in the expresser of an emotional display could provide valuable insights. Future experiments might also explore how the specificity of objectives influences the strategic use of emotional cues in goal-oriented tasks.

This is especially pertinent in goal-oriented tasks, where an individual aiming to achieve a specific goal may observe their environment, either deliberately or automatically, to guide their behavior towards that goal. Emotional cues or displayed traits signaling that an observed individual is unreliable could lead one to reconsider their reliance on that party. For instance, if a collaborator exhibits selfishness, lack of interest, or incompetence, they might be deemed replaceable. Similarly, respect or deference typically given to a leader or decision-maker might be redirected elsewhere. A relevant research direction could therefore be to examine how people's attitudes change towards someone

considered a reliable source of knowledge when they exhibit certain behaviors, and which cues are used to assess such status.

7.3 *From observation to (over-)imitation and transmission*

Moreover, if others' emotional displays are systematically generalized and used to detect social norms and standards, future research should also investigate how affective observation modulates imitation tendencies in infancy and childhood. Specifically, it would be relevant to study how positive and negative emotional feedback may impact the tendency to avoid or imitate particular behaviors throughout development. In fact, emotional cues become particularly important in unfamiliar and culturally opaque contexts, which are typical of our culturally diverse world and that can be extremely challenging for infants and young children[83]. Observing emotions could also shed light on how subtle, culturally specific practices, like the sequences of actions in cultural rituals that might not have a direct causal relevance, are passed on. Emotional expressions in these contexts could highlight the positive social value of these practices, encouraging observers to adopt them.

Finally, although the content transmitted may differ across cultures, the vehicle through which this transmission is achieved, i.e. affective displays, may be universal. Whether affective displays are one of the means by which human beings universally retain their cross-cultural adaptivity remains to be fully understood. While specific cues like a smile or a frown might have different meanings depending on the cultural context, the extent to which emotional expressions are universally used and understood as both communicative tools and valuable sources of information (both automatically and intentionally) could have significant implications for the role of affectivism as a means to study cognitive and behavioral patterns.

8. *Conclusion*

Overall, the observation of emotional displays could be a way to actively retrieve relevant social information, serving as a valuable tool for navigating complex cultural landscapes and learning the shared practices and values essential for integration into a social group. This is particularly true for naïve

[83] For example, when young children join kindergarten for the first time, where they are faced by many rules (e.g., shoes must be removed in specific areas and left in one particular cupboard) and social practices (e.g., how to play and coordinate with other kids during a specific game/ activity) that must be followed to be recognized as being part of the group. Another example is given by the different customs that have to be respected when dining together, or when greeting each other.

members of a social group, such as infants and young children, who can safely acquire shared cultural information through observation, helping them in forming expectations about others' evaluations and reactions in various situations.

The proposed future research directions aim to deepen our understanding of how individuals actively explore their environments by observing others' emotional expressions outside formal teaching settings. This is crucial to demonstrating that acquiring unfamiliar cultural content is possible without relying solely on instruction-based contexts and direct interaction, which has been the primary focus of past research on social learning in development.

In conclusion, a systematic description of affective observation throughout development, along with an empirical investigation of the mechanisms that allow infants and young kids to filter and strategically utilize emotional information, constitutes a significant area of research. This could enhance our understanding of how humans, from an early age, are able to actively navigate such complex cultural environments. This line of research could illuminate the ways in which we discern social norms and practices, ultimately influencing social behavior. More broadly, these open directions align with the recent emphasis on affective social learning, where emotions are recognized as key instruments in transmitting and acquiring cultural values.