

## A brief review of humor development [Una breve review sullo sviluppo dell'umorismo]

**Luca Bischetti**

*University School for Advanced Studies IUSS, Pavia, Italy*

E-mail: [luca.bischetti@iusspavia.it](mailto:luca.bischetti@iusspavia.it)

### Original Article

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### ABSTRACT

**EN** Humor is a pervasive aspect of human communication, yet its development remains less investigated than other cognitive and linguistic domains. This paper reviews past and current research on humor development from multiple perspectives. It traces the progression from early stage-based cognitive models to recent studies identifying humor precursors in early childhood, alongside evidence from neurodivergent populations. The limited but expanding neuroscientific literature is also examined. Three priority directions for future research, relevant to the Italian context, are identified: cross-linguistic validation of assessment tools, investigation of emerging humor cycles, use of modern paradigms.

**Keywords:** humor development; childhood; cognitive development; neuroscience; linguistic development

**IT** L'umorismo è una componente chiave della comunicazione umana, eppure il suo sviluppo resta poco esplorato rispetto ad altre capacità cognitive e linguistiche. Questo contributo esamina la letteratura sullo sviluppo dell'umorismo da molteplici prospettive. È ricostruito il percorso dai primi modelli cognitivi a stadi alle ricerche recenti sui precursori dell'umorismo nella prima infanzia, insieme alle evidenze cliniche. Si esamina inoltre la letteratura neuroscientifica, ancora limitata ma in crescita. Infine, sono identificate tre direzioni prioritarie per la ricerca futura, rilevanti nel contesto italiano: la validazione di strumenti di valutazione, lo studio dei cicli umoristici emergenti e l'uso di paradigmi moderni.

**Parole chiave:** sviluppo dell'umorismo; infanzia; linguistica; sviluppo cognitivo; neuroscienze

## 1. Introduction

Humor is a central feature of human life, yet its definition remains elusive. Historically, humor has been defined from several perspectives. For at least two millennia, philosophers have debated the nature and role of humor (and laughter) in society (Morreall, 2024). Within psychology, humor has subsequently been conceptualized in terms of superiority (Lintott, 2016; see also Larkin-Galiñanes, 2017), relief (e.g., Freud, 1905/1960; see also Gruner, 1978), and incongruity (Keith-Spiegel, 1972; Suls, 1972; see also the seminal proposal by Koestler, 1964). The challenge of theorizing humor is further compounded by the need to account for its multiple functions (see Meyer, 2000). As Morreall (2009) succinctly put it, “[t]heorizing about humor is difficult for several reasons.” The situation is no different in other fields of research, including linguistics: several theoretical frameworks have been proposed to account for different aspects of humorous phenomena. Among these, the most comprehensive and widely adopted is the General Theory of Verbal Humor (GTVH; Attardo, 2024; Attardo & Raskin, 1991), which analyzes verbal humor through six hierarchically organized Knowledge Resources, with Script Opposition at its core. Alongside the GTVH, relevance-theoretic accounts have framed humor as a case of optimal relevance achieved through the interpretive use of language (e.g., Yus, 2016).

Rather than adjudicating between competing frameworks, this paper adopts the operationalization proposed in *The Psychology of Humor: An Integrative Approach* (Martin & Ford, 2018), which has become a widely used reference point in contemporary humor research: “Humor is a broad, multifaceted term that represents anything that people say or do that others perceive as funny and tends to make them laugh, as well as the mental processes that go into both creating and perceiving such an amusing stimulus, and also the emotional response of mirth involved in the enjoyment of it.” This definition is broadly compatible with previously developed theoretical frameworks and primarily emphasizes humor’s dual nature as both a cognitive and an emotional phenomenon, integrating perception, interpretation, and social function. Moreover, this definition captures a broad range of observable humorous behaviors across the lifespan, including joke comprehension, punning, and humor styles. Despite the breadth of this conceptual framework, existing literature has tended to focus on adult-like and cognitively elaborated forms of humor, while failing to adequately capture the earliest developmental precursors of humor competence (see also Bischetti, 2022 for an introduction to humor in Italian).

This limitation also emerges in volumes written for the Italian readership, and two relevant books have been selected. First, the now-classic *Psicologia dell’Umore* by Alberto Dionigi and Paola Gremigni (2010), which examined humor and its major theoretical accounts with a focus on its social function and its relation to well-being, yet devoted only four pages to humor development. Second, the recent book *Il cervello che ride* by Mirella Manfredi (2025) (reviewed in this issue) devoted an entire chapter to the topic. Other relevant sources devote even less space to the topic, such as the books *Il settimo senso* by

Giovannantonio Forabosco (2020) and *Grammatica del comico* by Giovanni Nanfa (2008). This contribution does not aim to provide a full-fledged, comprehensive view of humor in development; rather, it seeks to map the current and future directions of this research domain, viewing gaps in the literature not merely as gaps in coverage, but as reflections of the inherent complexity of defining a developmental pathway for a skill that intertwines cognitive, linguistic, social, and pragmatic competencies.

## 2. Humor development in the domain of psychology

The study of humor development has a relatively long history within developmental psychology (see also the dedicated chapter in Martin & Ford's (2018) handbook), yet it is still a field where theoretical consolidation is ongoing, especially within linguistics and at the intersection with broader developmental and social psychology accounts.

This review traces these major lines of inquiry, moving from early cognitive models to more recent linguistically oriented insights. The core assumption of most cognitive approaches to humor development is that humor competence and the ability to find something funny are not isolated skills but rather products of a broader trajectory of cognitive maturation (Mireault & Reddy, 2016). Even basic ingredients of humor, such as incongruity, emerge in close connection with the development of expectation-based knowledge representations (Airenti, 2016). Incongruity has long been regarded as a cognitive engine of humor (Forabosco, 1992, 2008), and it has been shown that children under the age of six can positively evaluate purely incongruous, surprising situations, whereas older children increasingly appreciate humor when a resolution of the incongruity is available and cognitively challenging (Shultz, 1972; Shultz & Horibe, 1974; Shultz & Pilon, 1973).

No review of humor development would be complete without recognizing the pioneering work of Paul McGhee. His research is among the most influential in the field (see, for example, the Festschrift curated by Willibald Ruch and Jeffrey Goldstein and published in *Humor* in 2018). McGhee built upon early observations to develop a comprehensive stage-based model of humor development, grounding each stage in Piagetian cognitive milestones. His model maps five progressive stages (McGhee, 1971a, 1971b, 1974, 1979, 2002), each linked to advancing cognitive and linguistic skills:

- stage 1, incongruous actions toward objects (~18 months): amusement is linked with entities behaving against expectations, as children expect a common, recognizable schema of how things normally work; humor is rooted in physical, perceptual incongruity;
- stage 2, incongruous labelling (2-4 years): growing language skills support the deliberate mislabeling of objects, people, acts; humor is now (internally) self-generated and is sensitive to caregiver reinforcement;

- stage 3, conceptual incongruity (~4-6 years): children manipulate abstract properties and social norms, they act like someone else for parodic purposes, create nonsense rhymes for the sake of triggering a laugh, and start designing early proto-riddles (*pre-riddles*), though the underlying logical twist is not yet fully grasped and often they fall short in their intention;
- stage 4, multiple meanings (6-7 years): increasing metalinguistic awareness enables children to start appreciating the nature of puns and wordplay, as well as riddles based on lexical ambiguity; understanding humor is achieved, yet the ability to explain is still not ripe enough;
- stage 5, jokes and riddles (middle childhood, 7+, added in McGhee, 2002): humor moves to the verbal channel mainly, and becomes fully contextualized in social practices and relationships, with a marked shift from structural incongruity to perspective-taking and the violation of contextual expectations within social contexts and interactions.

McGhee's model, however influential, has been substantially complicated by more recent empirical studies that pushed the developmental timeline back considerably. Mireault and colleagues (Mireault et al., 2012, 2014, 2015) documented appreciation of humor in infants as young as 3 months in caregiver-infant interactions, well before the onset of language or symbolic play. As early as 2001, Reddy had similarly described teasing behaviors in the second half of the first year, interpreting them as early evidence of intentional norm violation for social effect. Precursors of humor, or proto-humor, seem not to depend on fully elaborated cognitive representations but to emerge, to varying degrees, within early social dynamics. Foundational contributions by Honig (1988), Bergen (1998, 2007, 2018), Cunningham and Derks (2005), Recchia et al. (2010), Loizou and Kyriakou (2016), and Loizou and Recchia's co-edited volume (2019) have detailed the way children's humorous repertoire expands and shifts across comic acts.

Nevertheless, the basic architecture of McGhee's model continues to inform the field. In particular, the relationship between humor and Theory of Mind (or mentalizing) has received increasing attention in the past 20 years. The ability to recognize humor, and especially to distinguish joking from sincere intent, is a non-trivial achievement that presupposes some capacity for mental state attribution (Leekam & Prior, 1994; Sullivan et al., 1995, 2003; Winner et al., 1998). Hoicka and Gattis (2008) experimentally demonstrated that children as young as 25 months could reliably distinguish between deliberate jokes and genuine mistakes, suggesting that toddlers are capable of framing an utterance as non-serious quite early. Subsequent studies by Hoicka and Akhtar (2011, 2012) further showed that toddlers not only appreciate but also produce humor through deliberate norm violations, and that they do so in a socially contingent manner by monitoring the caregiver's response and adjusting their behavior to sustain the shared humorous interaction. Thus, from its earliest manifestations, humor emerges as a cognitive skill that develops primarily within social and communicative interactions. Converging evidence comes from Ger

et al. (2024), who found in a pre-registered study that 4–5-year-olds' recognition of slapstick humor depended on the victim's facial expression and was significantly associated with Theory of Mind performance, underscoring that even non-verbal humor appreciation is grounded in the capacity to read mental and emotional states.

Overall, the available literature offers a fragmented picture. Moreover, longitudinal data covering the full arc from infancy through middle childhood remain scarce. The field also remains hampered by another form of fragmentation, namely the methodological approaches to the study of humor. Studies vary in their operationalization of humor (for example, in how humor is distinguished from or related to play; see, for instance, Paine et al., 2025), in their distinction between appreciation and production, and in their reliance on naturalistic observation, parental report, or limited experimental paradigms.

### **3. Humor development in the domain of linguistics**

If cognitive accounts have dominated the developmental literature, the linguistic dimensions of humor development have received comparatively less systematic attention (when not considered in their instrumental role in describing general cognitive maturation or behavior). The transition from physical and perceptual incongruities (e.g., funny faces, unexpected actions) to verbal humor triggers marks a qualitative shift in the child's humorous skills, one that maps onto, but is not entirely reducible to, general language development. The role of lexical and morpho-phonological knowledge in humor appreciation has been studied primarily in the context of riddles and puns (Aarons, 2017; Guidi, 2017), which require children to recognize that a single phonological string can simultaneously activate two semantic representations (e.g., Attardo, 2017). Shultz and Horibe (1974) showed that children's appreciation of puns increases with age; even by age six, participants were able to detect phonological comic ambiguities. The ability to grasp incongruities and Script Oppositions in puns develops gradually across middle childhood, and it is closely linked to metalinguistic awareness, that is, the capacity to treat language as an object of reflection rather than merely a transparent medium of communication (Tunmer & Herriman, 1984). Metalinguistic awareness, when defined as the ability to successfully solve humor-based riddles involving ambiguity, is predicted by core linguistic abilities, such as reading comprehension and vocabulary (Zipke, 2007). Children who struggle with phonological and morphological awareness, skills that are also predictive of reading development and reading disorders (Melloni & Vender, 2022; Vender & Melloni, 2021), tend to experience difficulties in understanding wordplay-based humor (Spector, 1990), thus pointing to a potential interface between humor development and the risk of language-related difficulties.

Discourse-level analyses in naturalistic contexts have documented the early emergence of verbal incongruities in children's speech, including deliberate mislabelling, invented words, and the strategic violation of conversational norms, all oriented toward eliciting an amused response from the interlocutor

(Loizou, 2004; Loizou & Kyriakou, 2016). These observations align with the broader stage-based model by McGhee (1979), but add important interactional and verbal detail.

More recently, researchers have begun applying frameworks developed for adult verbal humor to developmental data, with the aim of creating greater theoretical continuity across the lifespan. Recent work by Mazzocchi and Priego-Valverde (2025) is paradigmatic in this respect: drawing on the GTVH's notion of Script Opposition, the authors analyzed humorous episodes in longitudinal mother-child interactions from 12 to 36 months, proposing a new classification of Script Oppositions to map developmental trajectories of children's incongruity recognition with analytical precision. With this innovative approach based on rigorous theoretical premises, they found that some incongruity types (e.g., those related to the natural world and objects vs. those based on the social or metalinguistic sphere) emerge earlier than McGhee's model would predict, and that children between 12 and 30 months tend to rely on multiple simultaneous cues to interpret their caregiver's humorous intent. In this sense, humor development can be framed as an early pragmatic achievement, well before other facets of pragmatic competence, of which humor can serve as one of the earliest steps on the path toward effective social and verbal exchanges with caregivers first, and peers later.

Studies drawing on qualitative observational methodology, including the work of Del Ré and colleagues (2020) and Morgenstern, Dodane, and Leroy-Collombel (2023), have further enriched this picture by documenting the diversity of humorous behaviors in early childhood across different linguistic communities, highlighting the role of prosody, gesture, and gaze in the joint construction of humorous episodes before verbal competence is fully established.

#### **4. Humor development in the domain of clinical studies**

A further strand of inquiry deserves mention: the study of humor in neurodivergent populations. Interest in this area dates back several decades. Hans Asperger himself, as early as 1944, identified what he described as a marked difficulty with humor as one of the defining characteristics of the children he observed (see Samson, 2013). Yet it was not until the 2010s that this topic attracted sustained and methodologically rigorous attention (but see some notable cases, like St. James & Tager-Flusberg, 1994). Particularly influential has been the work of Samson and colleagues, who demonstrated that humor processing difficulties in individuals with Autism Spectrum Disorder (ASD) are not global but rather modulated by stimulus characteristics, particularly the degree of mentalistic content (Samson & Hegenloh, 2010). More recently, Treichel and colleagues (2022, 2024) broadened the transdiagnostic perspective by comparing humor comprehension and appreciation across ASD and Williams syndrome, discussing the distinct cognitive, social, and emotional profiles of these two conditions.

The state of the field was recently mapped by Mention, Pourre, and Andanson (2024). Unsurprisingly, they confirmed persistent difficulties in humor processing among individuals with ASD

and also highlighted a crucial gap: after decades of scattered empirical work, the field still lacks the psychometric infrastructure that would allow systematic developmental comparisons, early identification of atypical trajectories, or evidence-based clinical applications. This gap is all the more striking given that the relevance of humor extends well beyond ASD. This is evident in populations such as individuals with Down syndrome, where the social motivational profile is markedly different from ASD and may in fact support certain aspects of humor appreciation (Reddy et al., 2002; St. James & Tager-Flusberg, 1994), or ADHD, where impulsivity and novelty-seeking interact in complex ways with incongruity processing (Semrud-Clikeman & Glass, 2010). Acquired and neurodegenerative conditions affecting pragmatic processing have received some attention in the adult literature (see Bischetti et al., 2024 for a summary), but their developmental analogues and early-onset variants remain virtually uncharted. Notable exceptions include studies on adolescents with traumatic brain injury (Docking et al., 2000) and on individuals with primary agenesis of the corpus callosum (Brown et al., 2005). The cumulative picture is of a field with genuine clinical relevance that has not yet built the comparative and longitudinal infrastructure needed to realize it.

## **5. Humor development in the domain of neuroscience**

In the realm of neuroscience, even less is known. Neuroimaging research has confirmed that the widespread brain architecture supporting humor processing is already operational in school-age children (see Vrticka, Black, & Reiss, 2013, for a review of adult activations). In two studies, a group led by Pascal Vrticka used fMRI (i.e., functional magnetic resonance imaging) to characterize the role of temporo-occipito-parietal regions in incongruity resolution and of mesocorticolimbic circuits in the associated reward response (Vrticka, Neely, et al., 2013), with both components appearing to be modulated by age (Vrticka, Black, Neely, et al., 2013), pointing to the role of cognitive maturation in humor comprehension and appreciation across middle childhood. Similar activation patterns were also observed using fNIRS (i.e., functional near-infrared spectroscopy) by an independent group (Mayseless & Reiss, 2021). Extending this line to even younger populations, Manfredi and colleagues (2025) identified specific electroencephalographic (EEG) correlates of slapstick humor recognition in 4–5-year-olds, with neural activity linked to facial emotion processing, suggesting that humor comprehension at this age is closely integrated with affective perception of social situations.

## **6. Conclusion**

Current research has largely addressed the broad developmental trajectory of humor itself, yielding several converging findings even though the overall picture remains incomplete, but has devoted limited attention to how humor development interacts with, or is influenced by, other cognitive domains. The field has produced solid accounts of how different facets of cognition contribute to the developmental

trajectory of humor. Yet empirical studies directly assessing how these processes constrain or facilitate one another are limited. For example, it is unclear whether early humor processing accelerates the development of mentalizing abilities, whether phonological sensitivity supports the emergence of wordplay, or whether early engagement with humor enhances phonological and metalinguistic awareness. Furthermore, the possibility that these relationships are genuinely bidirectional, with each capacity supporting the other throughout development, has not been thoroughly investigated.

A similar gap exists in the neuroimaging literature. Although the neural correlates of individual components of humor processing have been characterized with increasing precision, the functional integration of these components across development, particularly in relation to children's cognitive and linguistic abilities, remains unexplored.

## 7. Open Questions and Future Directions

Several lines of inquiry remain largely unexplored and warrant further scientific and academic investigation. A primary need is the development and validation of tools to track humor trajectories in the earliest phases of life. The Early Humor Survey (EHS; Hoicka et al., 2022), a 20-item questionnaire designed for caregivers to measure and monitor children aged 1 to 47 months, represents a significant advancement. However, it has not yet been adapted for Italian-speaking populations, resulting in a notable gap for researchers and practitioners. In addition to its potential value for developmental assessment, the EHS supports a transdiagnostic approach: humor development may contribute to the identification of atypical developmental trajectories associated with conditions such as ASD and may signal broader developmental atypicalities that emerge early in life. Studies involving infant siblings of children diagnosed with ASD may be particularly informative. Furthermore, systematic monitoring of humor development could provide a novel means for early identification of language-related risks. The EHS should represent only one component of a broader set of standardized tools for use in infancy and childhood; there is a clear need for the development and validation of instruments to map and evaluate humor skills across age groups. Humor should be recognized as a phenomenon that develops within the complex, developing architecture of the mind and in real-world environments, rather than in a vacuum. In this vein, the role of caregivers in shaping the development of humor should be examined in greater depth. The predominantly child-focused orientation of experimental research partially obscures our understanding of how humorous behaviors are co-constructed and emerge within relationships. Notably, Liu (2019) showed that parental humor style, together with children's temperament, influences the development of humor in 3- to 5-year-old children. This line of research should be further deepened to provide a clearer picture of the role of adults in scaffolding early humor behaviors.

A second set of open questions pertains to the role of Italian scholars in addressing timely research challenges. The national context, characterized by unique cultural and historical manifestations of humor,

provides opportunities for empirical studies targeting emerging forms and cycles of humor. Digital platforms and social media have transformed the creation and dissemination of humor (see Bischetti, 2026 and Bischetti & Attardo, 2023), but also the way it can be studied (see Bianco, 2026 and Willoughby, 2026). An illuminating example is provided by the response of Italian scholarship to the Covid-19 pandemic, a period that saw a notable increase in research, with Italian scholars making significant and timely contributions. For example, Bischetti et al. (2021a, 2021b) investigated the appreciation of Covid-19 humor, Canestrari et al. (2021) examined humor-based coping among healthcare workers, and Amici (2020) demonstrated that sharing humor during lockdown primarily reinforced social cohesion.

No comparable wave of research has yet emerged around other novel or rapidly evolving humor phenomena at the national level. A notable example is Italian brainrot, a form of humor characterized by nonsense, surrealist visuals, and eccentric voice-overs, which has become pervasive among children, adolescents, and young adults alike, first in Italy and subsequently worldwide. This algorithmically accelerated form of humor has not yet attracted significant scholarly attention. However, the study of this and similar phenomena is relevant both within the national context and for broader international understanding.

A third and final direction concerns the neuroscientific study of humor development, which remains in its earliest stages, particularly in Italy. Existing work has established the core neural architecture of humor processing, yet the number of available studies remains small, replication is lacking, and the use of methods such as EEG in developmental humor research remains limited. Paradigms capable of capturing humor in naturalistic, dyadic settings would further bridge the persistent gap between neuroscientific and interactional approaches to humor development.

Just as the chicken crossed the road because it needed to be on the other side, research on humor development is interesting precisely because of where it could take us, namely, toward a richer understanding of the cognitive, linguistic, and social architecture of the developing brain and mind.

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During the preparation of this work, the author used Claude Sonnet 4.6 and Grammarly for grammar and spelling checks. The author subsequently reviewed and edited the content as needed and takes full responsibility for the final publication.

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**Bionote****Luca Bischetti**

Luca Bischetti è ricercatore (RTD/A) presso la Scuola Universitaria Superiore IUSS Pavia, dove lavora nel Laboratorio di Neurolinguistica e Pragmatica Sperimentale (NEPLab). La sua ricerca si colloca tra pragmatica sperimentale, neurolinguistica e linguistica clinica, con particolare attenzione all'elaborazione dell'umorismo e ai deficit pragmatici in diverse popolazioni cliniche. È P.I. del progetto CHICKENS (Comprehending Humor in Infants and Children: Knowledge, Experience, and Neural Substrates), finanziato dal MUR nell'ambito del programma Young Researchers 2024 - SoE. È membro della rete italiana di pragmatica sperimentale (XPRAG.it) e dell'International Society for Humor Studies (ISHS).