

Carving Stories at their Natural Joints

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Abstract

Over the past three decades, psychology has documented the recurrence of specific themes in stories across cultures (e.g., love, alliances, monsters, imaginary worlds) and linked them to identifiable motivational mechanisms (e.g., mate choice, cooperation, threat detection, exploration). Yet this body of work has remained fragmented, organized around individual themes rather than integrated into a unified account of what makes narrative content psychologically engaging. Here, we propose the Motivational-Ingredient Framework. We identify a set of motivational ingredients: core narrative features, each defined by the specific motivational mechanism it activates. Drawing on evolutionary psychology, affective neuroscience, and the study of human motivation, we compile a comprehensive table of ingredients grounded in the current understanding of human motivational architecture. This framework offers a theory-driven, cross-culturally applicable foundation for the empirical study of narrative content, with implications for fields ranging from media psychology and computational humanities to education and public policy.

1. Introduction

Stories are, at their core, psychological experiences. They attract and hold attention because their content engages motivational systems: mechanisms that, in real-life contexts, orient cognition, emotion and behavior toward adaptive solutions to recurrent evolutionary challenges such as finding mates, detecting threats, caring for offspring, navigating social hierarchies, or building alliances (Dubourg & Baumard, 2022a; Gottschall, 2012; J. Carroll, 2012; Scalise Sugiyama, 2024).

Over the past three decades, evolutionary approaches to narrative have documented the recurrence of specific themes across cultures and historical periods. Love and mating resonate with evolved mate preferences (Gottschall & Nordlund, 2006; Meredith et al., 2025). Violence and monsters engage threat-related motivational systems (Clasen, 2017; Dubourg & Scrivner, 2026). Social dynamics tap into the deep-rooted need for cooperative relationships (Nettle, 2005a; Gessey-Jones et al., 2020). Vulnerable protagonists activate compassion and care (Singh, 2021). This work has demonstrated, cumulatively, that the appeal of recurring narrative motifs is not arbitrary but rooted in the psychology of the audience.

Yet this body of research has remained largely fragmented. Individual studies have illuminated why specific themes recur (why horror attracts, why love stories persist, why audiences root for underdogs), but these insights have not been integrated into a unified framework for characterizing narrative content as a whole. Stories do not limit themselves to a single theme: they blend exploration, threat, mating, cooperation, justice, and care into complex configurations. Understanding what makes a particular story engaging requires a systematic account of the full range of motivational systems that narrative content can activate, and of how these activations combine.

This is the aim of the present paper. We propose the Motivational-Ingredient framework, a framework that synthesizes existing work on the psychology of narrative engagement into a single tool: a table core story feature that activates a specific, identifiable motivational mechanism. By grounding each ingredient in the current understanding of human motivational architecture (drawing on evolutionary psychology, affective neuroscience, and media psychology) we provide a principled, theory-driven decomposition of what stories are made of at a psychological level.

The ambition to identify the recurrent building blocks of stories is not new. Propp (1968) decomposed folktales into a fixed sequence of narrative functions, Lévi-Strauss (1955) analyzed myths as transformations of binary oppositions, Campbell (1949) proposed a single archetypal hero's journey, and the Aarne-Thompson-Uther index (Uther, 2004) catalogued thousands of tale types. More recently, genre categories inherited from market conventions and data-driven techniques that infer structure computationally from text have offered partial solutions, but genre labels rest on heterogeneous and culturally contingent criteria, while data-driven approaches provide scalability at the cost of interpretability (see Section 5 for more details). Our framework builds on these efforts by adding what we believe is a missing piece: a principled

connection to the psychology of the audience. If stories are psychological experiences, then the psychological systems that make them engaging should provide the natural basis for characterizing their content.

In what follows, we present the theoretical foundations of the Motivational-Ingredient framework (Section 2), discuss how it can be operationalized in empirical research across disciplines (Section 3), outline future directions (Section 4), and compare this framework to alternative approaches (Section 5).

2. A motivational framework of narrative content

If stories engage us because their content activates motivational systems, then the natural unit for analyzing narrative content is the individual activation: the moment a story element satisfies the input conditions of a specific motivational mechanism. Earlier work in the evolutionary study of fiction has converged on the conclusion that the appropriate resolution for studying stories corresponds to deep-seated motivational preferences that are not specific to fiction (J. Carroll, 2012; Nettle, 2005b; Pinker, 1997). We call these units *motivational ingredients*, and define them as the content features of stories that activate pre-existing motivational systems in the human mind by simulating their characteristic input conditions.

This definition draws on a key distinction in cognitive science. A cognitive mechanism responds not only to the stimuli it was designed by natural selection to process (its proper domain) but also to any stimulus that happens to satisfy its input conditions, even if that stimulus was not part of the original adaptive problem (its actual domain; Sperber & Hirschfeld, 2004; **Figure 1**). Fictional stories exploit this property systematically. For instance, the evolved mechanism for predator avoidance is tuned to detect threatening cues such as large size, sharp teeth, claws, scales, or featureless black eyes that disrupt gaze tracking (Clinchy et al., 2013; Mobbs et al., 2020; Öhman, 2009). A fictional creature like the xenomorph in *Alien* or Smaug in *The Hobbit* incorporates many of these features, effectively activating the fear response despite the audience knowing they are safe (Clasen, 2012; Morin & Sobchuk, 2023). The motivational system is triggered because the input conditions are met. The fictional stimulus falls within the actual domain of the mechanism, even though it is not a real-world instance of the adaptive problem the mechanism evolved to solve.

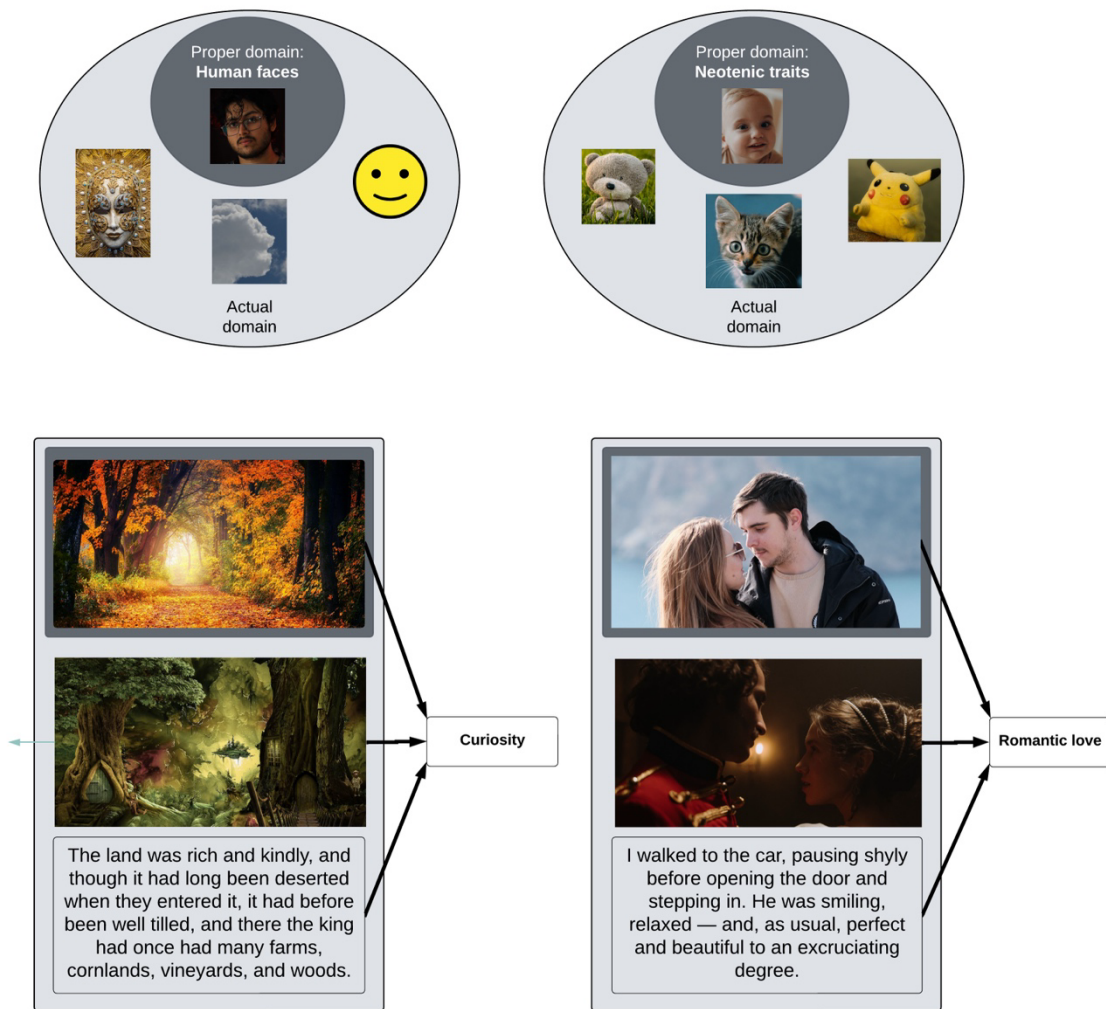


Figure 1. Motivational ingredients activate evolved motivational mechanisms beyond their proper domain. **Top:** Adapted from Sperber and Hirschfeld (2004). A cognitive mechanism responds not only to the inputs it was designed to process (its proper domain) but also to any stimulus that satisfies its input conditions without being part of the original adaptive problem (its actual domain). *Left:* The face-detection mechanism’s proper domain is human faces (here, a photograph of a man’s face), but its actual domain extends to face-like artifacts and patterns, such as a decorative mask, a face glimpsed in cloud formations, and a stylized emoji. *Right:* The caregiving mechanism’s proper domain is the neotenic features of human infants (large eyes, round face, small nose; here, a photograph of a baby), but its actual domain extends to animals and objects that share these features, such as a kitten, a teddy bear, and stylized cartoon figures with exaggerated juvenile traits. **Bottom:** The same principle applies to motivational ingredients. *Left:* Curiosity is triggered by real-life cues of explorable environments (here, an open woodland path), but also by the vast imaginary worlds of film, and by descriptions of unknown territories in novels (e.g., *The Lord of the Rings: The Fellowship of the Ring*, J. R. R. Tolkien, 1954). *Right:* Romantic love is triggered by real-life cues of mate value in a potential partner (here, photographs of couples), but it is also vicariously activated by fictional depictions of romantic connection, or descriptions of irresistible attraction in novels (e.g., *Twilight*, Stephenie Meyer, 2005). In each case, the fictional stimulus falls within the actual domain of the mechanism: it satisfies the input conditions sufficiently to generate motivational engagement, even though it is not a real-world instance of the adaptive problem the mechanism evolved to solve. Photographs are royalty-free (Pexels, Pixabay). Emoji: OpenMoji, CC BY-SA 4.0.

This principle applies broadly: any narrative element that satisfies the input conditions of a motivational mechanism can activate it, regardless of whether the element is real or fictional. But

this immediately raises a question: when do two narrative features engage the same underlying system, and when do they engage different ones? If ingredients are defined by the mechanisms they activate, then distinguishing ingredients requires distinguishing the mechanisms they recruit (**Figure 1**). Evolutionary psychology offers a powerful framework for drawing these distinctions. It has been proposed that the human mind consists of multiple specialized motivational mechanisms, each evolved to solve distinct adaptive problems (i.e., recurrent challenges that directly impacted survival or reproductive success over evolutionary time; see Al-Shawaf & Shackelford, 2024; H. C. Barrett, 2015; Buss, 2005; Del Giudice, 2024; Dunbar & Barrett, 2007; Nettle, 2009).

Let us consider some examples.

(1) Fear of predators evolved because it led individuals to recognize, learn from, anticipate, and respond to the threat of predators, a recurrent adaptive challenge in ancestral environments (Clinchy et al., 2013; Gross & Canteras, 2012; Öhman, 2009; on morbid curiosity, see: Scrivner, 2021). This mechanism processes environmental cues about potential predators and triggers the emotion of fear, preparing the individual to escape.

(2) Long-term love evolved to motivate individuals to form pair bonds with partners who are able and willing to invest in their offspring, which was another recurrent adaptive challenge in ancestral environments (Campbell & Ellis, 2005; H. E. Fisher et al., 2006; Fletcher et al., 2015; Kenrick, 2006). This mechanism takes as input information about potential mates and outputs feelings of attraction and attachment, which can help individuals form long-lasting relationships.

(3) Shame evolved to motivate individuals to avoid appearing as a bad cooperative partner that others would devalue (P. Gilbert, 2022; Sznycer et al., 2018; Argaman et al., 2026). This mechanism takes as input information about one's traits or actions that could cause social devaluation and produces feelings of shame, which in turn motivate behaviors that help prevent such devaluation (e.g., withdrawal, avoidance).

(4) Finally, curiosity evolved because it motivated individuals to find new information, which was another recurrent adaptive challenge in ancestral environments (Gottlieb et al., 2013; Kaplan, 1992; Mehlhorn et al., 2015; C. Scrivner, 2024). This mechanism takes as input cues of novelty or learning progress (Dubey & Griffiths, 2020; Golman & Loewenstein, 2012; Poli et al., 2022) and outputs the feeling of curiosity and a set of cognitive and behavioral strategies for exploration.

In this article, we provide a list of adaptive mechanisms, derived from a review of the literature in evolutionary psychology and related fields (**Table 1**, Columns 1 and 2), and primarily inspired by handbooks and theoretical frameworks making apparent such a structure in motivational systems (Al-Shawaf & Shackelford, 2024; H. C. Barrett, 2015; Buss, 2005; Del Giudice, 2020, 2023; Dunbar & Barrett, 2007; Kenrick et al., 2010; Nettle, 2009; Pick et al., 2022). This list is not meant as a definitive map of human psychology but as a synthesis reflecting the current state of knowledge in evolutionary and cognitive sciences. Inevitably, its structure will evolve as research progresses.

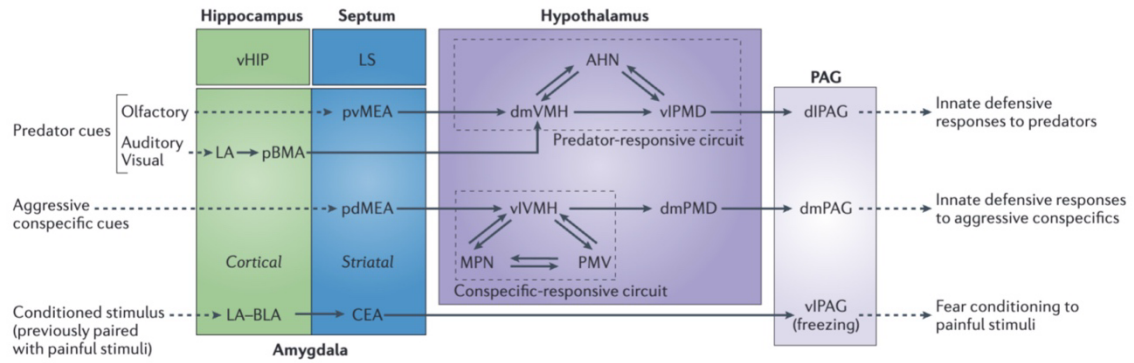
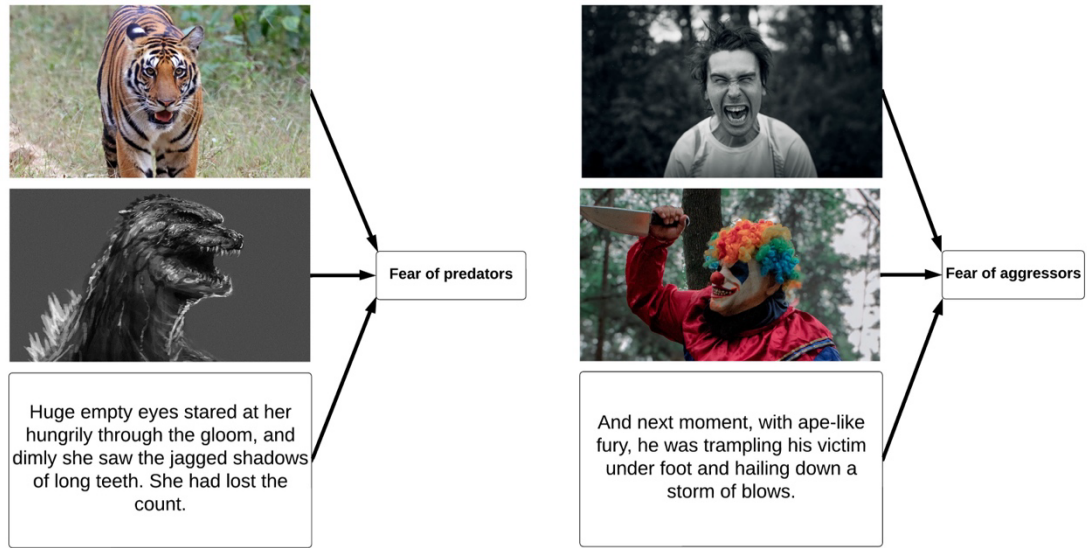


Figure 2. Two distinct fear mechanisms and their activation by stories. **Top:** Motivational ingredients can target functionally distinct motivational systems even within the same broad emotional category. *Left:* Fear of predators is triggered by cues of non-human predatory threat, such as large teeth, a predatory gaze, or looming body size (here, a tiger with its jaws open). In fiction, these cues are reproduced by monstrous creatures, just like Godzilla in film, and by descriptions of monsters in novels (e.g., *A Song of Ice and Fire*, George R. R. Martin, 1996). *Right:* Fear of aggressors is triggered by cues of aggressive conspecifics, such as facial displays of anger (here, photographs of a screaming man and a menacing costumed figure). In fiction, these cues are activated by threatening human antagonists and by descriptions of interpersonal violence in novels (e.g., *Strange Case of Dr Jekyll and Mr Hyde*, Robert Louis Stevenson, 1886). **Bottom:** Schematic of the underlying neuroanatomy, redrawn by the authors and inspired by Gross and Canteras (2012), showing that predator cues and aggressive conspecific cues are processed through anatomically distinct pathways. This neural dissociation supports treating fear of predators and fear of aggressors as separate motivational ingredients, even though they frequently co-occur in stories. Photographs are royalty-free (Pexels). Tiger: Charles J. Sharp, CC BY-SA 4.0, via Wikimedia Commons.

We have treated two mechanisms as distinct mostly on theoretical grounds, but empirical work is still needed to demonstrate their separation, for instance, by testing whether the enjoyment of their associated ingredients is statistically orthogonal (see M. Mercier et al., 2025, for a distinction between curiosity and explanation-seeking), whether the activation of the related cognitive

mechanisms involves distinct neural pathways (see Gross & Canteras, 2012, for a distinction between fear of predators and fear of aggressors; **Figure 2**), or whether their behavioral outputs differ and align with distinct adaptive functions (see Landers et al., 2025, for a distinction between anger and hatred).

In addition, there are ongoing debates about how best to carve psychological phenomena at their joints, both in evolutionary terms and with respect to which mechanisms form natural kinds apt for scientific theorizing (for emotions, see Moors, 2024 and Sander, 2025). For instance, selection may not have targeted a general anger mechanism, or even a more specific fear-of-predator mechanism, but rather the goals underlying these emotions, together with cross-domain, goal-directed response systems (Moors, 2017). On this view, goals such as defending against exploitation or avoiding predation explain what folk psychology labels “anger” and “fear of predators”, yet they are also expressed in a wider range of reactions, including non-emotional ones. This may support their explanatory priority over folk-psychological emotion categories, which may ultimately be set aside in scientific inquiry (Russell and Barrett, 1999; Moors, 2017).

Future research may refine this taxonomy, showing that some mechanisms are special cases of others or that new ones should be added. Our goal here is to provide a theoretically cogent, comprehensive and practically useful framework for studying human symbolic culture, and fictional storytelling more specifically (see **Table 1**, Columns 3 and 4).

Table 1. The table of motivational ingredients. Each row lists a motivational mechanism involved in story content. In this framework, motivations refer to the underlying psychological mechanisms shaped by evolution, whereas ingredients are the specific narrative elements that activate these motivations within a story. The first column specifies the adaptive domain (i.e., the general referent the mechanism is designed to act upon; note: headers use initials corresponding to the referent in the world that the motivational mechanism targets: S = Self, T = Threats, C = Cooperation, O = Competition, M = Mating, K = Kin). The second column describes the specific adaptive challenge that shaped the mechanism’s design. The third column names the mechanism itself, with key references identifying the main theoretical or empirical sources. The fourth column outlines the input conditions that typically activate the mechanism and can be used to study cases where narrative cues belong to the *actual domain* of the mechanism. The fifth column provides the corresponding motivational ingredients (i.e., story elements that engage motivational systems through indirect pathways, via characters, their goals, and the unfolding structure of narration). The references listed in the final column are intended as entry points to the literature linking specific narrative elements to audience interest or engagement. They are not meant to provide direct empirical tests of the underlying motivational mechanisms, but rather to point readers to relevant studies examining narratives that involve these ingredients.

The Table of Motivational Ingredient				
Domain	Adaptive challenge	Mechanism	Input conditions	Motivational ingredient
S	Find and consume nutrient-rich food	Hunger (Al-Shawaf, 2016)	Cues indicating caloric or nutrient-dense food	A story where a character enjoys, seeks, or struggles to obtain food.
	Allow the body to hydrate	Thirst (Aarts et al., 2001)	Cues indicating water or hydration sources	A story where a character enjoys, seeks, or struggles to obtain water.
	Allow the body to thermoregulate	Feeling cold / hot (IJzerman et al., 2015)	Cues indicating temperature extremes	A story where a character experiences extreme temperatures.
	Allows the body to repair	Sleepiness (Nunn et al., 2016)	Cues indicating physical fatigue or lack of rest	A story where a character feels exhausted or sleep-deprived.
	Discover new information	Curiosity	Cues indicating novel or unexplored information	A story where a character explores new environments. (Dubourg et al., 2023; Dubourg & Baumard, 2022b)

		(Berlyne, 1966; Gottlieb et al., 2013)		
	Identify causal relationship	Explanation-seeking (Goddu & Gopnik, 2024; Liquin & Lombrozo, 2020)	Cues indicating a knowledge gap	A story where a character solves mysteries. (M. Mercier et al., 2025; M. Mercier et al., 2025)
	Develop relevant competence	Skill acquisition (Bjorklund, 2022)	Cues indicating opportunities for learning or skill improvement	A story where a character trains, pushes their limits, and becomes stronger.
	Develop behavioral flexibility	Play (Pellis et al., 2019)	Cues indicating safe, low-stakes opportunities for behavioral calibration	A story where a character engages in play.
	Accumulate material resources	Resource accumulation (Mehlhorn et al., 2015)	Cues indicating opportunities for acquiring material resources or wealth	A story where a character gains wealth or valuable possessions. (Jonsson & Kruger, 2019)
	Collect resources	Resource foraging (Stephens et al., 2014)	Cues indicating opportunities for searching or gathering resources	A story where a character searches for necessary or rare resources.
	Identify the best strategy	Mental time travel (Addis, 2020; Suddendorf & Corballis, 2007)	Cues prompting reflection on past events or future planning	A story where a character plans ahead and develops strategies to achieve their goals. (Kanatova et al., 2017)
T	Avoid predation	Fear of predators (Clinchy et al., 2013; Gross & Canteras, 2012; Öhman, 2009)	Cues indicating predatory threats	A story where a character is threatened by dangerous creatures or monsters. (Andersen et al., 2020; N. Carroll, 1990; Clasen, 2017)
	Avoid aggression	Fear of aggressors (Duntley & Shackelford, 2012; E. Fox et al., 2000)	Cues indicating aggression or conflict	A story where a character is physically threatened by enemies or attackers. (Clasen & Platts, 2019; Kjeldgaard-Christiansen, 2016; Kjeldgaard-Christiansen, 2018; Vicary & Fraley, 2010; Wylie & Gantman, 2023)
	Avoid falling	Fear of heights (Huppert et al., 2020)	Cues indicating high or unstable physical environments	A story where a character deals with dizzying heights, dangerous falls, or vertigo.
	Avoid contact with pathogens	Disgust (Oaten et al., 2009; Tybur et al., 2013)	Cues indicating contamination or disease	A story where a character is threatened by decay, disease, or contamination. (Clasen, 2010; Eriksson & Coultas, 2014; Heath et al., 2001)
	Avoid injuries	Pain aversion (Gross & Canteras, 2012; Hagen & Barrett, 2007)	Cues indicating physical harm or injury	A story where a character endures physical suffering. (N. Carroll, 1990; Clasen, 2021)
C	Appear competent	Pride (Durkee et al., 2019; Sznycer et al., 2017)	Cues indicating success or competence	A story where a character accomplishes something impressive and earns recognition for it.
	Avoid appearing incompetent	Shame (Durkee et al., 2019; Sznycer et al., 2018)	Cues indicating failure or incompetence	A story where a character confronts shame after violating social standards. (Rapaport et al., 2016)
	Appear trustworthy	Moral pride (Barclay, 2013; Tomasello, 2020)	Cues indicating self-adherence to moral virtue	A story where a character stands by their values, even at great cost.
	Avoid appearing untrustworthy	Guilt (Fitouchi et al., 2023; Stanford, 2018)	Cues indicating personal moral wrongdoing	A story where a character is haunted by their past actions, seeking redemption.
	Appear willing to initiate cooperation	Warmth (Eisenbruch & Krasnow, 2019; Fiske et al., 2007)	Cues indicating kindness, care, or empathy from others	A story where a character shows kindness or deep empathy. (Grant, 2020)
	Limit immoral behaviors in others	Moral blame (André et al., 2022; Malle et al., 2022)	Cues indicating moral wrongdoing	A story where a character condemns wrongdoing or seeks justice. (Eden et al., 2011; Kjeldgaard-Christiansen, 2018)
	Encourage moral behaviors in others	Moral praise (R. A. Anderson et al., 2020; Carnes et al., 2022; Monroe, 2020)	Cues indicating adherence to moral virtue	A story where a character is celebrated for their goodness or heroism. (Eden et al., 2011; Wylie & Gantman, 2023)
	Punish cheaters or aggressors	Revenge (McCullough et al., 2013)	Cues indicating injustice or betrayal	A story where a character seeks vengeance on those who have wronged them. (Andrews, 2012; Flesch, 2007)

	Limit escalation of violence	Forgiveness (McCauley et al., 2021)	Cues indicating opportunities for reconciliation	A story where a character chooses to let go of hatred, finding peace or reconciliation.
	Provide benefits to others in need	Compassion (Decety & Wheatley, 2015; Goetz et al., 2010)	Cues indicating suffering or vulnerability	A story where a character cares for the weak or protects the vulnerable. (J. Saunders, 2005; Schmid & Klimmt, 2011; Singh, 2021)
	Attract cooperation partner	Affiliation (Barclay, 2013; Fiske et al., 2007)	Cues indicating warmth or competence	A story where a character seeks out new friends or companions. (Singh, 2021)
	Keep interdependent relationships	Friendship (Aktipis et al., 2018; Barclay et al., 2021)	Cues indicating shared social bonds	A story where a character forms close bonds with their friends. (R. Fox, 2005)
	Solicit social support	Sadness (Hagen & Barrett, 2007; Nesse, 2000; Olvet & Hajcak, 2012)	Cues indicating the loss of something or someone valuable	A story where a character feels deep sorrow after loss, failure, or separation. (Venkatesan et al., 2025)
	Detect benign violation	Humor (Warren et al., 2022)	Cues indicating benign violations	A story where humor is created through a character making jokes, engaging in playful interactions, or undergoing absurd or benignly misfortunate circumstances. (Eitzen, 2012; Hye-Knudsen, 2022)
	Limit devaluation of cooperators	Embarrassment (Krach et al., 2011)	Cues indicating social norm violations	A story where a character feels embarrassed. (Hye-Knudsen, 2018)
	Exchange reasons to convince	Reasoning (H. Mercier, 2016; H. Mercier & Sperber, 2011)	Cues indicating social justifications or arguments	A story where a character engages in intellectual battles or sharp debates.
	Form coalitions	Coalitional affiliation (Boyer et al., 2015; Lopez, 2017; Tooby & Cosmides, 2010)	Cues indicating opportunities for group formation	A story where a character forms or maintains a strong group identity. (J. Carroll et al., 2011; Jobling, 2001; Palmstierna et al., 2017)
O	Gain higher placement in social hierarchy	Status-seeking (von Rueden et al., 2011; Zeng et al., 2022)	Cues indicating opportunities for social rank	A story where a character gains influence or earns respect through their actions.
	Capture what competitors have	Envy (Hill & Buss, 2008; Ramachandran & Jalal, 2017)	Cues indicating others' success or resources	A story where a character longs for what others have. (M. L. Fisher, 2012; Palmstierna et al., 2017; J. Saunders, 2009)
	Defend against exploitation	Anger (Sell, 2011; Sell et al., 2009, 2014)	Cues indicating perceived injustice, harm, or offense	A story where a character is driven by rage, seeking justice, or acting on fury. (Kjeldgaard-Christiansen, 2016)
	Compete in adversarial relationships	Hatred (Landers et al., 2025; R. H. Smith et al., 2009; Vanman, 2016)	Cues indicating the failure or misfortune of others	A story where a character takes pleasure in a rival's downfall or a foe's suffering. (Fitzgerald, Francemone, et al., 2020; Grant, 2020; Kjeldgaard-Christiansen, 2016, 2018; Kjeldgaard-Christiansen & Schmidt, 2019; Wylie & Gantman, 2023)
M	Attract mate	Romantic affiliation (Finkel & Baumeister, 2010; H. E. Fisher et al., 2006; Greiling & Buss, 2000)	Cues indicating attractiveness (warmth, competence, beauty)	A story where a character is drawn to another, forming a romantic connection. (Cawelti, 1977; Cox & Fisher, 2009; M. L. Fisher, 2012; Grant, 2025; Kruger et al., 2013; J. Saunders, 2009)
	Reproduce	Sexual attraction (Diamond, 2004)	Cues indicating physical desirability or fertility	A story where a character experiences desire and irresistible chemistry. (Salmon & Symons, 2004; J. P. Saunders, 2015)
	Pair-bond	Long-term love (H. E. Fisher et al., 2006; Fletcher et al., 2015; Gelbart et al., 2025; Kenrick, 2006)	Cues indicating commitment or enduring emotional bonds	A story where a character develops a deep, lasting romantic commitment. (Baumard et al., 2022; Gottschall & Nordlund, 2006; Grant, 2025; Grant & Kruger, 2023; Keener, 2010; Lucchi Basili & Sacco, 2018; Nettle, 2005b; Nordlund, 2007; Salmon & Burch, 2020; Vanderbeke, 2019)
	Mate with various and numerous partners	Desire (Ellis & Symons, 1990; Surbey & Conohan, 2000)	Cues indicating opportunities for multiple sexual relations	A story where a character pursues physical encounters without long-term commitment. (J. P. Saunders, 2015)
	Keep mate	Romantic jealousy (Daly et al., 1982; Symons, 1979)	Cues indicating potential romantic rivalry or infidelity	A story where a character feels threatened by a potential romantic rival. (Dyer & Fisher, 2024; M. L. Fisher, 2012; Nettle, 2005b; Salmon, 2012; J. Saunders, 2009)
	Guard mate	Sexual jealousy (Buss et al., 1992)	Cues indicating sexual infidelity or competition	A story where a character feels threatened by a potential sexual rival. (M. L. Fisher, 2012; J. Saunders, 2009)

	Avoid low-quality mating	Sexual disgust (Al-Shawaf et al., 2015)	Cues indicating inappropriate or taboo sexual behavior	A story where a character deals with inappropriate, forced, or unsettling sexual relationships.
K	Avoid inbreeding	Kin sexual disgust (Antfolk et al., 2012; Lieberman & Smith, 2012)	Cues indicating sexual behavior within kinship	A story where a character avoids or rejects incestuous relationships. (Scalise Sugiyama, 2001)
	Protect children	Parental care (K. G. Anderson et al., 2007; Hoelzer, 1989)	Cues indicating vulnerability or dependency	A story where a character protects a child. (Nordlund, 2007; J. Saunders, 2009, 2020; Xu, 2013)
	Raise and educate children	Parental investment (Csibra & Gergely, 2011; Salmon, 2015)	Cues indicating a disposition to learn or improve	A story where a character nurtures or raises a child.
	Provide benefits to kin	Familial love (Gurven et al., 2001; Hamilton, 1964; Tanskanen et al., 2021)	Cues indicating kinship ties, familial obligations, or loyalty	A story where a character forms close bonds with their family. (M. L. Fisher, 2012; Palmstierna et al., 2017)

Importantly, these input conditions need not be restricted to ancestral stimuli. Cultural evolution can introduce novel cues that reliably activate the same underlying mechanisms. For example, firearms are recent artifacts, yet they readily trigger the specific fear associated with harm avoidance because individuals learn that they possess the property of causing harm (Blanchette, 2006; E. Fox et al., 2007). Similarly, financial bankruptcy may activate status- or shame-related mechanisms: modern credit systems were not present in our deep evolutionary past, yet they satisfy the input conditions associated with an evolved aversion for the loss of reputation or social standing. Motivational systems can therefore be engaged by culturally specific stimuli, provided these stimuli possess the properties sufficient to meet the mechanism’s input criteria (Sperber & Hirschfeld, 2004). This principle is central to the distinction between the proper and actual domains of the cognitive mechanisms which underpin motivational ingredients. What culture supplies are new formats and symbols; what remains constant are the motivational architectures that interpret them.

3. Operationalization and measurement

Every narrative can be described as a unique combination of ingredients, each corresponding to a specific motivational mechanism. These ingredients need not all be present in every story, and when present they can vary widely in intensity. Genres may therefore partly reflect relatively stable compositions of motivational ingredients that tend to cluster together. For instance, romantic dramas often emphasize romantic attachment (as a dominant ingredient) and social affiliation; horror narratives rely on fear-related mechanisms; detective stories foreground explanation-seeking; and adventure narratives often center on curiosity. Future empirical work can test whether certain configurations reliably cluster across corpora. For example, recent work has begun to quantify the presence of motivational ingredients in large collections of narratives and found systematic historical variation in their prevalence. In a large database of more than 3,000 Chinese fictional works spanning over a millennium, Zhong et al. (2025) show that ingredients such as romantic love, curiosity, and friendship cluster together and become more frequent during some periods in history.

What ultimately matters for analysis, however, is the variability in ingredient composition across stories. No two narratives share exactly the same configuration: across the roughly fifty ingredients identified here, each story is characterized by a distinct pattern of presence and relative weight. Even with a deliberately coarse measurement scale that reduces what are in reality continuous variables to just four discrete levels (absent, minor, important, central), fifty ingredients already generate over 10^{30} possible configurations. The combinatorial space of stories, in other words, is vast enough to guarantee that no two narratives need ever be alike, while the vocabulary of ingredients from which they are built remains finite and psychologically grounded.

For example, *Titanic* strongly features romantic affiliation, sadness, and status-seeking. Meanwhile, *Hamlet* mainly blends revenge, moral pride, mental time travel (through the protagonists’ constant reflection and planning), and sadness. Rather than assigning each of these stories to a single genre, we can score each ingredient individually, producing a kind of “recipe” that captures the motivational content of the narrative. We can therefore compare even very different stories by examining their underlying motivational profiles. For instance, while *Titanic* and *Hamlet* differ widely, they both feature sadness as a prominent ingredient, since characters in both stories lose something valuable. At the same time, the two stories differ markedly in other ingredients. Crucially, this kind of comparison can be extended to any story, from any culture, period, or medium, enabling precise, interpretable, and scalable analyses of narrative content across the full range of human storytelling.

Therefore, to leverage this framework, we can directly quantify the presence and importance of each ingredient in a given story. How can we operationalize such measurements? One approach to this is manual annotation, where coders estimate the importance of each ingredient in a story. It is important to remember that each mechanism can be triggered by a variety of particular ingredients in a story, as long as they fulfil the input conditions of that mechanism. For instance, status-seeking can be activated as a character earning a promotion or receiving an award. When we talk about measuring the importance of ingredients, here, we mean estimating the general importance of all concrete ingredients related to the same motivational mechanism in a story. This allows us to generate a single score for each psychological mechanism (see **Table 2**). Note that some stories encompass a greater variety of ingredients, much like a buffet offering multiple options: audiences may enjoy them for different reasons, with distinct motivational systems being engaged simultaneously. This variability does not undermine comparability but rather reflects the richness of narrative design. To address such diversity, several empirical strategies can be employed after annotation (e.g., normalizing ingredient scores within stories to enhance comparability across narratives that differ in length or thematic breadth).

With the advent of big data, we often encounter datasets that are too vast for manual annotation, such as extensive data on consumption behaviors related to movies or novels featuring various ingredients. How do we approach this challenge? To scale this process, notably for very large cultural datasets, it is possible to use automated annotation systems based on Large Language Models (LLMs; see Dubourg et al., 2024a). LLMs process the text, script, or summary of a story, using a list of abstract ingredient definitions to determine the presence and importance of each.

The LLMs, being able to operate at an abstract level, are not constrained by predefined lists of examples, allowing them to capture a wider range of ingredients. This automated system provides a practical way to apply our framework across larger datasets, generating ratings for the ingredients in numerous stories and enabling large-scale testing of psychological hypotheses (Dubourg, Safan, et al., 2025; Dubourg, Thouzeau, et al., 2025).

Finally, people’s preferences for specific ingredients can be measured in two ways. First, individuals can be asked to list their favorite fictions, after which these works are annotated (either manually or automatically) to determine the ingredients present. Alternatively, individuals can be directly asked about their interest in specific ingredients. For this, a 7-point Likert scale can be used, where participants rate their interest in each abstract ingredient (1: Not interested at all; 2: Slightly interested; 3: Somewhat interested; 4: Neutral; 5: Moderately interested; 6: Very interested; 7: Extremely interested). This method allows us to gather precise data on how much individuals are drawn to particular ingredients, giving us a clearer picture of the connections between the sensitivity of their psychological mechanisms and their fiction preferences. In turn, these measures can be used to investigate why preferences for different ingredients vary across individuals, for instance as a function of personality traits, life experiences, or environments.

All materials associated with this framework, including the annotation codebook, example annotated corpora, and coding scripts, are openly available on the Open Science Framework (<https://osf.io/j9xy3/>).

Table 2. Motivational ingredient profiles across classic and modern works of fiction. Each cell shows the relative prominence (0–4) of a motivational mechanism in each story, based on content analysis. Scores correspond to the framework described in Table 1. The scale is defined as follows: 0 = absent, 1 = present but negligible, 2 = present and secondary, 3 = present and central, 4 = dominant/defining. Scores were first produced through LLM-based annotation and subsequently verified and adjusted by researchers familiar with each work to ensure interpretive accuracy. The annotation codebook is available on OSF (<https://osf.io/j9xy3/>). Validation remains essential for any empirical application of this framework on larger corpora, both to confirm the internal consistency of annotations and to assess their robustness across works and annotators. One possible refinement is to apply within-story normalization, which rescales ingredient scores relative to each story’s overall distribution. This approach makes the prominence of ingredients more comparable across stories by expressing each mechanism’s salience as a proportion of the story’s total motivational content rather than as an absolute score.

Mechanism	The Iliad	The Tale of Genji	The Song of Roland	Journey to the West	Hamlet	Little Red Riding Hood	In Search of Lost Time	The Metamorphosis	Murder on the Orient Express	2001: A Space Odyssey	The Shining	Titanic	Harry Potter 1	One Piece
Hunger	1	0	1	3	1	4	2	4	1	1	1	0	2	4
Thirst	1	0	0	2	0	0	0	2	1	1	2	0	0	1
Feeling cold / hot	2	1	1	3	1	0	1	2	3	3	3	4	1	3
Sleepiness	2	1	2	2	2	0	3	4	2	3	3	1	1	2
Curiosity	2	2	0	3	2	1	4	2	2	4	2	1	4	4
Explanation-seeking	2	1	4	2	4	2	3	3	4	4	2	1	4	4
Skill acquisition	1	3	2	4	2	2	2	3	0	4	1	2	4	4
Play	1	2	1	4	2	1	1	2	0	1	1	3	3	3
Resource accumulation	4	2	3	2	4	1	3	4	0	2	0	3	2	3
Resource foraging	1	0	1	3	2	2	4	4	0	1	2	0	2	4
Mental time travel	3	3	3	1	4	1	4	3	3	4	2	2	2	3
Fear of predators	0	1	0	4	0	4	0	0	0	4	0	0	3	3
Fear of aggressors	4	1	4	4	4	4	0	4	4	4	4	2	4	4

Fear of heights	1	0	1	3	0	0	0	3	0	2	0	3	1	3
Disgust	3	2	3	3	0	1	0	4	1	2	3	0	0	3
Pain aversion	4	0	4	3	4	2	1	4	2	3	4	4	2	3
Pride	4	4	4	4	4	1	4	3	3	3	4	2	3	4
Shame	4	4	4	3	4	2	2	4	2	1	4	3	2	2
Moral pride	2	2	4	4	4	0	2	2	3	2	2	4	4	4
Guilt	2	3	2	2	4	0	3	4	3	1	3	1	2	3
Warmth	3	3	3	3	2	1	4	1	1	1	1	4	4	4
Moral blame	4	2	4	4	4	4	3	4	4	3	4	3	3	4
Moral praise	4	4	4	4	3	3	2	1	4	3	1	4	4	4
Revenge	4	3	4	3	4	1	1	1	4	0	2	1	1	2
Forgiveness	1	1	1	4	1	0	2	1	3	0	0	1	1	1
Compassion	3	1	3	4	2	2	2	1	2	1	2	4	3	4
Affiliation	4	1	3	4	4	0	4	4	2	3	0	2	4	4
Friendship	4	3	4	4	4	0	2	0	1	1	1	1	4	4
Sadness	4	4	4	2	4	1	3	4	2	2	3	4	3	2
Humor	1	1	1	4	2	0	2	3	1	2	0	2	2	3
Embarrassment	3	2	3	3	2	0	2	4	1	1	0	3	2	2
Reasoning	3	3	3	4	4	1	4	3	4	4	0	0	3	1
Coalitional affiliation	4	1	4	4	4	0	4	4	2	4	0	3	4	4
Status-seeking	4	4	4	4	4	1	4	3	0	2	1	3	2	4
Envy	3	3	4	3	3	0	4	1	0	1	0	4	2	2
Anger	4	2	4	4	4	2	1	4	2	3	4	2	3	4
Hatred	3	3	3	3	2	2	0	1	0	1	4	2	3	1
Romantic affiliation	2	4	1	1	3	0	4	0	0	0	0	4	1	0
Sexual attraction	2	4	1	1	3	0	3	0	0	0	0	4	0	1
Long-term love	4	1	4	2	4	0	4	2	1	0	2	1	2	0
Desire	1	3	1	4	3	0	3	0	0	0	1	0	0	0
Romantic jealousy	1	3	1	1	2	0	4	0	0	0	0	4	1	0
Sexual jealousy	1	3	1	1	3	0	4	0	0	0	0	4	0	0
Sexual disgust	0	3	0	2	4	0	3	0	0	0	0	2	0	0
Kin sexual disgust	0	0	0	0	4	0	0	0	0	0	0	0	0	0
Parental care	4	3	3	2	4	4	1	4	2	0	4	1	4	2
Parental investment	1	4	2	2	3	1	4	4	2	0	1	0	4	2
Familial love	3	4	4	2	4	3	3	4	3	1	2	1	3	2

4. Directions for future research

In the following sections, we outline possible avenues for future research made possible by this framework.

4.1. Mapping psychological variations across time and space

This framework addresses the problem of comparability. Because the ingredients we propose correspond to core narrative elements grounded in universal psychological mechanisms, they provide a common foundation for analyzing stories across cultures, historical periods, and media. Take the debate about science fiction. Many of its core ingredients tap into psychological mechanisms that are far from culturally specific (Dubourg et al., 2024b). These stories consistently activate curiosity (an adaptive motivation to discover the unknown) and skill acquisition (an adaptive motivation to master new tools and affordances). The ingredients tapping into these motivational mechanisms (e.g., spaceships, time travel devices or artificial intelligences) indeed recur in narratives from vastly different traditions. By annotating stories according to the presence and prominence of such universal ingredients, we can compare narrative content in a principled, interpretable way, regardless of the genre label, cultural origin, historical period or medium. Conversely, while the underlying motivational mechanisms may be shared, the specific narrative forms through which they are expressed (e.g., the particular creatures, technologies, social arrangements, or symbolic systems that satisfy their input

conditions) are likely to vary across cultures and historical periods in ways that remain largely unexplored within a psychological and evolutionary framework.

Conversely, this framework also allows us to take the opposite perspective: by examining how the prevalence of specific ingredients varies across cultures and historical periods, fiction itself can serve as a window into the human mind and psychological changes (Baumard et al., 2023). For instance, the recurrence and frequency of specific ingredients in stories (e.g., love, cooperation, curiosity) can reveal long-term shifts in human psychology. Using literary corpora spanning millennia, Baumard et al. (2022) showed that romantic elements such as “love at first sight” or “tragic separations” increased markedly in Eurasian literature over the past millennium, reflecting a broader rise in long-term pair-bonding motivations as living standards improved. Similarly, Zhong et al. (2025) demonstrated that Chinese fiction displayed an early rise in love, friendship, and open-mindedness as early as the seventeenth century, paralleling economic growth during the late Ming and High Qing periods. When prosperity declined in the nineteenth century, these ingredients faded, revealing a reversible, ecology-linked evolution of psychological values. By combining cognitive theory with large-scale annotation, the study of such narrative fossils opens a path to an empirical psychology of the past.

Beyond written or cinematic fiction, this framework can also be applied to anthropological and ethnographic materials, including oral traditions, myths, and folktales. Because such narratives often emerge and persist in small-scale societies, they provide valuable records of the motivational priorities of people living under diverse ecological conditions. Future work could, for instance, compare the prevalence of specific ingredients across environments differing in resource abundance, mobility, or institutional structure. Such cross-cultural analyses could reveal how ecological variables shape the motivational landscape of storytelling.

4.2. Shaping attitudes and behaviors through motivational framing

This framework could also extend to a research area not directly covered in this article. Narrative absorption (where individuals become immersed in a story) and narrative persuasion (where stories influence attitudes and beliefs) have generated significant research in recent years (Green & Brock, 2000; Dill-Shackleford et al., 2016; Moyer-Gusé, 2008; Busselle & Bilandzic, 2009). For example, Paravati (2022) demonstrated that when the main fictional character of a story about refugees exhibited perseverance and optimism, participants expressed more ‘elevation’ (which can be assimilated to moral praise in our framework; see **Table 1**) than when she did not. However, this study found no evidence supporting their most central hypothesis that this would, in turn, positively impact real-life attitudes toward refugees (see also, e.g. Fitzgerald, Paravati, et al., 2020; Lenhart et al., 2023).

The very idea that fiction can impact beliefs, attitudes, and eventually behaviors is difficult to assess. Mixed empirical findings challenge this assumption, with many studies failing to provide clear evidence of a direct causal relationship between fiction and belief change (see Dubourg & Baumard, 2024 for a review). Our framework could help this research by identifying key ingredients that tap into psychological mechanisms, to craft more precise test and control stories.

Additionally, our framework could support a new line of inquiry, similar to the message-matching approach in health communication research, where specific messages are calibrated to the underlying motivations of individuals (e.g. Persky et al., 2019; see Joyal-Desmarais et al., 2022 for a meta-analysis). This could involve designing stories that adjust based on socio-demographic or personality traits, better aligning ingredients with the psychological and motivational profiles of the audience to optimize both transportation into the story and the potential persuasive impact of the narrative.

A recent preregistered study illustrates how motivational ingredients can be used in applied research to predict and influence behavioral intentions (Avenel et al., 2026). In a large experiment, 2,622 daily smokers in France evaluated randomly assigned anti-smoking video advertisements drawn from a library of 38 campaigns ($N = 7,866$ evaluations). Advertisements were coded for 17 motivational ingredients and 19 argument types. Results showed that the presence of specific motivational ingredients significantly predicted intentions to quit smoking, and that tailoring ingredients to individuals' personality traits provided a better predictive account of quitting intentions than tailoring arguments. These findings suggest that the motivational content of narrative messages plays a key role in determining their persuasive impact. More broadly, the study illustrates how ingredient-based analysis can be used in applied domains such as health or environmental communication to align the content of messages with the motivational preferences of audiences (here, to design anti-smoking campaigns more likely to help people quit). Importantly, such applications do not require measuring the full set of ingredients: in practice, studies can focus on a subset of ingredients relevant to the behavioral domain under investigation.

The mechanism underlying this effect is consistent with prior findings in narrative persuasion research (Horton & Wohl, 1956; Shen et al., 2015). Narrative influence is likely facilitated when audiences can identify, sympathize or empathize with characters (Cohen, 2001; de Graaf et al., 2012; Vezzali et al., 2015; Smith, 2022), and therefore when they perceive the goals pursued by protagonists as relevant to their own motivational priorities (Moyer-Gusé, 2008; Dore, 2022; Chen et al., 2024; Maccoby & Wilson, 1957). In other words, motivational alignment may increase engagement by strengthening identification, transportation, and the perceived relevance of the narrative. Recent experimental work provides direct evidence for this mechanism (Maunoir et al., 2026). In two preregistered experiments ($N = 953$), participants read short movie pitches in which the protagonist's demographic attributes and motivations were systematically manipulated. Motivations were drawn from five motivational ingredients (i.e., skill acquisition, romantic love, curiosity, parental care, and friendship) and participants reported both their personal importance and their interest in the story. Results showed that motivational alignment between participants' own motivational priorities and the protagonist's motivations reliably predicted narrative interest, whereas demographic similarity did not.

4.3. Shedding light on the computations of motivational mechanisms

Finally, another promising avenue for future research is to unpack specific cognitive mechanisms to better understand their internal logic, that is, what information they process, how they

function, and the regulatory variables that influence them (Murayama & Jach, 2025; Tooby et al., 2014). For instance, research on kin detection shows that time spent in proximity during childhood is a key cue the mind uses to identify kin, shaping emotional bonds and behaviors toward those perceived as family (Lieberman et al., 2007). This proximity-based mechanism can be applied to fiction: characters that viewers encounter repeatedly, especially during childhood, may evoke strong emotional attachment (see also the exploration of the friendship mechanism in relation to long-form serial narrative in Blanchet & Vaage, 2012, and Nannicelli and Pérez, 2022). Exploring how this mechanism operates further opens new insights and predictions about why long-term exposure to fictional characters influences attachment and engagement.

We can apply the same approach to other motivations, such as anger. Which characters make audiences angrier on average? Research on anger shows that characters who impose unfair costs, especially when their power or status does not justify it (when we feel we should be able to push back) are more likely to trigger anger (Delton & Robertson, 2016; Sell, 2011; Sell et al., 2009). Using these regulatory variables, like a character's welfare-trade-off ratio (the weight one places on another's welfare relative to one's own) and their formidability (their capacity to impose costs on others), we could predict which characters should evoke anger, and test if these predictions hold true.

Our main point here is the following: each motivational system follows a functional, computational logic that determines which cues it treats as relevant, and this logic should leave a trace in the design of motivational ingredients. For example, fear emerges from a computation of vulnerability, that is, the appraisal that one's formidability is lower than that of a threatening agent. In fiction, this imbalance should be reflected in the structural asymmetry between protagonists and antagonists. Indeed, it has been shown that stories that feature greater asymmetry systematically evoke more fear and higher physiological arousal in audiences (Dubourg & Scrivner, 2026). Such findings demonstrate how fictional design exploits the computational variables of evolved motivational systems.

More generally, the framework also generates testable predictions about how narratives are psychologically represented and experienced. If motivational ingredients correspond to real cognitive dimensions, then stories that are similar in their ingredient profiles should also be represented more similarly by audiences. Evidence from neuroimaging of naturalistic narratives already supports the general claim that narrative content is represented in structured, multidimensional spaces: shared narrative structure elicits shared neural activity across listeners (Chen et al., 2017), and continuous stories are spontaneously segmented into events represented at distinct temporal and semantic scales (Baldassano et al., 2017; Zadbood et al., 2017). These approaches, however, have focused on event boundaries or generic semantic similarity rather than on the motivational dimensions proposed here. A direct test of the present framework would involve mapping stories into ingredient space, computing pairwise ingredient-similarity matrices, and comparing them to behavioral (Hasson et al., 2008; Lerner et al., 2011) or neural similarity measures (Jacoby & Fedorenko, 2020) using representational similarity analysis. This remains an open empirical question, but the methodological infrastructure is now mature enough to address it. Likewise, real-time engagement with narratives can be assessed through emotional

reports, physiological signals, or neural responses while participants experience stories differing in ingredient composition (Bezdek et al., 2015). Finally, the framework enables direct experimental manipulation: narrative stimuli can be systematically varied to include or exclude specific ingredients, allowing causal tests of their effects on attention, engagement, and memory (Stubbersfield et al., 2015, 2017; Carbone et al., 2025, 2026)

4.4. Accounting for the temporal dynamics of narratives

An important limitation of the present framework is that it characterizes stories through the relative prominence of motivational ingredients within a narrative taken as a whole. Yet in practice, these ingredients are rarely static. Many of them only become tractable or engaging through the temporal unfolding of a narrative. For instance, motivations such as revenge or forgiveness presuppose a sequence of events. A retaliatory attack can only be understood as revenge if the prior aggression that motivates it has already been established. Without this earlier event, the same action might simply appear as an unprovoked assault. In this sense, the interpretation of some ingredients depends directly on their position within a causal and temporal chain.

More generally, motivational ingredients themselves tend to unfold across the narrative timeline. Certain ingredients may dominate early phases of a story, while others emerge later as consequences of previous events. A simple illustration can be found in *Little Red Riding Hood*. The opening establishes affiliative motivations (the relationship between the girl and her grandmother) and exploratory curiosity as the protagonist travels through the forest. The encounter with the wolf then introduces threat and deception, triggering fear mechanisms. Finally, the climax and resolution (depending on the version, the grandmother's rescue or the wolf's defeat) allow the audience to evaluate the consequences of actions and strategies. The narrative thus progresses through a sequence of motivational activations that may support vicarious learning, whereby audiences extract information about the consequences of actions and strategies (Olsson et al., 2020; Olsson & Phelps, 2007; Singh, 2021; Maunoir et al., 2026).

Recognizing these temporal dynamics opens several avenues for empirical research. At a qualitative level, close-reading approaches (central to and well-developed in humanities disciplines) can annotate how motivational ingredients appear, intensify, or disappear across scenes, allowing researchers to reconstruct the narrative trajectory of different motivational systems. More recently, computational approaches make it possible to study such patterns at scale. Large corpora of novels, films, or scripts can be segmented into narrative units (e.g., scenes, chapters, or paragraphs), which are then annotated (either manually or using machine learning models) for the presence and importance of specific ingredients (Dubourg et al., 2024a). This allows researchers to reconstruct the temporal profiles of motivations within stories and to identify recurring narrative progressions across genres and cultures. Such analyses could reveal, for example, whether certain motivational sequences are particularly effective at sustaining engagement, or whether different genres rely on distinct patterns of ingredient combination and mechanism activation.

4.5. Moving forward on the ‘story’s function’ debate

The preceding sections have shown how motivational ingredients can be identified, measured, and applied to the empirical study of story content. But decomposing stories into motivationally grounded ingredients also has a theoretical payoff: it provides a new way to approach one of the oldest and most contested questions in the evolutionary study of storytelling. Why do humans everywhere invest so much time and emotion in stories? For more than three decades, competing answers have structured the field (Mellmann, 2012).

Adaptationist views argue that fictional storytelling emerged because it solved an adaptive challenge in our evolutionary past (J. Carroll, 2012; Gottschall, 2012). Within the adaptationist view, multiple sub-hypotheses compete over *what* fiction evolved *for* (i.e., which function it served in our evolutionary past). Proposed candidates include enhancing cooperation (Boyd, 2010; Coe et al., 2006; D. Smith et al., 2017), signaling mate value (Miller, 2001; Nettle & Clegg, 2006), training social inference (D. C. Kidd & Castano, 2013; Mar & Oatley, 2008; Oatley, 1999), rehearsing threats (Morin et al., 2019; van Mulukom & Clasen, 2026), calibrating behavioral systems (Tooby & Cosmides, 2001), or transmitting know-how (Nakawake & Sato, 2019; Scalise Sugiyama, 2024). Across these hypotheses, it often remains unclear whether storytelling or fiction itself is viewed as a specific adaptation or as an activity that adaptively recruits preexisting motivational systems (i.e., mechanisms that evolved for other purposes but whose engagement in narrative contexts may yield fitness benefits).

By-product accounts counter that fiction could be an ornamental pleasure that piggybacks on already-existing motivational preferences without itself being selected for (Mellmann, 2012; Pinker, 1997). Artificial stimuli can and do activate cognitive mechanisms when they resemble to a sufficient degree their input conditions (Bloom, 2010; Nettle, 2005a). Such matching may involve simplification or exaggeration (D. Barrett, 2010). For example, a teddy bear (like many other stylized characters in animation) appears cute because it mimics and exaggerates the neotenous features of an infant (e.g., large forehead, large eyes, round face, small nose) thus satisfying the input conditions of our caregiving system even though it is not a real baby (Borredon et al., 2025; Glocker et al., 2009). In Sperber and Hirschfeld’s terms, artificial stimuli, such as teddy bears, masks and fictions, belong to the actual domain of activation of a given mechanism, even if they fall outside its proper domain (i.e., the range of inputs it was designed by selection to process; Sperber & Hirschfeld, 2004). Artificial stimuli that exaggerate a mechanism’s input features, eliciting a stronger response than the natural stimulus, are called superstimuli (Barrett, 2010).

The framework proposed here offers a way to move past this debate by integrating the core insight of both accounts. By-product views are right that the capacity to produce and consume fictional stories is not itself a dedicated adaptation: stories are, to some extent, artifacts that exploit pre-existing motivational systems by satisfying their input conditions. Adaptationist views are right that engaging with fiction is not motivationally inert: once stories activate these systems, they can serve real adaptive functions, such as rehearsing threats, calibrating social inference, transmitting know-how or reinforcing cooperative norms. The synthesis is to treat stories as

technologies (Dubourg & Baumard, 2022a; Singh, 2022; Katz et al., 1973): artifacts that humans build by exploiting the input conditions of evolved motivational mechanisms, and that can serve a variety of instrumental goals in doing so. On this view, the capacity for fiction is a by-product, but its use is adaptive, and the goals it serves are heterogeneous (van Mulukom & Clasen, 2026), varying across individuals, societies, and historical periods. Instead of asking whether fiction evolved for one ultimate reason, the productive empirical question becomes whether particular narrative configurations successfully fulfill specific goals (or are perceived to do so).

By decomposing stories into motivationally grounded motivational ingredients, this Motivational-Ingredient Framework can move beyond global claims about “the function of fiction” and instead evaluate whether particular kinds of stories confer specific cognitive or behavioral benefits (Zillmann, 1988). Importantly, individuals do not seek identical learning experiences. Motivational profiles vary across persons as a function of personality traits, life history strategies, and ecological context. Different individuals therefore prioritize different motivations. Stories can be experienced as interesting and useful not because they are accurate in a propositional sense (Bruner, 1986), but because they provide vicarious information about which strategies succeed or fail in domains that matter to the individual’s motivational priorities (van Mulukom & Clasen, 2026). For example, an individual who places high importance on romantic relationships in their own life may be particularly drawn to romantic dramas or love stories (van Monsjou & Mar, 2019), as these narratives provide vicarious information about courtship, commitment, and relationship dynamics.

If this is correct, then individuals with different motivational profiles should preferentially engage with stories that contain ingredients relevant to their own motivational priorities. In a recent study, variation in personality did predict systematic variation in narrative preferences, consistent with the literature in personality psychology (Dubourg et al., 2026). Across 9,201 participants from 23 countries, personality traits predicted preferences for specific motivational ingredients in ways consistent with their motivational logic: higher openness predicted stronger interest in curiosity- and exploration-related ingredients; higher agreeableness predicted preferences for affiliation- and cooperation-related ingredients. Critically, 83.6% of preregistered predictions were confirmed in the expected direction, and the overall pattern replicated in 22 out of 23 countries. Such convergence between a priori ingredient definitions and downstream behavioral patterns provides initial evidence that the taxonomy tracks psychologically meaningful dimensions. A parallel analysis using ecologically valid data from 689 films, annotated with the same ingredients and linked to the Big Five personality profiles of 3.5 million Facebook users, yielded strikingly similar results at the population level. Moreover, motivational ingredients themselves tend to cluster in ways that mirror the structure of audience preferences, offering an opportunity to explain the existence of recurring and stable story types and genres. Together, these findings suggest that the motivational ingredient framework tracks stable individual differences in how motivational systems are calibrated and does so with cross-cultural generality. All annotated datasets are openly available on the Open Science Framework: <https://osf.io/j9xy3/>.

By enabling fine-grained measurement of ingredients, the present framework opens the door to testing more specific functional hypotheses. Rather than asking whether fiction as a whole is adaptive or a by-product, future research can examine when, for whom, and under which ecological conditions particular narrative configurations produce measurable cognitive, emotional, or behavioral effects. In particular, further research could investigate whether specific ingredients are perceived as useful for dealing with one's own challenges (Oliver & Raney, 2011), and whether this perceived usefulness depends on the individual's motivational profile (Maunoir et al., 2026). If stories function partly as sources of vicarious problem-solving, individuals should find narratives especially informative when they address motivational domains that are personally salient. This perspective could also extend to domains of psychopathology. For example, variation in personality and clinical traits predicts systematic differences in entertainment preferences (Bowes et al., 2018), suggesting that individuals may selectively engage with narrative content that resonates with their motivational or emotional dispositions (Kjeldgaard-Christiansen et al., 2021).

5. Comparison with alternative approaches

Existing approaches to characterizing narrative content either rely on genre categories or on data-driven techniques. Both have been productive, and both remain compatible with the framework proposed here. In this section, we examine each in more detail, not to dismiss them, but to clarify how a psychology-grounded approach complements them by addressing specific limitations they face.

5.1. Genre-based classifications

To make sense of the diversity of story content, humans have developed systems of classification that group stories into familiar types. This is especially visible in contemporary societies through the proliferation of *genres* in modern literary, cinematic, and media traditions (e.g., romantic comedies, psychological thrillers, science fiction, supernatural horror, historical dramas, fantasy epics). Such genre labels are, in this sense, intuitive folk taxonomies: they help audiences navigate stories through the kinds of experiences a story is likely to offer. People typically use them to find stories they are more likely to enjoy, and in everyday contexts, such labels serve their purpose well. In fact, the persistence and widespread use of such genre systems across industries, from bookstores to streaming platforms, suggest that they provide efficient and practical ways of signaling story content to audiences.

Such folk taxonomies have been successfully adopted in scientific research, where genre labels are frequently used as proxies for content in studies across disciplines. In psychology, for instance, a long-standing line of research has investigated how exposure to literary fiction versus genre fiction influences theory of mind (e.g., D. Kidd & Castano, 2017; Mar et al., 2006; Wimmer et al., 2024). Media psychology research by Oliver and Raney (2011) relied on genre distinctions to explore eudaimonic and hedonic motivations in entertainment. And in gaming research, Kim et al. (2022) investigated differences in addiction symptoms across video game

genres (e.g., FPS, RPG). These are just a few examples; across disciplines that study stories in all their forms, folk-category-based classifications have remained the default approach.

Although genre categories have been useful starting points for organizing story content, they pose certain limitations. First, most genres encompass a wide variety of subtypes and often overlap. Take, for instance, the *Harry Potter* series. It is almost universally categorized as fantasy, yet many of its central narrative arcs revolve around mystery and investigation (as in the first book, which follows a classic “whodunnit” structure). Despite this, it is rarely, if ever, labeled as mystery fiction. More generally, this kind of categorical framing obscures important aspects of a story’s content. When studies rely on genre labels to classify narrative material, they inherently lose information, specifically, the elements not captured by the assigned genre. Besides, this information loss is not random: some genres are broader and more inclusive (e.g., Action, Adventure), while others are narrower (e.g., Romance, Horror), leading to systematic biases in how content is analyzed.

This problem is compounded by the fact that genres are defined according to heterogeneous and often ad hoc criteria. Because they emerged from artistic and market conventions rather than from theory-driven principles, genres classify stories on the basis of highly variable features: some rely on themes or emotional tone (e.g., tragedy, comedy), others on setting or iconography (e.g., Western, science fiction), and others still on narrative structure or character relationships (e.g., romance, coming-of-age). For instance, Altman (1984) pointed out that some genres are primarily defined by their semantic elements (e.g., recurring motifs, characters, and settings) while others depend on syntactic structures (e.g., civilization versus wilderness in Westerns, conflict and reconciliation in romantic comedies).

Second, genre labels are historically contingent. They partly reflect the production norms and storytelling conventions of societies at particular points in time. As a result, stories with similar thematic cores can be labeled differently across historical periods. Take science fiction (Bould & Vint, 2011; Hillegas, 1979; Suvin, 1979). Some trace its origins to the 20th century, with authors like H. G. Wells and Isaac Asimov. Others push its roots further back to the 17th century, citing speculative works like *The Blazing World* by Margaret Cavendish. Still others point to ancient narratives such as Lucian’s *True History* (150 BCE), which includes space travel and interplanetary warfare, as an early form of science fiction long before the concept existed. Debates persist over when and how the genre began. Given all these factors, using genre labels makes it difficult to perform meaningful comparisons across time.

Third, genre categories are not only historically contingent but also culturally specific. They emerge within particular societies and are shaped by linguistic and market-specific factors, making them difficult to apply cross-culturally. For instance, American Westerns and Japanese *Jidaigeki* both seem to revolve around strikingly similar narrative elements (e.g., solitary heroes, moral codes, revenge, and honor) but are seldom analyzed in relation to one another. Even within a single cultural context, labeling practices vary. For instance, platforms like Netflix employ thousands of micro-genres for content personalization, while literary traditions often adhere to broader classifications. Even each medium (e.g., literature, cinema, video games,

manga) develops its own labeling practices. As a result, intuitive folk categories offer no stable and scalable framework for comparing fictional content across cultures or formats.

Importantly, however, the limitations of genre categories as analytical tools do not mean that genres themselves are uninteresting. Quite the opposite. If genres are understood not as fixed labels imposed from outside but as recurring configurations of motivational ingredients that audiences and industries have learned to recognize, then they become an object of study rather than a tool of classification. The motivational ingredient framework makes this shift possible: instead of taking genres as given and asking what they contain, we can annotate stories at the ingredient level and ask which clusters of ingredients reliably co-occur across large corpora. Genres, on this view, are emergent regularities in the combinatorial space of stories, shaped by the motivational architecture of audiences.

5.2. Data-driven techniques

One other promising solution has been to adopt data-driven techniques that infer structure from the bottom up. For instance, some studies have used sentiment analysis to extract latent emotional trajectories from stories (Reagan et al., 2016), while others have focused on semantic structure (Toubia et al., 2021) or thematic clustering through machine learning (Nielbo et al., 2024). Recently, most approaches typically convert story content into high-dimensional vector representations known as embeddings (Dubourg et al., 2023; Garg et al., 2018; Kozlowski et al., 2019). These embeddings capture semantic similarities between texts, allowing researchers to cluster stories based on shared content features without relying on predefined labels.

While these methods offer scalable alternatives to genre-based classification, they also face key limitations. First, they often depend on large amounts of metadata (e.g., plot summaries, user tags) which are not always available and can vary widely in quality and quantity across sources. As a result, these methods do not straightforwardly solve the problem of comparability. Second, they are computationally demanding, typically requiring thousands of datapoints to produce meaningful groupings or predictions. Third, and most importantly, they offer limited interpretability: although they can identify patterns or predict outcomes like user ratings, they rarely clarify which specific features of the content are responsible for the effect. As a result, their ability to inform theory or guide targeted interventions remains limited. Nevertheless, these methods remain fully compatible with the alternative we propose below, serving as powerful tools for exploration and hypothesis testing.

6. General discussion

Identifying and characterizing the specific motivational ingredients of stories offers a precise and comparable way to classify narrative content. Rather than relying on broad categories like genres, we can systematically characterize stories along psychologically meaningful dimensions. This should allow for improved predictive power in both applied and theoretical domains. Beyond offering a new framework, this paper also serves as a comprehensive synthesis for evolutionarily

minded researchers. By consolidating evidence from psychology, neuroscience, narratology, and media studies into a unified list of motivational mechanisms and motivational ingredients, it provides a conceptual map of the field, and a resource for identifying gaps, generating hypotheses, and connecting otherwise fragmented lines of inquiry across disciplines.

Notably, this framework addresses the problem of precision in tagging by shifting from categorical to dimensional representation. Indeed, by identifying core narrative elements that tap into distinct psychological mechanisms, we can meaningfully evaluate their presence and relative importance within a story in a *continuous* manner. The output of ingredient combinations works much like recipes in cuisine: ingredients vary not only in type but also in quantity and proportion, shaping the final product in specific ways. A story, similarly, can be understood as a unique blend of motivational ingredients. For this reason, we refer to these core elements as “ingredients”, emphasizing their combinatorial and graded nature. Take *Harry Potter*: rather than overlooking its mystery plots because it is labeled as fantasy, this framework allows the mystery ingredient to be explicitly identified and weighted. This prevents the loss of important content information. In all, much as personality psychology advanced by replacing rigid typologies with dimensional models like the Big Five, the study of stories can progress by breaking stories down into core narrative elements that vary in prominence.

However, the “recipe” metaphor warrants clarification. The term is intended as an analytical tool. It does not imply that artistic creation consists in the deliberate combination of predefined ingredients. Our aim is neither to model the psychology of artistic creation nor to prescribe how stories ought to be constructed. Rather, the framework offers a descriptive account of what stories are composed of. Emergent structure, exploratory writing, and artistic discovery are fully compatible with ingredient-level analysis: a chef need not know molecular chemistry to produce a dish whose flavor can later be analyzed in chemical terms. Likewise, authors may discover a story through exploration, yet the resulting narrative can still be described in terms of the motivational architectures it engages. The framework therefore seeks better descriptions of narrative composition and, through them, better explanations of story appeal, cultural recurrence, and narrative persuasion.

This framework has several limitations. It does not aim to account for all the variability in attention, interest, or persuasiveness that stories elicit. Many additional factors can shape engagement, such as stylistic and aesthetic features (e.g., quality of writing, rhythm, visual composition, or color palette) or audience expectations linked to genre labels. Our goal here is more circumscribed: to offer a principled framework for mapping the motivational content of stories. Future work should extend this approach to the form of stories, examining how aesthetic and stylistic variables interact with motivational ingredients to modulate engagement and impact (see Cutting et al., 2010; Cutting, 2016). Moreover, the list of mechanisms provided is provisional. While we have sought to summarize current consensus in evolutionary and motivational psychology, future research will likely refine, reorganize, or expand it. Depending on the research question, smaller subsets of mechanisms may also be used for focused analyses.

7. References

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