

Supplementary Information

Codebook for the Evaluation of Online Information by Adolescents

This section presents a coding framework developed for the analysis of students' written justifications when assessing the veracity of online content. Each code corresponds to a distinct cognitive or epistemic strategy, judgment criterion, or verification behavior, grounded in the empirical literature on digital literacy, credibility assessment, and information evaluation. Where possible, references to prior research are included to provide theoretical and empirical justification for the categories.

Three main macro-categories are included in the codebook (i.e., lateral reading, cues, plausibility), as well as two additional meta-codes (i.e., external search and search effectiveness).

Lateral Reading

1. Lateral Reading - Source-Oriented

Lateral reading on the source refers to the strategy of evaluating the credibility of an online post by actively searching for information about the source itself, e.g. the website, author, organization, or institutional affiliations. This practice reflects an epistemically sophisticated approach that shifts attention from the content of a claim to the context in which it is produced. The strategy has been shown to be characteristic of expert fact-checkers and is strongly associated with high-quality information evaluation (Wineburg & McGrew, 2017). Unlike passive reliance on source reputation, lateral reading involves leaving the original page to triangulate information using independent resources. This code is applied only when such investigative behavior is explicitly mentioned or plausibly inferred.

Reference:

Wineburg, S., & McGrew, S. (2017). Lateral reading and the nature of expertise: Reading less and learning more when evaluating digital information. *Teachers College Record*, 119(13), 1–40.

2. Lateral Reading - Content-Oriented

This category captures instances where participants engage in verification by cross-referencing the *content* of a post with external sources. Rather than scrutinizing the author or platform, the reader evaluates the factual claims being made by comparing them to other pieces of information found online. This practice can involve either a single external source or multiple sources, as detailed in the sub-strategies below. Content-based lateral reading is conceptually aligned with analytical reasoning and open-minded thinking, which are recognized as protective factors against misinformation (Bronstein et al., 2019). Importantly, this code excludes judgments based solely on prior knowledge or plausibility: verification must involve external consultation.

Reference:

Bronstein, M. V., Pennycook, G., Bear, A., Rand, D. G., & Cannon, T. D. (2019). Belief in fake news is associated with delays in reflective thinking. *Judgment and Decision Making*, 14(5), 509–517.

3. Lateral reading / Consensus Search

Consensus search refers to the comparison of information across multiple independent sources to assess consistency and convergence. Participants who adopt this strategy check whether different websites report similar facts or interpretations, using inter-source agreement as a proxy for reliability. This form of triangulation is supported by theories of social epistemology, where credibility is often reinforced through intersubjective corroboration (Goldman, 2001). It also aligns with digital literacy curricula that encourage cross-source comparison to reduce susceptibility to information bias (McGrew et al., 2018).

Reference:

Goldman, A. I. (2001). Experts: Which ones should you trust? *Philosophy and Phenomenological Research*, 63(1), 85–110.

McGrew, S., Breakstone, J., Ortega, T., Smith, M., & Wineburg, S. (2018). Can students evaluate online sources? Learning from assessments of civic online reasoning. *Theory & Research in Social Education*, 46(2), 165–193.

4. Lateral reading / Scientific Article Verification

In this case, participants refer explicitly to academic or peer-reviewed sources, or to websites that summarize such literature, to validate or invalidate the information in a post. This practice presupposes not only digital search skills but also some degree of epistemic trust in the scientific community, as well as the capacity to distinguish between scientific and non-scientific claims. Research in epistemic cognition suggests that individuals who consider the methodology and authority of science tend to be more resistant to misinformation (Barzilai & Chinn, 2020). Accordingly, this code is reserved for explicit references to scientific papers or journals, or to secondary sources that cite them reliably.

Reference:

Barzilai, S., & Chinn, C. A. (2020). On the goals of epistemic education: Promoting apt epistemic performance. *Educational Psychologist*, 55(3), 120–133.

5. Lateral reading / Debunking and Fact-Checking

This label applies to responses in which participants report consulting specialized fact-checking websites or debunking pages. Sites in Italian such as Snopes, PolitiFact, Pagella Politica, or Butac are designed to assess the accuracy of viral content and claims circulating online. Empirical studies indicate that exposure to high-quality fact-checks can significantly reduce belief in false information, especially when trust in the fact-checking source is high (Pennycook et al., 2020). This code requires that the respondent explicitly names or clearly refers to such a resource.

Reference:

Pennycook, G., McPhetres, J., Zhang, Y., Lu, J. G., & Rand, D. G. (2020). Fighting COVID-19 misinformation on social media: Experimental evidence for a scalable accuracy-nudge intervention. *Psychological Science*, 31(7), 770–780.

6. Lateral reading / ChatGPT/AI-Assisted Verification

This category captures cases in which participants employ generative artificial intelligence (AI) tools such as ChatGPT to verify the content of an online post. The use of AI may be explicitly stated (“I asked ChatGPT”) or inferred through stylistic markers characteristic of language models, such as bullet-pointed summaries, formulaic explanations, or generalized advice with no clear source. Although the epistemic reliability of AI-generated content

remains contested (Bender et al., 2021), the increasing integration of AI into everyday information practices warrants the inclusion of this label. As large language models become epistemic agents in digital environments, understanding how users treat their output as evidence is of growing importance.

Reference:

Bender, E. M., Gebru, T., McMillan-Major, A., & Shmitchell, S. (2021). On the dangers of stochastic parrots: Can language models be too big? *Proceedings of the 2021 ACM Conference on Fairness, Accountability, and Transparency*, 610–623.

7. Lateral reading / Wikipedia-Based Verification

Participants occasionally refer to Wikipedia as a source for verifying factual claims. While Wikipedia is often discouraged as a primary source in academic contexts, its collaborative and dynamically updated structure has been shown to offer relatively reliable coverage for many general topics (Jemielniak, 2014). This category is assigned when Wikipedia is explicitly mentioned as the source of information used to assess a claim's validity. It should be distinguished from general web searches, as Wikipedia's encyclopedic format often serves as a first-level check for plausibility.

Reference:

Jemielniak, D. (2014). *Common knowledge? An ethnography of Wikipedia*. Stanford University Press.

8. Lateral reading / YouTube or Other Video-Based Verification

In some cases, participants report consulting video content, such as YouTube videos, TikToks, or Instagram reels, to support or refute the information at hand. This code applies when the verification relies primarily on audiovisual sources. While such platforms are vulnerable to misinformation, they also serve as important vectors for informal learning, especially among adolescents (Swart et al., 2022). Evaluating the epistemic status of video content remains complex, depending on the channel's credibility, production quality, and the presence of cited evidence.

Reference:

Swart, J., Gillett, R., & O'Neill, B. (2022). Young people and YouTube: A source of learning, health information, and news? *Information, Communication & Society*, 25(10), 1463–1480.

Cues-based strategies

9. Cues / Clickbait or Misleading Title Awareness

This label identifies respondents who demonstrate awareness of a discrepancy between the title of a post and its actual content. Such recognition reflects a meta-cognitive understanding of clickbait strategies, which are known to manipulate attention and distort perceived credibility (Blom & Hansen, 2015). Noticing that a title exaggerates or misrepresents the article's substance is a sign of critical engagement with the format and rhetoric of online media.

Reference:

Blom, J. N., & Hansen, K. R. (2015). Click bait: Forward-reference as lure in online news headlines. *Journal of Pragmatics*, 76, 87–100.

10. Cues / Source Reliability (Heuristic Judgment)

Participants often make judgments about veracity based solely on the perceived trustworthiness of the source. This label applies to heuristic reasoning such as “It’s from a reputable newspaper, so it must be true,” without any additional verification. While relying on source cues can sometimes be effective, it also makes individuals vulnerable to brand manipulation and reputational laundering by bad actors (Lewandowsky et al., 2017). This code must be distinguished from *lateral reading on the source*, which involves a more deliberate and informed assessment.

Reference:

Lewandowsky, S., Ecker, U. K. H., & Cook, J. (2017). Beyond misinformation: Understanding and coping with the “post-truth” era. *Journal of Applied Research in Memory and Cognition*, 6(4), 353–369.

11. Cues / Language as Reliability Cue

This category includes responses in which the style, tone, grammar, or professional quality of the text is used as an indicator of validity. For example, a participant might state that the article “sounds professional” or is “full of typos, so it’s probably fake.” Although surface-level language cues can sometimes align with credibility (Housley & Fitzgerald, 2009), over-reliance on them may lead to erroneous judgments, particularly when misinformation is stylistically polished.

Reference:

Housley, W., & Fitzgerald, R. (2009). Media, policy and interaction: Governmentality and the “front stage” of local governance. *Sociological Research Online*, 14(1), 1–16.

12. Cues / Image or Video as Epistemic Evidence

This label refers to cases in which participants cite the presence of images or embedded videos as evidence of a claim’s authenticity. Visual content often exerts a strong effect on perceived veracity, even when it is unrelated to the claim (Newman et al., 2012). This strategy reflects a reliance on the *truthiness* conferred by visuals, which may or may not be contextually valid. Participants rarely question the source or potential manipulation of such images, making this a potentially vulnerable point in credibility assessment.

Reference:

Newman, E. J., Garry, M., Bernstein, D. M., Kantner, J., & Lindsay, D. S. (2012). Nonprobative photographs (or words) inflate truthiness. *Psychonomic Bulletin & Review*, 19(5), 969–974.

Plausibility

13. Plausibility / Internal Coherence

When participants rely on the logical or narrative consistency of the article itself to judge its truth, the label of *internal coherence* is applied. These responses indicate that the reader found the article plausible on its own terms, without needing to seek further information. This strategy can be epistemically useful in certain contexts (when coherence is linked to reliability), but it is also subject to confirmation bias and the persuasive effects of narrative structure (Green & Brock, 2000).

Reference:

Green, M. C., & Brock, T. C. (2000). The role of transportation in the persuasiveness of public narratives. *Journal of Personality and Social Psychology*, 79(5), 701–721.

14. Plausibility / Specific Plausibility

Specific plausibility occurs when the reader evaluates the post using personal experience, prior knowledge from school, or direct familiarity with the topic. This differs from general heuristics, as the knowledge invoked is content-specific and often justified with examples. While such knowledge can increase accuracy, it may also lead to overconfidence in one's subjective perspective (Nickerson, 1998).

Reference:

Nickerson, R. S. (1998). Confirmation bias: A ubiquitous phenomenon in many guises. *Review of General Psychology*, 2(2), 175–220.

15. Plausibility / General Plausibility

In contrast to specific knowledge, *general plausibility* involves intuitive judgments based on common sense, broad familiarity with the world, or general scientific literacy. Participants using this approach often express statements like “it makes sense” or “this seems realistic.” Although plausibility-based reasoning can be efficient, it is highly susceptible to cognitive biases and prior beliefs (Mercier, 2020).

Reference:

Mercier, H. (2020). *Not Born Yesterday: The Science of Who We Trust and What We Believe*. Princeton University Press. <https://doi.org/10.1515/9780691198842>

Additional meta-codes

16. External Search

This metacognitive label indicates whether a search for information was explicitly conducted, inferred from the response, or absent altogether. We distinguish between searches involving

multiple sources, single-source verification, declared searches without linked sources, and presumed searches based on linguistic cues. This classification allows for the analysis of behavioral patterns in digital inquiry (Hargittai et al., 2010).

Reference:

Hargittai, E., Fullerton, L., Menchen-Trevino, E., & Thomas, K. Y. (2010). Trust online: Young adults' evaluation of web content. *International Journal of Communication*, 4, 468–494.

17. Search Effectiveness

Finally, search effectiveness is assessed based on whether the participant's search led to an accurate and relevant conclusion. A search is coded as effective when (1) the factual judgment aligns with the actual veracity of the claim, and (2) the justification involves meaningful and pertinent evidence. Ineffective searches may result from misinterpretation, confirmation bias, or low-quality sources. This code is informed by research on information foraging and cognitive fit in web-based reasoning (Pirolli & Card, 1999).

Reference:

Pirolli, P., & Card, S. (1999). Information foraging. *Psychological Review*, 106(4), 643–675.

List of Instagram-like posts

All posts were based on news pieces the experimenters found on the web, and were selected and independently evaluated by pairs of researchers from the research team. Half of the posts were based on pseudoscientific claims and contained information that was shown to be unequivocally false or misleading by professional fact-checking organisations. The remaining half of the posts contained scientifically accurate claims supported by published scientific evidence. All the themes were selected based on scientific topics with neutral political resonance in order to avoid interference in evaluations with political motivated reasoning.

In particular, scientifically valid posts included statements about (i) the reasons behind the colour pink of flamingos, (ii) an HIV infection happened in a laboratory, and (iii) the results of a research where dead spiders were turned into ready-to-use actuators. On the other hand, invalid, pseudoscientific posts included statements about (i) weight-loss properties of dark chocolate, (ii) new archaeological results discussing the actual oldest pyramid known until now, and (iii) a cause-effect relationship between geoengineering and recent floods in Spain. Each post was linked to its original online source and accompanied by two emoji-buttons (i.e.,  and ) that redirected students to specific Padlet boards.

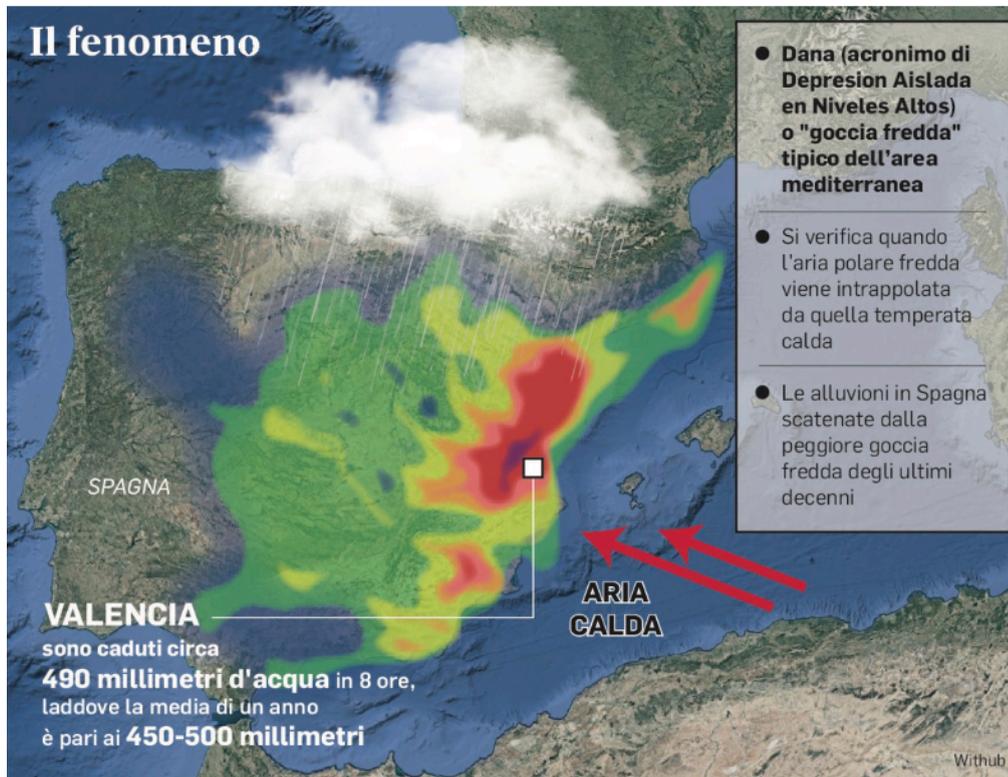
The list of Instagram-like posts provided through Notion can be found [here](#).

Please, find below all the Instagram-like posts used in the study.

Supplementary Figure 1



ilmessaggero  · Following



ilmessaggero Alluvione Spagna, colpa delle nuvole "inseminate" in Marocco? Due mesi fa l'allarme dei meteorologi iberici dell'agenzia meteorologica El Tiempo sottolineava che «l'attuazione di questi progetti suscita sospetti nella regione, soprattutto nelle zone vicine come il sud della Spagna».

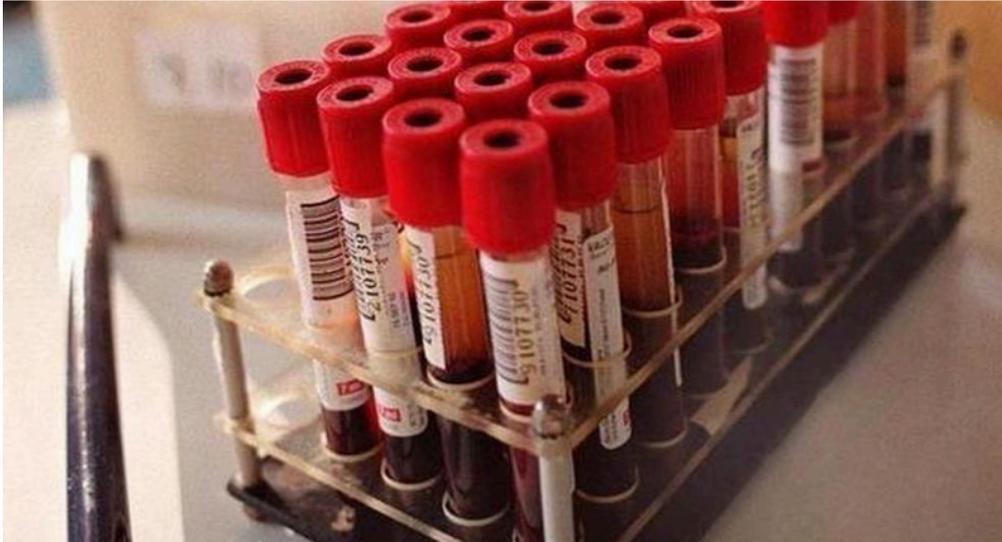


Legend: the Instagram-like post about a cause-effect relationship between geoengineering and recent floods in Spain.

Supplementary Figure 2



ilmessaggero  · Following



[Redacted]

ilmessaggero Manipola alcuni pezzi di HIV mentre prepara la tesi di laurea nel laboratorio di un'università straniera, e pochi mesi dopo scopre di aver contratto il virus. La vittima è un'ex studentessa, poi laureatasi in un'Università del Veneto.

[Redacted]

[Redacted]

Legend: the Instagram-like post about an HIV infection happened in a laboratory.

Supplementary Figure 3



ciboserio  · Following





ciboserio Volete dimagrire? Bene, allora mangiate cioccolato tutti i giorni...però fondente 😊

Uno studio della University of California di San Diego pubblicato su Archives of Internal Medicine sostiene infatti che il cioccolato fondente non faccia ingrassare, tutt'altro! E' un potente stimolo al dimagrimento e alla lipolisi, cioè fa bruciare grassi nel corpo molto efficacemente. Perché? Perché il cacao è ricco di epicatechina, un antiossidante che brucia grassi e addirittura migliora la massa muscolare.





Legend: the Instagram-like post about weight-loss properties of dark chocolate.

Supplementary Figure 4



geopop  · Following





geopop È possibile "rianimare" un ragno morto e trasformarlo in una pinza meccanica di precisione? Uno studio pubblicato sulla rivista *Advanced Science* sviluppato dal Preston Innovation Laboratory della Rice University sostiene che sì, è possibile.





Legend: the Instagram-like post about the results of a research where dead spiders were turned into ready-to-use actuators.

Supplementary Figure 5



Stop&GoTV  · Following



Stop&GoTV Di recente, uno studio pubblicato nell'ottobre 2023 ha rivelato che la piramide di Gunung Padang, sull'isola di Java, potrebbe essere la più antica conosciuta, con una datazione stimata tra 16 000 e 27 000 anni. Questo fatto mette in discussione la nostra conoscenza delle civiltà antiche, che si pensava fossero limitate alle strutture egizie, erette circa 4 500 anni prima della nostra era.



Legend: the Instagram-like post about a new archaeological results discussing the actual oldest pyramid known until now.

Supplementary Figure 6



geopop  · Following



geopop Perché i fenicotteri sono rosa? Uno studio condotto da Matthew J. Anderson dimostra che il piumaggio rosa dei fenicotteri dipende dalla loro dieta ricca di carotenoidi, presenti in alghe e piccoli crostacei. Questo colore non è solo estetico: si intensifica con l'età e segnala salute e vitalità, fondamentali per attrarre compagni durante la riproduzione.



Legend: the INstagram-like post about the reasons behind the colour pink of flamingos.