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EDITORIAL

On making things visible. Including ourselves

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Abstract: This editorial introduces a special issue on animation in science communication, situating the contributions within broader debates on mediation, representation, and knowledge production. It highlights three interconnected themes: the instrumental use of animation to translate complex scientific phenomena; the ethical tensions between accuracy, engagement, and transparency; and the collaborative, interdisciplinary practices that underpin contemporary visualisation. The issue also reflects on the epistemological limits of visual representation and the implications of current publishing models. Together, the contributions position animation not only as a communicative tool, but as an epistemic practice operating between science and society.

Keywords: animation; science communication; visualization; interdisciplinarity; epistemology

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1. Twelve numbers and the thirteenth, at last

As the readers who follow us perhaps know, *Mutual Images* journal was established in 2016 by the Mutual Images Research Association (MIRA), a scholarly, non-profit, and independent organisation committed to the study of the ever-changing cultural relations between Europe and Asia; and, more broadly, between specific national and regional contexts across these two vast cultural areas. The journal's field of interest has always been wide and deliberately porous: it encompasses visual media, popular culture, animation, comics, cinema, television, media studies, cultural history, and the analysis of mutual stereotypes and representations. What has remained constant across twelve numbers is the conviction that the meeting of cultures — often asymmetrical, always complex — produces images that deserve sustained scholarly attention.

Looking back at those twelve issues is an exercise that combines satisfaction and humility in equal measure. Satisfaction, because the journal has grown in scope, visibility, and authorial diversity: scholars from Australia, China, France, Germany, Italy, Japan, Singapore, Spain, the United Kingdom, the United States, and many other countries have published here,

and the range of disciplines and methodologies represented in our pages has expanded in ways we could not have anticipated at the outset. Humility, because we are acutely aware of the limitations that come with being a small, independent, non-funded journal run by a handful of dedicated people in their own time, without institutional support and without the resources that larger publications take for granted.

Those limitations bring us to something we owe our readers, contributors, and the wider scholarly community: a frank acknowledgement of the delays that have affected this number, and an apology for them. The submission deadline for no. 13 was generously set for mid-November 2025. The papers arrived, were reviewed through our standard double-blind peer-review process, were revised by their authors, and were cleared for publication. What then intervened was a combination of factors internal to our editorial process: a period of structural reorganisation affecting the journal's workflow, a redesign of our metadata standards, and, most significantly, an ongoing effort to re-index all previously published articles across a range of academic catalogues and bibliographic databases with a view to broadening the journal's visibility and accessibility from late 2026 onwards. This re-indexing work, which is a condition for our inclusion in several important scholarly directories and citation indices, has been as time-consuming as anticipated, and it has occupied much of the editorial team's capacity during the months when this number should have been finalised and published.

We are aware that delays in academic publishing are never merely administrative matters: they may affect the career progression of the scholars who have entrusted their work to us, the timeliness of research contributions, and the credibility of a journal that asks its authors to invest their time and expertise. We take these concerns seriously, and we commit to a more regular publication rhythm going forward. To all contributors who waited longer than they should have: we are genuinely grateful for your patience, and we hope that the quality of this issue goes some way toward justifying it.

2. Animation, science, and the "challenge of the invisible"

The articles gathered in this issue derive, for the most part, from papers presented at the international conference "Figuring the Invisible: The Role of Animation in the Communication of Scientific Knowledge" held on 15-16 December 2023 at the Lucerne University of Applied Sciences and Arts (HSLU). The conference was organised by Marco Bellano and Jlanit Schumacher, under the auspices of the Marie Skłodowska-Curie Global Research Project *Ficta SciO* (European Commission Horizon framework), whose central aim is to identify and raise awareness about the audiovisual conventions and communication tactics of animation in multimedia science outreach. The scientific committee included Marco Bellano himself with Tina Ohnmacht and Jürgen Haas.

A comprehensive introduction to this special number — situating the articles within the intellectual framework of the *Ficta SciO* project and the broader field of science communication and animation studies — has been prepared by the guest editor, Marco Bellano, and appears separately in these pages. What follows here is not a substitute for that introduction, but a complementary and more personal reading.

2.1. Animation as instrument and expression

One of the most striking features of this collection is the consistently instrumental orientation of its contributions. Animation here is not, in the main, treated as an autonomous expressive medium — the object of aesthetic or historical inquiry in its own right — but as a tool: a means to communicate science, to change behaviour, to dismantle stigma, to render perceptible what would otherwise remain hidden from view. This is not a criticism. The instrumental uses of animation constitute a rich and socially consequential domain of practice, and they are, as the *Ficta SciO* project recognises, underrepresented in animation scholarship relative to their cultural significance. But it is worth naming this orientation explicitly, because it shapes what the contributions ask of animation and what they find in it.

Across the papers, animation is mobilised "to make the invisible visible" in at least three registers. In health communication, it serves to translate medical data — the nutritional content of a meal, the immune response to a virus — into emotionally legible experiences that can motivate real-world behavioural change. In science outreach, it gives sensory form to phenomena that lie beyond direct human perception: the behaviour of black holes, subatomic particles, the biochemical architecture of a coral polyp. And in what we might call critical or reflexive communication, it raises questions about the nature of images themselves: about what it means to "see" something, and about the conditions under which we can claim that this or that visual representation is "truthful".

This last register is perhaps the most philosophically ambitious, and it is developed most forcefully in the contribution that sits, deliberately, at the close of the issue: a wide-ranging argument about computation, machine learning, and the epistemic crisis of the generated image. Where most of the other papers treat animation as a solution to the problem of invisibility — a way of making the unseen accessible — this final piece reframes the production of images itself as a problem, asking what happens to the evidentiary and communicative function of the visual when any image can be fabricated and distributed at speed. The tension between these two orientations — animation as illumination, animation (and image generation altogether) as potential deception — is not resolved in this issue, nor should it be. It is one of the defining tensions of our present moment, and it would be intellectually dishonest to paper over it.

2.2. Ethics of representation. Accuracy, engagement, honesty

A second thread running through virtually all the contributions is the ethical dimension of science visualisation: the question of how to balance accuracy with accessibility, scientific rigour with emotional engagement, fidelity to data with the demands of storytelling and aesthetic pleasure. This is not a new problem — it is, in some sense, as old as scientific illustration itself — but it appears in these pages with a freshness and urgency that reflects the expanded possibilities of contemporary media.

Several authors wrestle explicitly with the risks of oversimplification and misrepresentation. The dangers of using visual language in ways that exceed what the underlying data actually supports — a standard atom diagram that encodes a fundamentally misleading picture of atomic structure, a solar system representation that sacrifices scale to aesthetics — are discussed with a practical rigour that will be useful to anyone working in science communication. Alongside these risks, the same contributions identify a powerful countermeasure: transparency. A proposed framework distinguishing between original data, accurate simulation, designed

communication, and artistic interpretation offers a vocabulary for being explicit about the epistemic status of visual content: a vocabulary which, in an age of generative artificial intelligence and pervasive image fabrication, is more necessary than ever, as hinted at a few paragraphs earlier, in § 2.1.

At the same time, other contributions in this issue demonstrate that the pursuit of emotional engagement and narrative satisfaction is not inherently in tension with scientific integrity. A stylised, deliberately non-photorealistic VR environment can communicate nutritional information more effectively than a clinical data display; an animated short film can honour both the scientific intentions of its NASA collaborators and the expressive ambitions of its student animators; a mixed-technique documentary can anthropomorphise a researcher as the microscopic organism she studies without betraying the complexity of her work. The ethics of visual science communication, these papers suggest, is less a matter of choosing between accuracy and engagement than of finding forms — and maintaining a reflexive honesty about the choices made — that serve both.

2.3. Making the inscrutable visually comprehensible

There is a further dimension of this problem that the contributions in this issue touch on, and that deserves naming directly. Much of what animation and computer graphics have done for science communication has involved making the invisible not merely visible, but clean — legible, bounded, coloured, and scaled for a human eye that was never designed to perceive what it is being shown. The atoms in a chemistry textbook have neat orbits and clear borders; the planets of the solar system appear, in almost every illustration ever produced, at scales and distances that bear no relation to reality; the nebulae photographed by space telescopes glow with colours that are, in large part, the product of false-colour imaging and processing choices made by human operators.

This is understandable, and often necessary. A nucleus drawn to its true scale relative to its electron cloud would be invisible on any page. A solar system drawn to correct proportions would require most of its planets to be represented as specks too small to see. The aesthetic decisions embedded in scientific visualisation are not incidental: they are the condition of possibility for any visual communication of science at all. But they carry epistemological costs that are rarely made explicit, and that accumulate over time into a collective visual imagination of nature that may be, in fundamental ways, misleading.

The question becomes sharper when we move from the microscopic to the astronomical. The black hole at the narrative centre of the film *Interstellar* (by Christopher Nolan, 2014) — visualised by a team that included the physicist Kip Thorne, working from general-relativistic equations to produce what were, at the time, some of the most scientifically grounded dynamic images of a rotating black hole ever rendered — is a case worth pausing on. The images are extraordinary, and the physics behind them is serious. But are they comprehensible to a non-specialist audience in the way that matters most: not as spectacle, but as understanding? The spacecraft orbiting the event horizon is depicted at a scale legible to human perception; the black hole itself appears as a sphere, which is the correct topological intuition for a hole in three-dimensional space, but also an analogy that may smuggle in wrong assumptions about what a singularity actually is. The question is not whether the images are accurate — they are, within their assumptions — but whether the frame of accuracy is itself

communicable to those who do not already understand the physics behind all that.

This tension — between the image that is scientifically defensible and the image that is epistemically transparent to its audience — runs beneath the surface of several contributions in this issue. It also points toward a question that the field of science visualisation has not fully resolved: whether the goal of animated and illustrated science communication is to give audiences a correct impression of what things are, or a useful one, and whether these two goals can, in practice, always be pursued together. The cleaned-up, high-contrast, spectrally enhanced images that dominate science outreach — the crystalline atomic models, the vividly coloured cellular structures, the sharp-edged astronomical objects — are pedagogically powerful precisely because they are not what those things look like. The universe, at most scales accessible to scientific instruments, is noisy, ambiguous, and resistant to the kind of visual resolution that makes for a compelling educational image for us small, in so many ways at once mighty and limited, human beings. One might ask whether there is not also a place, in science communication, for images that preserve some of that noise that may let audiences encounter the genuine difficulty of *seeing*, rather than the reassuring clarity of having been shown.

2.4. Collaboration, interdisciplinarity, and the co-production of knowledge

A third shared characteristic of the contributions in this issue is their emphasis on collaboration: not as an incidental feature of the projects described, but as a methodological and even an epistemological value. Virtually every paper discusses, in varying degrees of detail, the processes by which scientists, animators, educators, medical professionals, students, children, and community members have worked together to produce forms of visual communication that none of them could have achieved alone.

What is notable is how consistently the contributors describe this collaboration as transformative: not merely additive, not a matter of scientists providing content while animators provide form, but a process in which the encounter between different ways of knowing produces something new. Scientists discover that their hand gestures, captured on film and translated into animation, convey dimensions of their understanding that their equations and graphs do not reach. Animators find that the discipline of scientific accuracy, far from cuffing their creativity, provides narrative and aesthetic constraints that can be generative. Children, given confocal microscopes and drawing paper, produce characters and worlds that illuminate the scientific phenomena they have just observed in ways that neither the scientists nor the animators had anticipated.

These are not isolated anecdotes, but structurally recurring features of the interdisciplinary practice described across the issue, and they point toward a model of science communication — and, more broadly, of knowledge production — in which the boundaries between expert and audience, between researcher and public, are productively blurred.

2.5. A note on geographic and cultural distribution

A candid editorial note is warranted here. The contributions to this number are geographically and culturally concentrated in ways that are worth acknowledging. The authorial voices represented in this issue come predominantly from Europe and North America — from Australia, Austria, Italy, and the United States. The most notable exception is the contribution from Singapore, itself a multilingual and multicultural city-state whose relationship to the categories of "Western" and "Eastern" is complex and not reducible to simple binaries; and even there, the research team is predominantly of Western institutional formation. The views from outside the Global North — and specifically those from East, South, and Southeast Asia — are largely absent from this collection.

This is a limitation that the guest editor and the editorial team are probably aware of, and it is one that reflects broader structural asymmetries in the fields from which these papers emerge. Animation studies, as a discipline, has made significant strides in recent years toward diversifying its geographic and cultural perspectives. For example, the two volumes edited by Tze-yue G. Hu and Masao Yokota, *Japanese Animation: East Asian Perspectives* and *Animating the Spirited* (both published by the University Press of Mississippi, in 2013 and 2020 respectively), among others, have done important work in foregrounding Asian perspectives on animation history, industry, and aesthetics that had been marginalised by the field's predominantly North Atlantic orientation. The study of science communication and science visualisation has been somewhat slower to undertake this kind of critical self-examination, though the urgency of doing so is recognised.

For *Mutual Images* journal, this asymmetry is more than a bibliographic observation. The journal's founding mission — to facilitate genuine intellectual exchange between European and Asian perspectives on cultural phenomena, visual media, and creative industries — makes the relative absence of Asian scholarly voices from a special issue published under its auspices a matter of some concern. The *FICTA SciO* project, which provided the conference from which this issue originated, is a European-funded initiative, and the conference itself took place in an Italian university: these institutional conditions go some way toward explaining the demographic of the contributions, but they do not make the imbalance less significant. We note it here not as self-criticism for its own sake, but as an invitation — to future contributors, to future guest editors, and to the research communities whose work we hope to host — to help us make this journal's pages more faithfully reflect the cross-cultural dialogue it was created to promote.

3. Independent, free, ethical

There is a conversation happening in the world of academic publishing that deserves to be named directly. Over the past decade, an increasing number of scholarly journals have adopted the "article processing charge" (APC) model: a system in which authors — or, more typically, their institutions or funders — pay substantial fees, often running to several hundreds or even thousand euros or dollars per article, to have their work published in open access. The fees vary, but they are rarely modest: major publishers charge anywhere from one thousand five hundred to over eleven thousand euros per article, and even some ostensibly mission-driven open-access publishers have adopted tariffs that effectively price out scholars from less affluent institutions or from countries without robust research funding systems.

The logic of this model is presented, almost universally, in the language of openness and democratisation: by shifting the cost from the reader to the author, it removes paywalls and makes scholarship freely available to anyone with an internet connection. This is a genuine good, and we do not dispute it. What we do dispute is the extent to which this model has, in practice, transferred significant financial power to commercial publishers, created new forms of inequity between well-funded and under-resourced researchers, and introduced perverse incentives: since a journal that charges per article has, structurally, a financial interest in accepting as many articles as possible, which is not an arrangement that naturally favours rigour and selectivity.

Mutual Images Journal charges nothing. Not to readers, and not to authors. We operate on the principle that scholarly knowledge should circulate freely, without financial gatekeeping of any kind; and we operate on it not because we have found a comfortable way to make it costless, but because we believe the principle matters enough to absorb the costs ourselves. The journal's editorial, technical, and administrative work is carried out by members of the Mutual Images Research Association on a voluntary basis, in time taken from teaching, research, and personal life. Our platform costs are borne by the Association directly. Our peer reviewers, like peer reviewers everywhere, give their expertise without remuneration. We mention none of this to solicit sympathy, but to be transparent about what independent, non-profit academic publishing actually involves.

We are not under the illusion that this model is scalable to all contexts, or that it is without cost — as the delays discussed in the first section of this editorial attest, there are things a journal without a budget simply cannot do as quickly or as smoothly as one with institutional support. But we believe there is something important in maintaining the existence of scholarly spaces that are not governed by market logic, that do not treat the production and dissemination of knowledge as a transaction, and that insist, perhaps stubbornly, that it is possible to publish rigorous, peer-reviewed, open-access scholarship without charging anyone for the privilege.

In a publishing landscape that has become, in many areas and contexts, so blatantly mercenary — and in which the pressure to publish in high-fee journals is felt especially acutely by early-career researchers and by scholars from the Global South, who are doubly disadvantaged by a system that rewards wealth as much as quality — we think this insistence has a modest but genuine ethical value.

We thank all the contributors to *Mutual Images Journal* no. 13, the reviewers who gave their time and expertise generously and anonymously, the guest editor, talented fellow scholar, and good friend Marco Bellano for the intellectual energy and scholarly care he brought to this number, and the readers — wherever they are reading, and in whatever circumstances — who continue to find something of value in these pages.

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