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TOWARDS REFUSING AS A CRITICAL TECHNICAL PRACTICE: STRUGGLING WITH HEGEMONIC COMPUTER VISION

Abstract

Computer Vision (CV) algorithms are overwhelmingly presented as efficient, impartial, and desirable further developments of datafication and automation. In reality, hegemonic CV is a particular way of seeing that operates under the goal of identifying and naming, classifying and quantifying, and generally organizing the visual world to support surveillance, be it military or commercial. This paradigm of Computer Vision forms a 'common sense' that is difficult to break from, and thus requires radical forms of antagonism. The goal of this article is to sketch how refusing CV can be part of a counter-hegemonic practice – be it the refusal to work or other, more creative, responses. The article begins by defining hegemonic CV, the 'common sense' that frames machine seeing as neutral and impartial, while ignoring its wide application for surveillance. Then, it discusses the emergent notion of refusal, and why critical technical practice can be a useful framework for questioning hegemonic sociotechnical systems. Finally, several potential paths for refusing hegemonic CV are outlined by engaging with different layers of the systems' 'stack.'

The computer scientist Joseph Redmon, creator of the widely-used Computer Vision library YOLO, announced in 2020 he would no longer be developing the algorithm he created. The reason for this is made clear in a paper he co-wrote on the new features of YOLO:

> But maybe a better question is: "What are we going to do with these detectors [Computer Vision algorithms] now that we have them?" A lot of the people doing this research are at Google and Facebook. I guess at least we know the technology is in good hands and definitely won't be used to harvest your personal information and sell it to... wait, you're saying that's exactly what it will be used for?? Oh. Well the other people heavily funding vision research are the military and they've never done anything horrible like killing lots of people with new technology oh wait....
> (Redmon and Farhadi 4)

This humorous – yet critical – paragraph is crowned by a footnote, which states: "The author is funded by the Office of Naval Research and Google." Redmon's refusal to continue his work with Computer Vision (CV) – algorithms of image analysis and recognition – builds upon his realization of the contribution he makes, as a computer scientist, to algorithms of oppression (see Noble; Ochigame) and their nefarious impacts in society (e.g. consumer surveillance, drone attacks, tracking of migrants by governments). Rather than trying to reform the system from the inside or find technical fixes to these problems, Redmon decided to refuse, to deny his labor as part of developing such technology.[1]

Redmon's refusal throws a wrench in the system, breaking from the hegemonic presentation of CV (and AI) as a way of making everything better, faster, and more innovative. The techno-utopian and techno-solutionist discourse on CV pushed by Silicon Valley companies and other tech/government entities presents these technologies as efficient, impartial, and desirable further developments of datafication and automation. In reality, CV operates under the goal of identifying and naming, classifying and quantifying, and generally organizing the visual world to support surveillance, be it military or commercial. This hegemonic paradigm of Computer Vision forms a "common sense" (Gramsci) that is difficult to break from, and thus requires radical forms of antagonism, refusal, and resistance.

My goal in this article is to sketch a scenario of refusing as a reaction to hegemonic CV, in order to help readers engage in their own practices of antagonism – be it the refusal to work as shown by Redmon or other, more creative, responses. I particularly engage with the notion of refusing because, as seen in Redmon's example, it shifts the discussion away from a reform of technical character and towards a more radical counterhegemonic practice. Towards this goal, I begin by briefly defining what I understand as hegemonic CV, the 'common sense' that frames machine seeing as neutral and impartial, while ignoring its wide application for surveillance. Afterwards, I discuss the notion of refusal, and why I think critical technical practice serves as a useful framework for questioning hegemonic sociotechnical systems. Finally, I outline several paths for refusing hegemonic CV by engaging with different layers of its stack. These potential resistance acts, as I show, can take shape in varied forms – artistic projects, activist initiatives, and community organizing can all offer counterhegemonic pathways for CV.

Hegemonic CV: The limited ways of seeing of surveillance, advertisement, and the military

Who makes Computer Vision algorithms? How are they being trained to see? What is made visible through these algorithmic ways of seeing, and what is otherwise ignored? The answer to these and many other questions points to the often-ignored sociotechnical complexity involved in the widespread adoption of CV. As they get implemented in smart cameras or automated cars, these algorithms carry within them not the capacity to 'see,' but that of making judgements over what in the visual world should be seen and how.

CV's algorithmic power emerges from how, through their affordances and materiality, it defines what is made understandable, datafied, visible. In this sense, Matteo Pasquinelli and Vladan Joler compare algorithms to lenses: "Instruments of measurement and perception always come with inbuilt aberrations. In the same way that the lenses of microscopes and telescopes are never perfectly curvilinear and smooth, the logical lenses of machine learning embody faults and biases" (2). This is much similar to Amoore's framing of algorithms as "aperture instruments," thus suggesting that it is through "the processes of feature extraction, reduction, and condensation" that "algorithms generate what is of interest in the data environment" (16). These analogies to other instruments of perception are useful because they help understand contemporary CV as one possible lens, with many other possibilities. Algorithmic models are always imperfect and biased towards something – as Amoore puts it, they're "always already partial accounts" (20).

The particular lens of the hegemonic Computer Vision today is made of many ideological decisions over how the visual world should be understood and processed, including the ontology and epistemology that should be used in this process (see Azar et al.). What I call hegemonic CV is the dominant paradigm of automated ways of seeing, directly connected to surveillance, both military and commercial (e.g. automated military drones and biased proctoring systems). This paradigm is not directly stated or enforced, operating through consent and culture rather than force. Much as described by Gramsci, and later extended by Laclau and Mouffe, hegemonic ideological formations are produced and negotiated as the outcome of constant struggles for power, emerging from a wider cultural/social history. What's crucial is that they get sedimented as a "common sense" (Gramsci),[2] an "accumulation of taken-for-granted 'knowledge'" (Crehan 43). These collections of beliefs and ideas are "not a single unique conception, identical in time and space," (Gramsci 343) but fragmentary and contradictory, "a product of history and a part of the historical process" (327). Ultimately, 'common sense' makes it difficult to imagine alternative lenses to see the world: as hegemonic CV further entrenches itself in our lives, our human ways of seeing and wider societal processes are changed (see Cox).

CV is just one of the many data capitalist/colonialist algorithmic operations through which value is extracted from appropriating people's data, be it their face, their pictures, or other visual material (Couldry and Mejias). The main imperatives of 'smart technologies' such as hegemonic CV is extracting more data from all sources possible, while also "creating systems that monitor, manage, and manipulate the world and people" (Sadowski 9). In Sarah Myers West's words, this operation is marked by a change in power relations:

"Access to data, and the ability to transform raw data into useful information, is asymmetrical, and power lies in the institutions with the technical and economic resources to render it intelligible" (37). Hegemonic CV is based on these structural conditions and built upon their limitations, thus operating in order to meaningfully limit who gets to see and who is seen – making itself into a crucial site of centralized and unequal surveillance and data extraction.

Hegemonic CV intentionally focuses on efficiency and scalability, diverging attention from its unequal power structures and the many problems involved in its limited perception of the visual world. Hegemonic CV presents itself as objective, hiding its deep commitments to military and surveillant ways of seeing formed by Western, white, and capitalist frames (Silva; Silva et al.; Buolamwini and Gebru; Mirzoeff; Pereira and Moreschi). As scholars have demonstrated time and again, supporting these structural inequalities are, among other issues, exploitative labor practices (Tubaro et al.; Irani "The Cultural Work of Microwork") and problematic data sets (Thylstrup; Harvey and LaPlace; Prabhu and Birhane; Crawford and Paglen). Furthermore, there are many intended and unintended, known and unknown, consequences of Computer Vision, which are mostly ignored in exchange for rapid deployment and profit (McCosker and Wilken).

Despite the many ways CV could have been formed, my argument is that a 'common sense' has emerged that frames CV in a particular way that's not just, equitable, and reflexive. As Markham describes, hegemonic algorithmic imaginaries perform a "discursive closure," cutting off alternatives that seek to work in a different way (3). Understanding the existence of a hegemonic CV allows to better think about possible oppositions, resistances, and alternatives to its outsized hegemony.

As described by Raymond Williams,

It can be persuasively argued that all or nearly all initiatives and contributions, even when they take on manifestly alternative or oppositional forms, are in practice tied to the hegemonic: that the dominant culture, so to say, at once produces and limits its own forms of counter-culture. (114)

The conceptualization of hegemony enables thinking of our practice as part of wider struggles for re-constituting these systems. The notion of refusing departs from understanding that counterhegemonic struggles are responses constructed in the interstices of hegemonic forms. That is, even though we may try to re-imagine CV, we're still located in relation to this dominant system.

Why a Critical Technical Practice, and the case for refusing as a verb

Redmon's refusal to continue working in Computer Vision uses his privileged position to throw a wrench in the gears of hegemonic CV, helping to both expose these harmful technologies and delay their development. The book "Breaking Things at Work" by the scholar Gavin Mueller presents a long vision of how workers, not unlike Redmon, have for long resisted the expansion of automation, seeing these "new machines as weapons wielded against them in their struggles for a better life" (e-book). Mueller suggests how Luddism – multiple forms of collective resistance to uncontrolled technological development – can form a decelerationist political project to challenge the continuous development and deployment of technologies. Such

a Luddite approach sees technology as a site of struggle in which antagonism is necessary to challenge hegemonic goals and assumptions – subverting technological control to regain power for workers. Mueller's analysis of the Luddites crucially defines refusal as part of a generative politics – not only breaking machines and sabotage, but also forms of struggle such as that over policy and legislation. It means not only to say no to the development of new technical systems, but also to actively envision how we can center other values and paradigms.

All through industry, activism, policy, and research there are increased calls that center rejection (saying "no") as a strategy to combat the problems caused by algorithm development and deployment in society. Just to cite a few recent calls: the "Feminist Data Manifest-No" proposes 10 points of refusal for harmful data regimes; Seeta Peña Gangadharan discusses people's unwillingness "to accept data-driven systems in the terms and conditions that government or private actors present to us" (3); Sarah Hamid, in a remarkable interview, argues for abolishing "carceral technologies," and organizing "against the logics, relationships, and systems that scaffold their existence"; and Chelsea Barabas suggests tech designers should "turn down requests and opportunities to build technologies that are likely to produce harm." All of these pleas are located in a wider global environment in which tech workers have been putting pressure on companies' unethical developments, as shown in the case of Google workers' refusal to build *Project Maven* and the *Tech Won't Build It* activist group.

The goal of refusing is compelling, and these initiatives make visible how it is both an important and historically efficient way of antagonizing hegemonic technological systems. There are certainly many ways such disposition can operate, and I'll focus here on just one of them: the concept of "critical technical practice" (referred here as CTP). In his seminal text conceptualizing the term, "Toward a Critical Technical Practice: Lessons Learned in Trying to Reform AI," Phil Agre recognizes "computing has been constituted as a kind of imperialism; it aims to reinvent virtually every other site of practice in its own image" (131). Agre's CTP emerges from his own personal story as a computer scientist that only after some time began to realize the political, social, and cultural constitution of technology, therefore suggesting how practice should avoid the separation between computer science and critical reflection (social sciences and humanities). Practitioners would work interdisciplinarily, "one foot planted in the craft work of design and the other foot planted in the reflexive work of critique," in order to create alternative formations by "figur[ing] software as a technical, cultural, and interpersonal object" (Harwood 32).

The problem I see in the conceptualization of CTP brought by Agre is that, as it was created over 20 years ago, it is somewhat detached from the current historical momentum. It defines the need to "reform AI," refusing major revolutions and believing that change can be brought through individual practitioners and their "intrapersonal" critical consciousness. The notion of CTP has been further adapted through the past two decades, as scholars/practitioners have spun it into a wide range of directions such as reflective design (e.g. Phoebe Sengers, Matt Ratto, Garnet Hertz, Alan Blackwell, Shaowen and Jeffrey Bardzell) or artistic practice (e.g. YoHa and Matthew Fuller, Winnie Soon). This body of work has solidified CTP as a key conceptualization for thinking of technological practice as a mode of critique – making computation as a way of understanding and re-thinking computation itself.

Much as these developments have been important, I suggest CTP now needs to be further updated with contemporary notions of collective resistance, as well as more radical forms of antagonism and resistance. Agre himself acknowledged that critical research that worked from inside the system – including his own – could be quickly appropriated by the industry or the military. This further suggests how the goal of reform (or critiquing from the inside) can end up being innocuous, and reinforces the need for practices that defy institutionalization and that more strongly reject the 'common sense'.

As hegemonic CV has become particularly entrenched, my argument is to use CTP to engage with radical contemporary proposals for refusing. Rather than simply building more stuff, or building better, this means centering considerations about what not to build, and of more strongly thinking about building as a way of creating alternatives. The concept of "refusing" allows us to abandon the need for technical fixes and solutionism, and instead supports a multifaceted, activist disposition through different approaches, including arts, activism, community organizing, and research. Refusing as a practice is not just for those who have coding or technical skills. Much to the contrary, it needs to engage with the stack of technological systems from their labor practices to their philosophical underpinnings.

A practice that centers 'refusing' doesn't necessarily mean not using AI or algorithms, but breaking from its hegemonic paradigms to imagine how they could be different if they could center marginalized perspectives. Refusing, importantly, is to go against the tech/AI hype (Vinsel) and instead show how and when these technologies may not work as supposed. Moreover, and paraphrasing Agre in *Your Face Is Not a Bar Code*, this means understanding that surveillant technologies will "work well enough to be dangerous, and poorly enough to be dangerous as well."

Finally, 'refusing' as a lens for a critical technical practice is not a negative, but a generative proposition – therefore always a verb indicating a continuous struggle. It's not just saying "no," but understanding how technology is located within a wider array of historical, social, and cultural conditions. It, drawing for the work of data feminism, needs to "name and challenge sexism and other forces of oppression, as well as… seek to create more just, equitable, and livable futures" (D'Ignazio and Klein 6). As the artist and researcher Caroline Sinders proposes, our practice needs to be "productive, as well as provocative," operating as "band aids": "not meant to create an end to all other potential solutions, but serve to offer rather, temporary or open-source fixes for gaps in equity and violence created by society and are poetic witnesses of those gaps." Refusing needs to be an interdisciplinary practice that aims to affect the world, moving beyond the practitioner and attempting to disrupt hegemonic structures of power and make change. Refusing both breaks the system in operation and creates alternative systems.

Speculations on what refusing can mean across the 'stack' of hegemonic CV

I will now focus on the particular case of Computer Vision, to highlight potential directions refusing as a critical technical practice may take when engaging with such technologies. CV, as any other algorithmic technology, is tremendously complex, formed of many different interlocking social, cultural, economic, and legal aspects. Any attempt at considering such wide scale systems is necessarily partial, focusing only on some parts

of the whole. One attempt at looking at the 'stack' of CV has been suggested by Azar, Cox, and Impett, a "vertical cartography" comprised of six different levels (10). While their original goal was organizing critical scholarly responses in the field, I aim here to use these layers to envision sites of refusing interventions by artists, researchers, and activists. For this, I both point to important initiatives in the field and the gaps that I think still remain to be intervened on. I hope, with this, to offer more questions than answers and suggest critical pathways for a counter-hegemonic practice:

> *(1) Social level (where are such systems deployed, by whom, for what purpose)*
>
> *At this level, it's possible to critique and reject systems that are being deployed, as well as imagine alternative technological formations. How can practitioners expose the nefarious impacts of CV, including the way these systems concentrate power and affect the most marginalized? For example, the* Coveillance *project (coveillance.org), aims to map surveillant technologies in the city space, creating workshops such as "A walking tour of surveillance infrastructure in Seattle," in which the deployment of smart cameras are discussed by organizers and the public.*
> *What technologies shouldn't be used at all? And how can practitioners act on the creation of alternative institutions for this emergent regulation and policy of technology? A particularly powerful example of this is the* Seattle Surveillance Ordinance, *which has sought to create new systems for the regulation of technologies by involving the affected communities (Lee; Young*

et al). The Ordinance *sought to involve citizens in approving or rejecting emergent technology uses, such as Automated License Plate Readers (ALPR). By creating the possibility of curtailing the operation of these systems, or at least exposing them, the* Seattle Ordinance *is a major example of how refusal can take place in a policy, activism, and community organizing sense.*
Here also lies the discussion on the workers behind CV algorithms. What kinds of actions are possible to allow them to refuse creating certain technologies? Could CV developers refuse the use of their code by the military and big tech companies? The case of Redmon, discussed in the introduction, is just one of many attempts by tech workers to organize and find agency in their labor, a practice in which activists play a major role (Mueller). However, how can practitioners also involve other workers, that are often not given much power in the system, the possibility of antagonizing the development of CV? (see e.g. the work of xtine burrough with Amazon Mechanical Turkers).

> *(2) Computational level (which problems are being solved: e.g. 'object detection')*
>
> *Refusing CV's hegemonic ideology of surveillance and tracking, could other 'problems' be solved? Hegemonic CV focuses mostly on detecting and classifying according to efficiency-oriented parameters. One possibility is the use of CV from a disobedient gaze, "surveilling the most powerful, as opposed to those marginalized" (Pereira 154; see also Barabas et al.). An example of this is* VFRAME,

by Adam Harvey and Jules LaPlace, which seeks to create AI/CV tools for human rights uses, including a "Munition Detector" which could locate illegal munitions and support the work of activists.

What if, instead of the obsession for solving problems, CV focused on "errors, glitches, and inefficiencies of these systems both as a sign of their limitations and as a way to think otherwise" (Pereira 156)? This form of refusal suggests the embrace of error, indeterminacy, opacity, and situated-ness instead of the solution of bias and partiality (Amoore). This means using algorithmic ways of seeing as ways for exploring alternative visibilities and to create new connections that couldn't be otherwise (see Pereira and Moreschi for an example of using CV to look at artworks through the lens of error).

(3) Data level (who labels, which images are chosen, who takes the photographs)

How can we refuse problematic data sets and their troubled histories? Vinay Prabhu and Abeba Birhane even name computer vision a pyrrhic win due to the "problematic practices and consequences of large scale vision datasets" (1). Data sets often rely on the extraction of images without agreement from users (see Harvey & LaPlace; Thylstrup), use precarious labor of Amazon Mechanical Turkers (Irani, "Justice for 'Data Janitors'"), as well as orgazine seeing through labels that encode racist, classist, and sexist histories (Hanna et al.; Crawford and Paglen; Smits and Wevers). How can designers instead create datasets in

ways that are more just, operating other ways of collecting, curating, and organizing images? The project Feminist Data Set, by researcher and artist Caroline Sinders asked this question, and through the period of many years has been holding work-shops and forums to collaboratively investigate these questions in the case of a chat bot. The outcome of this project hasn't been (and won't be) an ultimate response, but different tools and examinations on what data sets could look like if data sets were thought from a feminist lens.

It's important to also consider how im-age data sets are themselves partial, reflecting a selective gaze on what could/should be included in the crea-tion of CV. What becomes possible if, for example, there wasn't an expecta-tion of bigness in data sets, with a practice focusing on small data? (see e.g. Eifler's project Prosthetic Memory for an example of a custom-made one-person machine learning tool). And, finally, what if even the idea of collecting images/data is refused, and instead CV is trained on computation-ally manufactured image data? Could that open a way of not even needing to collect people's image data at all? (see e.g. Harvey's VFRAME project).

(4) Algorithmic/representational level (e.g. Siamese convolutional neural network with Adam gradient descent optimization)

Though much discussion critical of hegemonic CV has tended to focus on the "data problem" (Hooker), the algorithm is crucial in defining which ways of seeing are possible, what data are valued, and the particular modes

through which problems are solved. How could we refuse current modes of measuring and quantifying? Outside of the field of CV, Rodrigo Ochigame has written about the historical construction of alternative search algorithms in Cuba and Brazil, which evaded hegemonic notions of 'relevance.' Departing from examples like this, how could machine ways of seeing break from predictive models and the simple flattening of the visual space through tags/descriptions?

This also relates to how computer code is created and the assumptions that go into its development. Much practice, for example within Software Studies (Soon and Cox), seeks precisely to queer code, breaking with the binary in algorithmic operations through the practice of coding. This practice based on software art goes beyond the purely technical to engage with the writing of code as potentially also poetic, critical, and material. How could the code of CV be made more visible, refusing its disappearance into technical infrastructures? An example of this is the work of the Brazilian artist Waldemar Cordeiro, who over 50 years ago experimented with ways images could be represented and analyzed by creating his own computer algorithms.

(5) Implementation/physical level (abor. Tensorflow on cuDNN/CUDA on Nvidia GPU)

Where are the physical structures of CV located, and who owns them? This question leads to a political economy of infrastructures and to considering what infrastructures could instead be used for doing this work. How

could CV be developed in ways that decentralize away from the power of Amazon's AWS or the Microsoft Cloud? Could these alternative CV infrastructures allow individual practitioners to operate away from the control of tech companies? Likewise, could these computational systems be developed in ways that are based on nature rather than continuous extractivism? The Low Tech Magazine *(solar.lowtechmagazine.com) points to alternative directions by hosting a static website entirely through solar energy. These low-tech perspectives could very much change how CV is practiced, potentially away from centralized large-scale image data.*

(6) Philosophical/axiomatic level (e.g. vision as inverse graphics)

This is the hardest level to refuse because the philosophical underpinnings that contemporary CV stands on are particularly hegemonic. How could CV operate from completely different values and theories? Perhaps most importantly of all, how could CV refuse whiteness and colonialism, and its problematic categorizations and standardizations? As phrased by Rachel Adams, decolonial thought needs "to make intelligible, to critique, and to seek to undo the logics and politics of race and coloniality that continue to operate in technologies and imaginaries associated with AI in ways that exclude, delimit, and degrade other ways of knowing, living, and being that do not align with the hegemony of Western reason" (190). In this sense, Couldry and Mejias remind us that it is not enough to fight colonial rationality with individual tactics, but to engage

in collective resistance (much like the Luddites).

A goal for practice then needs to be the much wider change on how data and algorithms are rationalized, which can only happen through alternative institutions and networks of practice. Though not focused on CV, Sabelo Mhlambi has written on how Ubuntu philosophies could change AI's paradigms. He suggests AI could operate away from its dominant culture of personhood based on rationality and individualism. The Ubuntu framework for personhood is based on relationality and different principles: "solidarity, reconciliation, equality, equity, and community" (15). What would it mean to, in fact, put these into practice as guiding notions in CV policy, for example?

Considering refusal as part of this wider stack serves to argue that counterhegemonic responses can happen across different areas, even in places that so far remain little acknowledged. It shows how refusal can have many different facets and intensities beyond the work of computer scientists like Redmon. It importantly highlights the radical work being done by activists, artists, community organizers, researchers, etc. While useful, this stack is just one of many possible cartographies of action. The *Stop LAPD Spying* activist group, for example, suggests a framework for mapping surveillance divided on different layers: "Ideological, Institutional, Operational, and Community." Such a way of mapping illuminates how practice also needs to consider how communities should be involved in the creation and use of CV. Which communities should be centered that haven't yet, and which are being marginalized by CV use? This essay only hopes to serve as a starting point, so I leave it to you, the reader, to consider what other 'counter-cartographies'

of refusing are possible, and how they can support your practice.

Conclusion: Performing alternatives, bearing witness to limitations

When the computer scientist Joseph Redmon decided to refuse to work in the field of Computer Vision, due to his perception of the harms and injustices these technologies were causing, he threw a wrench in the system. Hegemonic Computer Vision advances these algorithms as natural developments, neutral and impartial operations, even though they're mostly used for supporting multiple forms of surveillance. In this article, I've demonstrated how refusing is a powerful counter-hegemonic stance to this 'common sense,' especially through personal and collective antagonism to uncontrolled technological development. Bridging this stance with critical technical practice's focus on developing reflexive practices between social and technical can serve to perform alternatives and pave the way to radical reimaginations – or at least create some 'band-aids' that bear witness to how much work we still need to do.

We needn't only reform CV, but to depart from an active refusal of its ideology and organizations, completely breaking it apart in pieces before building something new. Our goal is not to "fix" these technological formations, but to refuse the unsettling 'common sense' of technological progress through action. Much like the Luddites, refusing to work and sabotaging, but also building new ways of seeing and generating new collective engagements with the visual world.

Notes

[1] We also have to be somewhat critical of Redmon's refusal to build CV, particularly his late realization of what he was doing and his privileged position to refuse work while still being a white male US-American grad student (see the movie *The Social Dilemma* for an infuriating example of late realizations by privileged computer scientists).

[2] What I refer as 'common sense' is originally referred by Gramsci, in Italian, as *senso commune*. Although 'common sense' is the adopted English translation, it is important to make clear that the Italian term used by Gramsci does not have the connotation of a good and reasonable judgement, which is instead referred to as *buon senso* ('good sense'; see Crehan 43-58).

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