On Attention and Norms: An Opinionated Review of Recent Work  
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How might attention intersect with normative issues and the psychology surrounding them? This survey connects three phenomena discussed in ethics and epistemology: salience, vigilance (attunement) and attentional character. I connect these phenomena drawing on an empirical understanding of attention and bias in the biology of human agents that enriches the relevant psychology.

Section 1 establishes a common ground conception of attention that is no more controversial than the established empirical paradigms for attention. This allows for an explication of bias needed to explain action and attention, an explication that is both biological and philosophical. With this in place, I emphasize historical biases associated with learning and experience. Section 2 presents an analysis of automaticity and control, concepts needed for an adequate characterization of skill. Historical biases are revealed as automatic, so not controlled through intention. The automatization of attention is central to acquiring skills and excellence in light of normative standards. Section 3 argues that salience involves the deployment of attention, while section 4 characterizes vigilance not merely as a disposition but as an active orientation to attend. Vigilance is one type of attunement, and the set of attunements constitute the agent’s varied orientations to deploy attention. This informs the idea of attentional character as the goal of a normatively sensitive upbringing where appropriate attention is automatized through learning. Section 6 draws on these lessons to assess one common form of epistemic bias in academia and attempts to debias to establish virtuous attentional character.

1. The Science of Attention

Since William James’s time, scientists have complained that attention is ill-defined. Yet James assured us that “everyone knows what attention is”:

> It is the taking possession by the mind, in clear and vivid form, of one out of what seem several simultaneously possible objects or trains of thought. Focalization, concentration, of consciousness are of its essence. It implies withdrawal from some things in order to deal effectively with others.

Here, James emphasizes selectivity by a subject in mentally taking possession of attention’s target relative to other potential targets in perception and thought where selectivity focuses consciousness. Crucially, the selectivity enables the subject to deal with what is selected.

The “to deal with” gloss fixes the common but faulty textbook definition of attention as selection for further processing. Counterexamples to this abound. Not every selective information process is a form of attention. To pick a neural case, the retina selects information carried by specific wavelengths of light for further processing but there is no attention on the retina. Mere selection captures too much. James’ characterization identifies the type of selection that constitutes attention, selection to guide action.
Experimental methodology builds on this. Selection to deal with things is implemented in the standard paradigms used to study attention and guides design of new experiments. If so, the Jamesian idea, or an entailment of it, is a methodological assumption in the science of attention. To study attention to target type $T$, the scientist must ensure that the experimental subject is attending to $T$ during the experiment. How so? Every experimentalist knows what to do: design a task such that one correctly performs it if and only if one selects $T$ in responding to it as instructed. This standard draws on an empirical sufficient condition, a consequence of James’ condition:

if S mentally selects $T$ to perform task $A$, then S attends to $T$ in doing $A$.

Since selecting $T$ is a necessary condition for correct performance, experimental measures give evidence of appropriate attention. In enjoining the subject to select $T$ in doing $A$, attention to $A$ is set.

Consider the first contemporary paradigm of attention, *dichotic listening* (Cherry 1953): a subject hears two verbal streams, one in each ear, and their auditory attention is directed to one of the two streams by instructing them to verbally parrot it, i.e. to select the stream to guide response. In the figure, the subject parrots the left verbal stream (underlined words) as instructed:

![Figure 1](image)

The man opened the gate and picked up the paper.

A car drove by as we strolled along the dirt road.

The man opened the gate and picked up the paper.
This is just the subject’s selection of one among two things to deal with (parrot). The general point is that the form of attention studied in science is tied to the selective guidance of behavior.

In affirming a science of attention methodologically centered on selection for guiding behavior, one endorses a part of the Jamesian conception. A folk-psychological posit expressed in James’ articulation of common knowledge informs the methodological assumption in cognitive science, not surprisingly since scientists are folk too. Hence, the empirical answer to the question, “What is attention?” is: the science of attention studies the mind’s selecting something to deal with in responding to things. Call this the common ground conception.

This common ground links work at multiple levels of analysis. After all, the behavioral and neural data deployed in computational modeling is collected with paradigms built on the empirical sufficient condition. To see this unification, consider biases, a causal factor needed to produce action. Take Buridan’s donkey as an illustrative case. The donkey confronts two qualitatively identical bales of hay. In the story, there is no basis for choosing one over the other, and nothing internal or external compels a choice. As a result, the donkey never acts, never selects one bale to eat, ending in starvation and death. We can depict the donkey’s decision problem as follows:

This diagram connects the donkey’s visual experience of each bale (two left inputs) to a response (right output), so depicts two possible visually-guided actions. We can characterize the paths, each visually guided actions, competing for the right to be expressed. Buridan’s fable...
illustrates a Selection Problem. In actions of epistemic and ethical concern, a Selection Problem must be solved. For the donkey, life requires resolution of action competition. This is the role of the bias. With a bias, the donkey acts. A bias might be a decision to eat the right bale or it might be driven by a change in the environment, the sun suddenly shining on the right bale. These two biases are often empirically characterized as top-down or bottom-up influences on attention.

The philosophical analysis of bias through the Selection Problem is enriched via empirical-computational models. The link is attention. First, run “modus ponens” on Figure 2 using the empirical sufficient condition. That is, solving the Selection Problem satisfies the antecedent of the conditional, so locates attention in agency.

Say that the bias is a decision to eat the right bale. The donkey then visually selects one bale rather than the other in order to eat it. Thus, in acting, the donkey attends to the bale eaten.

The previous discussion, a bit of philosophical psychology, if correct, should be grounded in actual biology. Drawing these connections provides an empirical check on the adequacy of philosophical theories of mind. This can be done for the model of attention and action just bruited. Consider the biased competition model of attention (Desimone and Duncan 1995). If a subject faces a Buridan Selection Problem, then so does the subject’s brain. One popular model, divisive normalization, implements biased competition. Here is the version due to John Reynolds and David Heeger (2009):
We begin with a Buridan Selection Problem in Figure 4: two stimuli, one left and one right of the central fixation dot where the subject keeps eyes fixed. In this example, the stimuli are qualitatively identical vertical lines (typically contrast figures or Gabor patches). What is modeled in the dark squares is the activity of visual neurons. The stimulus drive represents neurons that respond to one of two stimuli. As depicted each vertical line corresponds to neurons responding to the left or right patch, with the intensity of the line indicating the activity of neurons with different tunings to orientation. The brighter the area of the line, the stronger the response in the neurons represented. Notice that the stimulus drive gives us a neural implementation of a Buridan Selection Problem, the brain’s not differentiating between two qualitatively identical stimuli. Now, to act, the donkey and its brain must prioritize a target. Prioritization is reflected in the output population response that depicts a shift to greater activity in neurons sensitive to the right stimulus with suppression of the left (“withdrawal”) as indicated in the increased brightness of the right vertical line relative to the left (compare also the intensity of these lines as compared with their intensity in the stimulus drive).

This resolution of competition is explained partly by the neural bias of the attention field. In the experiment, the subject receives a cue that the right stimulus is to be acted on, so the subject forms an intention to act on it. Accordingly, the content of the attention field carries that information in the form of a strong rightward spatial bias (bright right vertical line centered on the location of the cued target). This bias signal is multiplied with the stimulus drive. The result is a resolution of competition between the stimuli in favor of the task relevant stimulus. The output response of the population of neurons to the task relevant target might be the
neural basis of the subject’s attending to the target (salience, Section 3) or of an active propensity to attend (vigilance, Section 4).

The figures tell a unified story linked by the empirical sufficient condition:

(a) As in Figure 1, a conception of the task, what the subject does, and a connected notion of attention as selection of a target to inform the subject’s response;
(b) Related to Figure 1 and 2, behavioral data that shows that the subject performs the instructed task, demonstrating that attention is appropriately directed;
(c) In Figure 3, correlated neural activity that tracks task information and its selective processing; and
(d) In Figure 3, a computational model that links the biased resolution of neural competition to selectively inform behavior, the neural biasing partly explaining behavioral biasing.

The reason the science matters is that it provides evidence that philosophical psychology does in fact capture lived agency, here the influence of intention as a bias that resolves competition, yielding attention and action. We cannot canvas all the relevant science in what follows, but the previous discussion shows how philosophers should ideally proceed in providing empirical friction to armchair reflection, thereby validating that theories in philosophy of mind identify not merely possible constructs, but ones actualized in biology. In connecting philosophy to empirical psychology and neuroscience, we have drawn on a common ground view of attention that is no more controversial than the experimental paradigms built on it. There is more to say about attention, but in saying more, we should not jettison this fixed point on which folk and empirical psychology converge.¹

2. Automaticity, Control and Hysteresis

Section 1 explicates bias. Divisive normalization provides one account of a top-down bias from the agent’s task representation (intention). If an intention to act on target T sets attention to T, then the subject’s intention controls her attention—and action. Notice that if the intention is to harm T, say to racially discriminate against a person T, then we have an intentional negative bias.

Attention, however, can also be automatic and, where attention harms, it sometimes emerges from negative automatic biases (cf. implicit biases). The empirical literature has long drawn on a contrast between automatic and controlled process, perhaps most familiar to philosophers in the contrast between System 1 and System 2 processing (Evans and Stanovich 2013). Yet cognitive scientists have eschewed defining automaticity and control, opting for coarse characterizations of the features of these two types of processes. I have argued that when this assumption of distinct processing kinds is conjoined with two truths about human agency, a paradox of automaticity arises (Wu 2013):

1. Intentional action is a paradigmatic form of control
2. Intentional action is substantially automatic.

¹ For more discussion of the issues raised here and related matters, see Wu (forthcoming) Chps. 1 and 2.
3. An automatic process is not controlled and vice versa

(3), the Simple Connection, figures centrally in psychological theorizing yet cannot be consistently conjoined with (1) and (2) since (1) and (3) imply the negation of (2) if we take intentional action as a process. Rejecting (3) jettisons a fundamental assumption in cognitive science.

We render the claims consistent by dropping the standard interpretation of (3) that treats automatic and controlled processes are distinct kinds. Given (1) and (2), intentional action is an automatic and controlled process. The solution is to relativize automaticity and control to features of a process. So

A feature $F$ of an action $A$ is controlled iff $A$’s having $F$ is due to the agent intending to $A$ in an $F$ way.

Consider Elizabeth Anscombe’s (1957) discussion of action as intentional under a description, say as a doing $F$. Given the Simple Connection, if feature $F$ is controlled at a time, then $F$ is not automatic at that time. Notably, most features of action are not intended, so are automatic. The proposal renders consistent (1)-(3) and yields a precise analysis of automaticity and control fixed conceptually by the three propositions.

We can merge this analysis with the inclusion of historical biases on attention (hysteresis) (Awh, Belopolsky, and Theeuwes 2012). This third factor enriches the traditional bottom-up/top-down contrast. We can capture this along with identifying (non-exhaustively) a number of historical biases as follows (cf. (Todd and Manaligod 2018)):
Keeping ourselves honest about the biology of agency, divisive normalization provides one explication of top-down bias while saliency maps, noted in the next section provide an account of bottom-up bias. Since control is tied to top-down biasing, the rest of the influences are defined as automatic. Hence, hysteresis marks automatic biases on attention.

I now turn to the aforementioned attentional phenomena of normative significance which reflect different types of bias explicated on the philosophical-empirical action framework (Figures 1-5). The frame does not entail normative conclusions but yields a biologically plausible, detailed perspective on the background psychology. If discussions of norms entail psychological consequences, then an adequate normative psychology requires engaging actual psychology as we empirically understand it. The scientific details enrich our understanding of the intricacies and contours of normatively consequential actions and their psychological background. That this enrichment can provide a broader psychological basis for, say, exculpation, due to understanding cognitive limitations (see Section 5) is not the central message. Rather, the enrichment enhances understanding of agentive capacities to do well as part of living well. Attentional phenomena are an essential part of meeting normative requirements with skill and expertise: normative salience to the subject is constituted by appropriate attention while vigilance is an active readiness to attend, a specific type of attunement to the environment, the set of the subject’s attentional proclivities that constitute their attentional character, for example, good character, acquired through learning and experience.

3. Salience

The common ground view of attention links attention to agency. This secures the normative assessment of attention since agency is subject to such assessment. Still, attention might bring out distinct normative requirements, and this is a topic of recent discussion (Watzl 2022). Focusing on moral psychology, I begin with recent work on salience/priority (for a recent collection, see (Archer 2022a)). I emphasize ethical implications but similar issues arise in epistemology (for an overview, see Gardiner (2022) and detailed discussion in Fairweather and Montemayor (2017) as well as Section 6).

We can distinguish between an objective versus subjective or subject-level salience. A fact T can be objectively salient to subject S given a moral requirement that holds for S. For example, that a child before S is drowning imposes a moral demand that S try to save the child, which in turn enjoins appropriate attention. Such objective requirements do not guarantee attention, for one might not notice the child due to inattentional blindness (Mack and Rock 1998), say if S has headphones on and is otherwise visually distracted. The objective salience of T only requires that S have a capacity to attend in that context. I set aside objective salience until Section 5, but one should take care to disambiguate claims about salience as objective versus as subjective in unqualified invocations of “salience”.

There is also subject-level salience that entails a psychological relation between subject and a target. We can divide between those approaches that take salience to have a determinate phenomenal upshot, phenomenal salience (Watzl 2017; Archer 2022b), and those which are
noncommittal about specific phenomenology (Wu 2011b). We can also identify a purely functional conception. Within each position, there is a division between salience as entailing the subject’s attending or only as entailing a capacity to or draw on attention. Accordingly, subject-level salience involves either attentional access, namely attention deployed, or attentional accessibility, a disposition or readiness to attend. Objective salience requires only accessibility (cf. claims that normative reasons do not entail motivating reasons).

Empirical accounts of salience highlight stimuli that “grab” attention such as a loud bang or bright flash. This suggests

If $X$ is salient to $S$, then $S$ attends to $X$

Where the target captures attention, attention being so grabbed is, as defined, automatic. Yet we can make a target salient by intentionally directing attention to it, say in conversation or other joint activities. Were subjects to fail to attend, we would have failed to make the target salient (cf. Archer p. 115; and Watzl p. 135-7 who treat salience as passive). This suggests:

If $S$ attends to $X$, then $X$ is salient to $S$.

Colloquially, if you pay or direct attention to $X$, you make it salient to you. These familiar phenomena suggest an initial analysis as working hypothesis:

$X$ is salient to $S$ iff $S$ attends to $X$
Subject-level salience entails attention. Note that attention to X can be automatic, say X is a loud bang, or controlled, say X is what is highlighted during a discussion. So,

1. X is salient to S iff S attends to X in a controlled or automatic way.

Folding in bias as in Figure 5:

2. X is salient to S iff S is biased to X in solving the Selection Problem.

If we treat salience as relative, then we might define a background set B of other objects such that

3. X is salient to S relative to the members of B iff S is biased to X rather than members of B in solving the Selection Problem.

Some deny the initial analysis, but why? Consider phenomenal salience as discussed in (Wu 2011b). After arguing that there is no unique perceptual representational content associated with phenomenal salience (for related arguments, see (Watzl 2019; Lerman 2022); cf. Stazicker (2011)), I became skeptical that phenomenal salience has a uniform phenomenal character. It seemed to me that where a stimulus was phenomenally salient to me, this was because I was attending to it such that my thoughts and responses where anchored to the attended object. That anchoring explains its salience to me. Accordingly, I proposed that a target is salient because it is the focal point of the agent’s actions which on my view entails that the subject is attending to X. Phenomenal salience can have varied phenomenal upshots, as diverse as the phenomenology of the various actions anchored on the target of attention.

Sebastian Watzl (2017) presents a different account of phenomenal salience (or priority) based on his priority structure view of attention. Attention on this account alters the priority ordering of the subject’s mental states and correlativey, the organization of the conscious field. Structurally, the item at the top of the phenomenal priority structure is phenomenally salient (or has priority). Further, Watzl’s picture allows, while mine does not, that phenomenal salience can be disconnected from the actual deployment of attention.

Watzl agrees that when something is salient, it yields attention. Salience involves an imperatival command for the subject to prioritize a target, namely to set it at the top of a priority structure. He disagrees, however, with the other direction of the initial analysis, that attention yields salience. He notes that a salient target draws attention, but a target of attention need not. Is this restriction required? As noted, we can generate conversational salience by directing attention. David Lewis (1996) captured a similar idea in his “Rule of Attention” where “if in this context we are...attending to [something], then for us now it is a relevant alternative” (559). Here, relevance might entail salience for the interlocutors. Finally, there seem to be things that repulse attention, say one’s parent drunkenly heating up the dance floor, where to look is painful yet also to render salient by drawing the attention of others (don’t look...yet some of us will be unable to look away). These points are not to beg but
raise questions, noting cases where many treat attention as generating salience where there is no draw.

Sophie Archer notes that “for something to be salient to you is for it to ‘stand out’ to you, to be ‘prominent’ or in the ‘foreground’ of your experience or thought (Archer 2022b, 114). The subject need not yet be attending to the target, for the phenomenology is the draw. I suspect many will find this intuitive, yet a position that characterizes salience phenomenally and allows that attention need not be deployed commits itself to phenomenal overflow, the possibility of phenomenology beyond attention and access. Overflow is largely empirically rejected. Drawing on phenomena such as inattentual blindness, the attentional blink or hemispatial neglect, most scientists conclude that without attention, there is no phenomenal consciousness. Rather, attention gates consciousness, the gatekeeping view. Accordingly, without attention to X, one is blind to X. X cannot be phenomenal in any sense, and a fortiori, phenomenally salient.²

Does introspection reveal phenomenal salience? Yes, but I doubt that introspection can adjudicate whether such phenomenology is independent of attention since introspection relies on attention so introduces a confound of access. What introspection reveals might be a complicated product of the introspective act itself as opposed to a unique qualitative feature of salience that we simply attend to. On balance, an endorsement of phenomenal salience as independent of attention is more contentious than a view that anchors it to attention’s deployment. I suggest that the least contentious starting place is to tie phenomenal salience to the deployment of attention. This is not to endorse gatekeeping, but to recognize that salience and attention are correlated.

What of a functional accessibility conception of salience as tied only to a propensity to attend. Sophie Archer notes three illustrative cases where salience functions in normative assessments:

1. Listening to a speech of a politician you support, you affirm the politician’s conclusions but fail to notice a non sequitur in their argument.
2. Your blind date is stunningly gorgeous, yet so entranced are you by their physical beauty that you fail to notice their self-centeredness.
3. Discussing with your boss your salary and position, you fail to notice her terrible mood, yet persist with the discussion focused on you.

Given that you can be held responsible for what you notice or fail to, Archer emphasizes that judgments about responsibility can be based on what one did or did not find salient (see also Cat Saint-Croix (forthcoming) on attention and doxastic wronging). On the initial analysis, the judgments are based on what one did or did not attend to.

One should have noticed the non sequitur, one should not have been dazzled by beauty but recognized rudeness and self-centeredness, and one should be attuned to the boss’s mood. Archer comments, “You are not being held responsible for what you attend to exactly, but for

² These issues remain fraught. For a polemical overview, see Cohen and Dennett (2011). For a defense of overflow, see (Block 2007; Lamme 2010). For arguments that the evidence is neutral between the two positions, see (Wu 2017a)). On intricacies in formulating the gatekeeping view clearly, see Wu (2014, chap. 5) for discussion.
what is and is not salient to you in the first place” (pp. 113-4). Yet one can also be held responsible for inappropriate attention, and on the initial analysis, this explains the aptness of invoking salience in blame. Since Archer disconnects salience from attention, a different explanation is required. She holds that responsibility for salience requires evaluative control (Hieronymi 2009). Archer’s sophisticated constitution view of salience holds that a target is salient to a subject when the subject’s occurrent evaluation constitutes that target being salient. This involves “standing evaluations about what matters in general.” Specifically “what is salient to you in a situation can only be understood in terms of the meeting of your previously underdetermined evaluative worldview with the particularities of that specific situation” (124-5).

This epigenetic view deserves further examination. We can capture valuation as one of the historical biases on attention (Figure 5). I note only a challenge that Archer raises for herself when reflecting on salience in attentional capture or that associated with mental disorders such as obsessive compulsive disorder (see Levy (2018) and Ratcliffe and Broome (2022)). In such cases, a target is salient despite the subject having no evaluative attitude toward it or indeed, where the subject devalues the target. Archer entertains the claim that these are not “properly speaking, salient to you” (126). One might wish, however, to avoid revisionism about basic cases. The initial analysis captures basic cases as salient.

I suggest that where responsibility is tied to salience, it is tied to attention. Richard Yetter Chappell and Helen Yetter-Chappell, however, construe salience in terms of a draw on an agent’s disposition to attend to what is said to be salient (450). Salience is “attention grabbing” without entailing that attention is deployed. They consider why a failure to save a child drowning before you is more monstrous than failing to give to a charity that provides food to those starving far away when the cases are relevantly similar if intervention in either would make a life-saving difference. The salience of the nearby event is morally consequential.

Setting aside how to explain the moral difference by appeal to salience, what does a draw on attention come to? Some appeal to the computational theory of salience tied to a saliency map, a construct that explains the automatic orientation of visual attention to locations (Yetter Chappell and Yetter-Chappell 2016). On these accounts, the visual system processes visible features in separate feature maps which are integrated into a spatial saliency map that assigns to each represented location a salience value (Itti and Koch 2001). Overt visual attention, embodied in eye movements, is directed to the location of highest magnitude in the saliency map and the map biases spatial attention to yield automatic attention to a location. Denis Buehler (2022) explains the draw on attention through alterations to a priority map, a construct related to but broader than a saliency map in that it integrates more than basic perceptual features including many of the factors noted in Figure 5 (Bisley and Mirpour 2019; Todd and Manaligod 2018; Fecteau and Munoz 2006).

These maps, however, cannot on their own explain subject-level salience. What is subjectively salient are features, objects, and facts, yet salience/priority in salience/priority maps is tied to locations. These maps are feature and object silent. Information about what features and objects are at the salient/prioritized location is lost in constructing the maps so cannot be recovered from them. Accordingly, the subject-level salience of non-spatial targets will have to draw on other sources even if salience/priority maps are part of the story. As of yet, this explanatory lacuna has not been filled.
One concern is that “salience/priority” as fixed by the maps will drop away in the final explication of the biological basis of subject-level salience/priority since the emphasis on what subjects find subjectively salient will have to be reintroduced at another stage. The concept of a bias, however, can explain the priority of features, objects and facts by instantiating the setting of attention by biases such as those diagramed in Figure 5 (cf. the priority map in Todd and Manligod, op. cit.). Returning to divisive normalization in Figure 4, the output response embodies a (task-relevant) shift in priority based on a bias whose source is the subject’s intention. Thus, the functional accessibility account of subject-level salience can appeal to a bias to explain the “draw” on attention, a draw reflected in the relevant shift in neural response to the requisite targets, be these space, feature, object and so on. This leaves open an empirical account of subjective salience in terms of functional accessibility. In the next section, however, I suggest that the phenomenon at issue is not salience but vigilance, a form of attunement.

4. Vigilance and Attunement

The causal profile of functional accessibility salience fits with that of another attentional phenomenon, vigilance. Broadly, vigilance is a propensity to attend to a target not yet present. Sentinels provide a paradigm case. A sentry is vigilant for an enemy not yet arrived. There is nothing yet to attend to, nothing that engages a disposition to focus on an enemy. When the enemy appears, vigilance is transformed to attention...hopefully. Yet despite vigilance, failure is possible. If the sentry not notice the arriving enemy, we judge that the sentry should have noticed yet failed despite being vigilant. No sentry is perfect. Still, another sentry standing with the first, with the same intention and perceptual abilities, might notice the enemy. Both sentries are similarly vigilant, the enemy is objectively salient to both, yet subjectively salient to only one. The proposal is that subjective salience entails attention; vigilance only a readiness to do so.

Here’s a first pass characterization of vigilance:

Where $S$ has not yet perceptually attended to $T$, for $S$ to be vigilant for $T$ is for $S$ to be biased to perceptually attend to $T$.

This identifies a profile similar to accessibility conceptions of subjective salience. In (Wu 2014), I adduced the example of the gazelle at a watering hole being vigilant for predators. The gazelle scans the horizon between sips of water. Its visual search does not (yet) involve attention to the lion which might not be present or noticed. Visual search lands on other targets until the threat is found, if ever. My proposal was that vigilance for a lion supervenes on a pattern of intentional visual search for a lion.

I no longer think that this is the correct analysis of vigilance in the basic sense (see Wu (2023) Chapter 3 for a detailed discussion). Rather, in being vigilant, one is in an active state like the sentry. Active attention is not necessary for vigilance. For the experienced marine guard waiting for the U.S. President to enter the hall through a closed door, it is enough to be biased toward the sound of the door without actively attending to it. A familiar click induces the appropriate behavior, for the guard has learned to respond to, be biased toward, appropriate, objectively salient stimuli (cf. a less experienced guard who must actively listen for the click).
This biased propensity is more than a disposition to attend for such dispositions do not entail vigilance. They are merely necessary conditions for it.

The biological notion of bias begins explicating the relevant activity. Working memory provides one source. There is too much relevant empirical work to unpack (see (Wu Forthcoming, chap. 3) for more details), but here are the basic ideas in the visual case. First, the central function of working memory is to maintain memoranda ready to guide behavior. Second, traditionally, the neural substrates of memory maintenance of visual memoranda were assumed to be outside of visual cortex, but recent work decoding neural information during maintenance has extracted memoranda from visual areas, even as early as primary visual cortex. Third, this has led to a sensory recruitment theory of visual working memory storage (D’Esposito and Postle 2015), effectively the thesis that the same substrates used when seeing a stimulus are also used to encode and retain that stimulus. This selective activity of visual representational capacities in the absence of stimuli is an active mnemonic orientation to a target not yet seen and readies the agent to respond efficiently when the target appears. It is memory “ready for work”. Research on working memory reveals the biological basis for active propensities for visual attention short of visually attending.³

Figure 5 identifies myriad biases that can induce an active attentional orientation, redrawn in Figure 6.

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³ The activation of perceptual capacities for stimuli does not constitute perceptual attention since no perceptible target is present. Rather, such activation is part of maintaining an action plan trained on a specific target type or token. The activation of said capacities is a type of mnemonic attention as part of intending to act. The question then is how steadfast intention remains over time, how long can one sustain it. This connects vigilance to vigilance decrements as studied by Norman Mackworth (1948).
Vigilance in humans is often tied to an intention. Intentions need not be necessary for vigilance as the gazelle illustrates. It is habitually vigilant for predators. Further, vigilance is one form of a family of attentional orientations, *attunements*, that are more than dispositions to attend though one might also characterize such dispositions as among the set of subject level attunements. Some attunements are automatic, namely vigilance that is not explicitly tied to intention but is relevant to an agent’s intended action such as the influence of the agent’s *evaluations* (Anderson 2019; 2015). Other attunements are tied to expectation or knowledge, as in inattentional blindness paradigms where subjects, once learning of the critical stimulus (e.g. the gorilla), readily detect future presentations of it. Finally, there are certain ways of being attuned that are *structural*, set up in advance by learning and experience, and triggered in the right or wrong way (e.g. triggers in PTSD or addiction). Here, the sensory system is wired to be attuned by past experience, a weighting on connections between stimuli and response types.

Return to the accessibility conception of the salience of X where X is salient if it pulls but stops short of engaging attention by the subject. The pull must be more than a disposition to attend, else everything perceptible in the perceptual field is salient. Rather, if X is salient in this pulling sense, this must have a subject-level parallel in attunement, say in vigilance. In order to place salience and vigilance (attunement) together in a single psychological theory, I suggest accepting the initial analysis of (access) salience, and drop talk of salience in the accessibility sense in favor of vigilance for X and, more broadly, attunement to X. This integrates distinct phenomena into a single framework.

Samuel Murray (2017) has discussed vigilance, suggesting the following characterization:

The vigilance of an agent consists of a disposition to become occurrently aware of morally or prudentially relevant considerations that constitute a sufficient reason to act or omit. The exercise of this disposition constitutes the agent’s attunement to moral or prudential reasons to act. When those reasons constitute an obligation to act or omit, failures to act or omit are culpable. That is, vigilance enables an agent to increase or intensify one’s sensitivity to available moral reasons (513-4).

We need more than a disposition, since not everyone is vigilant for moral considerations even if they could be. Vigilance as discussed here has a broad array of targets, so Murray’s description is focused on *moral* vigilance (cf. section 5 on sensitivity to rich normative data). Murray and Manuel Vargas (2018) have applied this conception of vigilance to discuss moral responsibility in cases of omission and the concept productively engages with epistemic justice exemplified in one’s being sufficiently vigilant for epistemic agents such that one is more likely to accord to

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4 “Attunement” does not mean attention (cf. (Wu 2011a; Gardiner 2022)) Rather attunement is *tuning*, setting up for harmonious engagement with the environment, a readiness to attend to a target. When this attunement is engaged, attention arises.

5 Consider *static changes* in how representational capacities are *weighted* that increase the probability of their actualization. I previous construed intention as a structuring cause of attention/action (Wu (2008); cf. connectionist models such as Cohen et al.’s (1990) model of the Stroop Task). Arguably, weighting is associated with future-directed intentions, what psychologists call *prospective memory* (McDaniel and Einstein 2007).
them their due attention (Smith and Archer 2020). Similar issues arise regarding sensitivity to and gathering of evidence (Wu 2017b, sec. 5; Flores and Woodward, n.d.).

An interesting question concerns when vigilance fails. As noted, the targeted object might be visually present and yet the vigilant subject fails to notice. Since failed vigilance can lead to failed expression of attention, in certain cases, we might invoke dispositional *masking*. If my capacity for attention to X is masked, then I become inattentual unaware of X. Abrol Fairweather and Carlos Montemayor discuss the idea of a *culpable* mask, say

when a person lets something unimportant “get to them” and this prevents their abilities from successfully manifesting in the task at hand. Jealously, random memories, and distracting glimpses in our visual field can affect us in this way [cf. Archer’s case of the gorgeous blind date] 1/17/23 10:42:00 AM.

There are also nonculpable masks, say someone suffering from obsessive compulsive disorder or similar conditions who cannot help but deploy attention in unhealthy ways, thereby masking the deployment of healthy attention (Levy (2018)). Note two different sources of culpable masking. Jealousy can be understood as a bias that shifts what attunements are engaged in a context so that others that ought to be engaged are culpably masked (cf. Rosalind Hursthouse’s (1991) discussion of arational actions). On the other hand, random memories or distracting glimpses involve the deployment of automatic attention, necessitating the masking of attentional capacity for other things (cf. mind wandering (Irving and Glasser 2019)). These are not the only sources of masking. Indeed, we typically hold multiple intentions, and one intention might interfere with the action of another (cf. intention induced attentional capture, (Olivers et al. 2011)). Masking is correlated with inattentional insensitivity and unawareness.

Bias on attention systematizes discussion of attentional phenomena such as salience and vigilance. If vigilance for T does not imply attention to T, then the bias that induces vigilance must be the result of modulation on the input psychological capacities that serve as the basis of attention, a way of rendering those inputs in some sense active. Accordingly, our sentry, if vigilant, is ready to attend and more likely to do so. When she finally attends to the enemy, she makes the objectively salient become subjectively salient. Given the sculpting of the agent’s attentional dispositions through biases acquired in training, we can generalize by striking an Aristotelian note by turning to the idea of *attentional character*.

5. Patterns of Attention, Attentional Character and What is Learned

An open area of investigation concerns the broad swathe of automatic biases as major determinants of human behavior, especially learned behavior, whether through explicit practice or implicit influence (Figure 5). How we attend and consequently act is a complicated product of the agent’s state of mind, the current context and what we can call her *attentional character*. A subject’s attentional character involves the set of the subject’s attunements at a specified time including dispositions but more relevantly the active orientations driven by bias of which vigilance is an exemplar. This character is the determinant on how attention is deployed in a given context (or perhaps, a function from contexts to attention).
Ella Whiteley (2022) brings out issues related to attentional character when considering Terry who, when he interacts with women,

often notices and remembers a woman’s figure or chest more than their face and voice, finding these attributes most accessible in his mind when he later reflects on what they were like. [He] still notices and remembers other aspects of the women he meets; he does notice and remember their conversational contributions and personality quirks. They are simply less prominent in his mind than these other features.

Whiteley emphasizes memory, so cognitive attention (cf. a conference organizer recalling possible speakers and the skew in the list they arrive at as well as the correlated mnemonic inattentional unawareness of the unrecalled). Yet Terry’s skewed memory might be established by skewed gaze, his wandering eye. One can argue that the pattern of attention is harmful though as Whiteley points out, a doctor doing a physical exam might have similar patterns of attention to the woman as part of proper medical practice. Georgi Gardiner suggests that “when assessing a person’s attention, the locus of evaluation is often attentional patterns and habits, not instances” (Gardiner (2022) p. 50; also Siegel (2017, chap. 9) on assessing patterns of attention or, as she puts it, selection effects).

Notably, Terry might be unaware of his automatically wandering eye and indeed, his explicit attitude is that such wandering is offensive. He would be horrified to learn that his eye roves in this way. Accordingly, Terry’s automatic bias can be characterized as an implicit bias, a bias which the agent is unaware of having and which he explicitly characterizes as harmful. Other automatic biases that have potentially harmful effects are the biased distribution of gaze during conversations and other social encounters, say men who direct attention to other men rather than present women conversants (see (Wu Forthcoming, chap. 5); see also Austin Baker XX and section 6). Again, agents can explicitly criticize such biases while being unaware of their own exemplification of them in attention.

For Whiteley, such patterns of attention arise from a cognitive salience perspective drawing on Elisabeth Camp’s (2017) notion of a perspective as “an open-ended disposition to interpret whatever one encounters within the perspective’s target domain, by noticing, connecting, and responding to information in an intuitive way that is partly but not entirely under one’s voluntary control” (Camp Forthcoming). On Whiteley’s view, patterns of attention reflect the way a specific salience perspective structures how properties are foregrounded and back-grounded in our attention by giving some relative salience over others” (194. Whiteley’s emphasis).

We can invoke bias as a central explanatory construct in salience perspectives. Specifically, part of that perspective is the subject’s various attunements that constitute their attentional character. Terry might intend to leer, so his objectifying gaze is controlled and explicit. This contrasts with the doctor who, ex hypothesi, exhibits the same visual attentional pattern in intending to do in a physical exam. Then again, Terry might disavow ogling behavior, so have no corresponding intention, yet his eyes wander. Here, visual attention is automatic, an implicit bias.

Our attunements involve biases on attention due to different kinds of learning. Attentional character can be shaped thoughtlessly through engagement with environmental
structures that affects the flow of information including how we pick up the natural and social statistics of the world. These statistics are acquired automatically (implicitly). Jessie Munton (Munton n.d.) has described salience structures, including information that the subject has in mind as well as that not yet obtained. The informational structure is organized by accessibility relations which identify what can be more or less easily attended. The accessibility of information outside the mind can have a strong impact on the development of vigilance and attunement and changes to informational structure are provide important avenues to shift agentive bias (see also Elisabeth Camp and Carolina Flores on frames (Forthcoming)). Munton argues that salience structures can constitute a form of prejudice.

Shaping of attunement can also be thoughtful in that one’s agency or that of others influence the availability and flow of information. Here, attunement is tied to training, skill and expertise, bringing along associated norms. Good training from a wise teacher leads to appropriate attunement relative to the norms of a practice while bad training leads to amateurism, mediocrity, and even vice. Any discipline that has norms for excellence will require proper training that, in part, shapes appropriate attentional character.

In the ethical domain, expertise and skill engages an Aristotelian ideal in the practically wise person (phronimos) who on certain views (e.g. McDowell (1980)) is distinctive in that they see matters aright—indeed, not just awareness but appropriate attention. They attend aright. Further, in attending, they withdraw from “distractors”, silencing them, a virtuous masking of the normatively irrelevant. Inattentional blindness can be a virtue, a blocking of distraction, (Wu Forthcoming Chp. 3), and Fairweather and Montemayor (2017) have discussed virtuous insensitivity in epistemic agency. The ability to silence and the sharpening of attunement and attention are two sides of the same coin of character. Blindness and silencing can be tied to vice as in epistemic attention deficits that constitute sources of epistemic injustice in denying subjects their due attention (Smith and Archer 2020), see queue moderation, Section 6).

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6 It is interesting in thinking about attentional character to consider McClelland and Sliwa’s (XX) recent explanation of the unequal distribution of domestic labor among different-sex couples. They account for this in terms of differences in the perception of affordances. An affordance that an object presents to a subject is the object’s being “actionable” in a certain way. So, a tennis ball bouncing towards a subject affords being caught, if the subject does not have a racket, but also affords being hit by a forehand, if the subject holds a racket. In the case of domestic labor, items around the house can afford various actions: spills and crumbs afford wiping up, full trash cans afford emptying, dirty floors afford mopping and so on. McClelland and Sliwa posit that the unequal distribution of domestic labor among men and women is due to a difference in perceptual sensitivity to such affordances, either a propensity to perceive the affordance or a propensity to be moved by them. Women are postulated to be more sensitive to affordances relative to their male partners. Consequently, they are postulated to be more likely to do the work. In contrast, male partners are correspondingly less likely to do chores and further, less likely to notice their partners doing them.

This proposed explanation is plausible once one affirms the perception of affordances. While, McClelland and Sliwa speak as well of attunement and sensitivity which suggest attention, they are clear that attention is merely one factor affecting sensitivity to affordance. A different view invokes attention and related phenomena as an alternative explanation largely in the spirit of McClelland and Sliwa’s perspective. First, we can speak of different levels of vigilance among couples, namely varying readiness to attend to targets of domestic action. A couple who walk into the kitchen facing the same direction with similar fields of view will notice different things that reflect their attunement and vigilance. A woman might notice the crumbs on the counter while the man notices the source, an open package of cookies. Further, this leads to different forms of attention, the woman thinking, “I should wipe that up” or perhaps her just wiping up the crumbs while the man might think, “Yum!”, or
Objective normative standards for excellence bring us back to objective salience. These standards identify features and facts that are objectively salient to practitioners, what they ought to attend to. Susanna Siegel discusses the importance principle as guiding journalistic practice in democracies to render topics as salient because they are important for the public to know (Siegel 2022, 239). Print newspapers satisfy this principle by placing appropriate stories on the front page. Digital papers organize content by the accessibility of items in the number of clicks (pages) separating them from what is immediately available. Journalistic practice puts items “forward as both demanding attention and deserving it” though this does not guarantee that the public pays attention. Siegel raises important questions about citizens’ capacities to meet the attentional requirements for good citizenship. We might restate this as a question about developing proper attentional character for democracy, a character that has arguably been declining. Engagement in democracy can be better or worse, and attention is central to this.

Objective salience teeters on being overly demanding. Sabina Lovibond (2022) considers Robert Adams’s suggestion that we are responsible for “data that are rich enough to permit a fairly adequate ethical appreciation” (Adams 1985, 25–26). Someone with the right attentional character should be appropriately attuned to such rich data. Lovibond suggests that this implies that

a person is guilty of involuntary wrong whenever they are presented with data rich enough to permit the recognition of certain values, and yet they fail—albeit through inattention, and therefore unconsciously—to register those values, and hence to respond adequately to the data (163)

An ambitious conception of the data is

all the information and all the insight that can be assumed to be available at a given time and place to a human being with the normal natural powers of such a being (subject to any necessary adjustments for age, physical or mental abnormality, and the like) (164).

This burdens mortal moral sentinels. With predictable failures of attention come “chronic moral fault”. Lovibond suggests that we reconceptualize normative requirements not as demanding “maintaining the required standard, but [of] progressing in the right direction...[to] a more adequate ‘perception of salience’” (167, Lovibond’s emphasis). This Aristotelian perspective is at home within a normative conception of skill.

That said, biology constrains normative demands. The demands of objective salience will always be filtered by cognitive and agentive limitations. That is our lived reality. Obligations just reach for some more cookies, creating more crumbs. The different propensities to attend and varied patterns of attention, due to different biases on attention, can explain the common differential distribution of labor in domestic actions without appeal to affordances as a substantive posit. Men and women often have different domestic attentional character.
must be sensitive to what agents can do. Notably, attention has always been characterized as capacity limited, and the Buridan case shows us that agency is also limited. We can neither attend to nor do everything. Even across time, attention, cognition and action would be limited by the limits of working memory (Cowan 2012). Chronic moral fault invokes an inapt cognitive standard suited to angels rather than mortals.

That said, we must be wary of too casually invoking what is under the biological hood in searching for excuses and exculpations. Certainly, genuine individual differences in working memory capacity that correlate with executive control show us that some are more capable of certain forms of attention than others, and normative demands might accordingly shift with the situation (cf. a teacher who modulates demands on her pupils in light of her knowledge of their abilities and limitations). We should not fixate on exculpation, however, for the biological details also show precisely what we are capable of such that normative expectations can be informed and enriched. Good attentional character is inculcated, the instilling of appropriate attunement, subject to cognitive capacity, context and norms.

6. Bias and Debiasing in Philosophical Practice

Let me end with a concrete example of a negative bias and attempts to debias or, as I prefer, to transform bias and character. This will draw on the framework set in Sections 1-5. Many departments have noticed undesirable biases during question and answer (Q&A) periods after talks, where opportunities to speak have been continuously accorded to a select few. Floor time is a limited epistemic resource, and appropriate allocation is a question of epistemic distributive justice. Specifically, there can be poor queue moderation after talks where, for example, faculty dominate the discussion, silencing students. In response, departments have instituted an explicit rule such as this: the first few questions go to graduate students. The rule, or related versions, attempt to redistribute epistemic resources equitably. Students are deemed objectively salient: one ought to attend to them.

Q&A moderation involves a form of visual search, one of the most well-studied attentional behaviors (see Jeremy Wolfe (2020); cf. Ruth Rosenholtz et al. (2012) for a different perspective). A moderator must look out to the audience and search for those with hands raised. There is also the construction of the queue, a cognitive task, which can be complicated. To simplify, I focus on a common procedure of building the order of the queue in light of the order of who is seen first. We all know how to game such queues: sit in the front row. Assume that all moderators begin with the same intention, to take down the names of people who wish to ask questions. As none have an explicit bias to pick only famous or senior male faculty first, the skew in resulting queues due to biased search is automatic, as defined (Section 2). The rule to prioritize graduate students yields a compensatory bias. As this rule is intentionally implemented, the resulting skew prioritizing students is controlled, as defined. As an intentional debiasing bias, the application of the rule can be understood concretely in a biologically plausible way as setting attention in visual search through intention (cf. the model of top-down modulation in divisive normalization in Section 1).

At one level, the rule works well. If a student raises their hand, they will likely be called on. Yet this implementation might in the end be a poor one, or at least not the best one. Consider the common performative act of announcing the rule. Making salient the group and
the time period might *discourage* participation. Further, there are many stakeholders and limited resources. How do we find the right distribution? We need an open discussion about what rules might do better, with sensitivity to types of stakeholders and specific situations. The same issues arise with respect to distribution of other limited resources: speaking slots at conferences, spaces for articles in journals, placement in graduate school and academic jobs, etc.

Let us not forget, however, the source of the problem: the moderator. The rules were implemented in response to various automatic biases found in many of us who are faculty. These biases structure an undesirable aspect of attentional character which does not change just because on the occasions when we moderate a queue, we intentionally apply a rule. This is like learning musicianship by practicing an instrument occasionally even with good intentions. The role of a good rule is not just to produce the right distribution of attention that yields a desirable queue, but just as importantly, to effect a change in the source of attention, the problematic attunement that led to negative biases. The role of the rule should also be to transform bias, both individually and in the community. Each moderation then is an opportunity not just to do things right, but in doing so to *exercise* attention that leads to the development of an ideal attunement, thereby tamping down problematic automatic biases by transforming them. The rule should be seen as implementing an intentional bias that, with practice, yields automatization that is part of being a skilled moderator, teacher and epistemic agent. Excellence requires attunement and vigilance that yields appropriate attention.

Since part of the problem in queue moderation began with biased visual search, let me give one more example of eye movement that tracks epistemic skill as an existence proof (or proof of concept) that debiasing/biasing works. Donovan and Litchfield examined the eye movements of individuals searching for anomalies in an X-Ray.

![Figure 8](image-url)
Note three stages in learning: (1) the beginning novice, (2) the rule applying learners, and (3) the expert. What we see in Figure 7 is first a transformation of visual search (attention) driven initially by a bottom-up bias in (1), here what automatically “pops out” as visually salient in the saliency map, the healthy structure (see figure legend). Next, we have rule-based scanning in (2) where the students, at different levels in apprenticeship, intentionally apply a rule to scan the image systematically. Finally, in (3) we have the actualization of vigilance in the expert in the automatic pull of the (objectively) salient anomaly. Different biases are operative during training, and practice transforms bias, instilling proper attunement that engenders attentional excellence. These changes, however, require sustained, intentional practice, the methodical transformation of attentional biases. Many queue moderators are stuck in moment (2).

Queue moderation is not as synchronically impactful as searching for tumors, but it has substantial diachronic impact on members of a community (see Wu (2011b) on synchronic and diachronic salience). These cases fundamentally involve the deployment of attention, whether in perception or thought. The Aristotelian tradition, in one of its guises, helps us see that attending to a matter aright is central to skillful performance and that skillful performance requires setting character, including attentional character, as reflected in our attunement, vigilance, and salience in attention. There is much work, theoretical and practical, to be done.\(^7\)

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